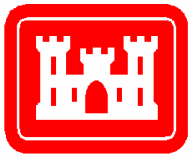
Quality Assurance Project Plan/Work Plan

Environmental Long-Term Monitoring and Inspection
Former U.S. Disciplinary Barracks (USDB)
Lompoc, California

Prepared for:



Department of the Army
U.S. Army Corps of Engineers, Los Angeles
915 Wilshire Blvd, Suite 930
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Prepared by:

Ahtna

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USACE Contract No.	W912PL-18-D-0044
Delivery Order	W912PL-21-F-0041
Version	Final
Date	November 2021

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Acronyms and Abbreviations

µg/L	Micrograms per liter
Ahtna	Ahtna Global, LLC
Army	U.S. Department of the Army
BCT	BRAC Clean-up Team
BFB	4-Bromofluorobenzene
bgs	Below ground surface
BOP	Bureau of Prisons
BRAC	Base Realignment and Closure
CCB	Continuing Calibration Blank
CCRWQCB	Central Coast Regional Water Quality Control Board
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of concern
COR	Contracting Officer's Representative
DL	Detection limit
DoD	Department of Defense
DQI	Data quality indicators
DQO	Data Quality Objective
EB	Equipment blank
EDD	Electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
ERD	Enhanced Reductive Dechlorination
FAL	Former Army Landfill
FB	Field blanks
FCC	Federal Correctional Complex
FCI	Federal Correctional Institution
FD	Field duplicates
ft amsl	Feet above mean sea level
ft btoc	Feet below top of casing
GC	Gas chromatography
GIS	Geographic Information System
ICAL	Initial calibration
ICS	Interference Check Solutions
ICV	Initial Calibration Verification
IDW	Investigation derived waste

Acronyms and Abbreviations (continued)

KO	Contracting Officer
LCS	Laboratory control sample
LOD	Limit of detection
LOQ	Limit of quantitation
MB	Method Blank
MCL	Maximum Contaminant Level
MD	Matrix duplicate
MMP	Mitigation Monitoring Plan
MPC	Measurement performance criteria
MS	Matrix spike
MSD	Matrix spike duplicate
ND	Non-detect
OSHA	Occupational Safety & Health Administration
PARCCS	Precision, accuracy, representativeness, comparability, completeness, and sensitivity
PCE	Tetrachloroethene
PDB	Passive diffusion bags
PDS	Post-Digestion Spike
POC	Point of contact
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	DoD Quality Systems Manual
RF	Relative frequency
RPD	Relative percent difference
RRT	Relative Retention Time
RSD	Relative standard deviation
RT	Retention Time
SOP	Standard operating procedure
TB	Trip blank
TCE	Trichloroethene
TCRA	Time-critical removal action
UNICOR	UNICOR Federal Prison Industries
USACE	U.S. Army Corps of Engineers
USDB	U.S. Disciplinary Barracks
USP	United States Penitentiary
USEPA	U.S. Environmental Protection Agency

VOC	Volatile organic compound

Worksheet 01/02—Title and Approval Page

Title Page

Project Name	Environmental Long-Term Monitoring and Inspection
Facility Name	Former U.S. Disciplinary Barracks (USDB)
Operable Unit(s)	Washrack Site (LOMO-17), Wood Dump and Former Army Landfill
Site Location	Lompoc, California
USACE Contract No.	W912PL-18-D-0044
Delivery Order	W912PL-21-F-0041
Contractor Name	Ahtna Global, LLC

Lead Organization

JAMES.BRUCE.RUSSELL.1171620135 Digitally signed by JAMES.BRUCE.RUSSELL.1171620135 Date: 2021.11.08 16:52:58 -08'00'

Bruce James
USACE Project Manager

8 Nov 2021
Date

Introduction

Ahtna Global, LLC (Ahtna) has prepared this Quality Assurance Project Plan (QAPP)/Monitoring and Inspection Work Plan (Work Plan) for environmental long-term monitoring at the Former U.S. Disciplinary Barracks (USDB) located in Lompoc, California. The QAPP/Work Plan has been prepared at the direction of the U.S. Army Corps of Engineers (USACE) under Contract No. W912PL-18-D-0044, Delivery Order W912PL-21-F-0041. The purpose of this QAPP/Work Plan is to provide the project specifications for the groundwater monitoring program at the Washrack Site (LOMO-17) and monitoring and inspection activities at the Wood Dump Site and Former Army Landfill (FAL).

Previous QAPPs

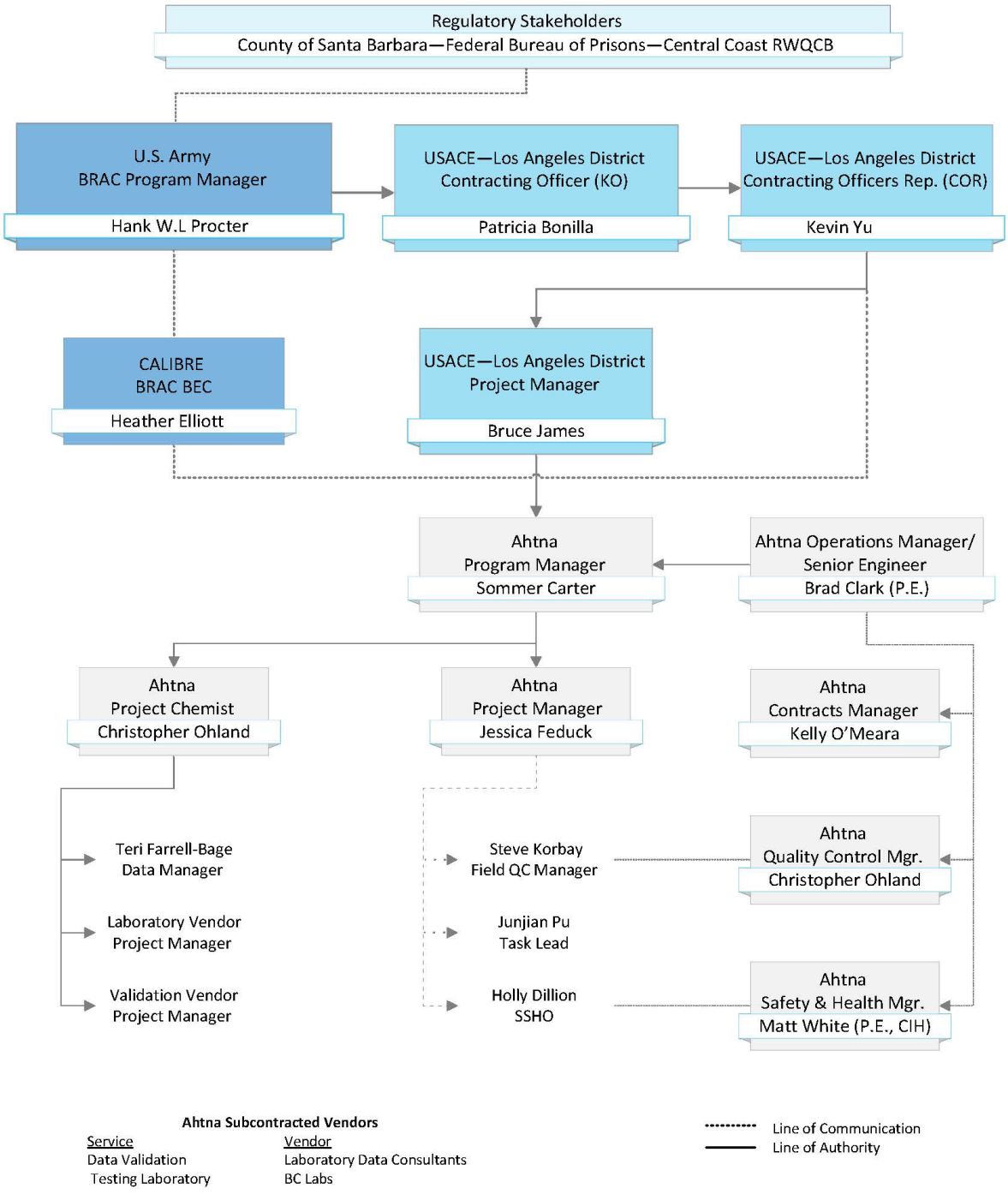
Title	Date
Final Quality Assurance Project Plan, Former United States Disciplinary Barracks	October 17, 2002
Final Quality Assurance Project Plan, Former United States Disciplinary Barracks (Amendment)	March 25, 2003
Final Quality Assurance Project Plan, Former United States Disciplinary Barracks (Change Memorandum)	July 31, 2003

Current QAPP

Item	Description
Preparer's Names	Jessica Feduck
Organizational Affiliation	Ahtna Global, LLC
Preparer's Address Telephone Number E-mail Address	9699 Blue Larkspur Lane, Suite 203, Monterey, California 93940 (925) 330-5479 jfeduck@ahtna.net
Preparation Date	July 23, 2021
Identify Regulatory Program(s)	Groundwater investigation and cleanup activities at the Former USDB have been performed under Base Realignment and Closure (BRAC) Program environmental restoration guidelines. Clean up activities were performed voluntarily under the oversight of the BRAC Clean-up Team (BCT). The BRAC Program requires compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan. Cleanup goals are the California Maximum Contaminant Levels (MCLs). The lead agency is the Central Coast Regional Water Quality Control Board (CCRWQCB).
Identify Approval Entity	U.S. Army Corps of Engineers (USACE)
Stakeholders/Data Users	U.S. Department of the Army (Army), USACE, BRAC, U.S. Department of Justice Federal Bureau of Prison (BOP), U.S. Federal Penitentiary Lompoc, County of Santa Barbara, CCRWQCB, USACE/BRAC contractors, property owners, occupants and managers, and the public.
Guidance used to prepare QAPP	Uniform Federal Policy for Quality Assurance Project Plans, Optimized UFP-QAPP Worksheets. March (USEPA, 2012). Department of Defense (DoD), 2019, Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3 (DOD, 2019)
The QAPP is Project-Specific or Generic (select one)	Project-Specific
Project Kick-off Meeting	July 16, 2021

Worksheet 03/05—Project Organization and QAPP Distribution

Project Organization



QAPP Distribution

QAPP Recipients	Title	Organization	Telephone Number	e-mail address
Kevin Yu	Contracting Officer's Representative	USACE	(626) 401-4087	kevin.yu@usace.army.mil
Bruce James	Project Manager	USACE	(213) 452-3988	bruce.r.james@usace.army.mil
Hank W.L. Procter	Program Manager	BRAC	(703) 545-2498 (O) (703) 830-5213 (C)	webster.w.procter.civ@mail.mil
Heather Elliott	BRAC BEC	CALIBRE	(256) 217-1678	heather.elliott@calibresys.com
Brad Clark	Operations Manager/Senior Engineer	Ahtna	(831) 264-3770	bclark@ahtna.net
Sommer Carter	Program Manager	Ahtna	(925) 357-0750	scarter@ahtna.net
Jessica Feduck	Project Manager	Ahtna	(925) 330-5479	jfeduck@ahtna.net
Christopher Ohland	Project Chemist	Ahtna	(925) 222-6593	cohland@ahtna.net
Bryan Little	Project Manager	CCRWQCB	(805) 549-3704	bryan.little@waterboards.ca.gov
Yosuke Yamada	Project Manager	Santa Barbara Public Health Department	(805) 346-7131	yosuke.yamada@sbcphd.org
Thomas Webber	Chief, Capacity and Construction Branch	Department of Justice, Federal Bureau of Prisons	(202) 514-6470	txwebber@bop.gov
Sheila Soderberg	Program Manager	CCRWQCB	(805) 549-3592	sheila.soderberg@waterboards.ca.gov
Norma Campos Bernal	Inspector	Santa Barbara County Environmental Health Services	(805) 681-4942	norma.camposbernal@sbcphd.org
Natalie Serda	Project Manager	BC labs	(661) 327-4911	natalie.serda@bclabs.com

QAPP Recipients	Title	Organization	Telephone Number	e-mail address
Pei Geng	Data Validator	Laboratory Data Consultants	(760) 827-1100	pgeng@lab-data.com

Worksheet 04/07/08—Personnel Qualifications and Sign-Off Sheet

Personnel Qualifications

Name	Title	Organization	Responsibilities	Experience/ Qualifications
Patricia Bonilla	Contracting Officer (KO)	USACE	Ensures performance of all necessary actions for effective contracting, ensures compliance with the terms of the contract, and safeguards the interests of the United States in its contractual relationships.	Resume in USACE project file
Kevin Yu	Contracting Officer's Representative (COR) Project Engineer	USACE	Provides administrative direction to Ahtna Contracts Manager. Administers the contract, reviews change orders, and approves Ahtna's work and invoices. Provides support to the technical execution of work, reviews, and approvals	Resume in USACE project file
Hank W.L. Procter	Program Manager	BRAC	Overall responsibility for all phases of work, review, and approval.	Resume in BRAC project file
Heather Elliott	BRAC- BEC	CALIBRE	Overall responsibility for technical execution of work, reviews, and approvals.	Resume in BRAC project file
Bruce James	Project Manager	USACE	Provides support for all phases of work, review and approval.	Resume in USACE project file
Brad Clark	Operations Manager/Senior Engineer	Ahtna	Provides senior engineering expertise and input on project decisions. Coordinates with Program Manager to allocate resources for successful completion of project deliverables.	Resume in Ahtna project file
Sommer Carter	Program Manager	Ahtna	Principal point of contact (POC) for the USACE Contracting Officer and Project Officer; selects the program Quality Assurance (QA) Manager; reviews budget, schedule, and performance reports; reviews corrective actions and lessons	Resume in Ahtna project file

Name	Title	Organization	Responsibilities	Experience/ Qualifications
			learned to assess the effectiveness of resolutions; allocates resources for project delivery and quality management.	
Jessica Feduck	Project Manager	Ahtna	Manages project fieldwork, data, and document preparation. Coordinates, directs, participates in, and reports site activities; ensures adherence to the QAPP; communicates issues to Program Manager and field team; contractor oversight.	Resume in Ahtna project file
Kelly O'Meara	Business/Contracts Manager	Ahtna	Performs management of team contracts and subcontracts and provides technical support for management activities.	Resume in Ahtna project file
Christopher Ohland	Project Chemist/ Quality Control Manager	Ahtna	Provides senior chemistry expertise. Assists in QAPP preparation; coordinates laboratory subcontractors; performs oversight of laboratory and data validation; performs data evaluation. Overall responsibility for project quality, providing quality control (QC) review of delivery order documents in coordination with the Project Manager, and, in coordination with the Project Manager, implementation of corrective actions when deficiencies are identified.	Resume in Ahtna project file
Matthew White	Safety and Health Manager	Ahtna	Provides senior health and safety oversight for the program.	Resume in Ahtna project file
Holly Dillon	Site Safety and Health Officer	Ahtna	Oversees health and safety for all field activities. Conducts health and safety audits.	Resume in Ahtna project file
Teri Farrell-Bage	Data Manager	Ahtna	Manages sample tracking and maintains communication with the Ahtna Project Chemist.	Resume in Ahtna project file
Sara Guron	Laboratory QA Manager	BC Labs	Subcontracted laboratory QA Manager.	Resume in Ahtna project file
Natalie Serda	Laboratory Project Manager	BC Labs	Subcontractor laboratory Project Manager.	Resume in Ahtna project file

Name	Title	Organization	Responsibilities	Experience/ Qualifications
Pei Geng	Data Validator Project Manager	Laboratory Data Consultants	Subcontractor Consultant Project Manager.	Resume in Ahtna project file

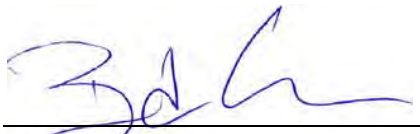
Special Training Requirements

Project Function	Specialized Training Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Fieldwork	Hazardous waste operations 40-hour training; 8-hour refresher	Registered training organization	Annually	All field staff	Field team staff	Ahtna Project File
Fieldwork	Occupational Safety & Health Administration (OSHA) Site Supervisor Training	Registered training organization	Before fieldwork	Field Team Leader	Field Team Leader	Ahtna Project File
Fieldwork	Cardiopulmonary resuscitation and first-aid	Registered training organization	Every 3 Years	All field staff	Field team staff	Ahtna Project File
Fieldwork	Site Safety & Health Officer	Registered training organization	Every 3 Years	Site Safety Health Officer	Safety & Health Manager from Ahtna	Ahtna Project File
Fieldwork	Overview of QAPP and APP	Ahtna	Before fieldwork	All field staff	Field team staff	Ahtna Project File
Quality	Construction Quality Management	Ahtna	Every 5 years	Site Manager and Field Quality Manager	Field personnel from Ahtna	Ahtna Quality Management Department
Health and Safety	Health and Safety Plan	Ahtna	Various	Field personnel and subcontracted project	All field personnel from Ahtna and	On-site health and safety folder

Project Function	Specialized Training Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
				personnel working in the field	subcontracted personnel	
Laboratory Analysis	State of California and DoD Environmental Laboratory Accreditation Program (ELAP) Accreditation	Vendor	Before sample analysis	Analytical laboratory	Laboratory QA Manager	Ahtna Project File

Approvals – Prime Contractor

Ahtna Global, LLC
2255 Contra Costa, Blvd., Suite 312
Pleasant Hill, CA 94523
Tel: (925) 222-6578

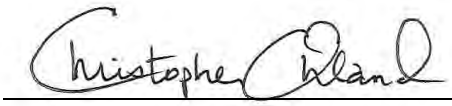


11/8/2021

Bradley Clark, P.E. C55425 Date
Operations Manager

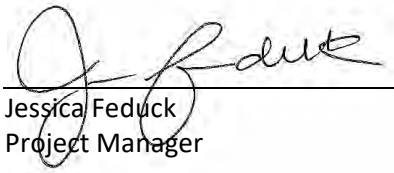
11/8/2021

Sommer Carter, PMP Date
Program Manager



11/8/2021

Christopher Ohland Date
Project Chemist



11/8/2021

Jessica Feduck Date
Project Manager

Approvals – Subcontract Laboratory

BC Laboratories, Inc.
4100 Atlas Court,
Bakersfield, CA 93308
(661) 327-4911

Natalie Serda
Project Manager

11/12/21
Date

Sara Guron
Quality Assurance Director

11/12/2021
Date

Worksheet 06—Communication Pathways

Communication Drivers	Responsible Entity	Name/Phone Number	Procedure
Communication with Ahtna contract manager	USACE Contracting Officer (KO)	Patricia Bonilla (213) 452-3255	Provides administrative direction to Ahtna contracts manager.
Communication with Ahtna contract manager on behalf of KO	USACE Contracting Officer's Representative	Kevin Yu	Provides administrative direction to Ahtna contracts manager on behalf of KO.
Communication with Ahtna program and project managers	BRAC BEC	Heather Elliott (256) 217-1678	Provides administrative direction to Ahtna Program Manager and technical direction to Project Manager and team, authorizes changes to planning, and can stop work, if needed, in coordination with USACE PM and COR Reviews and approve technical deliverables. Approves payment milestone schedule. Reviews status reports.
	USACE Project Manager	Bruce James (213) 452-3988	
Communication with Ahtna program and project managers	BRAC BEC	Heather Elliott ((256) 217-1678	Reviews technical deliverables and status reports to ensure compliance with contractual obligations.
	USACE COR/Project Engineer	Kevin Yu (626) 401-4087	
POC with USACE Project Manager	Ahtna Program Manager	Sommer Carter (925) 357-0750	All materials and information about the project will be forwarded to USACE Project Manager. Notifies USACE Project Manager of remedial-action-related problems by next business day. Serious issues will also be reported to Ahtna Operations Manager.
POC with Regulatory Stakeholders	BRAC BEC	Heather Elliott (256) 217-1678	Serves as a primary POC for the Site; communicates directly with regulatory stakeholders as needed.
Field staff discussion and inquiry	Ahtna Project Manager	Jessica Feduck (925) 330-5479	Serves as a primary POC for field team before, during, and after the investigation; communicated back to the Program Manager, quality manager, and Project Chemist, as needed. Communication by

Communication Drivers	Responsible Entity	Name/Phone Number	Procedure
			phone as needed with field staff during field sampling events, followed up with an e-mail to document decisions and actions.
QAPP changes in the field	Ahtna Field Team Leader	Jessica Feduck (925) 330-5479	The Field Team Leader will notify the Project Chemist by phone and will e-mail changes to the QAPP made in the field and the reasons for the changes within 24 hours. Documentation of deviations from the work plan will be kept in the field logbook; deviations are made only with the approval of the contractor site manager.
Daily field progress reports	Ahtna Field Team Leader	Jessica Feduck (925) 330-5479	E-mail or fax daily progress reports to Ahtna's Program Manager.
Field corrective actions	Ahtna Field Team Leader	Jessica Feduck (925) 330-5479	The need for corrective action for field issues will be determined by the Field Team Leader. The Program Manager will monitor the QAPP requirements are met by field staff. The Field Team Leader will notify the Ahtna Program Manager of any needed field corrective action. The Program Manager will have 24 hours to respond to the request for field corrective action.
QAPP amendments	Ahtna Project Chemist	Christopher Ohland (925) 222-6593	Any major changes to the QAPP prior to or during fieldwork will be approved before the changes can be implemented.
Analytical corrective actions	Ahtna Project Chemist	Christopher Ohland (925) 222-6593	The need for corrective action by the analytical laboratory will be determined by the Project Chemist. The Project Chemist will monitor that QAPP requirements are met by the laboratory. No analytical data can be released until data are reviewed for completeness and conformance to analytical guidelines by the Project Chemist. The Project Chemist will review all data as soon as possible upon receipt from the validator.

Communication Drivers	Responsible Entity	Name/Phone Number	Procedure
Data validation issues, e.g., non-compliance with procedures	Ahtna Project Chemist	Christopher Ohland (925) 222-6593	The Project Chemist will review all data as soon as possible upon receipt from the validator.
Communication with USACE Project Manager and COR	Ahtna Program Manager	Sommer Carter (925) 357-0750	Receives contractual direction from USACE COR, and notifies USACE of contractual deviations (changes in the scope of work, budget, or schedule) by e-mail or letter.
Communication with Ahtna Field Team Leader	Ahtna Program Manager	Sommer Carter (925) 357-0750	Serves as primary POC for USACE and provides approval of technical direction to Ahtna Field Team Leader.
Health and safety	Ahtna Site Safety and Health Officer (SSHO)	Holly Dillon (831) 324-3299	Responsible for the adherence of team members to the site safety requirement described in the health and safety plan. Will report health and safety incidents and near misses to the Project Manager and Safety and Health Manager. Has authority to stop work for safety concerns.
Reporting Laboratory data quality issues	Laboratory Project Manager	Natalie Serda (661) 327-4911	All sample login discrepancies with field samples, laboratory QC issues with testing methodologies, and delays in reporting will be reported to the Ahtna Project Chemist immediately.
Release of analytical data	Laboratory Project Manager	Natalie Serda (661) 327-4911	No analytical data can be released to Ahtna and USACE until it has been reviewed by the laboratory. No final data can be released to Ahtna until laboratory validation is completed and the laboratory has approved the release.
Issues found during data validation Release of data validation reports	Data Validation Project Manager	Pei Geng (760) 827-1100	The Data Validation Project Manager will report all issues with validating the laboratory data. Analytical data must be reviewed according to data validation specifications and data flags added to the electronic data deliverable (EDD) before it can be released to Ahtna. Issues will be communicated to the Ahtna Data Manager.

Worksheet 09—Project Planning Session Summary

Project Kick-off Meeting

Site Name/Project Name	Former U.S. Disciplinary Barracks/ Environmental Long-Term Monitoring
Operable Unit(s)	Washrack Site, Wood Dump Site, and Former Army Landfill
Site Location	Lompoc, CA
Projected Date(s) of Sampling	Semi-Annually, starting with winter 2021 with optional years to summer 2026
Project Manager	Jessica Feduck/Ahtna
Program Manager	Sommer Carter/Ahtna
Date of Session	Not applicable
Scoping Session Purpose	A scoping session was not performed with the stakeholders

Participants

Name	Title/Role	Affiliation	E-mail Address

Worksheet 10—Conceptual Site Model

USDB Location

The USDB is located 1.5 miles northwest of Downtown Lompoc, California (Figure 1). The Lompoc Valley, which is part of the central California coastal region, is surrounded by rolling hills to the north, south, and east, and is open toward the west. The Santa Ynez River, along the southern boundary of the property, runs from east to west through the valley before it empties into the Pacific Ocean approximately 5 miles to the west.

In 1941, the United States War Department purchased the property for the establishment of Fort Cooke, a tank-training base. In 1946, the USDB was built as a military detention center. In July 1959, the USDB and the surrounding land were permitted to the Bureau of Prisons (BOP) and renamed the Federal Correctional Institution (FCI). In July of 1981, the FCI officially became a United States Penitentiary (USP). The property, currently and hereinafter referred to as the Federal Correctional Complex (FCC), includes the USP, the Federal Prison Camp (FPC; a minimum-security prison), the FCI (a low-security prison), the Sewage Treatment Plant, the Farm area, UNICOR Federal Prison Industries (UNICOR), the Dairy, and the Intensive Confinement Center (ICC).

Operational History

Washrack Site

The Washrack Site is located directly to the north of the USP (Figure 2). The Washrack is an approximately 950 square foot, 4-inch thick concrete wash pad. A high-pressure steam-cleaning unit used to clean vehicles was stored in a small shed at one corner of the pad. The concrete wash pad is sloped so that water from the steam-cleaning process drained to a 2 feet by 4 feet catch basin in the middle of the pad. In the past, water drained from the catch basin, through underground piping, to the sanitary sewer line, and into the FCC's wastewater treatment plant. The Greaserack Site, considered part of the Washrack Site, is located approximately 100 feet to the south of the concrete wash pad. This area was also used for cleaning and servicing of USDB, and later BOP, vehicles. Equipment was removed, the area is paved, and now includes an aboveground tank storing propane for fueling forklifts. The areas surrounding the site, which are mostly paved and generally busy with vehicular and pedestrian traffic, include: a paved access road and warehouse to the north; a grassy area and the Transportation Building to the east; the fenced yard of the USP (the medium-security prison) to the south; and paved areas with equipment and vehicles to the west (ERRG, 2001).

Wood Dump Site

The Wood Dump site is located approximately one mile east of the USP and is located in a southwest trending valley that drains to the Santa Ynez River located approximately 2,000 feet southwest of the site (Figure 3). The Wood Dump is approximately 6 acres in size, measuring approximately 650 feet in length by approximately 400 feet in width and is surrounded by a 5-strand barbed-wire fence (Figure 4). The nearest facilities to the Wood Dump include stockyards and hay storage facilities east and south, respectively; the dairy, located approximately 2,000 feet due west. The Wood Dump site was created by infilling an existing southwest-flowing 60 to 70 feet deep drainage with approximately 25 to 35 feet of waste/debris. Disposal at the Wood Dump probably occurred between 1967 and 1978 and included mainly inert wastes such as wood, bricks, and concrete; and some organic matter like grasses (USEPA, 2000). Ground surface elevations at the Wood Dump site range from 65 ft above mean sea level (msl), in

the valley floor, to 135 ft above msl on slope that border the west side of the Wood Dump surface. The Wood Dump spans the full width of the valley and has a 24-inch corrugated metal pipe, now rehabilitated, located beneath it to pass surface water flowing down the valley.

Former Army Landfill

The FAL encompasses an approximately 2-acre area in a large, open field situated east of the FCC main delivery gate and between the Capehart and Wherry staff housing areas (Figure 1). The Army constructed and used the FAL as a sanitary landfill from the early 1940s to the late 1950s when the adjacent Capehart housing was constructed and closed in 1959. The types of materials or waste that were disposed of within the landfill are unknown. The site has a 5- to 7-foot berm to the north, gently slopes to the south, and surface undulations (less than one acre in area) indicative of filled-in trenches. Previous reports indicated that the material at the FAL is buried at a depth of less than 7.5 feet bgs.

Geology and Hydrogeology

The FCC is located in the northern Lompoc Plain and rolling hills of the Lompoc Upland. The Lompoc Upland borders the Lompoc Plain to the north in the vicinity of the Complex. The Lompoc Valley in the Lompoc Plain is open to the west to the Pacific Ocean. The valley and its coastline are underlain by unconsolidated deposits including terrace deposits (0 to 150 feet thick), the Orcutt Sand (0 to 300 feet thick), and the Careaga Sand (450 to 1,000 feet thick). Ground surface elevations across the FCC range from 40 feet above mean sea level (amsl) on the Lompoc Plain to 130 feet amsl in the Lompoc Upland. The site topography generally slopes towards the south (towards the Santa Ynez River) with southerly flowing drainages.

Monitoring wells drilled into the Lompoc Plain indicate alluvium consisting of silty sand and sandy clay extending to depths of over 40 feet below ground surface (bgs). Monitoring wells drilled in the Lompoc Upland are underlain by sand or gravelly sand to the depths explored (140 feet bgs). Published geologic maps of the area suggest that the geologic units underlying the Upland area include terrace deposits, the Orcutt Sand, and the Careaga Sand.

The FCC is within the Lompoc subunit of the Santa Ynez River Basin, which includes two water-bearing units, the Upper and Lower Aquifers. The Upper Aquifer is limited to the Lompoc Plain; the Lower Aquifer exists at depth beneath the Upper Aquifer on the Lompoc Plain and in the Lompoc Upland areas. The FCC crosses the contact between the Lompoc Plain and the Lompoc Upland or the Upper Aquifer and Lower Aquifers, respectively. The Washrack site overlies the Upper Aquifer deposits, and in the vicinity of the FCC, the Orcutt Sand is partially saturated (ERRG, 2021).

Groundwater at the site is typically encountered at depths ranging from 80-85 ft bgs (elevations of approximately 35-40 ft amsl). The flow direction is typically northwest at a low gradient with less than 1 foot of elevation difference between the most upgradient (WR-MW-08A) and most downgradient (WR-MW-04A) wells. Seasonal variations in water levels are small and groundwater has risen slowly across the site in recent years with most wells experience an increase of 1-2 feet of rise since 2016.

Previous Investigations and Cleanup Activities

Environmental investigations have been performed by USACE and other contractors at the site. Contaminant assessments based on the findings of these previous investigations are summarized below.[1]

Washrack Site (LOMO-17)

The Washrack site (inclusive of the Washrack and Greaserack sites) is located immediately north of the USP. This site may have been used for vehicle maintenance in the past. Total petroleum hydrocarbons have been tentatively identified in soils south of the former Washrack. Groundwater sampling has identified organic constituents in groundwater at the Washrack site, including tetrachloroethene (PCE) and trichloroethene (TCE) above the MCL of 5 micrograms per liter (µg/L) for each compound. The state and federal MCLs for TCE and PCE are the same.

In July 2001, quarterly groundwater monitoring was initiated at the Washrack site with monitoring wells WR-MW-01, WR-MW-02, and WR-MW-03. In September 2002, ten additional groundwater monitoring wells were installed (WR-MW-01B, WR-MW-04A and B, WR-MW-05A and B, WR-MW-06A and B, WR-MW-07, WR-MW-08A, and WR-MW-09A) to delineate the lateral and vertical limits of the PCE/TCE plume (Figure 5). In addition, four injection wells (WR-IW-01 through WR-IW-04) were installed to initiate an Enhanced Reductive Dechlorination (ERD) program at the site.

The ERD program, beginning in December 2002, was implemented at the Washrack site as a time-critical removal action (TCRA) due to its close proximity to the Lompoc federal prison and the associated security risks. Discussion and documentation of the TCRA is presented in *the Action Memorandum for the Time Critical Removal Action (TCRA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for the "Washrack" and "Farm Fuel" Sites* (HQDA BRAC AFO, 2006). Discussions related to the start-up and preliminary data of the ERD program were presented in the *Final Enhanced Reductive Dechlorination Start-up Report for the Washrack and Farm Fuel Sites* (Arcadis, 2004a).

In July 2004, the plume was further delineated in accordance with the *Final Enhanced Reductive Dechlorination (ERD) Expansion Work Plan for the Washrack Site* (Arcadis, 2004b). As part of the plume delineation, two additional monitoring wells (WR-MW-10A and WR-MW-11A) were installed and have been monitored since the third quarter of 2004.

A one-time injection event was conducted in July 2004 to supplement the ERD program. Fifteen temporary injection borings were used in an attempt to further distribute total organic carbon to the impacted areas. Results of the field activities were presented in the *Technical Memorandum – Plume Delineation and Enhanced Reductive Dechlorination Expansion Program, Washrack Site* (Arcadis, 2005a).

In September 2005, the ERD program was expanded at the Washrack site by adding 12 injection wells (WR-IW-05 through WR-IW-16) and one monitoring well (WR-MW-12A) in accordance with the *Analysis of ERD Injections and Proposed Expansion of the ERD Program at the Washrack Site* (Arcadis, 2005b). One monitoring well (WR-MW-04B) was abandoned in accordance with the *Proposed Well Abandonment at the Former United States Disciplinary Barracks* (Arcadis, 2005c). Details of the ERD expansion, well

[1] Additional information on project sites is available on the State Water Resources Control Board's GeoTracker database at:
Washrack Site: http://geotracker.waterboards.ca.gov/?gid=DOD100154800
Wood Dump Site: http://geotracker.waterboards.ca.gov/?gid=DOD100154600
Former Army Landfill: http://geotracker.waterboards.ca.gov/?gid=DOD100151700

installation, and survey activities were presented in the *Technical Memorandum –Expansion of the ERD Remediation System at the Washrack Site* (Arcadis, 2005d). Details of the well abandonment activities were presented in the *Documentation of Well Abandonment and Well Construction Letter (*Arcadis, 2005e).

In June 2006, injection/tracer tests were performed at monitoring wells WR-MW-01 and WR-MW-09A. Results and conclusions from the tests were presented in the *ERD Injection Tests at the Washrack Site* (Arcadis, 2006). The last injection event was completed in December 2008 and included focused groundwater monitoring at wells WR-MW-10A through WR-MW-12A.

In September 2009, two monitoring wells (WR-MW-06A and B) and all 16 injection wells (WR-IW-01 to WR-IW-16) were abandoned in accordance with the P*roposed Well Abandonment at the Former United States Disciplinary Barracks* (Figure 5; Arcadis, 2005c). Details of the well abandonment activities were presented in the *Documentation of Well Abandonment and Well Construction Letter* (Arcadis, 2009a).

The BOP has implemented Land Use Controls (LUCs) throughout the Washrack area. LUCs are necessary to restrict land and groundwater use and prevent unacceptable risk. LUCs at the site include:

- Restriction of groundwater withdrawal and protecting the integrity of existing and proposed wells to prevent exposure to groundwater
- BOP will not allow or conduct extraction, injection, sampling, incidental disturbance during soil excavation or any other activity potentially or actually contacting, handling, impacting or involving subject waste constitute plume without Water Board approval.

BOP conduct periodic inspections of the site to ensure compliance with all criteria stated.

Wood Dump Site

This site has been investigated and has undergone extensive rehabilitation and maintenance upgrades. An engineered cover along with drainage control feature was installed in July 2004. In 2005, a *Final Post Site Mitigation Maintenance and Monitoring Plan* (Arcadis, 2009c) was established to define future long-term monitoring. The current status is documented in the *Change Memorandum – Final Post Site Mitigation Maintenance and Monitoring Plan, Wood Dump Site* (Army, 2014).

Former Army Landfill

A Site Investigation was completed in 2000 and included a geophysical survey, soil gas survey, and the collection of surface and subsurface soil and water samples. The FAL was issued a No Further Action letter in 2000 based on the results of the investigation (BCT, 2000). During site visits in 2004, it was noted that ground squirrels were unearthing contained waste. The BOP developed a Site Maintenance Program to address this issue and is currently conducting quarterly inspections of the landfill (Army, 2006).

Contaminants of Concern

The contaminants of concern (COCs) for the Washrack Site are PCE, TCE, and their degradation products. PCE exceeded the MCL in four of the ten monitoring wells: WR-MW-02 (6.9 µg/L), WR-MR-04A (5.7 µg/L), WR-MW-10A (7.4 µg/L), and WR-MW-11A (5.1 µg/L) during the November 2020 monitoring event (ERRG, 2021). The most current site data from the November 2020 monitoring event also showed concentrations of cis-1,2-dichloroethene and vinyl chloride above the California Maximum Contaminant Levels (MCLs). Cis-1,2-dichloroethene exceeded its MCL in three monitoring wells: WR-MW-05A (15 µg/L), WR-MW-09A

(16 µg/L) and WR-MW-12A (11 µg/L) and vinyl chloride exceeded its MCL in one well: WR-MW-05 (0.98 µg/L; ERRG, 2021). These degradation product concentrations are considered indicative of the reductive dechlorination process. Other site-specific COCs were below laboratory detection limits.

Table 10-1. Maximum Contaminant Levels

			MCL (µg/L)	
Contaminant	**Short Name**	**CAS No.**	**California[1]**	**Federal[2]**
cis-1,2-Dichloroethene	cis-1,2-DCE	156-59-2	6	70
Tetrachloroethene	PCE	127-18-4	5	5
Trichloroethene	TCE	79-01-6	5	5
Vinyl chloride	VC	75-01-4	0.5	2

Notes:
[1] Environmental Screening Levels (SFBRWQCB, 2019)
[2] Regional Screening Levels; TR=1E-06, HQ=1, (USEPA, 2020)
µg/L microgram per liter

Other compounds have been detected above MCLs less frequently and are thus not considered COCs (Table 10-2). Arsenic and chromium MCL exceedances have been attributed to secondary effects of the ERD program (IES, 2014).

Table 10-2. Non-COC Maximum Contaminant Level Exceedances

Contaminant	MCL (µg/L)		Date of Last California MCL Exceedance
	California[1]	Federal[2]	
Benzene	1	5	04/18/2002
Methyl tert-butyl ether	13	None	12/08/2004
bis(2-Ethylhexyl)-phthalate	4	6	10/03/2002
Arsenic	10	10	11/05/2014
Cadmium	5	5	10/03/2002
Chromium	50	100	11/04/2014
Lead	15	15	07/27/2001
Mercury	2	2	07/27/2001
Nickel	100	None	12/12/2007
Selenium	50	50	09/30/2002
Nitrite (as Nitrogen)	1,000	1,000	06/26/2003

Notes:
[1] Environmental Screening Levels (SFBRWQCB, 2019)
[2] Regional Screening Levels; TR=1E-06, HQ=1, (USEPA, 2020)
µg/L microgram per liter

Current Monitoring Program

The ERD program reduced concentrations of volatile organic compounds (VOCs) in groundwater, and since 2009, groundwater monitoring has been performed at the Washrack site under the requirements of the *Final Post Mitigation Monitoring Plan (MMP), Washrack Site* (Arcadis, 2009b) and associated change memorandums (IES, 2010a, 2010b). The intention of the current monitoring program is to monitor contaminant reductions, plume extents, and plume stability.

Currently, there are 11 existing monitoring wells at the site. Well locations are shown on Figure 5.

WR-MW-01	WR-MW-04A	WR-MW-08A	WR-MW-11A
WR-MW-01B	WR-MW-05A	WR-MW-09A	WR-MW-12A
WR-MW-02	WR-MW-07A	WR-MW-10A	

Well WR-MW-07A previously served as an upgradient/background monitoring well for the ERD program. Sampling was discontinued at WR-MW-07A after the ERD program ended. Currently, WR-MW-07A is used for water levels only. Sampling is performed annually in the fourth quarter at well WR-MW-01B. The remaining nine wells are sampled semiannually (typically second and fourth quarter) for VOCs.

Due to low water levels in many wells at the Washrack site, sampling has been performed using passive diffusion bags (PDBs) since 2016 (ERRG, 2016). Water levels have increased slightly (approximately 1–2 ft per well) since 2016, but, as of November 2020, water columns in the A-zone wells still ranged in height from 2.01 to 6.67 ft. Five wells (WR-MW-04A, -09A, -10A, -11A, -12A) had water columns of less than 3 ft (ERRG, 2021).

PDB sampling allows for sampling of wells with lower water columns than could be sampled with submersible pumps. Because no pumping is performed, field measurements of general water quality parameters have not been collected in recent events. VOCs, including all site COCs, are able to diffuse across the membrane of the PDBs; however other contaminants are unable to diffuse into the PDBs. Sampling has not been able to be performed for non-VOC analyses since 2014. Arsenic and chromium were detected above their MCLs in November 2014, the last event in which they were sampled. These concentrations were attributed to secondary effects of the ERD program.

Worksheet 11—Project/Data Quality Objectives

Data Quality Objectives (DQOs) provide strategic scientific planning which defines systematic criteria on the type, quality, and quantity of data needed to characterize current site conditions and make future remediation and/or monitoring program decisions, if necessary. The DQOs for this project pertain to the Washrack Site.

Step 1 - State the Problem

The Former USDB is monitored under the following documents: *Final Post Mitigation Monitoring Plan* (Washrack Site; Arcadis, 2009b), *Final Post Mitigation Maintenance and Monitoring Plan* (Wood Dump Site; Arcadis, 2009b) and Restoration of Site Conditions (FAL; Army 2006).

Groundwater at the Washrack Site has historically contained concentrations of VOCs in excess of MCLs. The current COCs for the site include TCE, PCE, cis-1,2-DCE, and vinyl chloride. Active groundwater remediation at the Washrack Site is no longer performed at the site due to the reduced concentrations achieved by the ERD program from 2002-2008. However, contaminants remain above MCLs and the extent of the remaining plume should be monitored to develop recommendations for the site.

The remedy for the Site groundwater at the Washrack Site is protective of human health and the environment because groundwater at the site is currently not a potable water source nor is it planned to be used as a potable water source in the near future. Exposure pathways that would lead to unacceptable risk are being controlled (Arcadis, 2014). Changes to the extent of groundwater contamination or COC concentrations may affect the level of protectiveness.

Step 2 – Identify the Goals of the Study

Ongoing monitoring of site pollutants is needed to monitor the stability and extents of the VOC plume at the Washrack Site. An assessment of the monitoring data will be used to determine if the Site continues to be protective of human health and the environment, progressing toward closure, and if not, whether additional actions are needed.

Step 3 - Identify Information Inputs

Inputs to decisions regarding the monitoring program are as follows:

- Historical groundwater monitoring results and archived information
- Historical details of the ERD program including injection volumes, locations, and substrate chemistry
- Groundwater monitoring data
- Groundwater levels
- State and Federal MCLs

Step 4 - Define the Boundaries of the Study

The spatial boundaries of the study include the boundaries of Washrack Site and the screened intervals of the monitoring wells. The temporal boundary is described in Step 5 of the DQOs.

Step 5 - Develop the Decision Rules and Analytic Approach

The MMP established the data collection, data management, and reporting requirements for long-term monitoring of the Washrack site (Arcadis, 2009b). The following if-then statements are intended to build off the MMP and further refine the program. Changes to the monitoring program will only be made with approval from the Army and CCRWQCB.

If-Then Statements

Item	If Statement	Then Statement
1	If analyte concentrations are decreasing to near or below the MCL for two consecutive monitoring events	Then recommendations and follow up actions including continuation, modification, or elimination of the program (site closure) may be prepared and then submitted to the Army and CCRWQCB for review.
2	If analyte concentrations are increasing or above the MCLs for two consecutive events	Then the sampling and monitoring program continues as described in this QAPP/Work Plan and the MPP.
3	If analyte concentrations are increasing or above the MCLs for four consecutive events	Then additional action may be required.
4	If no contaminants are present in any wells at concentrations above MCLs for two consecutive events or contaminant trends at all wells are either stable or decreasing	Then an application for site closure may be prepared and then submitted to the Army and CCRWQCB for review.
5	If a well is no longer needed for contaminant sampling or water level measurements	Then the well may be proposed for decommissioning and then a decommissioning plan submitted to the Army and CCQWQCB for review.

Step 6 - Specify Performance or Acceptance Criteria

The performance objectives for new groundwater data are specified in this document and as defined in the *Department of Defense Quality Systems Manual (QSM) Version 5.3 for Environmental Labs* (DoD, 2019).

Specification of Limits of Decision Errors

The null hypothesis for this project is that concentrations of VOCs in groundwater exist above relevant MCLs and trigger concentrations. A false acceptance decision (i.e., false positive decision error) would be to assume that a measured concentration is above the action level, when in fact, it is not. The consequences of this decision error would be to incur unnecessary expense to study and potentially modify the monitoring network to address an extent of contamination that does not exist.

A false rejection decision error (i.e., false negative decision error) would be to assume that a measured concentration is not above the action level when in fact it is. The consequences of this decision error

would be to not study or potentially modify the monitoring network, thereby resulting in an incomplete understanding of the extent of contamination and the potential threat to groundwater quality.

Decision errors are most likely to occur when the measured concentration is near the action level, or in the case of non-detect (ND), when the reporting limit is near the action level. To control decision errors when the reporting limit is near the action level, the laboratory is required to periodically assess method DLs and analyze low-level standards to verify method sensitivity.

All chemical data are reviewed as described in Worksheet 36 (Data Validation Procedures).

Step 7 - Develop the Detailed Plan for Obtaining Data

As a result of the DQO process, the optimum sampling design is derived from the review of historical operations data and previous investigations. Sample collection locations, rationales, and frequencies are presented in Worksheet 17 (Sampling Design and Rationale) and are established to provide data to be evaluated relative to project goals. Method performance criteria are presented in Worksheet 24 (Analytical Instrument Calibration) and Worksheet 28 (Analytical Quality Control and Corrective Action).

Validation and verification of the data generated during field and laboratory activities are essential to obtaining defensible data of an acceptable quality to support project decisions. Field data will be verified through the procedures presented in QAPP Worksheet 20 (Field QC Summary), and field personnel will be responsible for following the field standard operating procedures (SOPs) specified in QAPP Worksheet 21 (Field SOPs).

To ensure that the analytical data can be used for its intended purpose, the laboratory data are subject to a 100% Stage 2B data review. Data is verified to be of a known quality that complies with the criteria in this QAPP, the general guidance presented in the DoD QSM (DoD, 2019) the published analytical methods, and capable of supporting project decisions. Elements of data reviews are explained in Worksheet 36 (Data Validation Procedures). The data should meet the project action levels as specified in QAPP Worksheet 15 (Project Action Limits) and the QC requirements that are explained in QAPP Worksheet 36 (Data Validation Procedures).

How "good" does the data need to be in order to support environmental decisions?

Definitive data using standard laboratory reporting limits below federal and state MCLs for water, subject to quality control (QC) criteria specified in this QAPP. Standard laboratory in-house performance-based QC limits based on compliance with DoD QSM Version 5.3.

Where, when, and how should the data be collected?

Worksheet 17 (Sampling Design and Rationale) describes the remedial action activities. Worksheet 18 (Sampling Locations and Methods) summarizes the number of samples and the analytical parameters.

How will the data be reported and archived?

Work performed and data collected will be presented in the annual reports. Reports will be submitted electronically and via hardcopy. Final report repositories for the Administrative Record and for the public are established at the Lompoc Public Library, 501 E. North Avenue, Lompoc, CA 93946. Electronic copies of annual reports are also available via the GeoTracker database at https://geotracker.waterboards.ca.gov/.

Worksheet 12—Measurement Performance Criteria

The measurement performance criteria (MPC) for chemical analyses being performed for each analytical parameter are summarized in Table 12-1. The MPCs follow those defined in the referenced USEPA method or laboratory SOPs and the QSM. The quality of the data to be collected for this project will be verified through appropriate MPCs established for both sampling procedures and analytical methods. The criteria relate to data quality indicators (DQIs) consisting of precision, accuracy, representativeness, comparability, completeness, and sensitivity, commonly referred to as PARCCS parameters. The DQIs are defined as follows:

- Precision refers to the reproducibility of measurements. Precision is usually expressed as standard deviation, variance, percent difference, or range, in either absolute or relative term.
- Accuracy refers to the degree of agreement between an observed value (such as sample results) and an accepted reference value. A measurement is considered accurate when the reported value agrees with the true value or known concentration of the spike or standard within acceptable limits.
- Representativeness describes the extent to which a sampling design adequately reflects the environmental conditions of a site. Representativeness is determined by appropriate program design, with consideration of elements such as proper well locations, drilling and installation procedures, operations process locations, and sampling locations.
- Comparability addresses the degree to which different methods or data agree or can be represented as similar. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats.
- Completeness is a measure of the amount of valid data collected using a measurement system. Completeness is expressed as a percentage of the number of measurements that are specified in this QAPP.
- Sensitivity is the ability of a method or instrument to detect the target analytes at the level of interest. Sensitivity can be measured by calculating the percent recovery of the analytes at the detection limit (DL), which is the minimum concentration of an analyte that can be routinely identified and quantified above the method DL by a laboratory.

The quality of the sampling procedures and laboratory results will be evaluated for compliance with project DQOs through a review of overall PARCCSs, in accordance with procedures described in Worksheet 37 (Data Usability Assessment). The results will be summarized in an overall data usability report.

Table 12. Measurement Performance Criteria

Matrix Water
Analytical Group(s) Organics (VOCs)

Procedures	Data Quality Indicators	Measurement Performance Criteria	QC Sample or Activity	QC Sample Assessment
Sampling (Table 21-1) Analytical (Table 23-2)	Precision	RPD <30%	MSD or MD	Analysis
		RPD <30%	FD	Sampling and Analysis
	Accuracy/Bias	QSM, Appendix C	LCS, MS/MSD	Analysis
	Representativeness	The greater of: <½ LOQ, 10% of decision limit, 10% of sample concentration	MB, FB, EB, TB	Sampling and Analysis
	Comparability	Qualitative measure for field sampling procedures	LCS, MS/ MSD (or MD), and method selection	Analysis
	Completeness	>90% of laboratory results or enough to make sound project decisions	Percent Completeness	Sampling and Analysis
	Sensitivity	LODs less than the decision limits for non-detects and LOQs less than the decision limits for detections (Worksheet 15)	LCS, ICAL, CCAL	Analysis

Notes:
CCAL continuing calibration
ICAL initial calibration
EB equipment blank
FB field blank
LCS laboratory control sample
LOD limit of detection
LOQ limits of quantitation
MB method blank
MD matrix duplicate
MS matrix spike
MSD matrix spike duplicate
RPD relative percent difference
QC Quality Control

Worksheet 13—Secondary Data Uses and Limitations

Table 13-1. Supporting Documents

Data Source	Data Generator	How Data Will be Used	Data Use Limitation
Final Post Mitigation Monitoring Plan, Washrack Site	Arcadis, 2009	Presents the Washrack site groundwater monitoring plan	None
Change Memorandums	IES, 2010 (June and October)	Presents changes to the Mitigation Monitoring Plan	None
Groundwater Monitoring Reports	ERRG (Various)	Provide data from groundwater monitoring events	None
Final Post Mitigation and Maintenance Monitoring Plan, Wood Dump Site	Arcadis, 2009	Presents the inspection and monitoring plan for the Wood Dump Site	None
Change Memorandum	Army, 2014	Presents changes to the Mitigation and Maintenance Monitoring Plan	None
Restoration of Site Conditions at the Former Army Landfill	Army, 2006	Presents site restoration and inspection plan	None

Worksheet 14/16—Project Tasks & Schedule

This QAPP/Work Plan was prepared for groundwater monitoring at the Washrack Site and site monitoring and inspection at the Wood Dump and FAL performed at the Former USDB. Information pertaining to the number and type of field and field QC samples collected at the Washrack site is presented in Worksheet 18 (Sampling Locations and Methods) and Worksheet 20 (Field QC Summary).

Quality Control Tasks

Implement field and laboratory SOPs. For items related to QC, see Worksheets 11, 12, 15, 22, 24, 25, 27, and 28.

Groundwater Monitoring Tasks

See Worksheet 18 (Sampling Locations and Methods).

Data Management Tasks

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

Project Chemist

The chemist oversees the proper use of Ahtna's sample management system and accuracy of the information entered.

Data Manager

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. Responsible for the review of the chain of custody forms and establishing the sample tracking system. Conducts tracking of samples, forwards tracking information and received data to the Project Manager, and identifies the data inputs for example, (sample numbers) to use in generating tables and figures. Compares electronic outputs to laboratory electronic copies for completeness and accuracy. Coordinates with the person responsible for reviewing the entered data for QC purposes. Forwards all deliverables to the Project Manager.

Geographic Information System (GIS) Technician

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.

Sample Tracking

The Data 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 COCs from the field team are used to enter in sample IDs, collect data, and for analyses. Upon receipt of a sample receipt notice from the laboratory, the Data Manager will enter the date received by the laboratory and date that the electronic copy is due. Likewise, upon receipt of the electronic copy and electronic data deliverable (EDD), entry will include the date they are received. 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.

Data Types

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

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 consistently. The laboratory and field data are uploaded to the database. Every data set will be assigned a unique identifier. The date of receipt, the status of data validation, and the status of the 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 document logs. Field data will be reduced and summarized, tabulated, and stored along with the field logbooks and sample processing logs. Field and laboratory measurements are uploaded to the database and 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, and the result qualifiers updated upon completion of data validation reviews. Other available field-related data collected will be manually entered onto standard EDD templates for loading into the database.

Computer Database

The technical data, field observations, laboratory analytical results, and analytical data validation will be managed using the database to store and analyze project data submissions. The database system is based on a relational model in which independent tables, each containing a certain type or entity of data, can be linked through selected fields that are common to two or more tables. The database design allows for the inclusion of historical data and allows users to effectively conduct trend analysis and generate a variety of data reports to aid in data interpretation.

The database will be protected from unauthorized access, tampering, accidental deletions or additions, and data or program loss that can result from power outages or hardware failure. The following procedures will be adopted to ensure protection:

- The master database will be stored on a cloud-based enterprise server for the Ahtna data management system. Members of the data management team involved in loading, modifying, or querying the database will be given access through user accounts and passwords, as well as the appropriate network server permissions.
- Project staff access the data through reporting tools developed to minimize possible database corruption by users.

- Continuous backups of the master database and its copies will be made to ensure that the data will not be lost due to problems with the network.

Geographic Information System (GIS) Description

A project geodatabase will be set up prior to sampling by the Project Manager, database technician, and GIS technician. Ahtna will adhere to all applicable federal, DoD, and Army geospatial data standards for tasks and deliverables in this QAPP.

The horizontal accuracy of any geospatial data created will be tested and reported in accordance with the National Standard for Spatial Data Accuracy, and the results will be recorded in the metadata. All data will have a datum of WGS84 and a projection of NAD 1983 State Plane California Zone 5.

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.

Documentation

Documentation of data management activities is critical because it provides the following:

- An electronic copy record of project data management activities
- Reference information critical for database users
- Documentation that the activities have been properly planned, executed, and verified
- Continuity of data management operations when personnel changes occur

Additional documentation will be maintained to document specific issues such as database structure definitions, database inventories, database maintenance, user requests, database issues and problems, and client contact.

The final project file will be the central repository for all documents that are relevant to sampling and analysis activities. This also includes database and spatial data storage. Ahtna will be the custodian of the evidence file and will maintain the contents of the files for the project, including relevant records, reports, logs, field notebooks, sketches, pictures, contractor reports, and data reviews. Ahtna will keep all records for five years after project completion. As necessary, records may be transferred to an offsite records storage facility. The records storage facility will provide secure, controlled-access records storage.

Presentation of the Monitoring 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

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.

Assessment and Audit Tasks

See Worksheets 31, 32, and 33

Data Review Tasks

The laboratory will make sure that the data are complete for all samples received. Laboratory data will be validated. 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.

Documentation and Records

		Anticipated Date(s)		
Activity	**Organization**	**Initiation**	**Completion**	**Deliverable**
Laboratory analysis	Subcontracted laboratory (Worksheet 23, Analytical SOPs)	Within required analytical holding times	21 calendar days after the last sample received at laboratory	Data package and EDD
Data validation	Ahtna or subcontracted vendor	After receipt of analytical data reports	15 business days after receipt of final data	Data validation report
Data evaluation	Ahtna	After receipt of validated data	15 business days after receipt of validated data	Annual Groundwater Monitoring Report

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

Table 15-1. Volatile Organic Compounds

Matrix Water
Analytical Group Organics (VOCs)
Method SW5030B/8260C

Analyte[1]	CAS#	Unit	California MCL[2]	Federal MCL[3]	Laboratory Limits		
					LOQ	LOD	DL
1,1,1-Trichloroethane	71-55-6	µg/L	200	200	0.50	0.16	0.051
1,1-Dichloroethene	75-35-4	µg/L	6	7	0.50	0.20	0.070
2-Butanone (MEK)	78-93-3	µg/L	—	—	10	3.0	2.1
Acetone	67-64-1	µg/L	—	—	10	8.0	3.5
Benzene	71-43-2	µg/L	1	5	0.50	0.16	0.063
Bromodichloromethane	75-27-4	µg/L	80[4]	80[4]	0.50	0.30	0.064
Bromoform	75-25-2	µg/L	80[4]	80[4]	0.60	0.30	0.15
Chloroform	67-66-3	µg/L	80[4]	80[4]	0.50	0.16	0.050
Chloromethane	74-87-3	µg/L	—	—	0.50	0.16	0.075
cis-1,2-Dichloroethene	156-59-2	µg/L	6	70	0.50	0.16	0.085
Dibromochloromethane	124-48-1	µg/L	80	80	0.50	0.16	0.083
Methyl tert-butyl ether	1634-04-4	µg/L	13	None	0.50	0.16	0.055
Tetrachloroethene	127-18-4	µg/L	5	5	0.50	0.30	0.077
Toluene	108-88-3	µg/L	150	1,000	0.50	0.16	0.055
trans-1,2-Dichloroethene	156-60-5	µg/L	10	100	0.50	0.16	0.050
Trichloroethene	79-01-6	µg/L	5	5	0.50	0.16	0.065
Vinyl chloride	75-01-4	µg/L	0.5	2	0.50	0.16	0.097
Xylenes (total)	1330-20-7	µg/L	1,750	10,000	1.0	0.16	0.20

Note:
[1] Analytes reported during the last sampling event (ERRG, 2021)
[2] Environmental Screening Levels (SFBRWQCB, 2019)
[3] Regional Screening Levels; TR=1E-06, HQ=1, (USEPA, 2020)
[4] The listed MCL is for total trihalomethanes
µg/L microgram per liter
CAS Chemical Abstract Service Registry
DL Detection limit
LOD Limit of detection
LOQ Limit of quantification

Worksheet 17—Sampling Design and Rationale/Inspection Activities

This section describes the sampling design for the Washrack Site and inspection activities for the Wood Dump Site needed to achieve the goals of the project (WS#11). The FAL is currently inspected quarterly by the BOP. Fieldwork is expected to be conducted during 2Q and 4Q. The annual inspection of the Wood Dump Site and FAL and the 4Q semiannual groundwater monitoring event are expected to occur in one mobilization.

Field samples will be handled, documented, and disposed of in accordance with WSs 26 and 27. Sampling activities will follow field SOPs (Appendix A) and documented using field forms presented in Appendix C. All activities will be performed following the *Accident Prevention Plan and Site Safety and Health Plan* (Ahtna, 2021; *in progress*).

Field Activity Overview

Activity	Location	Frequency	Target Analysis	Matrix	Offsite Analytical	Sampling Techniques
Groundwater Monitoring	Washrack	Semiannual	Depth to water	Groundwater	No	Water level probe
Groundwater Monitoring	Washrack	Semiannual	VOCs	Groundwater	Yes	PDB sampling
Site Inspection	Wood Dump Site	Annual	—	—	No	—
Site Inspection [1]	Former Army Landfill	Quarterly	—	—	No	—

Notes:
1. The FAL site inspection is conducted by the BOP and is not part of the scope of work covered by this QAPP.

PDB Passive diffusion bag

Annual Inspections

Inspection of the Wood Dump Site will be conducted annually. Visual inspections will include the vegetation and soil cover, and the surface water control system per the *Final Post Mitigation and Maintenance Monitoring Plan for the Wood Dump Site* (Arcadis, 2009c) and associated *Change Memorandum* (Army, 2014). Inspections will be photo documented and the Inspection checklist can be found in Appendix A.

The cover of the wood dump will be visually inspected for erosion, ponding and rodent burrows. Vegetation growth will be visually inspected for vigor (or distress).

Ditches, drain pipes, overside drains, and culverts will be visually inspected to assess their integrity including evidence of erosion/undercutting. The perimeter drainage ditches and drainpipes will be inspected for obstructions (fallen trees, sediment buildup) and the toe of the Wood Dump Site will be visually inspected for seepage from the waste fill.

The FAL is inspected on a quarterly basis by the BOP and is not part of the scope of work covered by this QAPP.

Groundwater Sampling

The current well network consists of 11 groundwater monitoring wells. One monitoring well, WR-MW-07A, remains at the site but is used to collect depth to water measurements only and is not sampled. Groundwater samples will be collected as described in SOP-007 (Appendix A). Sampling locations and methods can be found in WS#18 and the project reporting limits and screening levels can be found in WS#15.

Waste Management

Investigation Derived Waste (IDW) that may be generated from sampling events may be discharged (in accordance with the USP discharge permit) into a manhole located approximately 500 feet southwest of the Washrack site that flows directly into the USP wastewater treatment plant.

Security Clearance

Access to the Site is controlled by the BOP. Site access permission will be obtained through contact with the BOP onsite attorney/legal office. A release form for the national crime database search will be submitted at least two months prior to the proposed access date. Access requests will be submitted at least two weeks prior to any site visits. A copy of the access agreement will be carried while on site.

Worksheet 18—Sampling Locations and Methods

Table 18-1. Monitoring Wells

Matrix Water
Field SOPs SOP-007 (Table 21-1)

Well ID	Frequency	Analytes	Sampling Method	Top of Casing (ft amsl)	Total Depth (ft btoc)	Top of Screen Interval (ft btoc)	Bottom of Screen Interval (ft btoc)
WR-MW-01	Semiannual[1]	VOCs	PDB	122.05	87.49	71.5	86.5
WR-MW-01B	Annual[2]	VOCs	PDB	122.15	139.73	130	140
WR-MW-02	Semiannual	VOCs	PDB	121.73	88.02	72.5	87.5
WR-MW-04A	Semiannual	VOCs	PDB	121.55	84.59	75.0	85.0
WR-MW-05A	Semiannual	VOCs	PDB	121.85	84.91	75.0	85.0
WR-MW-07A	Water Level Only[3]	—	—	119.33	83.32	75.0	85.0
WR-MW-08A	Semiannual	VOCs	PDB	121.30	84.72	75.0	85.0
WR-MW-09A	Semiannual	VOCs	PDB	122.17	84.55	75.0	85.0
WR-MW-10A	Semiannual	VOCs	PDB	121.95	84.05	75.0	85.0
WR-MW-11A	Semiannual	VOCs	PDB	121.99	84.61	75.0	85.0
WR-MW-12A	Semiannual	VOCs	PDB	121.80	84.51	75.0	85.0

Notes:
[1] semiannual events occur in the second and fourth quarter
[2] WR-MW-01B is sampled in the fourth quarter
[3] WR-MW-07A remains at the site but was removed from the monitoring program with Water Board concurrence (IES, 2010a)
ft amsl feet above mean sea level
ft btoc feet below top of casing
PDB passive diffusion bags

Worksheet 19/30—Sample Containers, Preservation, and Hold Times

Matrix: Groundwater
Analytical Group: Organics
Lab Turnaround Time: Laboratory report and EDD—21 calendar days

Table 19/30-1. Groundwater

Group — Analyte(s)	Prepare Method	Analysis Method	Holding Time	Minimum Amount	Recommended Container	Preservative
Organics—VOC	SW5030B	SW8260C	14 days	40 mL	3 × 40-mL Teflon-lined septa	Cool 0 to 6 °C; HCl, no headspace

Notes:
HCl hydrochloric acid
VOC volatile organic compounds

Worksheet 20—Field QC Summary

Field Duplicate Samples

Field duplicates (FD) are two field samples taken concurrently at the same location. FDs are intended to represent the same population and are taken through all steps of the sampling and analytical procedures in the same manner as the associated native sample. The samples are used to assess the precision of the entire data collection activity, including sampling, sample handling and storage, and site heterogeneity. The FDs are assigned a unique sample name, are collected in a separate container from the associated native sample and sent blind to the laboratory for subsequent analysis. Unlike the native sample, a relative percent difference result is reported from the field duplicate. One FD will be collected for every 10 field samples, with at least one FD being collected per event.

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike (MS) and matrix spike duplicate (MSD) samples are an aliquot of the sample fortified with known concentrations of specific analytes. Matrix duplicate (MD) samples are a second aliquot of the sample without fortifying analytes. The spiking occurs before sample preparation and analysis at the laboratory. Samples will be collected in triplicate, and the additional volume used for matrix pairs, MS/MSD, or MS/MD analysis. The laboratory must prepare one matrix pair per analytical batch of project samples to run whether the sample is collected from the project site or from a non-project sample. The laboratory will perform a batch laboratory control sample (LCS) analysis. If no MS/MSD is included in the batch, then an LCS and LCS duplicate will be prepared and analyzed. An MS/MSD (or MD) pair will be collected for every 20 field samples.

Field Blanks

Field blank (FB) samples will be collected to assess the potential introduction of contaminants from the surroundings by pouring deionized (or laboratory purified) water directly into the sampling containers while out in normal field conditions. The FB will be analyzed for the same parameters specified for the corresponding matrix. Field blanks are collected once per sampling event.

Equipment Blanks

Equipment blank (EB) samples are collected to assess the effectiveness of equipment decontamination procedures by placing deionized water (or laboratory purified) water in contact with the sampling equipment and collecting the rinsate in an appropriate sample container and analyzed by the laboratory for the same parameters as the associated field samples. Because PDBs are single-use and disposable, no equipment blanks samples will be collected.

Trip Blanks

Trip blank (TB) samples are used to assess the potential introduction of contaminants to VOC sample containers during field events and during shipment of empty bottles to the site and return to the laboratory. One TB will accompany each sample transport container that holds water samples for analysis of VOCs.

Table 20-1. Summary of QC Samples

Matrix Groundwater
Analytical Group Organics

Sampling Event	Field Samples	Field Duplicate	QC Blanks[1]			MS/MSD (MD)	Total
			Equip.	Field	Trip		
Semiannual Groundwater Monitoring (2Q)	9	1	0	1	1	1/1	14
Semiannual Groundwater Monitoring (4Q)	10	1	0	1	1	1/1	15

Notes:
[1] Estimated quantity, actual number is based on the frequency stated in Worksheet 20 (Field QC Summary).

Worksheet 21 — Field SOPs

Table 21-1. Field Standard Operation Procedures

Project SOP#[1]	Title	Originating Organization	Equipment Type	Modified for Project Work
SOP-001	Field Sample Management	Ahtna	None	No
SOP-002	Field Activity Records	Ahtna	None	No
SOP-003	Equipment Decontamination Procedures	Ahtna	None	No
SOP-004	Chain of Custody	Ahtna	None	No
SOP-005	Packing and Shipping of Environmental Samples	Ahtna	None	No
SOP-006	Investigation Derived Waste Management	Ahtna	None	No
SOP-007	Passive Groundwater Sampling	Ahtna	PDB hardware	No
SOP-008	Measurement of Groundwater Levels	Ahtna	Water Level Meter	No

Notes:
[1] Appendix A includes copies of the field SOPs
PDB Passive diffusion bag
SOP Standard operating procedure

Worksheet 22—Field Equipment Calibration, Maintenance, Testing, and Inspection

Table 22-1. Field Equipment Inspections

Equipment[1]	Calibration Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person
—	—	—	—	—	—
—	—	—	—	—	—

[1] No field equipment requiring calibration, maintenance, testing, or inspection is used during the groundwater monitoring events.

Worksheet 23—Analytical SOP's

The laboratory used for sample analysis maintains DoD ELAP certification and undergoes an annual audit of this documentation by the independent accrediting bodies responsible for the DoD ELAP certification. Copies of the laboratory certifications are provided in Appendix B. A review of the certifications found the following exceptions to the testing methods specified for the sample and analysis activities: No exceptions are noted for any method or analyte.

Table 23-1. Laboratory Accreditation

Organization	Analytical SOPs[1]	Accreditation Program	Certificate Number	Expiration Date
BC Laboratories, Inc.	01	DoD ELAP	L20-280-R1	May 10, 2022
		CA ELAP	1186	May 31, 2022

Notes:
[1] Analytical SOPs are listed in Table 23-2

Table 23-2. Analytical SOPs

SOP No.	Description Lab SOP ID Effective Date	Matrix/ Analytical Group	Data Type	Equip. Type	Party	Modified for Work?
01	Volatile Organic Analysis EPA Method 8260 C REV 3 11/20/2020	Water/ Organics	Definitive	GC/MS	BC Labs	No

Notes:
GC/MS gas chromatography/mass spectroscopy

Worksheet 24—Analytical Instrument Calibration

Instrument calibration is performed by the instrument technician and then reviewed on a tiered system progressing from self and peer review of data generated by Lab Technician and culminating with Lab Supervisor review. The QA Manager is responsible for ensuring all data generated are appropriately reviewed and reported. QC department reviews are intended to verify that laboratory personnel implements the laboratory's quality systems and that the data meets method, client, and regulatory requirements. Calibration Specifications are provided for the following analyses:

Table 24-1. Organic Analysis by Gas Chromatography/Mass Spectrometry (GC/MS)

Source QSM 5.3; Appendix B, Table B-4
Analytical Group Organics
Analytical SOP# 01 (Table 23-2)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Tune Check	Prior to ICAL and prior to each 12-hour period of sample analysis.	Specific ion abundance criteria of BFB from method.	Retune instrument and verify.	Flagging is not appropriate.	No samples shall be analyzed without a valid tune.
Initial calibration (ICAL) for all analytes (including surrogates)	At instrument set up and after ICV or CCV failure, prior to sample analysis.	Each analyte must meet one of the three options below: Option 1: RSD for each analyte ≤ 15%; Option 2: linear least squares regression for each analyte: $r^2 \geq 0.99$; Option 3: non-linear least squares regression (quadratic) for each analyte: $r^2 \geq 0.99$.	Correct problem, then repeat ICAL.	Flagging is not appropriate.	Minimum 5 levels for linear and 6 levels for quadratic. No samples shall be analyzed until ICAL has passed. If the specific version of a method requires additional evaluation (e.g., RFs or low calibration standard analysis and recovery criteria) these additional requirements must also be met.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Retention Time (RF) window position establishment	Once per ICAL and at the beginning of the analytical sequence.	Position shall be set using the midpoint standard of the ICAL curve when ICAL is performed. On days when ICAL is not performed, the initial CCV is used.	NA.	NA.	Calculated for each analyte and surrogate.
Evaluation of Relative Retention Times (RRT)	With each sample.	RRT of each reported analyte within ± 0.06 RRT units.	Correct problem, then rerun ICAL.	NA.	After maintenance is performed, which may affect retention times, RRTs may be updated based on the daily CCV. RRTs shall be compared with the most recently updated RRTs.
Initial Calibration Verification (ICV)	Once after each ICAL, analysis of a second source standard prior to sample analysis.	All reported analytes within ± 20% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.	Flagging is not appropriate.	No samples shall be analyzed until calibration has been verified with a second source.
Continuing Calibration Verification (CCV)	Daily before sample analysis; after every 12 hours of analysis time; and at the end of the analytical batch run.	All reported analytes and surrogates within ± 20% of true value. All reported analytes and surrogates within ± 50% for end of analytical batch CCV.	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,	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative. Apply Q-flag to all results for the specific analyte(s)	Results may not be reported without valid CCVs. Flagging is only appropriate in cases where the samples cannot be reanalyzed. If the specific version of a method requires additional evaluation

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
			perform corrective action(s) and repeat CCV and all associated samples since last successful CCV. Alternately, recalibrate if necessary; then reanalyze all associated samples since the last acceptable CCV.	in all samples since last acceptable calibration verification.	(e.g., average RFs) these additional requirements must also be met.
Internal Standards (IS)	Every field sample, standard, and QC sample.	Retention time within ± 10 seconds from retention time of the midpoint standard in the ICAL; EICP area within – 50% to +100% of ICAL midpoint standard. On days when ICAL is not performed, the daily initial CCV can be used.	Inspect mass spectrometer and GC for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	If corrective action fails in field samples, data must be qualified and explained in the Case Narrative. Apply Q-flag to analytes associated with the non-compliant IS. Flagging is not appropriate for failed standards.	NA.

Notes:

BFB	4-Bromofluorobenzene	ICV	initial calibration verification
CCV	continuing calibration verification	IS	internal standards
DDT	Dichlorodiphenyltrichloroethane	RF	relative frequency
GC	gas chromatography	RRT	relative retention time
ICAL	initial calibration	RSD	relative standard deviation

Worksheet 25—Analytical Instrument and Equipment Maintenance, Testing, and Inspection

Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible for CAR CA	SOP Reference [1]
P&T GC/MS	Change Trap	Volatile Organics		When responses drop or after a foam over sample	CCV passes	Bake trap, replace trap, reanalyze CCV, recalibrate	Lab Analyst	01
P&T GC/MS	Backflush Lines	Volatile Organics	Analyze CCV	When CCV will not pass; after sample foamed over; high-level sample analyzed	CCV passes, Blank clean	Backflush lines again, replace lines, recalibrate	Lab Analyst	01
P&T GC/MS	Change Column	Volatile Organics	Analyze CCV	When peak resolution deteriorates, or ICAL will not pass	Good resolution, acceptable ICAL	Check for leaks, recondition column, replace column	Lab Analyst	01
P&T GC/MS	Clean Ion Source	Volatile Organics	Analyze Tune Std	When BFB, CCV, or ICAL will not pass	Tune & ICAL pass	Change column, replace parts	Lab Analyst	01

Notes:

[1]	Analytical SOP References table (Worksheet 23).
CCB/MB	continuing calibration blank/method blank
CCV	continuing calibration verification
GC/MS	gas chromatography/mass spectroscopy
ICAL	initial calibration
ICP/AES	inductively coupled plasma atomic emission spectroscopy
ICV	initial calibration verification
P&T	purge and trap
RT	retention time

Worksheet 26/27—Sample Handling, Custody, and Disposal

Table 26/27-1. Sample Handling, Custody, and Disposal

Activity	Organization and Title or Position of Person Responsible for the Activity	SOP Reference
Sample Collection, Packaging, and Shipment		
Sample Collection	Field Team Leader/Ahtna	Refer to Worksheet 21
Sample Packaging	Field Team Leader/Ahtna	
Coordination of Shipment	Field Team Leader/Ahtna	
Type of Shipment/Carrier	Overnight carrier	
Sample Receipt and Analysis		
Sample Receipt	Subcontracted laboratory Receiving Personnel and Sample Custodian	Maintained by Subcontracted Laboratory QC Department
Sample Custody and Storage	Subcontracted Laboratory Personnel	
Sample Preparation	Subcontracted Laboratory Personnel	
Sample Determinative Analysis	Subcontracted laboratory Personnel, PM	
Sample Archiving		
Field Sample Storage (No. of days from sample collection) Sample Extract/Digestate Storage (No. of days from extraction/digestion)	The laboratory will retain samples for at least 180 days and sample extracts for at least 30 days after submittal, pending the need for reanalysis	Maintained by Subcontracted Laboratory QC Department
Sample Disposal		
Personnel/Organization	Subcontracted laboratory Sample Custodian	Maintained by Subcontracted Laboratory QC Department
Number of Days from Analysis	The laboratory will retain samples for at least 180 days and sample extracts for at least 30 days, after submittal, pending the need for reanalysis	

Field Sample Custody Procedures

Sample collection, packaging, shipment, and delivery to the laboratory will be performed per Worksheet 21 (Field SOPs).

Sample coolers will be shipped overnight to arrive at the subcontracted laboratory or will be sent by a courier to arrive the same day. The laboratory will be notified of the sample shipment and the estimated date of arrival of the samples being delivered.

Regulations for packaging, marking/labeling, and shipping of hazardous materials and wastes are promulgated by the U.S. Department of Transportation. Air carriers that transport hazardous materials, in particular, Federal Express, require compliance with the current edition of the International Air Transport Association Dangerous Goods Regulations, which apply to shipment and transportation of hazardous materials by the air carrier. Following current International Air Transport Association regulations will ensure compliance with U.S. Department of Transportation regulations.

Sample Identification Procedures

A sample numbering system will be used to identify each sample, including duplicate samples. The sample number will be a unique identifier. This system allows for a uniform and consistent numbering system to be employed in the field. Samples to be collected will employ the following sample numbering system.

[Location/Well ID]-[Two-digit month][Two-digit year]-[Sample code]

Example ID: MW04A-1121-N

Where:
Location/Well ID (WR-MW-04A) = MW04
Sample Date (1121) = November 2021
Sample code:
(N) = Normal sample
(D) = Field duplicate
(FB) = Field blank
(T) = Trip Blank

For trip blanks and field blanks, the well ID will be replaced with the most recently sampled well at the time of collecting the blank sample. MS/MSD do not have a sample code instead the MS/MSD request is added to the chain of custody comment line.

Chain of Custody Procedures

Chains of custody will include, at a minimum, laboratory contact information, client contact information, sample information, and relinquished by/received by information as per the field SOPs. Sample information will include sample identification, date and time collected, number and type of containers, preservative information, analysis method, and comments. The chains of custody will also have the sampler's name and signature. The chains of custody will link the location of the sample from the field logbook and sample processing log through sample disposal by the laboratory. The laboratory will use the sample information to populate the laboratory database for each sample.

Laboratory Sample Custody Procedures (Receipt of Samples, Archiving, and Disposal)

Once samples reach the laboratory, they shall be checked against information on the chain of custody form for anomalies. For the safety of the personnel involved, coolers containing samples shall be opened in a hood in case there has been any breakage of the container of potentially contaminated sample material. The condition, temperature, and appropriate preservation of samples shall be checked and documented on the chain of custody form. The occurrence of any anomalies in the received samples and their resolution shall be documented in laboratory records. All sample information shall then be entered into a tracking system, and unique analytical sample identifiers shall be assigned. A copy of this information shall be reviewed by the laboratory for accuracy. Sample holding time tracking begins with

the collection of samples and continues until the analysis is complete. Procedures ensuring the internal laboratory chain of custody shall also be implemented and documented by the laboratory. Specific instructions concerning the analysis specified for each sample shall be communicated to the analysts. Analytical batches shall be created, and laboratory QC samples shall be introduced into each batch.

Samples shall be stored in limited access, temperature-controlled areas while in the laboratory. Refrigerators, coolers, and freezers shall be monitored for temperature seven days a week. The acceptance criterion for the temperatures of the refrigerators and coolers is <6°C. The acceptance criterion for the temperatures of the freezers shall be less than -7 °C. All of the cold storage areas shall be monitored by thermometers that have been calibrated with a National Institute of Standards and Technology -traceable thermometer. As indicated by the findings of the calibration, correction factors shall be applied to each thermometer. Records that include acceptance criteria shall be maintained. Samples shall be stored after analysis until disposed of, in accordance with applicable local, state, and federal regulations. Disposal records shall be maintained by the laboratory.

Worksheet 28—Analytical Quality Control and Corrective Action

The elements of analytical QC and corrective actions are implemented by the instrument technician and then reviewed on a tiered system progressing from self and peer review of data generated by Lab Technician and culminating with Lab Supervisor review. The QA Manager is responsible for ensuring generated data are appropriately reviewed and reported. QC department reviews are intended to verify that laboratory personnel implements the laboratory's quality systems and that the data meets method, client, and regulatory requirements. Analytical QC and corrective action specifications are provided for the following analyses:

Table 28-1. Organic Analysis by Gas Chromatography/Mass Spectrometry (GC/MS)

Source QSM 5.3; Appendix B, Table B-4
Analytical Group Organics
Analytical SOP# 01 (Table 23-2)

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Method Blank (MB)	One per preparatory batch.	No analytes detected > ½ LOQ or > 1/10th the amount measured in any sample or 1/10th the regulatory limit, whichever is greater. Common contaminants must not be detected > LOQ.	Correct problem. If required, reprep and reanalyze MB and all QC samples and field samples processed with the contaminated blank.	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch.	Results may not be reported without a valid MB. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Laboratory Control Sample (LCS)	One per preparatory batch.	A laboratory must use the QSM Appendix C Limits for batch control if project limits are not specified.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated preparatory batch for	If reanalysis cannot be performed, data must be qualified and explained in the Case Narrative.	Must contain all surrogates and all analytes to be reported.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
		If the analyte(s) are not listed, use in-house LCS limits if project limits are not specified.	failed analytes if sufficient sample material is available.	Apply Q-flag to specific analyte(s) in all samples in the associated preparatory batch.	Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed.
Matrix Spike (MS)	One per preparatory batch.	A laboratory must use the QSM Appendix C Limits for batch control if project limits are not specified. If the analyte(s) are not listed, use in-house LCS limits if project limits are not specified.	Examine the project-specific requirements. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	Must contain all surrogates and all analytes to be reported. For matrix evaluation only. If MS results are outside the limits, the data shall be evaluated to determine the source(s) of difference, i.e., matrix effect or analytical error.
Matrix Spike Duplicate (MSD) or Matrix Duplicate (MD)	One per preparatory batch.	A laboratory must use the QSM Appendix C Limits for batch control if project limits are not specified. If the analyte(s) are not listed, use in-house LCS limits if	Examine the project-specific requirements. Contact the client as to additional measures to be taken.	For the specific analyte(s) in the parent sample, apply J-flag if acceptance criteria are not met and explain in the Case Narrative.	MSD: Must contain all surrogates and all analytes to be reported. The data shall be evaluated to determine the source of difference.

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
		project limits are not specified. MSD or MD: RPD of all analytes ≤ 20% (between MS and MSD or sample and MD).			For Sample/MD: RPD criteria only apply to analytes whose concentration in the sample is greater than or equal to the LOQ.
Surrogate Spike	All field and QC samples.	QC acceptance criteria specified by the project if available; otherwise, use QSM Appendix C limits or in-house LCS limits if analyte(s) are not listed.	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 is present, reanalysis may not be necessary, but the client must be notified prior to reporting data and the failures must be discussed in the Case Narrative.	Apply Q-flag to all associated analytes if acceptance criteria are not met and explain in the Case Narrative.	Alternative surrogates are recommended when there is obvious chromatographic interference.

Notes:

LCS	laboratory control sample	MSD	matrix spike duplicate
LOQ	limit of quantitation	QC	quality control
MB	method blank	RPD	relative percent difference
MS	matrix spike		

Worksheet 29—Project Documents and Records

Document/Record	Generation	Verification	Storage Location
Sample Collection and Field Records			
Contractor Daily QC Reports	Field Team Leader	Project Manager	Project File
Field logbook or data collection sheets	Field Technicians	Field Team Leader	
Chain of Custody Forms/Bill of Laden			
Equipment calibration logs			
Equipment maintenance, testing, and inspection logs			
Deviations			
Corrective Action Reports			
Reported field sample results			
Safety Records	Site Safety & Health Officer	Safety & Health Manager	Project/Corporate File
Project Assessments			
Field Audit Checklists	Field Team Leader	Project Manager	Project File
Data verification checklists	Field Team Leader/ Project Chemist		
Data validation report	Project Chemist		
Data usability assessment report	Project Chemist		
Corrective Action Forms	Field Team Leader/ Project Chemist		
Laboratory Records			
Laboratory Audit Report (if applicable)	Project Chemist	Project Manager	Project File
Sample Acknowledgment Letters			
Project Narratives	Laboratory Project Manager	Project Chemist	Project File
Data package completeness checklists			
QA review records			
Data Packages/EDDs			
Corrective action and deviations forms			

The laboratory data package will be organized such that the analytical results are reported on a per analytical batch basis unless otherwise specified. In addition to the summary data deliverable, a full supporting raw data deliverable package is required from the laboratory. All data will be provided electronically as a PDF file attached to the annual reports.

An EDD from the laboratory is required for all data. The laboratory will provide Ahtna with an EDD in the current format for the chemistry module. The data will undergo QA reviews prior to being loaded into the project database. Delivery time for data from the laboratory will vary based on project-specific data use.

Documentation and reports specified in this QAPP will be retained in Adobe PDF format.

Worksheet 31/32/33—Assessments and Corrective Action

Contractor Quality Control

Assessment	Person(s) Responsible for Performing Assessment	Assessment Mechanism	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Phase I – Preparatory Phase					
Have planning documents been prepared in accordance with the statement of work and regulatory requirements? Have regulatory comments been addressed? Are planning documents approved?	Project Manager, Ahtna QC Manager, Ahtna	Peer review of planning documents in addition to technical editors, project management, and QC review. Author and Project Manager review of the response to comments and revisions to the document. Receive sign-off from USACE	Document author and Project Manager, Ahtna	Document author and Project Manager, Ahtna	Project Manager, Ahtna

Assessment	Person(s) Responsible for Performing Assessment	Assessment Mechanism	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Phase I – Preparatory Phase					
Have planning documents been read by appropriate project personnel (including subcontractors)?	Project Chemist, Ahtna	Personnel to complete sign-off form for each applicable document that it has been read and requirements are understood	Project Chemist, Ahtna Field Team Leader, Ahtna	Project Chemist, Ahtna Field Team Leader, Ahtna	Project Chemist, Ahtna
Are staff and subcontractors prepared to implement project activities according to planning documents? Does the contract laboratory (and any approved subcontract laboratories) have current DoD ELAP certification for the planned analyses?	Project Chemist, Ahtna Field Team Leader, Ahtna	Perform project kick-off meetings with laboratory and field personnel to review requirements and expectations for performance. Review copy of current DoD ELAP Certificate	Project Manager, Subcontracted Laboratory Field Team Leader, Ahtna	Project Manager, Subcontracted Laboratory Field Team Leader, Ahtna	Project Chemist, Ahtna

Assessment	Person(s) Responsible for Performing Assessment	Assessment Mechanism	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Phase I – Preparatory Phase					
Is necessary field equipment available and in acceptable working order?	Field Team Leader, Ahtna	Inspect field equipment and compare inventory and condition of equipment with planned activities. Inspect field equipment calibration documentation for compliance with requirements specified in this QAPP	Field Team Leader, Ahtna	Field Team Leader, Ahtna	Project Chemist, Ahtna

Assessment	Person(s) Responsible for Performing Assessment	Assessment Mechanism	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Phase II – Initial Phase					
Is work being performed in accordance with project plans?	Project Chemist, Ahtna QC Manager, Ahtna	Perform field audits. 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 an additional audit from the DoD ELAP accrediting bodies	Project Manager, Subcontracted Laboratory Field Team Leader, Ahtna	Project Chemist, Ahtna Project Manager, Subcontracted Laboratory Field Team Leader, Ahtna	Project Chemist, Ahtna
Have necessary audits been performed?	Project Manager, Ahtna	Review audit reports of findings from field and laboratory audits	Project Chemist, Ahtna	Project Chemist, Ahtna	—
Are daily Contractor QC Reports being prepared?	Project Manager, Ahtna	Review daily Contractor QC Reports from field supervisors	Field Team Leader, Ahtna	Field Team Leader, Ahtna	QC Manager, Ahtna

Assessment	Person(s) Responsible for Performing Assessment	Assessment Mechanism	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions	Person(s) Responsible for Monitoring Effectiveness of Corrective Action
Phase II – Initial Phase					
Do project plans adequately address any changes in project activities or goals?	Project Chemist, Ahtna	Review any changes in project activities or goals for compliance with approved plans	Project Chemist, Ahtna	Project Chemist, Ahtna	Project Chemist, Ahtna
Phase III – Follow-up and Reporting Stage					
Have data reports been prepared in accordance with project plans?	Project Manager, Ahtna	Compare data reports to specifications in the Task Order and planning documents	Document Authors	Document Authors	Project Manager, Ahtna
Are reports adequate to meet client and regulatory agency requirements?	Project Manager, Ahtna	Review client and regulatory comments and prepare response to comments and revised reports	Document Authors	Document Authors	Project Manager, Ahtna

Assessments

Assessment Type	Person(s) Responsible for Performing Assessment	Frequency	Projected Delivery Date(s)	Assessment Deliverable	Report Recipient(s)
Field progress report	Field Team Leader, Ahtna	Daily	Daily during field activities	Summarizing e-mail	Project Manager, Ahtna
Contractors QC Report	Field Team Leader, Ahtna	Daily	Daily during field activities	Ahtna form	Project Manager, Ahtna
Data review and verification	Project Chemist, Ahtna	For all analytical delivery packages	After arrival of data from the laboratory and during data verification activities	E-mail of deficiencies	Subcontracted Laboratory QA Officer
Data validation	Project Chemist, Ahtna	One after all data are validated	21 business days after receipt of validated data	Data validation report	Project Manager, Ahtna
Data evaluation	Project Manager, Ahtna	One after project completion	45 business days after project completion	Data evaluation summary report	BRAC BEC, ARMY BRAC Project Manager, USACE

Assessments and Corrective Action

Assessment Type	Responsibility for Responding to Assessment Findings	Assessment Response Documentation	Timeframe for Response	Responsibility for Implementing Corrective Action	Responsible For Monitoring Corrective Action Implementation
Daily field documentation reviews	Field Team Leader, Ahtna	Field notes/e-mail	As soon as notification of corrective action is received	Field Team Leader, Ahtna	Project Manager, Ahtna Field Team Leader, Ahtna
Data review and verification	Project Chemist, Ahtna Subcontracted Laboratory, QA officer	Corrective action reports and/or updated case narratives and corrected data submissions	3 to 5 business days	Project Chemist, Ahtna Subcontracted Laboratory, QA officer	Project Chemist, Ahtna
Daily field documentation reviews	Field Team Leader, Ahtna	Field notes/e-mail	As soon as notification of corrective action is received	Field Team Leader, Ahtna	Project Manager, Ahtna Field Team Leader, Ahtna
Data review and verification	Project Chemist, Ahtna Subcontracted Laboratory, QA officer	Corrective action reports and/or updated case narratives and corrected data submissions	3 to 5 business days	Project Chemist, Ahtna Subcontracted Laboratory, QA officer	Project Chemist, Ahtna

Deficiency Documentation

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	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	Project Manager, Ahtna	One week
Planning document (QAPP) sign-off by field and laboratory	Memo	Field Team Leader, Ahtna Project Manager, Subcontracted	Prior to the start of field activities	Obtain sign-off that document has been read and understood by field and lab personnel	Project Chemist, Ahtna	One week
Review of lab and field staff readiness	Memo	Field Team Leader, Ahtna Project Manager, Subcontracted	Prior to the start of field activities	Provide kick-off meeting notes from field and lab meetings	Project Chemist, Ahtna	One week
Review of field equipment	Memo	Field Team Leader, Ahtna	Prior to the start of field activities	Provide checklist documenting field equipment is available and in good working order	Project Chemist, Ahtna	Prior to the start of field activities

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	Timeframe for Response
Phase II – Initial Phase						
Field and laboratory audit	Field and Lab audit report	Field Team Leader, Ahtna Project Manager, Subcontracted Laboratory Project Chemist. Ahtna Project Manager, Ahtna	Within 48 hours of audits	Field and laboratory to issue formal response to audit findings requiring corrective action	Project Chemist, Ahtna	One week
Review of Contractor QC Reports	Memo	Field Team Leader, Ahtna QC Manager, Ahtna	Within 48 hours of review	Revision of Contractor QC Reports as needed	Project Manager, Ahtna	One week
Review of project plans to reflect current site or lab activities	Memo	Project Manager, Ahtna Field Team Leader, Ahtna Project Manager, Subcontracted Laboratory	Within 10 days of observations	Update project plans to reflect current conditions (may be an addendum to existing document) or documentation of changes to field or lab protocol to be in accordance with project plans	Project Manager, Ahtna	Prior to next scheduled sampling event

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	Timeframe for Response
Phase III – Follow-Up and Reporting Phase						
Review of Data Reports	Internal comments from staff and external comments from client and Regulatory Agencies	Document Author Project Manager, Ahtna	Internal = prior to issuance of report, External = Within 30 days of receipt of report	Provide response to comments and revise report as needed	Commenting Client and or Agencies BRAC BEC, Army BRAC Project Manager, USACE Project Manager, Ahtna	

Worksheet 34—Data Verification and Validation Inputs

To ensure that scientifically sound data of known and documented quality are used in making environmental decisions, the following three-step data review will be performed.

- Step I (verification) will confirm 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
- Step II (validation) will assess whether the sampling and analytical processes comply with the contract-specific and the QAPP-specific requirements
- Step III (usability assessment) will determine whether the resulting data are suitable as a basis for the decision being made.

Worksheets 34 to 37 describe the processes to be followed. Worksheet 34 (Data Verification and Validation Inputs) establishes the procedures that will be followed to verify project data including, but not limited to, sampling documents and analytical data packages. The items subject to verification and validation are listed below.

Table 34-1. Data Verification and Validation Inputs

Item	Description	Verification (Completeness)	Validation (Conformance to specifications)
Planning Documents/Records			
1	Approved QAPP	✓	
2	Field SOPs	✓	
3	Laboratory SOPs	✓	
Field Records			
4	Field logbooks	✓	✓
5	Sample processing logs	✓	✓
6	Chain of custody forms	✓	✓
7	Field corrective action reports	✓	✓
Analytical Data Package			
8	Cover sheet (laboratory identifying information)	✓	✓
9	Case narrative	✓	✓
10	Internal laboratory Chain of custody	✓	✓
11	Sample receipt records	✓	✓
12	Sample chronology (that is, dates and times of receipt, preparation, and analysis)	✓	✓
13	DL/LOD/LOQ establishment and verification	✓	✓

Item	Description	Verification (Completeness)	Validation (Conformance to specifications)
14	Standards traceability	✓	✓
15	Instrument calibration records	✓	✓
16	Definition of laboratory qualifiers	✓	✓
17	Results reporting forms	✓	✓
18	QC sample results	✓	✓
29	Corrective action reports	✓	✓
30	EDD	✓	✓

Worksheet 35—Data Verification Procedures

Verification Input	Description	Internal/ External	Responsible for Verification
Field Notes	Verify that records are present and complete for each day of field activities. Verify boring logs. Verify that all planned samples, including field QC samples, were collected and that sample collection locations are documented. Verify that meteorological data were provided for each day of field activities. Verify that changes/exceptions are documented and were reported in accordance with requirements.	Internal	Field Team Leader, Ahtna Project Manager, Ahtna
Chain of custody and Shipping Forms	Verify the completeness of chain of custody records. Examine entries for consistency with the field logbook and sample processing log. Check that appropriate method and sample preservation has been recorded. Verify that the required volume of sample has been collected and that sufficient sample volume is available for QC samples (for example, MS/MSD). Verify that all required signatures and dates are present. Check for transcription errors.	Internal/ External	Field Team Leader, Ahtna Project Chemist, Ahtna Project Manager, Subcontracted Laboratory
Laboratory Data	Verify that the laboratory deliverable contains all records specified in the QAPP. Check sample receipt records to ensure sample condition upon receipt was noted, and any missing/broken sample containers were noted and reported according to plan. Compare the data package with the chain of custody to verify that results were provided for all collected samples. Review the narrative to ensure all QC exceptions are described. Check for evidence that any required notifications were provided to project personnel as specified in the QAPP. Verify that necessary signatures and dates are present.	Internal	Project Chemist, Ahtna
Audit Reports, Corrective Action Reports	Verify that all planned audits were conducted. Examine audit reports. For any deficiencies noted, verify that corrective action was implemented according to the plan.	Internal/ External	Field Team Leader, Ahtna Project Chemist, Ahtna Project Manager, Subcontracted Laboratory

Worksheet 36—Data Validation Procedures

Table 36-1. Data Validation Procedures

Step IIa/IIb	Validation Input	Description	Responsible for Verification
IIa	Methods used for sample collection	Field data notes will be reviewed for compliance with published methods and SOPs. Deviations from SOPs and methods described in this QAPP will be summarized and provided to the Project Manager in writing.	Field Team Leader, Ahtna
IIa	Methods used for analysis	Laboratory data packages will be reviewed to verify that the methods specified in this QAPP were followed. Deviations shall be documented in writing.	Project Chemist, Ahtna
IIa	Sampling SOPs and Analytical Compliance	Review field notes for compliance with SOPs. Review laboratory data deliverables for compliance with QAPP and published methods.	Field Team Leader, Ahtna
IIa	Documentation of method QC results	Review laboratory data packages to determine if QC parameters required by the referenced methods were performed and reported. The QC forms will be reviewed to determine if method acceptance criteria were met. Method QC outliers will be identified by the laboratory in the case narrative. The reviewer will determine if data will require qualification due to outliers.	Project Chemist, Ahtna
IIb	Documentation of QAPP QC sample results	Verify that QC samples specified in this QAPP were analyzed and reported. The reviewer will identify QAPP QC sample results in the data validation report.	Project Chemist, Ahtna
IIb	Laboratory data package documentation	Laboratory data packages will be reviewed to ensure that documentation requirements specified in the QAPP have been met. If deficiencies are found, the data reviewer will document the issue in a memorandum to the laboratory. The laboratory will address deficiencies in writing or submit a revised data package addressing the deficiency.	Project Chemist, Ahtna
IIb	Target analyte list	Laboratory report summary forms will be reviewed to verify that the target compounds and parameters specified in the QAPP were reported.	Project Chemist, Ahtna
IIb	LOQs	Determine that the quantitation limits were achieved, as outlined in the QAPP. Verify that the laboratory analyzed a low standard at the quantitation limit in the initial calibration.	Project Chemist, Ahtna

Step IIa/IIb	Validation Input	Description	Responsible for Verification
IIa	Raw data and laboratory transcription errors	Ten percent (10%) of raw data will be reviewed to confirm laboratory calculations and that there are no transcription errors. Chromatographs that contain manual integrations, if any, will be evaluated as part of the raw data review.	Project Chemist, Ahtna
IIa and IIb	Data Validation Report	Summarize deviations from the referenced methods, SOPS, and QAPP-specific requirements. Include qualified data and explanations of all data qualifiers.	Project Chemist, Ahtna
IIa and IIb	Data Validation Report Review	Review validation reports and Validation Summary Report.	Project Chemist, Ahtna

The Ahtna Project Chemist will perform Stage 2B (not to be confused with Table 36-1, Step IIb) data validation on 100 percent of the laboratory-generated data. Validation will be performed in accordance with the *Department of Defense General Data Validation Guidelines* (DoD, 2018) and analytical technique specific modules and the project QAPP. Data reported for investigation derived waste (IDW) disposal are not reviewed.

The following hierarchy will be used in applying guidance/requirements documents to the review of project-specific analytical data. Professional judgment may take precedence depending on the DQOs.

QAPP/Work Plan

DoD Data Validation Guidelines (DOD, 2018)

Field Data Review

Field-generated information may include field logbooks, boring logs, sample chain of custody forms, shipping documents, sampling observations, sample labels, and other miscellaneous field observations.

All field measurements and or field log information will be entered into field forms or logbooks, and reviewed daily by the field team leader or designee. The designee may be a qualified field geologist, engineer, environmental scientist, and/or technician.

Laboratory Data Review Requirements

All analytical data generated by the laboratory will be verified before submittal to the Project Chemist. The internal data review process, which is multi-tier, will include all aspects of data generation, reduction, and QC assessment. In each analytical section, the analyst performing the tests shall review 100 percent of the definitive data. After the analyst's review has been completed, 100 percent of the data will be reviewed independently by a senior analyst or by the supervisor of the respective analytical section using the same criteria.

Elements for review or verification at each level must include, but not be restricted to, the following:

- Sample receipt procedures and conditions
- Sample preparation
- Appropriate SOPs and analytical methodologies
- Accuracy and completeness of analytical results
- Correct interpretation of all raw data, including all manual integration
- Appropriate application of QC samples and compliance with established control limits
- Documentation completeness (for example, all anomalies in the preparation and analysis have been identified, appropriate corrective actions have been taken and documented in the case narrative[s], associated data have been appropriately qualified, and anomaly forms are complete)
- Accuracy and completeness of data deliverables (electronic)

Laboratory Data Evaluation

The calibration, QC, corrective actions, and flagging requirements for definitive data are shown in Worksheet 12 (Measurement Performance Criteria), Worksheet 15 (Project Action Limits), Worksheet 24 (Analytical Instrument Calibration), and Worksheet 28 (Analytical Quality Control). The laboratory may apply data qualifiers based on its review or add a note in the laboratory case narrative. The definitions of any data qualifiers applied by the laboratory must be defined in the case narrative. The data qualifiers are reviewed by the supervisor of the respective analytical sections after the first and second-level reviews of the laboratory data have been performed.

Data Review Guidelines

The laboratory assessment of the data quality will be reviewed for completeness and accuracy. Data review will be done manually and will include, but is not limited to, the following:

- Sampling documentation (such as the chain of custody form)
- Preservation summary and technical holding times
- Presence of all analyses and analytes requested
- Use of the required sample preparation and analysis procedures
- The method detection and reporting limits will be evaluated against the project requirements
- The correctness of the concentration units
- Case narrative

Data Verification/Validation Guidelines

The data verification process builds on data review. Project data will be reviewed and verified as part of the data assessment for this project. The review will be performed on an sampling event basis by assessing QC samples and associated field sample results. Data verification guidelines have been developed in accordance with the *Department of Defense General Data Validation Guidelines* (DOD, 2018).

Summary data review and verification will be performed as follows:

- Chain of custody documentation
- Holding time

- QC sample frequencies
- MB
- LCS
- Surrogate spikes
- MS/MSD
- Initial and continuing calibration information
- FD precision
- Case narrative review and other method-specific criteria

The manual verification/validation process includes data flagging for issues related to MB, LCS, MS/MSD samples, FDs, surrogate recoveries, holding time, and reconciliation of dilutions and re-extraction. Data flags, as well as the reason for each flag, are entered into an electronic database and made available to the data users. A final flag is applied to the data by the Ahtna Project Chemist after evaluating all flags entered into the database and selecting the most conservative of the verification flags.

If a systematic problem or another major issue with the data is identified during the data review and verification process, the Ahtna Project Chemist will contact the laboratory's Project Manager or QA Manager.

Additional evaluation of the data may be performed, including an in-depth review of the raw data to verify accuracy followed by analysis and interpretation of the data in the context of the project objectives and end-user as part of the usability assessment. A data validation report will be prepared to summarize the findings and discussing their impact on the overall data usability. It will be incorporated into the final data evaluation summary report.

Flagging Conventions

Final data qualifier definitions are summarized in Table 36-2.

Data Usability

The final report will contain a statement of data completeness and usability.

Table 36-2. Verification/Validation Data Qualifiers

Qualifier	Description
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 low.
J+	The result was an estimated quantity, but the result may be biased high.
N	The analysis indicates the presence of an analyte for which there was presumptive evidence to make a "tentative identification."
NJ	The analyte has been “tentatively identified” or “presumptively” 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.

Table 36-3 presents the general data validation guidelines to be used by Ahtna for applying the data qualifiers.

Table 36-3. Data Qualifying Conventions—General

QC Requirement	Criteria	Flag	Flag Applied To
Holding Time	Time exceeded for extraction and analysis	J- for positive results; X or UJ for NDs	All analytes in the sample
Sample Preservation	Sample not preserved (if sample preservation was not done in the field but was performed at the laboratory upon sample receipt, no flagging is required)	J- for positive results; X or UJ for NDs	Sample
Sample Integrity	Temperature out of control	J- for positive results; X or UJ for NDs	Sample
Initial Calibration	All analytes must be within method specified criteria	J for positive results; X or UJ for NDs	All associated samples in analysis batch

QC Requirement	Criteria	Flag	Flag Applied To
Second Source (ICV)	All analytes must be within method specified criteria	High Bias: J for positive results, no flag for NDs Low Bias: J for positive results, UJ for NDs X for all NDs greater than twice the control criteria	All associated samples in analysis batch
Low-level Calibration Check or ICP	All analytes must be within 20% of expected value	High Bias: J positive results, no flag for NDs Low Bias: J positive results, UJ NDs X for all NDs greater than twice the control criteria	All associated samples in analysis batch
Internal Standards	Area > upper control limit	J for positive results, no flag for NDs	Samples
Internal Standards	Area < lower control limit	J for positive results; UJ for NDs	Samples
Surrogates	%R > upper control limit	J for positive results, no flag for NDs	Sample
Surrogates	%R < lower control limit	J for positive results; UJ for NDs	Sample
Surrogates	%R <10%	J for positive results; X for NDs	Sample
LCS	%R > upper control limit	J for positive results, no flag for NDs	The specific analyte(s) in all samples in the associated batch
LCS	%R < lower control limit	J for positive results; UJ for NDs	The specific analyte(s) in all samples in the associated batch
LCS	%R <10%	J for positive results; X for NDs	The specific analyte(s) in all samples in the associated batch
Blanks (Method, Field, Equipment, Trip)	Analyte(s) detected (use the blank of the highest concentration)	U for positive sample results times the highest blank concentration	All samples in preparation, field or analytical batch, whichever one applies

QC Requirement	Criteria	Flag	Flag Applied To
Field Duplicates	RPD > 30%. If sample result is less than 5X LOQ than ±1X LOQ	J for positive results, no flag for NDs	The specific analyte(s) in the associated sample
MS/MSD and Post-Digestion Spikes	%R > upper control limit	J for positive results, no flag for NDs	The specific analyte(s) in the parent sample
MS/MSD and Post-Digestion Spikes	%R < lower control limit	J for positive results; UJ for NDs	The specific analyte(s) in the parent sample
MS/MSD and Post-Digestion Spikes	MS/MSD %R <10%	J for positive results; X for NDs	The specific analyte(s) in the parent sample
MS/MSD and Post-Digestion Spikes	MS/MSD RPD > 30%	J for positive results, no flag for NDs	The specific analyte(s) in the parent sample
MS/MSD and Post-Digestion Spikes	Sample concentration > 4 times the spike concentration	No flag required	The specific analyte(s) in the parent sample
MS/MSD and Post-Digestion Spikes	Excessive dilution	No flag required	The specific analyte(s) in the parent sample
Serial Dilutions	All analytes must be within 10% of expected value	J positive results, UJ NDs	The specific analyte(s) in the parent sample
Serial Dilutions	Sample concentration < 50x Method DL	No flag required	The specific analyte(s) in the parent sample

Worksheet 37—Data Usability Assessment

The data usability assessment is an evaluation based on the results of data verification and validation in the context of the overall project decisions or objectives. The assessment determines whether project execution and resulting data meet the project DQOs. Both the sampling and analytical activities must be considered, with the ultimate goal of assessing whether the final, qualified results support the decisions to be made with the data.

The following subsections summarize the processes to determine whether the collected data are of the right type, quality, and quantity to support the environmental decision-making for the project and describe how data quality issues will be addressed and how limitations of the use of the data will be handled.

Summary of Usability Assessment Processes

It is the responsibility of the Ahtna Project Chemist and the laboratory to ensure that the data meet the DLs and laboratory QC limits listed in this QAPP. During the data verification assessment, non-conformances are documented, and data are qualified for use in decision-making. The data are determined to be usable by the Project Chemist based on the requirements of this QAPP. Data gaps will be present if a sample is not collected, a sample is not analyzed for the requested parameters, or the data are determined to be unusable. The need for further investigation will be determined on a case-by-case basis. All data are usable as qualified by the data validator, with the exception of rejected data. Estimated and/or biased results are usable. Outliers, if present, can be addressed on a case-by-case basis. There is no generic formula for determining whether a result is an outlier. Potential outliers will be referred to a statistician and senior consultant, who will determine which formulas are appropriate for classifying data points in a statistically appropriate and defendable manner.

Evaluation Procedures to Assess Project-specific Overall Measurement Error

An in-depth assessment occurs during the data verification process. The verification will assess conformance with the requirements of the methods, SOPs, and objectives of this QAPP. The findings of the data verification process will generate qualifiers applied to the data considered in context to assess the overall usability of the data.

Personnel Responsible for Performing Usability Assessment

- Project Chemist, Ahtna
- Database Manager, Ahtna
- Review Team Leader, Ahtna
- Project Manager, Ahtna
- Field Team Leader, Ahtna

Usability Assessment Documentation

The data verification report will identify precision and accuracy exceedances with respect to the laboratory performance for each batch of samples, as well as the comparability of FDs. All the results will be assembled and statistically reported for an overall quality assessment provided in the final data evaluation summary report. The discussion will cover precision, accuracy, representativeness, comparability, and completeness defined as follows.

Precision

Laboratory precision is measured by the variability associated with duplicate (two) or replicate (more than two) analyses. Total precision is the measurement of the variability associated with the entire sampling and analytical process. It is determined by analysis of duplicate field and/or laboratory samples and measures variability introduced by both the laboratory and field operations. FD and MS/MSD samples will be analyzed to assess field and laboratory precision. For duplicate sample results, the precision is evaluated using the RPD. For replicate results, the precision is measured using the relative standard deviation (RSD). The formula for the calculation of RPD is provided below.

If calculated from duplicate measurements: (1)

$$RPD = \frac{C1 - C2}{\overline{x}(C1, C2)} \times 100$$

Where:

RPD	=	relative percent difference
C1	=	larger of the two observed values
C2	=	smaller of the two observed values
$\overline{x}$	=	mean of the observed values

If calculated from three or more replicates, use RSD rather than RPD: (2)

$$\frac{S}{\overline{x}} \times 100$$

Where:

RSD	=	relative standard deviation
S	=	standard deviation
$\overline{x}$	=	mean of replicate analyses Standard deviation,

S is defined as follows: (3)

$$S = \sqrt{\frac{(x_1 - \overline{x})^2 + (x_2 - \overline{x})^2 + (x_3 - \overline{x})^2 + \ldots}{n - 1}}$$

Where:

S	=	standard deviation
n	=	number of replicate measurements
x	=	measured value of the replicate
$\overline{x}$	=	mean of the replicate analyses

Accuracy

Accuracy reflects the total error associated with a measurement. A measurement is considered accurate when the reported value agrees with the true value or known concentration of the spike or standard within acceptable limits. Analytical accuracy is measured by comparing the percent recovery of analytes spiked into an LCS and/or MS/MSD to a control limit. Surrogate compound recoveries are also used to assess accuracy and method performance for each sample analyzed.

Both accuracy and precision are calculated for each analytical batch, and the associated sample results are interpreted by considering these specific measurements.

The formula for calculation of accuracy is included below as percent recovery (%R). (4)

$$\%R = \frac{S - U}{C_{sa}} \times 100$$

Where:

%R	=	percent recovery
S	=	measured concentration in spiked aliquot
U	=	measured concentration in unspiked aliquot
Csa	=	actual concentration of spike added

For situations where a standard reference material is used instead of or in addition to MSs: (5)

$$\%R = \frac{C_m}{C_{sm}} \times 100$$

Where:

%R	=	percent recovery
Cm	=	measured concentration of standard reference material
Csm	=	actual concentration of standard reference material

Representativeness

Representativeness is the degree to which sample data accurately reflect the characteristics of a population of samples. It is achieved through a well-designed sampling program and by using standardized sampling strategies and techniques and analytical procedures. Factors that can affect representativeness include sample collection, storage, preservation procedures, site homogeneity, sample homogeneity at a single point, and available information around which the sampling program is designed.

Completeness (Statistical)

Completeness is a measure of the amount of valid data obtained compared with the amount expected under correct, normal conditions. It is calculated for the aggregation of data for each analyte measured as a compound of concern for the project objectives. Valid data are data that are usable in the context of the project goals. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results expressed as a percentage determines the completeness of the dataset. For completeness requirements, valid results are all results not qualified with an R-flag after a usability assessment has been performed. The goal for completeness, based on specific project goals, is 95 percent.

Defined as follows for all measurements: (7)

$$\%C = \frac{V}{T} \times 100$$

Where:

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

Comparability

Comparability is the confidence with which one data set can be compared to another. It is achieved by maintaining standard techniques and procedures for collecting and analyzing samples and reporting the analytical results in standard units.

References

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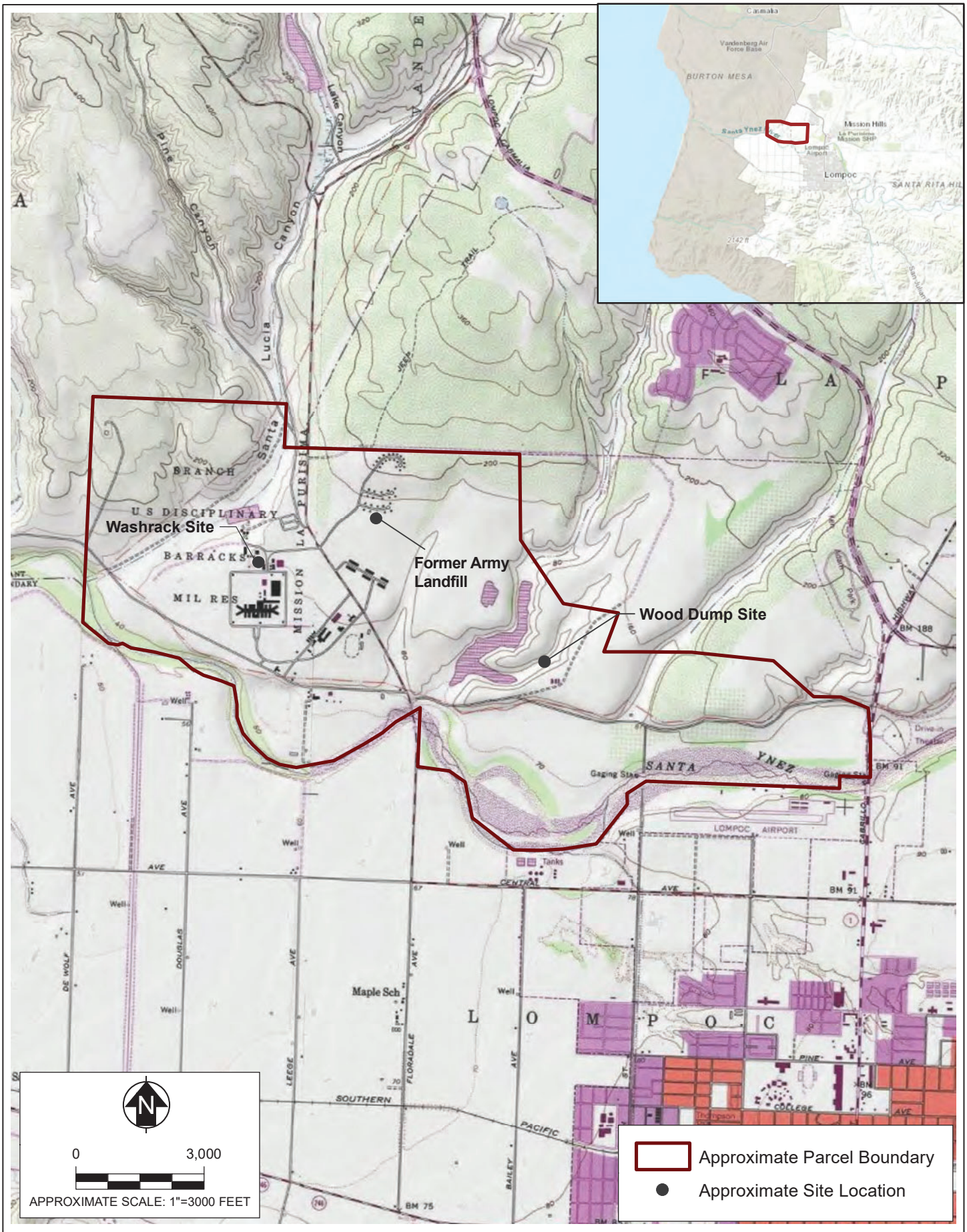
Figures



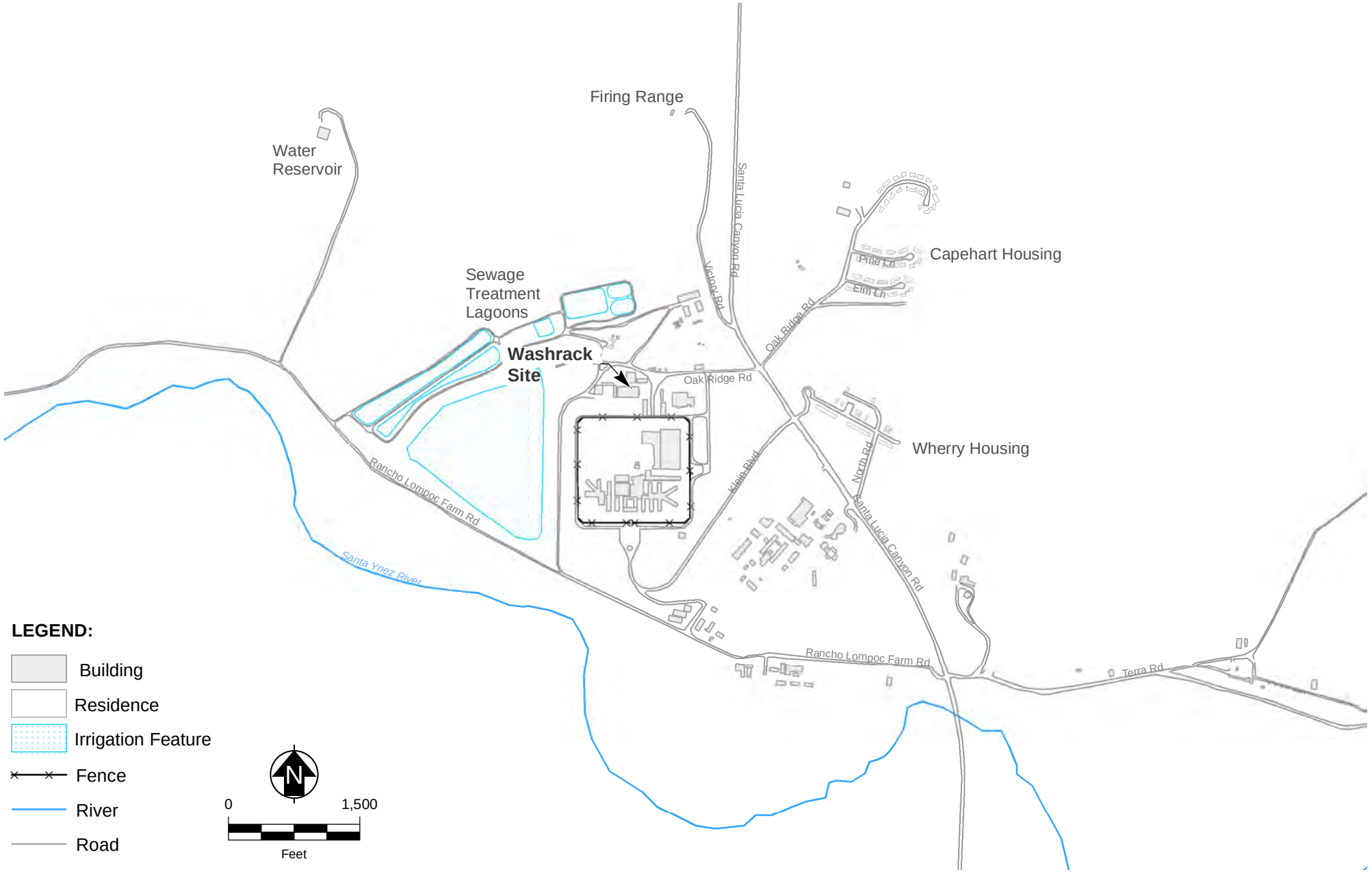
Ahtna

Quality Assurance Project Plan/Work Plan
Environmental Long-Term Monitoring and Inspection
Former USDB, Lompoc, California

Complex Location Map

1

Source: ERRG, 2021. Washrack Site Second Semiannual 2020 Groundwater Monitoring Report, Former United States Disciplinary Barracks, Lompoc, California



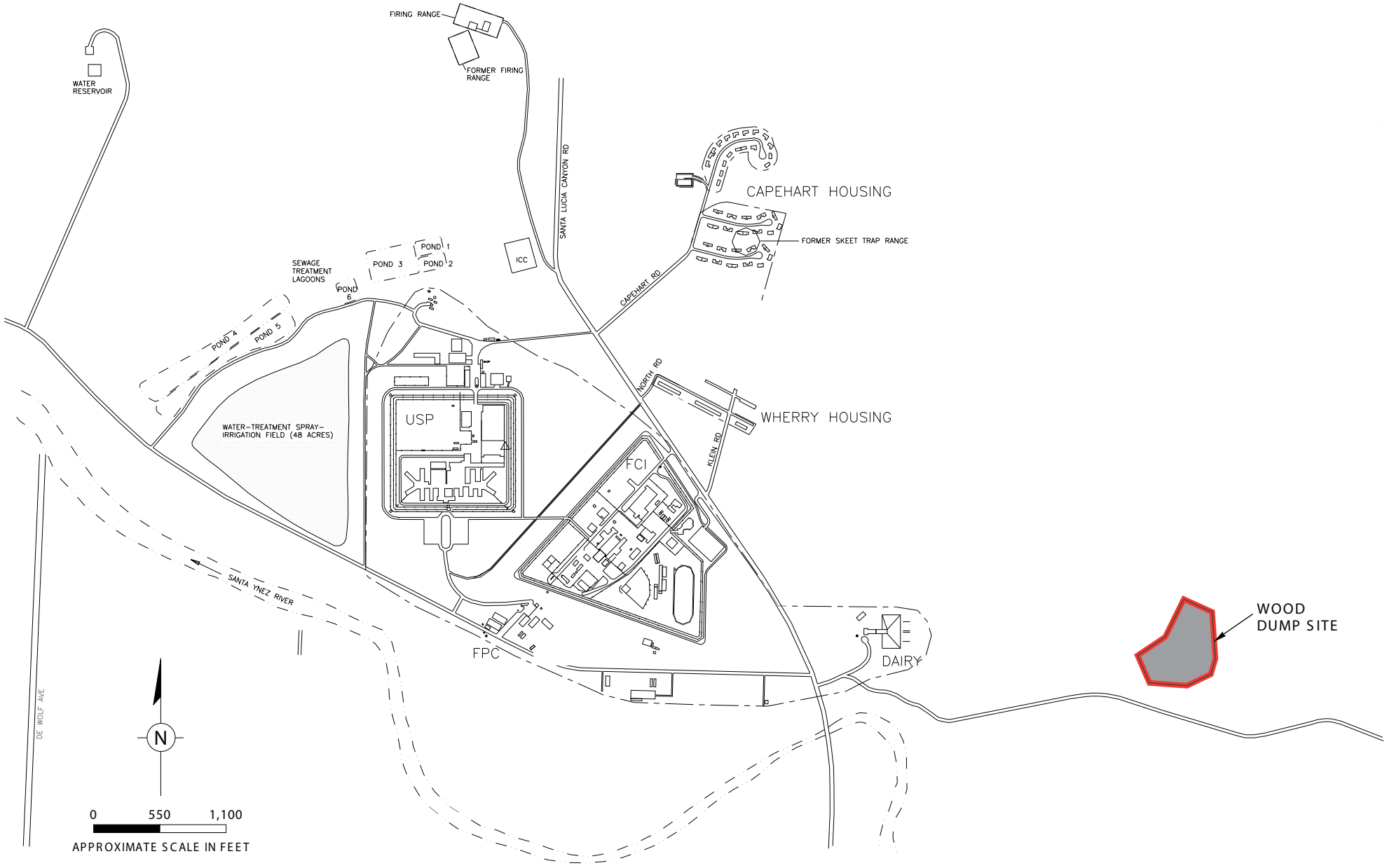
Ahtna

Quality Assurance Project Plan/Work Plan
Environmental Long-Term Monitoring and Inspection
Former USDB, Lompoc, California

Washrack Site Location Map

2

Source: ERRG, 2021. *Washrack Site Second Semiannual 2020 Groundwater Monitoring Report, Former United States Disciplinary Barracks, Lompoc, California.* January.



LEGEND:

Approximate Wood Dump Boundary

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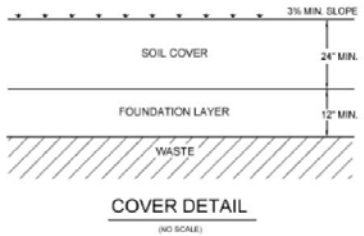
Quality Assurance Project Plan/ Work Plan
Environmental Long-Term Monitoring
Former USDB, Lompoc, California

Wood Dump Location Map

3

Source: Final Post Site Mitigation Maintenance and Monitoring Plan, Wood Dump Site, Former United States Disciplinary Barracks, Lompoc, California (Revision 1) (ARCADIS, 2005)



Notes:

1. High-density polyethylene (HDPE) drain pipes were installed October 2005 as part of the permanent erosion repairs.
2. The storm water sampling location is at the sampler's discretion on the basis of access, amount of flow, etc. as either the north or south overside drain and either the inlet or outlet.

LEGEND:

- Gas Monitoring Vapor Point
- Groundwater Monitoring Well
- 24" Corrugated Metal Pipe Culvert
- 12" HDPE Drain Pipe
- Drain Inlet
- Permanent Erosion Control Mat Lined Ditch
- Fence
- Gate
- Concrete V-Ditch
- Rip Rap
- Limit of Waste
- 1-foot Contour Interval

0 100 Feet

Elevation data from USGS
Coordinate System: U.S. State Plane, California FIPS 0405 Zone V, NAD 1983 Datum
Projection: Lambert Conformal Conic

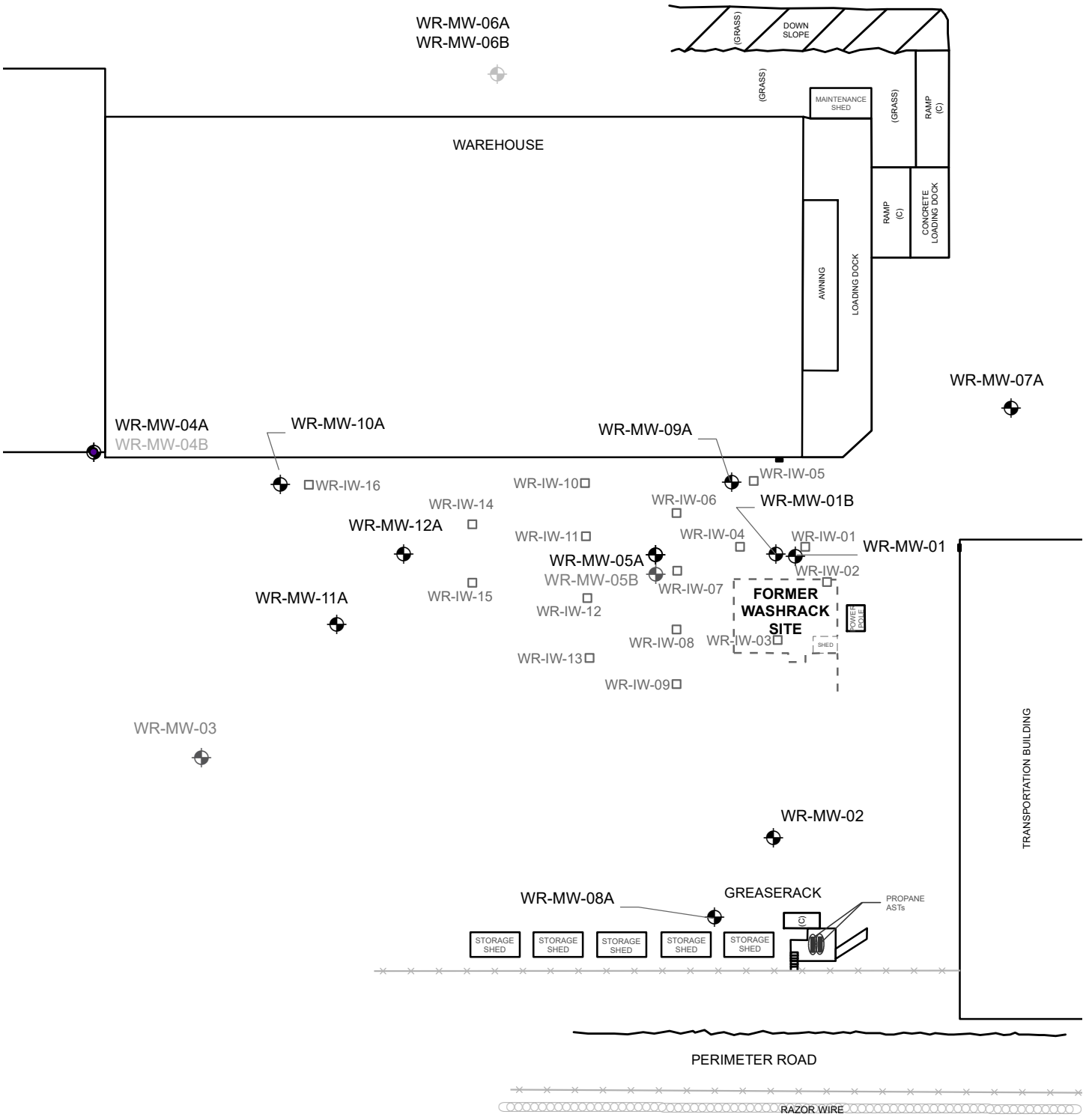
Ahtna

Quality Assurance Project Plan/Work Plan
Environmental Long-Term Monitoring and Inspection
Former USDB, Lompoc, California

Wood Dump Site Map

4

Source: Final Post Site Mitigation Maintenance and Monitoring Plan, Wood Dump Site, Former United States Disciplinary Barracks, Lompoc, California (Revision 1) (ARCADIS, 2005)



LEGEND:

- Former Injection Well (Abandoned)
- Monitoring Well
- Former Monitoring Well
- Fence

N

0 50

1" = 50'

Ahtna	**Quality Assurance Project Plan/ Work Plan** Environmental Long-Term Monitoring and Inspection Former USDB, Lompoc, California	**Washrack Monitoring Well Locations**	5

Source: ERRG, 2021. *Washrack Site Second Semiannual 2020 Groundwater Monitoring Report, Former United States Disciplinary Barracks, Lompoc, California.* January.

Appendices

Appendix A. Field Standard Operation Procedures and Example Field Forms

SOP-001	Field Sample Management
SOP-002	Field Activity Records
SOP-003	Equipment Decontamination Procedures
SOP-004	Chain of Custody
SOP-005	Packing and Shipping of Environmental Samples
SOP-006	IDW Management
SOP-007	Passive Groundwater Sampling
SOP-008	Measurement of Groundwater Levels
Checklist	Wood Dump Site Inspection

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to demonstrate representative environmental sample data by documenting the management of samples from time of collection through analysis and final disposition.

2.0 Scope

This SOP applies to all personnel who collect and/or handle environmental samples.

3.0 Method

3.1 General

An essential part of the sampling/analytical portion of any environmental project is demonstrating the integrity of the sample from collection to data reporting. Projects where analytical data are critical to project conclusions demand that accountability of the history of a sample be available to demonstrate that the data are a true representation of the environment. The chain of custody (COC) form is used as evidence in legal proceedings to demonstrate that a sample was not tampered with or altered in any way that may skew the analytical accuracy of the laboratory results. Therefore, it is extremely important that COC forms be complete, accurate, and consistent.

- Demonstrating sample integrity and accountability requires strict adherence to the proper use of the following six essential sampling components:
- Field Sampling Plans (FSPs);
- Sample labels;
- Sample logs (i.e., boring, well construction, development, and sampling log sheets);
- Sample custody seals;
- Field logbooks; and
- COC forms.

Successful implementation of these components requires a thorough understanding of sample custody requirements. A sample is under an organization's custody if:

- It is in an employee's physical possession;
- It is in view of an employee, after being in their physical possession;
- It was in an employee's physical possession and then locked up so no one could tamper with it; and
- It is in a designated and identified secure area, controlled and restricted to authorized personnel (or individuals accompanied by authorized personnel) only.

A sample remains in an organization's custody until relinquished in writing to another person or organization that is authorized to take custody of the sample.

3.2 Procedures

3.2.1 Sample Identification

A sample numbering system will be used to identify each sample, including duplicate samples. The sample number will be a unique identifier. This system allows for a uniform and consistent numbering system to be employed in the field. Samples to be collected will employ the following sample numbering system.

[Location/Well ID]-[Two digit day of month][Two month][Two digit year]-[Sample code]

Example ID: MW1030-073121-N

Where:

Location/Well ID (MW1030) = MW1030

Sample Date (073121) = 07/31/2021

Sample code (N) = Normal sample

(D) = Duplicate

For equipment blanks, field blanks, and trip blanks, there will be no sample code, and the location/well ID will be replaced with the following:

(FB) = Field Blank

(EB) = Equipment Blank

(TB) = Trip Blank

MS/MSD do not have a sample code instead the MS/MSD request is added to the chain of custody comment line.

3.2.2 Sample Labels

Sample labels are required to prevent misidentification of samples. Sample labels will generally be pre-printed by a database technician and taken to the field by the sampling crew.

The sample label will be affixed to the proper sample container at the time of the sampling event by the field sampler. The labels will contain the following information:

- Sample identification number (ID);
- Analyses requested;
- Preservatives used;
- Matrix spike/matrix spike duplicate (MS/MSD) if required.
- Field sampler's initials;
- Date (mm/dd/yy or m/d/yy, i.e., 04/03/18 or 4/3/18 is April 3, 2018); and
- Time of sample collection (military format).

Custody seals are narrow strips of adhesive paper used to document that no sample tampering has occurred during transport from the time of collection to laboratory receipt. Custody seals will be signed, dated, and attached to all coolers so they tear if the cooler is opened.

3.2.3 Field Logbooks

All samples collected will be documented in field logbooks. All field documentation will follow SOP-002, Field Activity Records.

3.2.4 Chain-of-Custody Form

Every person involved with sample collection and handling will know and understand the COC form, discussed in detail in SOP-004, Chain-of-Custody. These procedures will be made available to all field personnel.

The sample shipper will complete the COC form while preparing the samples for shipment. This individual or other authorized person will sign the "Relinquished By" box prior to sealing a sample shipping container for courier pickup after checking that samples and COC forms match (in other words, only samples identified on the enclosed COC(s) are in the container and all samples enclosed are listed on the COC(s) enclosed). The "Received By" box will be signed by the laboratory sample receipt staff. As long as COC forms are sealed inside the sample shipping container, commercial carriers are not required to sign the COC form.

Distribution of the COC form will be:

- Original and one copy - sealed in plastic bag and taped inside the top of the shipping container;
- One copy - file in appropriate Field Office project file; and
- One copy - submit to Data Management staff.

All changes to a COC form will be made by striking the incorrect information with a single line, initialing and dating the strike, and inserting the correct information. If changes are made to a COC form after the original distribution, the following steps will be taken:

- Make the change by striking the incorrect information with a single line, initialing and dating the strike, and inserting the correct information (in black or blue indelible ink). Add a comment as to why the change was made, as appropriate.
- Distribute copies of the corrected COC form as specified above.

Whenever a sample is split with a second party (e.g., client, agency) a separate COC form must be prepared for those samples.

4.0 Records

Procedures for maintaining COC forms are described in SOP-004, Chain-of-Custody.

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to set site-wide criteria for content entry and form of field logbooks and activity-specific forms, and to document procedures employed in recording site activities photographically or using a video camera.

2.0 Scope

This SOP applies to all personnel who record information in field logbooks and on forms, or employ photographic or video techniques to document site activities.

3.0 Method

3.1 General

An essential part of the sampling/analytical portion of any environmental project is assuring that proper documentation of all activities is accomplished. The primary document used to record site data is the field logbook and activity-specific forms. Tasks where analytical data or conclusions based upon analytical data may be used in litigation demand that accountability of the history of a sample be available to demonstrate that the data are a true representation of the environment. The field logbook and forms may be used as evidence in legal proceedings to defend procedures and techniques employed during site investigations. Therefore, it is extremely important that field documentation be factual, complete, accurate and consistent.

Likewise, when photographic or videography techniques are used to document site activities, the goal of the records is a true representation of field activities that accurately portrays site conditions or procedures.

3.2 Procedures

3.2.1 Preparation

New field logbooks and activity-specific forms will be obtained as needed from the Field Manager/Task Leader. The individual using the field logbook will be responsible for its care and maintenance throughout the field task.

Field logbooks will be bound with lined, consecutively numbered pages. All pages must be numbered prior to initial use of the logbook. The following information will be recorded on the cover, binding, or inside the front cover of the logbook:

- Field document control number;
- Activity;
- Contractor's name;
- Phone number; and
- Site contact (Field Manager/Task Leader).

Field forms will be specific to the activity being performed.

3.2.2 Operation

The following requirements must be followed when using a logbook:

- The date must be recorded at the top of each page.
- If data collection forms are specified by an activity-specific plan or procedure, the information need not be duplicated in the logbook.
- All changes must be made with a single line through the deletion. Changes must be initialed and dated.
- A diagonal line must be drawn through any space left at the bottom of each page.
- The bottom of each page will be signed by the author.
- Do not remove any pages from the logbook.

For field forms, each form must contain the date, location, the name of the personnel performing the work, and sufficient detail to allow a third party to understand what task was performed and what measurements/data was collected.

Entries into field forms and logbooks will be preceded with the time of the observation. The time should be recorded frequently and at the point of events or measurements that are critical to the activity being logged.

At each station where a sample is collected or an observation made, a detailed description of the location is required. If a map is not already available that shows the sample location, a sketch of the location is required. The sketch or diagram should be detailed enough for other individuals to locate the points at future times. A direction indicator or compass direction should be located on the sketch. It is preferred that maps and sketches be oriented so that north is towards the top of each page. Events and observations that should be recorded include, but are not limited to:

- Changes in weather that may impact field activities;
- Deviations from procedures outlined in any governing documents. Also record the reason for any noted deviation;
- Problems, downtime, or delays;
- Upgrade or downgrade of personal protective equipment;
- All task members and visitors;
- Actual and background readings of health and safety monitoring equipment;
- Identification of equipment used, including model numbers and/or serial identification numbers;
- Start and end times of sample locations; and
- Decontamination times and methods.

When samples are collected, the following should be recorded:

- Sample location;
- Sample number;
- Sample methodology;

- Sample description;
- Sample collector;
- Sample depth;
- Sample type;
- Sample analyses requested;
- Sample preservation and confirmation; and
- Quality control (QC) sample numbers and types.

3.2.3 Visual Recordings

When visual recordings (photographs or video recordings) are made, they will be documented in the associated field logbook. At the start of the day, the weather conditions should be recorded; the weather should also be noted if site conditions change (e.g., weather goes from clear to overcast) throughout the day. For each photograph, the following information must be recorded:

- Location;
- Date and time;
- Photographer;
- Detailed description of subject of photograph;
- Direction of photograph (e.g., "taken facing northwest");
- Identification of individuals in the photograph and their affiliation;
- Photograph number;
- Mechanical difficulties (if encountered) and corrective actions taken (and results).

A figure, map, or sketch of the site indicating the locations where photographs were taken is useful, especially if before and after photographs are to be taken at different times (potentially by different photographers, although using the same photographer is highly recommended).

For video recordings, the same information should be noted, along with the start and stop times on the recording. If the camera is capable of captioning with date, time, and text information to the recorded image, this is recommended. Such a captioning capability aids in later labeling and identifying the photographs or video recordings.

Photographs and/or video recordings should be taken with a camera-lens system having a perspective similar to that afforded by the naked eye. Telephoto or wide-angle shots are to be avoided unless previously approved by the client.

Most video cameras offer the cameraperson, or an accompanying field technician, audio recording capability that can be used to provide a running commentary on the activities recorded. This information is not a substitute for hard-copy documentation in a logbook (wind blowing across the microphone or technical difficulties may render the sound inaudible). Commentary should be pertinent and succinct.

3.2.4 Post-Operation

At the conclusion of a task or when a logbook has been completed, it will be submitted to the Field

Manager/Task Leader for filing in the Project File.

Cameras will be returned to the location designated by the field task leader in the field office (the camera and film must be kept in a temperature and humidity controlled environment when not in use; camera batteries may need to be recharged overnight). Film and developed photographs should be protected from unnecessary exposure to light (to avoid fading), and video recordings must be protected from magnetic fields. The video cartridge must be labeled.

After the first day of work and on a regular basis thereafter, the Field Manager/Task Leader will perform a QC content check for compliance with this SOP.

4.0 Records

Documentation will follow all guidelines contained in this SOP.

1.0 Objective

Decontamination is performed as a quality assurance measure and safety precaution. It helps prevent cross-contamination among samples and helps maintain a clean working environment for the safety of field personnel.

2.0 Equipment and Materials Needed

- Cleaning liquids such as soap or detergent solutions (Liquinox or equivalent), potable water and distilled water
- Cleaning brushes
- Cleaning containers such as plastic buckets or tubs
- Pump sprayers for dispensing rinse waters
- A high-pressure hot water sprayer for cleaning large equipment
- Waste containers as outlined in SOP-006, Investigation Derived Waste Management
- Health and safety equipment as outlined in the Accident Prevention Plan

3.0 Methodology

Small, reusable equipment is decontaminated mainly by rinsing with liquids that include soap or detergent solutions, potable water, and distilled water. Steam cleaning should be used whenever visible contamination exists on large machinery/vehicles. Following decontamination, if the equipment is not to be reused immediately, it should be stored and protected from recontamination by wrapping in aluminum foil or plastic as necessary.

3.1 Pre-Sampling Decontamination Activities

- Don the appropriate personal protective equipment, including nitrile gloves, as specified in the Accident Prevention Plan and as required for the specific work area.
- Assemble containers and equipment for decontamination.
- Decontaminate new equipment or equipment not previously decontaminated before use. Disposable equipment, including polyethylene tubing and bailers, do not require decontamination prior to use.
- Rinse equipment not previously decontaminated and appropriately wrapped in aluminum foil before the next use. If the protective wrapping on a piece of pre-cleaned equipment has been torn or if there is a question of its cleanliness, the equipment should be considered contaminated and undergo full decontamination procedures before use.

3.2 Decontaminating Sampling and Hand-held Equipment

1. This section applies broadly to all hand tools (trowels, bowls, hand augers, slide hammer samplers, and other specialized and non-specialized tools), as well as meters and gauges (multimeters, water level indicators, etc.). Remove solid particles from the equipment or material by brushing and rinsing with potable water. This will remove gross contamination.
2. For hand-held equipment wash with a brush and a phosphate-free detergent solution (Liquinox or similar laboratory detergent). New wash water/detergent solution will be used at each location, as necessary.
3. Rinse equipment thoroughly with potable water.
4. Triple rinse the equipment with distilled water. New rinse water will be used at each location. Rinse water will not be used for multiple rinse cycles.
5. Unless the equipment is going to be used immediately, it must be wrapped in new aluminum foil, shiny side out, to keep it clean until needed. For large bulky equipment, clean visqueen can be substituted for the aluminum foil.
6. Decontamination of tools and equipment must be performed between each sampling location and before leaving the site.
7. For bladder pumps used during sampling, insert a new bladder into the pump housing and use new dedicated tubing cut to the required length between each monitoring well sampled. Do not reuse wetted components. Follow the bladder pump manufacturers' guidelines and specifications for changing wetted components in between sample points.
8. For Smeal rigs and variable speed pumps used during well development, all wetted components shall be steam cleaned and rinsed using clean potable water. No rinsate shall be reused.

3.3 Decontaminating Large Equipment

Large pieces of field equipment will be decontaminated before and after use. Steam cleaning will be performed as necessary at an appropriate decontamination area specified by the field supervisor. The decontamination area shall be capable of containing decontamination fluids and solids. The decontamination fluids shall be managed in accordance with SOP-006, Investigation Derived Waste Management. Decontamination should be performed before arriving at the site and between sampling locations. All equipment shall be decontaminated before leaving the site.

4.0 Equipment Blanks

An equipment blank (EB) is a sample of laboratory grade deionized water poured into or over, or pumped through, the sampling equipment, collected in the appropriate sample container, and analyzed by the laboratory for the same parameters as the field samples. The blanks are used to assess the effectiveness of equipment decontamination procedures.

Equipment blank samples may be collected as a method to ensure that decontamination methods are effective and that potential for cross-contamination is minimized. Analytes will be determined based on site-specific conditions and will be chosen to reflect the expected site contaminants. The sampling

schedule and procedures for equipment blanks, including frequency, collection method, and analytical suite will be presented in the project-specific Work Plan, QAPP, or similar document, as applicable.

5.0 Comments

Decontamination is critical for maintaining the integrity of the sampling program. Check equipment carefully prior to sampling, and if there is any doubt about the effectiveness of the decontamination, repeat the decontamination process as an extra precaution. Decontamination fluids will be containerized and disposed of, following the procedures provided in SOP-006, Investigation Derived Waste Management. Decontamination procedures shall be documented in the field logbook.

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to delineate protocols for use of the chain-of-custody (COC) form.

2.0 Scope

This SOP applies to all personnel responsible for collecting, shipping and analyzing environmental samples.

3.0 Method

3.1 General

COC forms are used to legally track samples from time of collection through completion of laboratory analysis.

3.2 Procedures

The following information will be preprinted on the COC form when possible:

- Project name;
- Name and address of laboratory; and
- Potential analysis and method numbers.

The following information will be written on the COC form by the sample controller/shipper:

- Site name;
- Name of receiving laboratory;
- Sample IDs for all samples in a particular cooler/shipping container;
- Sample matrix or matrix code (e.g., SO for soil);
- Sample type (environmental, trip blank, equipment blank, etc.);
- Analysis requested by method number unless other arrangements are made with the receiving laboratory;
- Number of containers;
- Quality Control (QC) required (to indicate the sample is to be used for matrix spike/matrix spike duplicate analyses);
- Date of collection (mm/dd/yy or m/d/yy: 04/03/18 or 4/3/98 is April 3, 2018);
- Time of collection (military format);
- Signature of individual who prepares the COC form;
- Carrier service and airbill number; and
- Signature of individual relinquishing samples along with the date and time of relinquishment.

Upon completion of the form, retain two copies and affix the original and one copy to the inside of the sample cooler (in a Ziploc® bag to protect from moisture), to be sent to the designated laboratory.

4.0 Records

Distribution of the COC record will be:

- Original - sealed in plastic bag and taped inside the top of the shipping container;
- One copy - file in Project File; and
- One copy - submit Project Manager.

5.0 Attachments

A sample of a chain-of-custody form is attached.

Ahtna 2255 Contra Costa Blvd Suite 312 Pleasant Hill, CA 94523

CHAIN OF CUSTODY

WATER / SOIL

Chain of Custody #: _____

Project Information:

Project Location: _____ Sampler/s: _____

Project Name: _____ Report To: _____

Project Number: _____ E-Mail: _____

Sampling Event: _____ Laboratory: _____

Analysis Requested

Lab Sample Receipt

Laboratory Sample Delivery

Group #: _____

Custody Seal: _____

Temp (°C): _____

Lab Number	Sample Number/Description	Sample Collection		Matrix			Total # of Containers	Number of Preserved Containers								Notes
		Date	Time	Water	Soil	Other		HCl	HNO_3	H_2SO_4	NaOH	MeOH	$NaHSO^4$	None	Other	

Turnaround Time: ____: Standard ____: 5 Day Rush ____: 72 Hour Rush ____: 48 Hour Rush ____: 24 Hour Rush Shipment Method: _____ Tracking ID: _____

Comments:

Chain of Custody Tracking:

Relinquished By Sampler:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received By Laboratory:	Date/Time:

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to provide guidance for the packing and shipping of environmental samples with the appropriate chain-of-custody (COC) forms. This is in accordance with all applicable transportation regulations, analytical requirements, and proper COC forms.

2.0 Scope

This SOP applies to all personnel involved in the packing and shipping of environmental samples. Samples determined to be hazardous will be managed in accordance with the requirements of the U.S. Department of Transportation (DOT) and the International Air Transportation Association (IATA) for shipping hazardous/dangerous goods by land or air.

3.0 Method

3.1 General

Environmental samples and quality control samples are collected, labeled, and sealed in the field, and COC is maintained, as defined in SOP-001, Field Sample Management.

40 Code of Federal Regulations (CFR) Part 261.4 describes sample shipping requirements. It states that:

> "... a sample of solid waste or a sample of water, soil, or air, which is collected for the sole purpose of testing its characteristics or composition, is not subject to any requirements of this part (hazardous materials shipping requirements)... when:
>
> (i) The sample is being transported to a laboratory for the purpose of testing; or
>
> (ii) The sample is being transported back to the sample collector after testing.

In order to qualify for the(se) exemption(s)..., a sample collector shipping samples to a laboratory and a laboratory returning samples to a sample collector must:

(i) Comply with DOT, U.S. Postal Service (USPS), or any other applicable shipping requirements; or

(ii) Comply with the following requirements if the sample collector determines that DOT, USPS, or other shipping requirements do not apply to the shipment of the sample:

- (A) Assure that the following information accompanies the sample:
  - (1) The sample collector's name, mailing address, and telephone number;
  - (2) The laboratory's name, mailing address, and telephone number;
  - (3) The quantity of the sample;
  - (4) The date of shipment; and
  - (5) A description of the sample.
- (B) Package the sample so that it does not leak, spill, or vaporize from its packaging. The URS Hazardous Materials Shipping Hotline can be reached at 1.800.381.0664. Shipping experts are available via the hotline to answer any shipping questions you may have.

Samples will be assessed to determine potential hazard. Potentially hazardous samples are required by law to be properly handled and labeled.

Good judgment on the part of the sample coordinator is necessary to identify potentially hazardous samples. Samples collected from chemical or fuel drums and tanks, stained or otherwise obviously contaminated soil, free product from a well, leachates, sludges, and samples with headspace readings noted above are all hazardous samples. Hazardous waste samples will be shipped according to DOT and IATA regulations.

Samples determined to be non-hazardous by the Sample Coordinator are environmental samples. They are to be labeled, packaged, documented, and shipped as described in Section 3.

4.0 Procedures

Determine the maximum allowable weight of each cooler (Federal Express limit for Priority Overnight shipping is 150 pounds).

Place each container in a Ziploc® bag and seal, squeezing as much air as possible from the bag before closing. Glass bottles and jars will be wrapped in bubble wrap.

Tape the cooler's drain plug shut on the inside and the outside.

If needed, place a large size plastic bag (trash bag) in the cooler to contain samples.

Place the sample bags in the plastic bag, with enough room for ice bags to be placed among and around the containers and insulate with enough bubble wrap to deter breakage.

Place ice (double-bagged) among the containers along the walls and top of each cooler in a manner to ensure uniform cooling. When shipping soil samples, place one bag of ice along the bottom of the cooler as well. Do not use Blue Ice, as its heat capacity is lower than regular ice. If the Sample Shipper/Controller is informed by the laboratory that the samples are not being chilled sufficiently, additional ice may be required. Note that in summer months, more ice may be needed to ensure the samples arrive cold at the laboratory.

If shipping via commercial carrier (e.g., Federal Express), write the carrier's airbill number on the COC form, place the appropriate pages of the COC form inside a Ziploc® bag, and seal the bag. The COC form has three pages. The original and one copy are sealed inside the Ziploc® bag and placed inside the cooler. One copy goes to project data management, and one copy (made by the Field Manager) is placed in field files. The COC form sent to the laboratory must be completed with all designated information, the pages must be originals (not photocopies), and the COC must be unique to the samples contained in the cooler.

If a courier from the laboratory is collecting the samples and delivering them to the laboratory, have the courier confirm that all samples listed are present and then sign the COC form.

Tape the Ziploc® bag with the COC form to the inside lid of the cooler, and close and latch the cooler.

Affix signed custody seals on the front right and back left of the cooler across the lid, so as to tear if the cooler is opened during shipping. Wrap strapping tape over the custody seals and completely around the cooler on both sides of the latch.

Affix the shipping label with the address and telephone number of the laboratory and the contractor.

The laboratory should be notified if the samples are being delivered via courier. They should be prepared to receive and check the samples and sign the COC form as the sample receiver.

5.0 Records

Completed COC form.

1.0 Purpose and Scope

This standard operating procedure (SOP) provides technical guidance and methods that will be used for the handling, management, and disposal of investigation derived waste (IDW) encountered or generated during environmental activities. This SOP gives descriptions of equipment, field development procedures, field data collection, and personnel responsibilities.

2.0 Responsibilities and Qualifications

The Project Manager or Field Team Leader have the overall responsibility for implementing this SOP. They will be responsible for assigning appropriate environmental staff to implement this SOP and for ensuring that the procedures are followed.

All personnel performing these procedures are required to have the appropriate health and safety training. Personnel overseeing the handling and disposal of IDW will have IDW management knowledge and experience or will work under the direct field supervision of knowledgeable and experienced personnel. Personnel will perform this work in accordance with the Accident Prevention Plan (APP).

All environmental staff and assay laboratory staff are responsible for reporting deviations from this SOP to the Project Manager or Field Manager.

3.0 Related Standard Operating Procedures

The procedures set forth in this SOP are intended for use with the following SOP-007 Low-Flow and Extraction Well Sampling.

4.0 Equipment List

The following materials and equipment may be needed for IDW management:

- Personal protective equipment (PPE) as outlined in the APP
- Decontamination equipment and supplies (e.g., wash/rinse tubs, brushes, liquidnox, plastic sheeting, paper towels, sponges, baby wipes, garden-type water sprayers, large plastic bags (minimum 0.85 mil), potable water, distilled water and/or 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)
- Laboratory-supplied sample containers
- Photoionization detector (PID)
- Wood pallets (as necessary)
- Non-porous (e.g., stainless steel) shovels
- Field notebook and waterproof permanent marking pens

- Waste manifests
- Secondary containment materials (i.e., spill containment platform/pallet with drain)

5.0 Procedures

It is anticipated that liquid IDW will be generated or encountered during field activities. IDW generated during the field investigation is expected to include:

- Well purge water
- Wash and rinse waste from decontamination activities

Sections 5.1 and 5.2 describe procedures for handling of IDW on-site. Section 5.3 addresses management and disposal requirements for off-site disposal and potentially hazardous materials.

All waste disposal and manifests will be coordinated with the base point of contact.

5.1 Liquid IDW

Well purge and decontamination water will be contained in DOT-rated drums, or appropriately sized watertight containers, at the point of generation.

When drums are full, or daily activities are completed, the containers will be sealed; for example, drum lids and rings will be fastened.

Waste water IDW that is generated and containerized at sample locations will be transported to the storage area and consolidated in drums.

Drums or other containers of waste water will be composite sampled and characterized as requested by the disposal facility. If waste water is generated from a distinct area of contamination identified by previous sampling, individual samples may be required.

5.2 PPE and Disposable Investigation Equipment

- The plan for managing used PPE and other non-soil solid waste generated during field activities (e.g., sample handling) is to collect it in plastic trash bags and for the material to be disposed of as a solid waste.
- Potentially contaminated PPE or disposable investigation equipment will be decontaminated prior to placement in the plastic bags or containers, if warranted.
- Decontamination procedures consist of brushing off, or using small amounts of water to scrub off, gross potential contamination.

5.3 Waste Profiling

- Waste profiling will be coordinated with the disposal facility. At a minimum a representative sample will be collected (see Sections 5.1) and analyzed for COCs.

5.4 Labeling

- Once drums have been filled, a label will be applied immediately.
- The waste generated has not been profiled and therefore a “Pending Analysis” label (see Figure1) will

be applied. The contents, date(s) of generation, origin of materials, address of generation and contact information will be added to the label.

- Once the material has been profiled, and found non-hazardous, the "Pending Analysis" label will be removed, and a "Non-Hazardous" label (see Figure 2) will be applied. The shipper, address, date(s) of generation, contents, and contact information will be added to the label.

5.5 Disposal of IDW

IDW will be placed in drums and stored in the designated storage area. Waste disposal and manifests will be coordinated with the base point of contact. Alternatively, if approved by the appropriate base contacts (i.e. hazardous waste manager or equivalent), purging and decontamination liquid IDW may be discharged into onsite outfalls. 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).

6.0 Documentation

Documentation of field observations and data will provide information on the activities concluded and also provide a permanent record of field activities.

Project staff are responsible for thoroughly documenting IDW handling and disposal activities and are responsible for documenting the collection, transportation, labeling (if applicable), and staging or disposition of IDW. The information entered concerning IDW should include the following:

- Project Name
- Names of personnel
- Site location
- Type of activities
- Date waste generated
- 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

Figure 1 – Pending Analysis Label

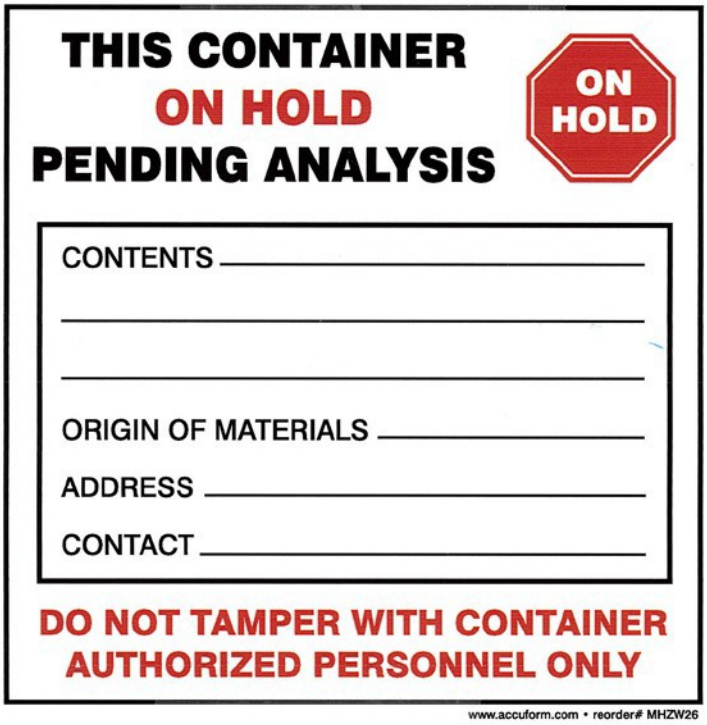


Figure 2 – Non-Hazardous Waste Label

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to direct field personnel in the proper techniques and documentation requirements for collection groundwater samples using passive techniques. In general, passive groundwater sampling is performed by obtaining samples without purging the well prior to collection of samples. These samples are then submitted for laboratory tests that may include trace analyses of analytes. Therefore, it is extremely important that care is taken to collect samples that are representative of the site groundwater and minimize cross-contamination of the collected sample.

2.0 Scope

The scope of this SOP applies to field staff collecting groundwater samples using passive sampling techniques from temporary and permanently installed wells. The field staff may be employed by Ahtna or a qualified subcontractor. Qualified environmental professionals will be engaged in or directly supervise the collection and handling of environmental samples.

3.0 Responsibilities

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

Site Safety and Health Officer (SSHO). The SSHO oversees site-specific health and safety activities and ensures compliance with the project requirements. The SSHO conducts personal protective equipment (PPE) evaluations, selects the appropriate PPE, lists the requirements in the site-specific safety and health plan (SSHP), and coordinates with the field team to implement the SSHP.

4.0 Equipment

Multiple types of equipment can be used to sample groundwater. The correct equipment to use should be determined by the project manager based on site conditions and analyses to be performed.

4.1 Sampling Equipment List

Passive Diffusion Bag (PDB) Samplers. No purge sampling technique that may be justified for use on wells that display little or virtually no recharge, or for long-term monitoring during the operation and maintenance phase of remediation. Applicable for sampling a select list of VOCs only. A single PDB represents only 5 feet of the water column.

HydraSleeve™. The HydraSleeve groundwater sampler can be used to collect a representative sample for most physical and chemical parameters without purging the well. It collects a whole water sample from a user-defined interval (typically within the well screen), without mixing fluid from other intervals. One or more HydraSleeves are placed within the screened interval of the monitoring well, and a period of time is allocated for the well to re-equilibrate. When activated, HydraSleeve collects a sample with no drawdown and minimal agitation or displacement of the water column. Once the sampler is full, the one-way reed valve collapses, preventing mixing of extraneous, non-representative fluid during recovery.

4.2 Support Equipment/Supply List

- Decontamination equipment including soap (i.e., Liquinox™) , de-ionized and tap water
- Health and safety equipment including safety glasses and nitrile/latex exam gloves as specified in the project-specific Health and Safety Plan
- Field logbook, indelible ink pens and field forms
- Tools to open wells
- Electronic water level meter such as the Solinst Model 101 or equivalent
- Purge water storage (drums, tanks, etc.)
- Multi-meter with flow-through-cell/chamber
- Meter calibration standards
- Paper towels
- Sample bottles
- Gel or bag ice (determine which is appropriate)
- Clean cooler
- Packaging tape
- Chain of custody forms and custody seals
- Sample Labels
- IDW Labels

5.0 Procedures

5.1 Pre-Sampling Tasks

The most recent groundwater levels and water quality data should be added to the groundwater sampling, field form. That information is used to evaluate the reasonableness of the water level and water quality measurements of the current event.

Decontaminate and calibrate all instruments before obtaining field data according to the appropriate equipment decontamination and water quality measurements SOPs.

Before groundwater sampling, conduct a site-wide groundwater level survey to determine the current site hydrogeologic conditions. Measure the depth to groundwater in each well to within 0.01 feet.

5.2 Passive Diffusion Bag (PDB) Samplers

Passive diffusion sampling allows for VOCs to diffuse from groundwater through a semi-permeable membrane, into a deionized (DI) water-filled, closed sampler until VOC concentrations equilibrate under

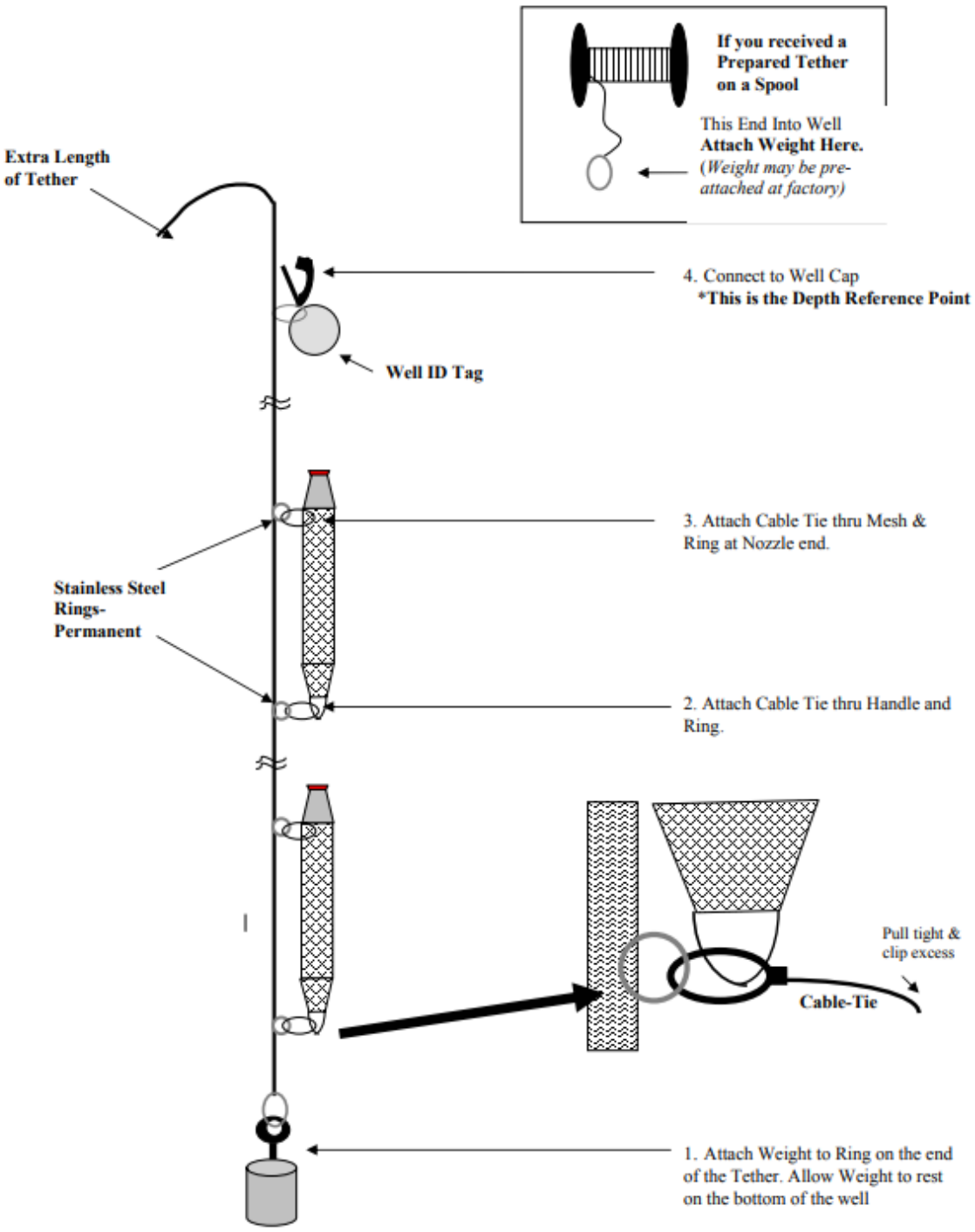
natural passive conditions from discrete intervals in the well screen. The general procedures are outlined below:

- Fill equilibrator with DI water (install plug after sampler is filled)
- Install in screen (location determined by project requirements) – multiple samplers can provide a concentration/contaminant vs. depth profile
- Leave in place for at least 1 – 2 weeks or longer
- Remove PDB and fill sampling jars following established sampling protocol.

The "hanger" method may be used to install 1 or 2 PDBs in a single well. Slip-on hangers, individual tethers with snap hooks, and a weight suspended from the hanger are all used following this method. A single-tether method may also be used to install multiple PDBs in a single well. This method requires the use of 1 tether and attachment rings, attaching the sample at the top and bottom, and installing a weight to the bottom of the tether.

Discharge options consist of a "juice box" straw which allows filling of a VOA vial from the bottom of the PDB or pouring from the fill port.

Typical PDB installation:


If you received a Prepared Tether on a Spool
This End Into Well
Attach Weight Here.
(Weight may be pre-attached at factory)
Extra Length of Tether
4. Connect to Well Cap
*This is the Depth Reference Point
Well ID Tag
3. Attach Cable Tie thru Mesh & Ring at Nozzle end.
Stainless Steel Rings- Permanent
2. Attach Cable Tie thru Handle and Ring.
Pull tight & clip excess
Cable-Tie
1. Attach Weight to Ring on the end of the Tether. Allow Weight to rest on the bottom of the well

5.3 HydraSleeve™

5.3.1 Placing the Hydrosleeve(s)

5.3.1.1 Single Hydrosleeve

1. Assemble the hydrosleeve per the manufacturer's field manual.
2. Lower the hydrosleeve device into the well using one of three techniques. Note, lowering the device displaces the water column and some mixing of the column occurs. The diameter of the device and rate the device is deployed into the water column affect the column mixing.
3. There are three basic methods for holding a HydraSleeve in position as the well equilibrates.
    a. **Top Down Deployment (Figure 1)**. Measure the correct amount of suspension line needed to "hang" the top of the HydraSleeve(s) at the desired sampling depth (in most cases, this will be at the bottom of the sampling zone). The upper end of the tether can be connected to the well cap to suspend the HydraSleeve at the correct depth until activated for sampling. Note: For deep settings, it may be difficult to accurately measure long segments of suspension line in the field. Factory prepared, custom suspension line and attachment points can be provided.
    b. **Bottom Deployment (Figure 2)**. Sound the well to determine the exact depth. Lower the weighted HydraSleeve into the well and let it touch the bottom. Very slowly (less than ½ feet per second) raise the sampler to the point where the check valve is at the depth the sample is to be collected. Attach the suspension line to the top of the well to suspend it at this depth. (It is often easier to measure a few feet from the bottom of the well up to the sample point, than it is to measure many feet from the top of the well down.) Alternately, the sampler can be left on the bottom until the well re-equilibrates. For sampling, it can be very slowly pulled (< ½ fps) to sampling depth, then activated to collect the sample, and retrieved to the surface.
    c. **Bottom Anchor (Figure 3)**. Determine the exact depth of the well. Calculate the distance from the bottom of the well to the desired sampling depth. Attach an appropriate length anchor line between the weight and the bottom of the sampler and lower the assembly until the weight rests on the bottom of the well, allowing the top of the sampler to float at the correct sampling depth.

Figure 1

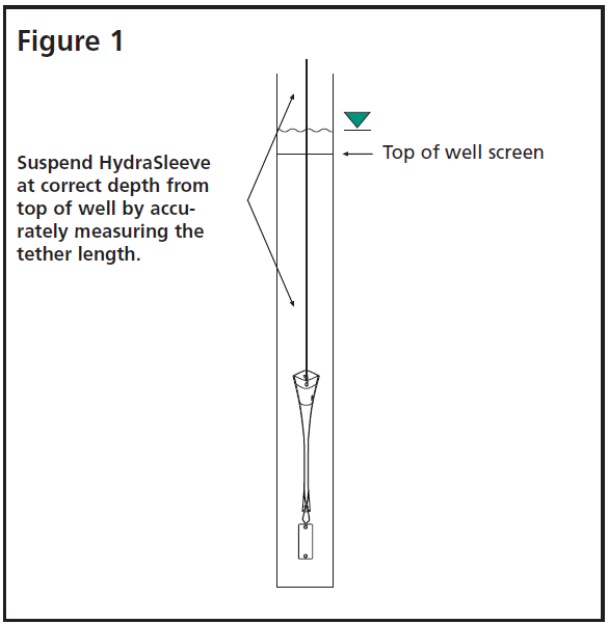


Figure 2

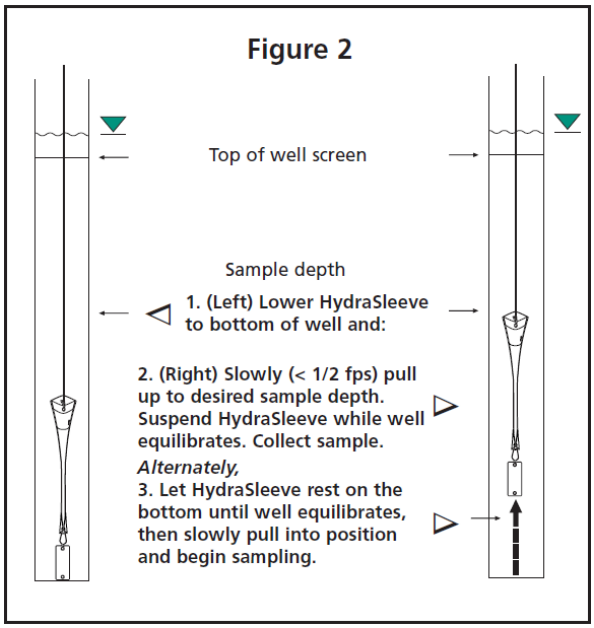
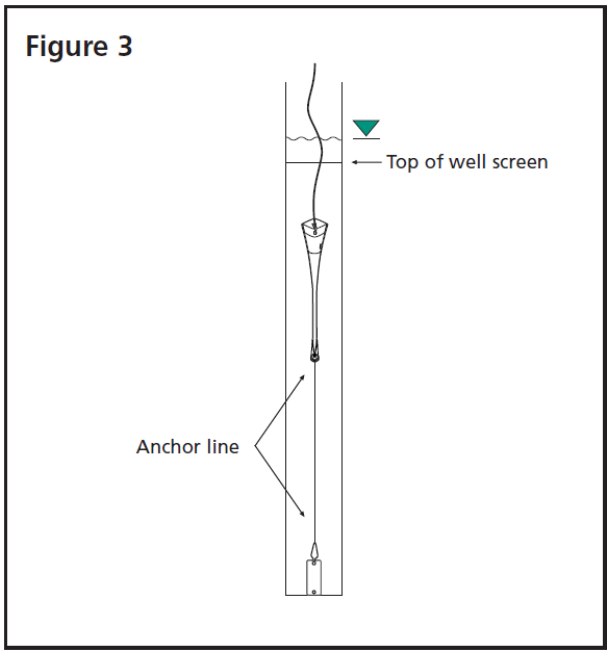


Figure 3



5.3.1.2 Multiple Hydrosleeves

1. Assemble the hydrosleeves per the manufacturer's field manual.
2. Lower the hydrosleeve device into the well using one of three techniques. Note, lowering the device displaces and the water column and some mixing of the column occurs. The diameter of the device and rate the device is deployed into the water column affect the column mixing.

3. There are two basic methods for placing multiple HydraSleeves in a well to collect samples from different levels simultaneously:
   a. **Attached to a Single Tether (Figure 4)**. To use 3 or more samplers simultaneously, attach them all to a tether for support to prevent the sampling string from pulling apart. The weight is attached to a single length of suspension line and allowed to rest on the bottom of the well. The top and bottom of each HydraSleeve are attached to the tether at the desired sample intervals. Cable tie or stainless steel clips (supplied) work well for attaching the HydraSleeves to the line. Simply push one end of the clip between strands of the rope at the desired point before attaching the clip to the HydraSleeve.
   b. **Attached End to End (Figure 5)**. To place 2 or 3 stacked HydraSleeves for vertical profiling, use one of the methods described above to locate the bottom sampler. Attach the bottom of the top sampler to the top of the following HydraSleeve(s) with a carefully measured length of suspension cable. Connect the weight to the bottom sampler. Note: if many HydraSleeves are attached to a tether, more weight may be required than with a single sampler.

Figure 4

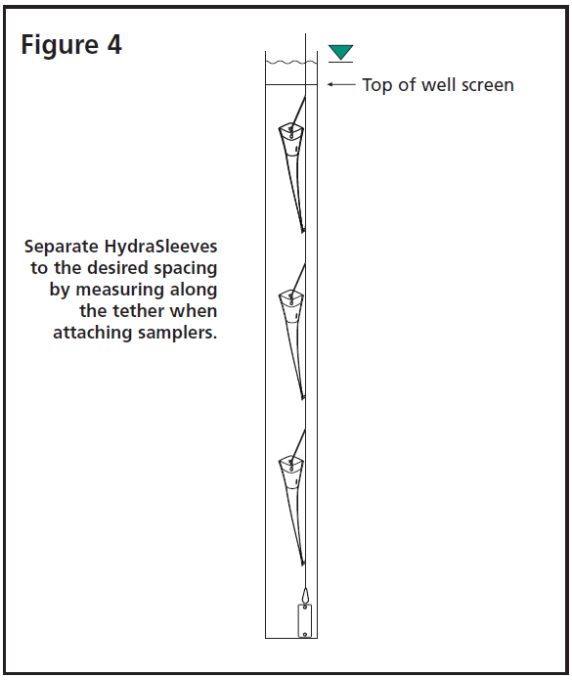
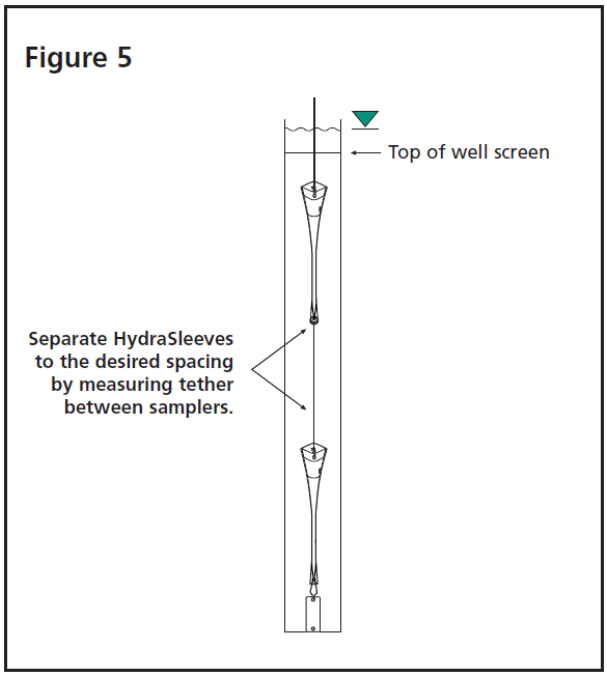


Figure 5



5.3.2 Filling the Hydrosleeve(s)

The HydraSleeve must move upward at a rate of one foot per second or faster (about the speed a bailer is usually pulled upward) for water to pass through the check valve into the sample sleeve. The total upward distance the check valve must travel to fill the sample sleeve is about 1 to 2 times the length of the sampler. For example, a 24-inch HydraSleeve needs a total upward movement of 24 to no more than 48 inches to fill. The upward motion can be accomplished using one long continuous pull, several short

strokes, or any combination that moves the check valve the required distance in the open position. A special technique is used for sampling low-yield wells (See (d) below).

a. **Continuous Pull (Figure 6)**. Pull the HydraSleeve continuously upward from its starting point at a constant 1 to 2 feet per second until full. This method usually provides the least turbid samples and is analogous to coring the water column from the bottom up. *Note: When using this method, the screen interval should be long enough, so the sampler fills before exiting the top of the screen*.

b. **Short Strokes (Figure 7)**. Pull the sampler upward at about 1 to 2 feet per second for the length of the sampler and let it drop back to the starting point. Repeat the cycle 3 to 5 times. This method provides a shorter sampling interval than the continuous pull method (above), and usually reduces the turbidity levels of the sample below that of numerous rapid, short cycles (below). The sample comes from between the top of the cycle and the bottom of the sampler at its lowest point.

c. **Rapid, Short Cycles (Figure 8)**. Cycle the HydraSleeve up and down using rapid, short strokes (6-inch cycle at a minimum of 1 cycle per second) 5 to 8 times. This method provides the shortest sampling interval. Dye studies have shown that when using this method the sample flows into the check valve from along the length of the sampler and immediately above the check valve. The sample interval is from the bottom the sampler at its lowest point in the cycle to the top of the check valve at the peak of the cycle.

d. **Sampling Low-Yield Wells (Figure 9)**. HydraSleeve provides the best available technology for sampling low yield wells. When pulled upward after the well re-equilibrates, the HydraSleeve will collect a water core from the top of the sampler to about its own length above that point. The sample is collected with no drawdown in the well and minimal sample agitation. An optional top weight can be attached to compress the sampler in the bottom of the well if needed for an extremely short water column. With a top weight, the check valve is pushed down to within a foot of the bottom of the well.

Figure 6

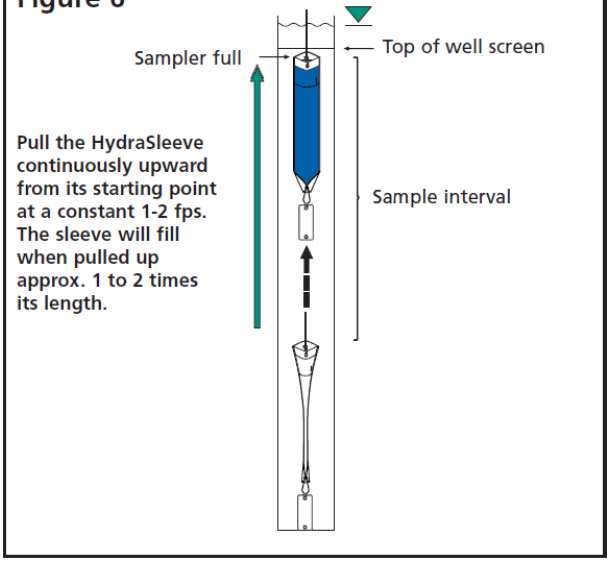


Figure 7

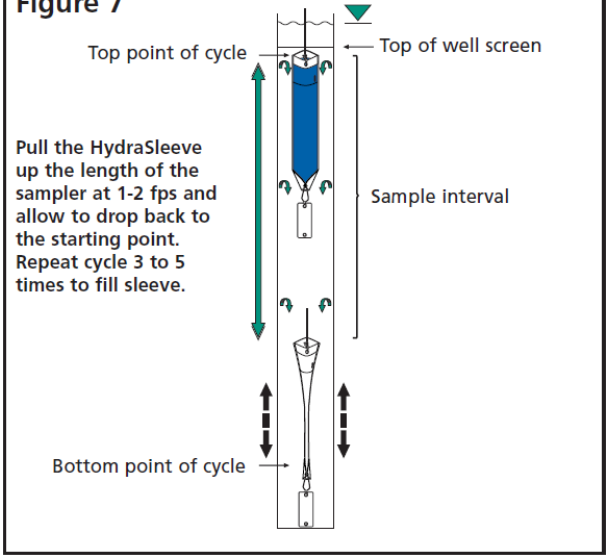


Figure 8

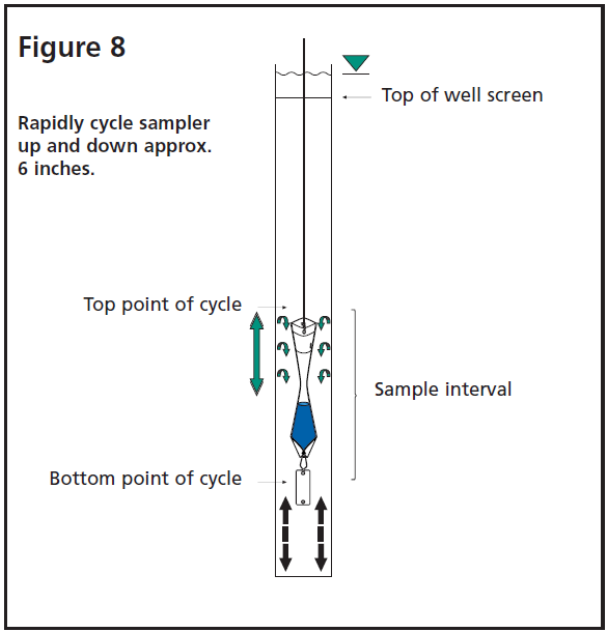
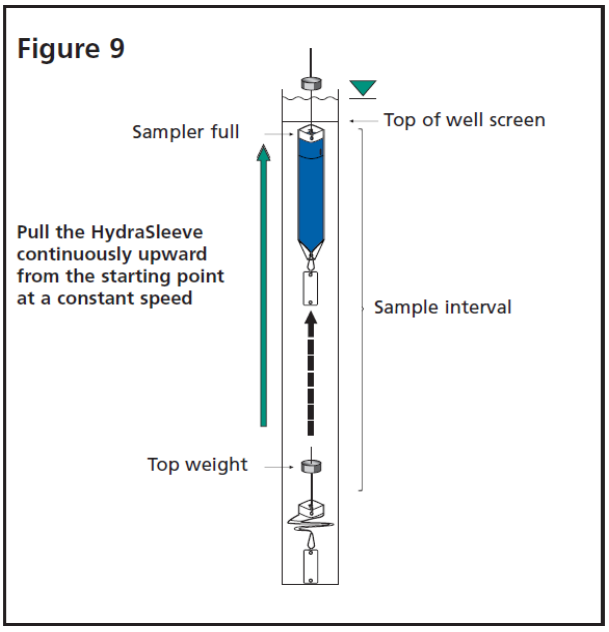


Figure 9



5.3.3 Sample Discharge

The best way to remove a sample from the Hydrosleeve with the least amount of aeration and agitation is with the short plastic discharge tube included in the product packaging.

1. Squeeze the full sampler just below the top to expel water resting above the flexible check valve.
2. Push the pointed discharge tube through the outer polyethylene sleeve about 3-4 inches below the white reinforcing strips.
3. Discharge the sample into the laboratory containers. Raising and lowering the bottom of the sampler or pinching the sample sleeve just below the discharge tube will control the flow of the

sample. The sample sleeve can also be squeezed, forcing fluid up through the discharge tube, similar to squeezing a tube of toothpaste.

5.4 Document Control

Example groundwater sampling, field forms are attached to this SOP. The form should be completed in its entirety. If an entry is not applicable, then indicate "n/a" or line-out.

At the conclusion of a task or project, all field documentation, including the field notes, field datasheets, and electronic data, shall be scanned in and placed on the server in the appropriate folder. All original documents shall be submitted to the PM and kept in the project file.

6.0 Quality Assurance/Quality Control

The values of the water quality parameter measurements must be compared to the previous event measurements to assess the reasonableness of the new data. If a measurement is inconsistent with the past measurement, then an instrument check of a calibration standard for the suspect parameter should be performed. If the calibration is out of spec the instrument should be repaired or replaced, and the suspect parameter measurement should be rejected, and a new measurement taken unless the PM approves otherwise.

7.0 Documentation Review

The FTL is responsible for the daily review the fieldwork documentation for compliance. Errors and omissions should be explained and revisions to an entry signed and dated by the FTL.

8.0 References

Not applicable.

1.0 Purpose

The purpose of this standard operating procedure (SOP) is to direct field personnel in the proper techniques and documentation requirements for the measurement of groundwater levels using a water level meter (sounder). In general, water level measurements are collected prior to groundwater sampling.

2.0 Scope

The scope of this SOP applies to field staff collecting groundwater level measurements from temporary and permanently installed wells. The field staff may be employed by Ahtna or a qualified subcontractor. Qualified environmental professionals will be engaged in or directly supervise the collection of water level measurements.

3.0 Responsibilities

Field Technician. The Field Technician is responsible for oversight of and/or the collection of water level measurements 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 Manager/Project Lead (PM/PL). The PM/PL is responsible for providing adequate resources to the field staff and ensuring that Field Technician has adequate experience and training to successfully comply with the SOP. The PM is responsible for approving and documenting techniques that are not specifically described in this SOP but are considered the best methods for the current project.

Site Safety and Health Officer (SSHO). The SSHO oversees site-specific health and safety activities and ensures compliance with the project requirements. The SSHO conducts personal protective equipment (PPE) evaluations, selects the appropriate PPE, lists the requirements in the site-specific safety and health plan (SSHP), and coordinates with the field team to implement the SSHP.

4.0 Equipment

Multiple types of equipment can be used to collected water level measurements. The correct equipment to use should be determined by the project manager based on site conditions.

4.1 Equipment/Supply List

- Decontamination equipment including soap (i.e., Liquinox™), de-ionized tap water
- Health and safety equipment including safety glasses and nitrile/latex exam gloves as specified in the project-specific Health and Safety Plan
- Bound field logbook with consecutive numbers and waterproof, indelible ink pens and field forms
- Tools to open wells
- Steel measuring tape and chalk (for calibration)
- Electronic water level meter such as the Solinst Model 101 or equivalent

5.0 Procedures

- Ensure calibrated Water Level Meter/Sounder is used for collecting water level measurements
- Review recent DTW and TD measurements and well construction details (if available)
- Set up traffic delineation around wells as needed
- Confirm that probe has been decontaminated prior to use at a new well
- Remove bolts on well lid or locks on stick-ups
- Locate the notch at the north end of the casing. If no notch is present, use a compass or GPS-capable device to locate due north
- Set up reel next to well and release locking mechanism
- Test the sounding button on the side of the reel to make sure water sensor is working properly
- Then slowly lower the reel into the well until you hear a beeping sound
- Gently raise and lower tape and hold vertically against well casing to get DTW measurement
- Record DTW measurement and then lower reel to bottom of well to get TD measurement as needed

6.0 Documentation Review

The FTL is responsible for the daily review the fieldwork documentation for compliance. Errors and omissions should be explained and revisions to an entry signed and dated by the FTL.

7.0 References

Not applicable.

Appendix B. Analytical Laboratory Certifications

PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

(Hereinafter called the Organization) and hereby declares that Organization has met the requirements of ISO/IEC 17025:2017) General Requirements for the competence of Testing and Calibration Laboratories and the United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP) requirements identified within the DoD/DOE Quality Systems Manual (DoD/DOE QSM) Version 5.3 May 2019 and is accredited is accordance with the:

United States Department of Defense Environmental Laboratory Accreditation Program (DoD-ELAP)

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system
(as outlined by the joint ISO-ILAC-IAF Communiqué dated April 2017):

This accreditation demonstrates technical competence for the defined scope:

Environmental Testing

(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President

Perry Johnson Laboratory Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
March 22, 2010	May 10, 2020	May 10, 2022
Revision Date:	*Accreditation No.:*	*Certificate No.:*
April 22, 2021	66175	L20-280-R1

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Air	EPA TO-15	GC/MS	1,1,1,2,-Tetrachloroethane
Air	EPA TO-15	GC/MS	1,1,2,2,-Tetrachloroethane
Air	EPA TO-15	GC/MS	1,1-Dichloroethene
Air	EPA TO-15	GC/MS	1,1,1,2-Tetrafluoroethane
Air	EPA TO-15	GC/MS	1,1-Difluoroethane
Air	EPA TO-15	GC/MS	1,2,3-Trichloropropane
Air	EPA TO-15	GC/MS	1,2-Dibromo-3-chloropropane
Air	EPA TO-15	GC/MS	1,4-Dioxane
Air	EPA TO-15	GC/MS	Allyl chloride
Air	EPA TO-15	GC/MS	Dibromomethane
Air	EPA TO-15	GC/MS	Diisopropyl ether
Air	EPA TO-15	GC/MS	2-Hexanone
Air	EPA TO-15	GC/MS	Ethanol
Air	EPA TO-15	GC/MS	Ethylbenzene
Air	EPA TO-15	GC/MS	Hexachloroethane
Air	EPA TO-15	GC/MS	Isooctane
Air	EPA TO-15	GC/MS	Methyl iodide
Air	EPA TO-15	GC/MS	Naphthalene
Air	EPA TO-15	GC/MS	tert-Butyl alcohol
Air	EPA TO-15	GC/MS	Tetrahydrofuran
Air	EPA TO-15	GC/MS	Vinyl acetate
Air	EPA TO-15	GC/MS	1,1,1-Trichloroethane
Air	EPA TO-15	GC/MS	1,1,2-Trichloro-1,2,2-trifluoroethane
Air	EPA TO-15	GC/MS	1,1,2-Trichloroethane
Air	EPA TO-15	GC/MS	1,1-Dichloroethane
Air	EPA TO-15	GC/MS	1,2,4-Trichlorobenzene
Air	EPA TO-15	GC/MS	1,2,4-Trimethylbenzene
Air	EPA TO-15	GC/MS	1,2-Dibromoethane
Air	EPA TO-15	GC/MS	1,2-Dichloro-1,1,2,2-tetrafluoroethane
Air	EPA TO-15	GC/MS	1,2-Dichlorobenzene
Air	EPA TO-15	GC/MS	1,2-Dichloroethane
Air	EPA TO-15	GC/MS	1,2-Dichloropropane
Air	EPA TO-15	GC/MS	1,3,5-Trimethylbenzene
Air	EPA TO-15	GC/MS	1,3-Butadiene
Air	EPA TO-15	GC/MS	1,4-Dichlorobenzene
Air	EPA TO-15	GC/MS	1-Ethyl-4-methylbenzene

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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Air	EPA TO-15	GC/MS	Acetone
Air	EPA TO-15	GC/MS	Acrylonitrile
Air	EPA TO-15	GC/MS	Benzene
Air	EPA TO-15	GC/MS	Benzyl chloride
Air	EPA TO-15	GC/MS	Bromodichloromethane
Air	EPA TO-15	GC/MS	Bromoform
Air	EPA TO-15	GC/MS	Bromomethane
Air	EPA TO-15	GC/MS	Carbon Disulfide
Air	EPA TO-15	GC/MS	Carbon Tetrachloride
Air	EPA TO-15	GC/MS	Chlorobenzene
Air	EPA TO-15	GC/MS	Chloroethane
Air	EPA TO-15	GC/MS	Chloroform
Air	EPA TO-15	GC/MS	Chloromethane
Air	EPA TO-15	GC/MS	cis-1,2-Dichloroethene
Air	EPA TO-15	GC/MS	cis-1,3-Dichloropropene
Air	EPA TO-15	GC/MS	Cyclohexane
Air	EPA TO-15	GC/MS	Dibromochloromethane
Air	EPA TO-15	GC/MS	Dichlorodifluoromethane
Air	EPA TO-15	GC/MS	Ethyl Acetate
Air	EPA TO-15	GC/MS	Ethyl t-butyl Ether
Air	EPA TO-15	GC/MS	Hexachlorobutadiene
Air	EPA TO-15	GC/MS	Hexane
Air	EPA TO-15	GC/MS	Isopropyl alcohol
Air	EPA TO-15	GC/MS	Methyl ethyl ketone
Air	EPA TO-15	GC/MS	Methyl isobutyl ketone
Air	EPA TO-15	GC/MS	Methyl t-butyl Ether
Air	EPA TO-15	GC/MS	Methylene Chloride
Air	EPA TO-15	GC/MS	n-Heptane
Air	EPA TO-15	GC/MS	o-Xylene
Air	EPA TO-15	GC/MS	p- & m-Xylenes

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BC Laboratories, Inc.

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Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Air	EPA TO-15	GC/MS	Propylene
Air	EPA TO-15	GC/MS	Styrene
Air	EPA TO-15	GC/MS	t-Amyl Methyl ether
Air	EPA TO-15	GC/MS	Tetrachloroethene
Air	EPA TO-15	GC/MS	Toluene
Air	EPA TO-15	GC/MS	Total Xylenes
Air	EPA TO-15	GC/MS	trans-1,2-Dichloroethene
Air	EPA TO-15	GC/MS	trans-1,3-Dichloropropene
Air	EPA TO-15	GC/MS	Trichloroethene
Air	EPA TO-15	GC/MS	Trichlorofluoromethane
Air	EPA TO-15	GC/MS	Vinyl Bromide
Air	EPA TO-15	GC/MS	Vinyl Chloride
Aqueous	EPA 1664B	Gravimetric	Oil & Grease
Aqueous	EPA 120.1	Conductivity Meter	Conductivity
Aqueous	EPA 180.1	TURB	Turbidity
Aqueous	EPA 200.7	ICP	Aluminum
Aqueous	EPA 200.7	ICP	Antimony
Aqueous	EPA 200.7	ICP	Arsenic
Aqueous	EPA 200.7	ICP	Barium
Aqueous	EPA 200.7	ICP	Beryllium
Aqueous	EPA 200.7	ICP	Boron
Aqueous	EPA 200.7	ICP	Cadmium
Aqueous	EPA 200.7	ICP	Calcium
Aqueous	EPA 200.7	ICP	Chromium
Aqueous	EPA 200.7	ICP	Cobalt
Aqueous	EPA 200.7	ICP	Copper
Aqueous	EPA 200.7	ICP	Iron
Aqueous	EPA 200.7	ICP	Lead
Aqueous	EPA 200.7	ICP	Magnesium
Aqueous	EPA 200.7	ICP	Manganese
Aqueous	EPA 200.7	ICP	Molybdenum
Aqueous	EPA 200.7	ICP	Nickel
Aqueous	EPA 200.7	ICP	Potassium
Aqueous	EPA 200.7	ICP	Selenium
Aqueous	EPA 200.7	ICP	Silver
Aqueous	EPA 200.7	ICP	Sodium

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Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 200.7	ICP	Strontium
Aqueous	EPA 200.7	ICP	Thallium
Aqueous	EPA 200.7	ICP	Titanium
Aqueous	EPA 200.7	ICP	Vanadium
Aqueous	EPA 200.7	ICP	Zinc
Aqueous	EPA 200.8	ICPMS	Aluminum
Aqueous	EPA 200.8	ICPMS	Antimony
Aqueous	EPA 200.8	ICPMS	Arsenic
Aqueous	EPA 200.8	ICPMS	Barium
Aqueous	EPA 200.8	ICPMS	Beryllium
Aqueous	EPA 200.8	ICPMS	Boron
Aqueous	EPA 200.8	ICPMS	Cadmium
Aqueous	EPA 200.8	ICPMS	Chromium
Aqueous	EPA 200.8	ICPMS	Cobalt
Aqueous	EPA 200.8	ICPMS	Copper
Aqueous	EPA 200.8	ICPMS	Lead
Aqueous	EPA 200.8	ICPMS	Manganese
Aqueous	EPA 200.8	ICPMS	Mercury
Aqueous	EPA 200.8	ICPMS	Molybdenum
Aqueous	EPA 200.8	ICPMS	Nickel
Aqueous	EPA 200.8	ICPMS	Selenium
Aqueous	EPA 200.8	ICPMS	Silver
Aqueous	EPA 200.8	ICPMS	Thallium
Aqueous	EPA 200.8	ICPMS	Vanadium
Aqueous	EPA 200.8	ICPMS	Zinc
Aqueous	EPA 300.0	IC	Bromide
Aqueous	EPA 300.0	IC	Chloride
Aqueous	EPA 300.0	IC	Fluoride
Aqueous	EPA 300.0	IC	Nitrate as N
Aqueous	EPA 300.0	IC	Nitrate as NO3
Aqueous	EPA 300.0	IC	Sulfate
Aqueous	EPA 310.1	Titrimetric	Alkalinity
Aqueous	EPA 314.0	IC	Perchlorate
Aqueous	EPA 350.1	UV/VIS	Ammonia
Aqueous	EPA 353.2	UV/VIS	Nitrate, total, NO3 & NO2
Aqueous	EPA 365.1	UV/VIS	Orthophosphate

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Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 365.4	UV/VIS	Total Phosphorus
Aqueous	EPA 410.4	Spectrophotometric	COD
Aqueous	EPA 415.1	UV/VIS	Total Organic Carbon (TOC)
Aqueous	EPA 608.3	GC/ECD	4,4-DDD
Aqueous	EPA 608.3	GC/ECD	4,4-DDE
Aqueous	EPA 608.3	GC/ECD	4,4-DDT
Aqueous	EPA 608.3	GC/ECD	a-BHC
Aqueous	EPA 608.3	GC/ECD	Aldrin
Aqueous	EPA 608.3	GC/ECD	Alpha-Chlordane
Aqueous	EPA 608.3	GC/ECD	Aroclor 1016
Aqueous	EPA 608.3	GC/ECD	Aroclor 1221
Aqueous	EPA 608.3	GC/ECD	Aroclor 1232
Aqueous	EPA 608.3	GC/ECD	Aroclor 1242
Aqueous	EPA 608.3	GC/ECD	Aroclor 1248
Aqueous	EPA 608.3	GC/ECD	Aroclor 1254
Aqueous	EPA 608.3	GC/ECD	Aroclor 1260
Aqueous	EPA 608.3	GC/ECD	b-BHC
Aqueous	EPA 608.3	GC/ECD	Chlordane
Aqueous	EPA 608.3	GC/ECD	d-BHC
Aqueous	EPA 608.3	GC/ECD	Dieldrin
Aqueous	EPA 608.3	GC/ECD	Endosulfan I
Aqueous	EPA 608.3	GC/ECD	Endosulfan II
Aqueous	EPA 608.3	GC/ECD	Endosulfan Sulfate
Aqueous	EPA 608.3	GC/ECD	Endrin
Aqueous	EPA 608.3	GC/ECD	Endrin Aldehyde
Aqueous	EPA 608.3	GC/ECD	Endrin ketone
Aqueous	EPA 608.3	GC/ECD	Gamma-Chlordane
Aqueous	EPA 608.3	GC/ECD	g-BHC
Aqueous	EPA 608.3	GC/ECD	Heptachlor
Aqueous	EPA 608.3	GC/ECD	Heptachlor epoxide
Aqueous	EPA 608.3	GC/ECD	Methoxychlor
Aqueous	EPA 608.3	GC/ECD	Toxaphene
Aqueous	EPA 624.1	GC/MS	1,1,1,2-Tetrachloroethane
Aqueous	EPA 624.1	GC/MS	1,1,1-Trichloroethane
Aqueous	EPA 624.1	GC/MS	1,1,2,2-Tetrachloroethane

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Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 624.1	GC/MS	1,1,2-Trichloroethane
Aqueous	EPA 624.1	GC/MS	1,1-Dichloroethane
Aqueous	EPA 624.1	GC/MS	1,1-Dichloroethylene
Aqueous	EPA 624.1	GC/MS	1,1-Dichloropropene
Aqueous	EPA 624.1	GC/MS	1,2,3-Trichlorobenzene
Aqueous	EPA 624.1	GC/MS	1,2,3-Trichloropropane
Aqueous	EPA 624.1	GC/MS	1,2,4-Trichlorobenzene
Aqueous	EPA 624.1	GC/MS	1,2,4-Trimethylbenzene
Aqueous	EPA 624.1	GC/MS	1,2-Dibromo-3-chloropropane
Aqueous	EPA 624.1	GC/MS	1,2-Dibromoethane
Aqueous	EPA 624.1	GC/MS	1,2-Dichlorobenzene
Aqueous	EPA 624.1	GC/MS	1,2-Dichloroethane
Aqueous	EPA 624.1	GC/MS	1,2-Dichloropropane
Aqueous	EPA 624.1	GC/MS	1,3,5-Trimethylbenzene
Aqueous	EPA 624.1	GC/MS	1,3-Dichlorobenzene
Aqueous	EPA 624.1	GC/MS	1,3-Dichloropropane
Aqueous	EPA 624.1	GC/MS	1,4-Dichlorobenzene
Aqueous	EPA 624.1	GC/MS	2,2-Dichloropropane
Aqueous	EPA 624.1	GC/MS	2-Butanone
Aqueous	EPA 624.1	GC/MS	2-Chloroethylvinyl Ether
Aqueous	EPA 624.1	GC/MS	2-Chlorotoluene
Aqueous	EPA 624.1	GC/MS	2-Hexanone
Aqueous	EPA 624.1	GC/MS	4-Chlorotoluene
Aqueous	EPA 624.1	GC/MS	4-isopropyltoluene
Aqueous	EPA 624.1	GC/MS	Acetone
Aqueous	EPA 624.1	GC/MS	Acrolein
Aqueous	EPA 624.1	GC/MS	Acrylonitrile
Aqueous	EPA 624.1	GC/MS	Benzene
Aqueous	EPA 624.1	GC/MS	Bromobenzene
Aqueous	EPA 624.1	GC/MS	Bromochloromethane
Aqueous	EPA 624.1	GC/MS	Bromodichloromethane
Aqueous	EPA 624.1	GC/MS	Bromoform
Aqueous	EPA 624.1	GC/MS	Bromomethane
Aqueous	EPA 624.1	GC/MS	Carbon Disulfide
Aqueous	EPA 624.1	GC/MS	Carbon Tetrachloride

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Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 624.1	GC/MS	Chlorobenzene
Aqueous	EPA 624.1	GC/MS	Chloroethane
Aqueous	EPA 624.1	GC/MS	Chloroform
Aqueous	EPA 624.1	GC/MS	Chloromethane
Aqueous	EPA 624.1	GC/MS	cis-1,2-Dichloroethylene
Aqueous	EPA 624.1	GC/MS	cis-1,3-Dichloropropene
Aqueous	EPA 624.1	GC/MS	Dibromochloromethane
Aqueous	EPA 624.1	GC/MS	Dibromomethane
Aqueous	EPA 624.1	GC/MS	Dichlorodifluoromethane
Aqueous	EPA 624.1	GC/MS	Diisopropyl ether (DIPE)
Aqueous	EPA 624.1	GC/MS	Ethylbenzene
Aqueous	EPA 624.1	GC/MS	Hexachloroethane
Aqueous	EPA 624.1	GC/MS	Hexachlorobutadiene
Aqueous	EPA 624.1	GC/MS	Isopropylbenzene
Aqueous	EPA 624.1	GC/MS	m- & p-Xylenes
Aqueous	EPA 624.1	GC/MS	MEK
Aqueous	EPA 624.1	GC/MS	Methylene Chloride
Aqueous	EPA 624.1	GC/MS	MIBK
Aqueous	EPA 624.1	GC/MS	MTBE
Aqueous	EPA 624.1	GC/MS	Naphthalene
Aqueous	EPA 624.1	GC/MS	n-Butylbenzene
Aqueous	EPA 624.1	GC/MS	n-Propylbenzene
Aqueous	EPA 624.1	GC/MS	o-Xylene
Aqueous	EPA 624.1	GC/MS	sec-Butylbenzene
Aqueous	EPA 624.1	GC/MS	Styrene
Aqueous	EPA 624.1	GC/MS	t-Butyl alcohol
Aqueous	EPA 624.1	GC/MS	t-Butylbenzene
Aqueous	EPA 624.1	GC/MS	Tetrachloroethylene
Aqueous	EPA 624.1	GC/MS	Tert-Amyl methyl ether (TAME)
Aqueous	EPA 624.1	GC/MS	Toluene
Aqueous	EPA 624.1	GC/MS	trans-1,2-Dichloroethylene
Aqueous	EPA 624.1	GC/MS	trans-1,3-Dichloropropene
Aqueous	EPA 624.1	GC/MS	Trichloroethylene
Aqueous	EPA 624.1	GC/MS	Trichlorofluoromethane
Aqueous	EPA 624.1	GC/MS	Vinyl Chloride
Aqueous	EPA 624.1	GC/MS	Xylenes

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Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 625.1	GC/MS	1-Chloronaphthalene
Aqueous	EPA 625.1	GC/MS	1,2,4-Trichlorobenzene
Aqueous	EPA 625.1	GC/MS	1,2-Dichlorobenzene
Aqueous	EPA 625.1	GC/MS	1,3-Dichlorobenzene
Aqueous	EPA 625.1	GC/MS	1,4-Dichlorobenzene
Aqueous	EPA 625.1	GC/MS	2,3,4,6-Tetrachlorophenol
Aqueous	EPA 625.1	GC/MS	2,4,5-Trichlorophenol
Aqueous	EPA 625.1	GC/MS	2,4,6-Trichlorophenol
Aqueous	EPA 625.1	GC/MS	2,4-Dichlorophenol
Aqueous	EPA 625.1	GC/MS	2,4-Dimethyl phenol
Aqueous	EPA 625.1	GC/MS	2,4-Dinitrophenol
Aqueous	EPA 625.1	GC/MS	2,4-Dinitrotoluene
Aqueous	EPA 625.1	GC/MS	2-Chloronaphthalene
Aqueous	EPA 625.1	GC/MS	2-Chlorophenol
Aqueous	EPA 625.1	GC/MS	2-Methylnaphthalene
Aqueous	EPA 625.1	GC/MS	2-Methylphenol
Aqueous	EPA 625.1	GC/MS	2-Nitroaniline
Aqueous	EPA 625.1	GC/MS	2-Nitrophenol
Aqueous	EPA 625.1	GC/MS	2,6-Dichlorophenol
Aqueous	EPA 625.1	GC/MS	2,6-Dinitrotoluene
Aqueous	EPA 625.1	GC/MS	3- & 4-Methylphenols
Aqueous	EPA 625.1	GC/MS	3,3-Dichlorobenzidine
Aqueous	EPA 625.1	GC/MS	3-Nitroaniline
Aqueous	EPA 625.1	GC/MS	4,6-Dinitro-2-Methylphenol
Aqueous	EPA 625.1	GC/MS	4-Bromophenyl Phenyl Ether
Aqueous	EPA 625.1	GC/MS	4-Chloro-3-Methylphenol
Aqueous	EPA 625.1	GC/MS	4-Chloroaniline
Aqueous	EPA 625.1	GC/MS	4-Chlorophenyl Phenyl Ether
Aqueous	EPA 625.1	GC/MS	4-Nitroaniline
Aqueous	EPA 625.1	GC/MS	4-Nitrophenol
Aqueous	EPA 625.1	GC/MS	Acenaphthene
Aqueous	EPA 625.1	GC/MS	Acenaphthylene
Aqueous	EPA 625.1	GC/MS	Aniline
Aqueous	EPA 625.1	GC/MS	Anthracene
Aqueous	EPA 625.1	GC/MS	Benzidine
Aqueous	EPA 625.1	GC/MS	Benzo(a)anthracene

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Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 625.1	GC/MS	Benzo(a)pyrene
Aqueous	EPA 625.1	GC/MS	Benzo(b)fluoranthene
Aqueous	EPA 625.1	GC/MS	Benzo(g,h,i)perylene
Aqueous	EPA 625.1	GC/MS	Benzo(k)fluoranthene
Aqueous	EPA 625.1	GC/MS	Benzyl Alcohol
Aqueous	EPA 625.1	GC/MS	Bis(2-chloroethoxy) Methane
Aqueous	EPA 625.1	GC/MS	Bis(2-chloroethyl) Ether
Aqueous	EPA 625.1	GC/MS	Bis(2-ethylhexyl)phthalate
Aqueous	EPA 625.1	GC/MS	Butyl Benzyl Phthalate
Aqueous	EPA 625.1	GC/MS	Carbazole
Aqueous	EPA 625.1	GC/MS	Chrysene
Aqueous	EPA 625.1	GC/MS	Dibenzo(a,h)anthracene
Aqueous	EPA 625.1	GC/MS	Dibenzofuran
Aqueous	EPA 625.1	GC/MS	Diethyl phthalate
Aqueous	EPA 625.1	GC/MS	Dimethyl phthalate
Aqueous	EPA 625.1	GC/MS	Di-n-butyl phthalate
Aqueous	EPA 625.1	GC/MS	Di-n-octyl Phthalate
Aqueous	EPA 625.1	GC/MS	Fluoranthene
Aqueous	EPA 625.1	GC/MS	Fluorene
Aqueous	EPA 625.1	GC/MS	Hexachlorobenzene
Aqueous	EPA 625.1	GC/MS	Hexachlorobutadiene
Aqueous	EPA 625.1	GC/MS	Hexachlorocyclopentadiene
Aqueous	EPA 625.1	GC/MS	Hexachloroethane
Aqueous	EPA 625.1	GC/MS	Indeno(1,2,3-cd)pyrene
Aqueous	EPA 625.1	GC/MS	Isophorone
Aqueous	EPA 625.1	GC/MS	m- & p-Cresol
Aqueous	EPA 625.1	GC/MS	Naphthalene
Aqueous	EPA 625.1	GC/MS	Nitrobenzene
Aqueous	EPA 625.1	GC/MS	N-Nitrosodimethylamine
Aqueous	EPA 625.1	GC/MS	N-nitroso-di-n-propylamine
Aqueous	EPA 625.1	GC/MS	N-Nitrosodiphenylamine
Aqueous	EPA 625.1	GC/MS	o-Cresol
Aqueous	EPA 625.1	GC/MS	Pentachlorophenol
Aqueous	EPA 625.1	GC/MS	Phenanthrene
Aqueous	EPA 625.1	GC/MS	Phenol
Aqueous	EPA 625.1	GC/MS	Pyrene

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Contact Name: Sara Guron Phone: 661-327-4911

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Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 625.1	GC/MS	Pyridine
Aqueous	EPA 7196A	UV/VIS	Chromium (VI)
Aqueous	EPA 7470A	CV/AAS	Mercury
Aqueous	EPA 7470A	CVAA	Mercury
Aqueous	EPA 8260B, C	GC/MS	2-CEVE
Aqueous	EPA 8260B, C	GC/MS	Hexachloroethane
Aqueous	EPA 9040B	ISE	pH Determination
Drinking Water	EPA 200.7	ICP	Aluminum
Drinking Water	EPA 200.7	ICP	Antimony
Drinking Water	EPA 200.7	ICP	Arsenic
Drinking Water	EPA 200.7	ICP	Barium
Drinking Water	EPA 200.7	ICP	Beryllium
Drinking Water	EPA 200.7	ICP	Cadmium
Drinking Water	EPA 200.7	ICP	Calcium
Drinking Water	EPA 200.7	ICP	Chromium
Drinking Water	EPA 200.7	ICP	Copper
Drinking Water	EPA 200.7	ICP	Iron
Drinking Water	EPA 200.7	ICP	Lead
Drinking Water	EPA 200.7	ICP	Magnesium
Drinking Water	EPA 200.7	ICP	Manganese
Drinking Water	EPA 200.7	ICP	Molybdenum
Drinking Water	EPA 200.7	ICP	Nickel
Drinking Water	EPA 200.7	ICP	Potassium
Drinking Water	EPA 200.7	ICP	Selenium
Drinking Water	EPA 200.7	ICP	Silica
Drinking Water	EPA 200.7	ICP	Silver
Drinking Water	EPA 200.7	ICP	Sodium
Drinking Water	EPA 200.7	ICP	Thallium
Drinking Water	EPA 200.7	ICP	Vanadium
Drinking Water	EPA 200.7	ICP	Zinc
Drinking Water	EPA 200.8	ICP/MS	Aluminum
Drinking Water	EPA 200.8	ICP/MS	Antimony
Drinking Water	EPA 200.8	ICP/MS	Arsenic
Drinking Water	EPA 200.8	ICP/MS	Barium
Drinking Water	EPA 200.8	ICP/MS	Beryllium
Drinking Water	EPA 200.8	ICP/MS	Boron

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Drinking Water	EPA 200.8	ICP/MS	Cadmium
Drinking Water	EPA 200.8	ICP/MS	Chromium
Drinking Water	EPA 200.8	ICP/MS	Cobalt
Drinking Water	EPA 200.8	ICP/MS	Copper
Drinking Water	EPA 200.8	ICP/MS	Lead
Drinking Water	EPA 200.8	ICP/MS	Manganese
Drinking Water	EPA 200.8	ICP/MS	Mercury
Drinking Water	EPA 200.8	ICP/MS	Molybdenum
Drinking Water	EPA 200.8	ICP/MS	Nickel
Drinking Water	EPA 200.8	ICP/MS	Selenium
Drinking Water	EPA 200.8	ICP/MS	Silver
Drinking Water	EPA 200.8	ICP/MS	Thallium
Drinking Water	EPA 200.8	ICP/MS	Uranium
Drinking Water	EPA 200.8	ICP/MS	Vanadium
Drinking Water	EPA 200.8	ICP/MS	Zinc
Drinking Water	EPA 524.2	GC/MS	trans-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC/MS	1,1,1,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC/MS	1,1,1-Trichloroethane
Drinking Water	EPA 524.2	GC/MS	1,1,2,2-Tetrachloroethane
Drinking Water	EPA 524.2	GC/MS	1,1,2-Trichloroethane
Drinking Water	EPA 524.2	GC/MS	1,1-Dichloroethane
Drinking Water	EPA 524.2	GC/MS	1,1-Dichloroethene
Drinking Water	EPA 524.2	GC/MS	1,1-Dichloropropene
Drinking Water	EPA 524.2	GC/MS	1,2,3-Trichlorobenzene
Drinking Water	EPA 524.2	GC/MS	1,2,3-Trichloropropane
Drinking Water	EPA 524.2	GC/MS	1,2,4-Trichlorobenzene
Drinking Water	EPA 524.2	GC/MS	1,2,4-Trimethylbenzene
Drinking Water	EPA 524.2	GC/MS	1,2-Dichlorobenzene
Drinking Water	EPA 524.2	GC/MS	1,2-Dichloroethane
Drinking Water	EPA 524.2	GC/MS	1,2-Dichloropropane
Drinking Water	EPA 524.2	GC/MS	1,3,5-Trimethylbenzene
Drinking Water	EPA 524.2	GC/MS	1,3-Dichlorobenzene
Drinking Water	EPA 524.2	GC/MS	1,3-Dichloropropane
Drinking Water	EPA 524.2	GC/MS	1,4-Dichlorobenzene
Drinking Water	EPA 524.2	GC/MS	2,2-Dichloropropane
Drinking Water	EPA 524.2	GC/MS	2-Chlorotoluene

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Drinking Water	EPA 524.2	GC/MS	4-Chlorotoluene
Drinking Water	EPA 524.2	GC/MS	4-Isopropyltoluene
Drinking Water	EPA 524.2	GC/MS	Benzene
Drinking Water	EPA 524.2	GC/MS	Bromobenzene
Drinking Water	EPA 524.2	GC/MS	Bromochloromethane
Drinking Water	EPA 524.2	GC/MS	Bromodichloromethane
Drinking Water	EPA 524.2	GC/MS	Bromoform
Drinking Water	EPA 524.2	GC/MS	Bromomethane
Drinking Water	EPA 524.2	GC/MS	Carbon Tetrachloride
Drinking Water	EPA 524.2	GC/MS	Chlorobenzene
Drinking Water	EPA 524.2	GC/MS	Chloroethane
Drinking Water	EPA 524.2	GC/MS	Chloroform
Drinking Water	EPA 524.2	GC/MS	Chloromethane
Drinking Water	EPA 524.2	GC/MS	cis-1,2-Dichloroethene
Drinking Water	EPA 524.2	GC/MS	cis-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC/MS	Dibromochloromethane
Drinking Water	EPA 524.2	GC/MS	Dibromomethane
Drinking Water	EPA 524.2	GC/MS	Dichlorodifluoromethane
Drinking Water	EPA 524.2	GC/MS	Ethylbenzene
Drinking Water	EPA 524.2	GC/MS	Hexachlorobutadiene
Drinking Water	EPA 524.2	GC/MS	Isopropylbenzene
Drinking Water	EPA 524.2	GC/MS	m&p-Xylenes
Drinking Water	EPA 524.2	GC/MS	Methylene Chloride
Drinking Water	EPA 524.2	GC/MS	Methyl-tert-butyl-ether (MTBE)
Drinking Water	EPA 524.2	GC/MS	Naphthalene
Drinking Water	EPA 524.2	GC/MS	n-Butylbenzene
Drinking Water	EPA 524.2	GC/MS	o-Xylene
Drinking Water	EPA 524.2	GC/MS	Propylbenzene
Drinking Water	EPA 524.2	GC/MS	sec-butylbenzene
Drinking Water	EPA 524.2	GC/MS	Styrene
Drinking Water	EPA 524.2	GC/MS	tert-Butylbenzene
Drinking Water	EPA 524.2	GC/MS	Tetrachloroethene
Drinking Water	EPA 524.2	GC/MS	Toluene
Drinking Water	EPA 524.2	GC/MS	trans-1,3-Dichloropropene
Drinking Water	EPA 524.2	GC/MS	Trichloroethylene
Drinking Water	EPA 524.2	GC/MS	Trichlorofluoromethane

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BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Drinking Water	EPA 524.2	GC/MS	Trichlorotrifluoroethane
Drinking Water	EPA 524.2	GC/MS	Vinyl Chloride
Solid	AK-103	GC-FID	Diesel Range Organics (RRO)
Solid	EPA 1311	TCLP Extractables	TCLP, STLC, & ZHE
Solid	EPA 7471A	CVAA	Mercury
Aqueous/Solid	AK-101	GC-FID	Gasoline Range Organics (GRO)
Aqueous/Solid	AK-102	GC-FID	Diesel Range Organics (DRO)
Aqueous/Solid	EPA 160.1	GRAV	Total Dissolved Solids (TDS)
Aqueous/Solid	EPA 6010B	ICP/AES	Aluminum
Aqueous/Solid	EPA 6010B	ICP/AES	Antimony
Aqueous/Solid	EPA 6010B	ICP/AES	Arsenic
Aqueous/Solid	EPA 6010B	ICP/AES	Barium
Aqueous/Solid	EPA 6010B	ICP/AES	Beryllium
Aqueous/Solid	EPA 6010B	ICP/AES	Cadmium
Aqueous/Solid	EPA 6010B	ICP/AES	Calcium
Aqueous/Solid	EPA 6010B	ICP/AES	Chromium
Aqueous/Solid	EPA 6010B	ICP/AES	Cobalt
Aqueous/Solid	EPA 6010B	ICP/AES	Copper
Aqueous/Solid	EPA 6010B	ICP/AES	Iron
Aqueous/Solid	EPA 6010B	ICP/AES	Lead
Aqueous/Solid	EPA 6010B	ICP/AES	Magnesium
Aqueous/Solid	EPA 6010B	ICP/AES	Manganese
Aqueous/Solid	EPA 6010B	ICP/AES	Molybdenum
Aqueous/Solid	EPA 6010B	ICP/AES	Nickel
Aqueous/Solid	EPA 6010B	ICP/AES	Potassium
Aqueous/Solid	EPA 6010B	ICP/AES	Selenium
Aqueous/Solid	EPA 6010B	ICP/AES	Silver
Aqueous/Solid	EPA 6010B	ICP/AES	Sodium
Aqueous/Solid	EPA 6010B	ICP/AES	Strontium
Aqueous/Solid	EPA 6010B	ICP/AES	Thallium
Aqueous/Solid	EPA 6010B	ICP/AES	Tin

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 6010B	ICP/AES	Titanium
Aqueous/Solid	EPA 6010B	ICP/AES	Vanadium
Aqueous/Solid	EPA 6010B	ICP/AES	Zinc
Aqueous/Solid	EPA 6020	ICP/MS	Antimony
Aqueous/Solid	EPA 6020	ICP/MS	Arsenic
Aqueous/Solid	EPA 6020	ICP/MS	Barium
Aqueous/Solid	EPA 6020	ICP/MS	Beryllium
Aqueous/Solid	EPA 6020	ICP/MS	Cadmium
Aqueous/Solid	EPA 6020	ICP/MS	Chromium
Aqueous/Solid	EPA 6020	ICP/MS	Cobalt
Aqueous/Solid	EPA 6020	ICP/MS	Copper
Aqueous/Solid	EPA 6020	ICP/MS	Lead
Aqueous/Solid	EPA 6020	ICP/MS	Manganese
Aqueous/Solid	EPA 6020	ICP/MS	Molybdenum
Aqueous/Solid	EPA 6020	ICP/MS	Nickel
Aqueous/Solid	EPA 6020	ICP/MS	Selenium
Aqueous/Solid	EPA 6020	ICP/MS	Silver
Aqueous/Solid	EPA 6020	ICP/MS	Thallium
Aqueous/Solid	EPA 6020	ICP/MS	Vanadium
Aqueous/Solid	EPA 6020	ICP/MS	Zinc
Aqueous/Solid	EPA 7199	IC	Chromium (VI)
Aqueous/Solid	EPA 8015B	GC/PID/FID	Diesel Range Organics (C12 - C24)
Aqueous/Solid	EPA 8015B	GC/PID/FID	TPH - Diesel (C10 - C34)
Aqueous/Solid	EPA 8015B	GC/PID/FID	TPH - Gasoline
Aqueous/Solid	EPA 8021B	GC/PID/FID	Benzene
Aqueous/Solid	EPA 8021B	GC/PID/FID	Ethylbenzene
Aqueous/Solid	EPA 8021B	GC/PID/FID	Methyl tert butyl ether
Aqueous/Solid	EPA 8021B	GC/PID/FID	Toluene
Aqueous/Solid	EPA 8021B	GC/PID/FID	Total Xylenes
Aqueous/Solid	EPA 8081A	GC/ECD	4,4'-DDD
Aqueous/Solid	EPA 8081A	GC/ECD	4,4'-DDE
Aqueous/Solid	EPA 8081A	GC/ECD	4,4'-DDT
Aqueous/Solid	EPA 8081A	GC/ECD	Aldrin
Aqueous/Solid	EPA 8081A	GC/ECD	alpha-BHC
Aqueous/Solid	EPA 8081A	GC/ECD	alpha-Chlordane
Aqueous/Solid	EPA 8081A	GC/ECD	beta-BHC

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ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8081A	GC/ECD	Chlordane (Technical)
Aqueous/Solid	EPA 8081A	GC/ECD	delta-BHC
Aqueous/Solid	EPA 8081A	GC/ECD	Dieldrin
Aqueous/Solid	EPA 8081A	GC/ECD	Endosulfan I
Aqueous/Solid	EPA 8081A	GC/ECD	Endosulfan II
Aqueous/Solid	EPA 8081A	GC/ECD	Endosulfan Sulfate
Aqueous/Solid	EPA 8081A	GC/ECD	Endrin
Aqueous/Solid	EPA 8081A	GC/ECD	Endrin Aldehyde
Aqueous/Solid	EPA 8081A	GC/ECD	Endrin ketone
Aqueous/Solid	EPA 8081A	GC/ECD	gamma-BHC (Lindane)
Aqueous/Solid	EPA 8081A	GC/ECD	gamma-Chlordane
Aqueous/Solid	EPA 8081A	GC/ECD	Heptachlor
Aqueous/Solid	EPA 8081A	GC/ECD	Heptachlor Epoxide
Aqueous/Solid	EPA 8081A	GC/ECD	Methoxychlor
Aqueous/Solid	EPA 8081A	GC/ECD	Toxaphene
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1016
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1221
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1232
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1242
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1248
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1254
Aqueous/Solid	EPA 8082A	GC/ECD	PCB-1260
Aqueous/Solid	EPA 8141A	GC/NPD	Azinphos Methyl
Aqueous/Solid	EPA 8141A	GC/NPD	Chlorpyrifos
Aqueous/Solid	EPA 8141A	GC/NPD	Demeton O/S
Aqueous/Solid	EPA 8141A	GC/NPD	Diazinon
Aqueous/Solid	EPA 8141A	GC/NPD	Dichlorvos
Aqueous/Solid	EPA 8141A	GC/NPD	Dimethoate
Aqueous/Solid	EPA 8141A	GC/NPD	Disulfoton
Aqueous/Solid	EPA 8141A	GC/NPD	Ethion

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8141A	GC/NPD	Ethoprop
Aqueous/Solid	EPA 8141A	GC/NPD	Ethyl Parathion
Aqueous/Solid	EPA 8141A	GC/NPD	Malathion
Aqueous/Solid	EPA 8141A	GC/NPD	Methyl parathion
Aqueous/Solid	EPA 8141A	GC/NPD	Phorate
Aqueous/Solid	EPA 8141A	GC/NPD	Ronnel (Fenchlorphos)
Aqueous/Solid	EPA 8151A	GC/ECD	2,4,5-T
Aqueous/Solid	EPA 8151A	GC/ECD	2,4,5-TP (Silvex)
Aqueous/Solid	EPA 8151A	GC/ECD	2,4-D
Aqueous/Solid	EPA 8151A	GC/ECD	2,4-DB
Aqueous/Solid	EPA 8151A	GC/ECD	Dalapon
Aqueous/Solid	EPA 8151A	GC/ECD	Dicamba
Aqueous/Solid	EPA 8151A	GC/ECD	Dichloroprop
Aqueous/Solid	EPA 8151A	GC/ECD	Dinoseb
Aqueous/Solid	EPA 8151A	GC/ECD	Pentachlorophenol
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1,1,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1,1-Trichloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1,2,2-Tetrachloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1,2-Trichloro-1,2,2-trifluoroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1,2-Trichloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,1-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2,3-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2,3-Trichloropropane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2,4-Trimethylbenzene

Certificate of Accreditation: Supplement

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BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2-Dibromo-3-Chloropropane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2-Dibromoethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2-Dichloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,3,5-Trimethylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,3-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,3-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC/MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	1,4-Dioxane
Aqueous/Solid	EPA 8260B, C	GC/MS	2,2-Dichloropropane
Aqueous/Solid	EPA 8260B, C	GC/MS	2-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC/MS	2-Hexanone
Aqueous/Solid	EPA 8260B, C	GC/MS	4-Chlorotoluene
Aqueous/Solid	EPA 8260B, C	GC/MS	Acetone
Aqueous/Solid	EPA 8260B, C	GC/MS	Acrolein
Aqueous/Solid	EPA 8260B, C	GC/MS	Acrylonitrile
Aqueous/Solid	EPA 8260B, C	GC/MS	Benzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Bromobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Bromochloromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Bromodichloromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Bromoform
Aqueous/Solid	EPA 8260B, C	GC/MS	Bromomethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Carbon Disulfide
Aqueous/Solid	EPA 8260B, C	GC/MS	Carbon Tetrachloride
Aqueous/Solid	EPA 8260B, C	GC/MS	Chlorobenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Chloroethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Chloroform
Aqueous/Solid	EPA 8260B, C	GC/MS	Chloromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	cis-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	cis-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC/MS	Dibromochloromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Dibromomethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Dichlorodifluoromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Diisopropyl ether
Aqueous/Solid	EPA 8260B, C	GC/MS	Ethyl t-butyl ether

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8260B, C	GC/MS	Ethylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8260B, C	GC/MS	Isopropylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Methyl Ethyl Ketone
Aqueous/Solid	EPA 8260B, C	GC/MS	Methyl Isobutyl Ketone
Aqueous/Solid	EPA 8260B, C	GC/MS	Methyl t-butyl Ether
Aqueous/Solid	EPA 8260B, C	GC/MS	Methylene Chloride
Aqueous/Solid	EPA 8260B, C	GC/MS	Naphthalene
Aqueous/Solid	EPA 8260B, C	GC/MS	n-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	n-Propylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	o-Xylene
Aqueous/Solid	EPA 8260B, C	GC/MS	p- & m-Xylenes
Aqueous/Solid	EPA 8260B, C	GC/MS	p-Isopropyltoluene
Aqueous/Solid	EPA 8260B, C	GC/MS	sec-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Styrene
Aqueous/Solid	EPA 8260B, C	GC/MS	t-Amyl Methyl Ether
Aqueous/Solid	EPA 8260B, C	GC/MS	t-Butyl Alcohol
Aqueous/Solid	EPA 8260B, C	GC/MS	tert-Butylbenzene
Aqueous/Solid	EPA 8260B, C	GC/MS	Tetrachloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	Toluene
Aqueous/Solid	EPA 8260B, C	GC/MS	Total 1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	Total 1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC/MS	Total Xylenes
Aqueous/Solid	EPA 8260B, C	GC/MS	trans-1,2-Dichloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	trans-1,3-Dichloropropene
Aqueous/Solid	EPA 8260B, C	GC/MS	Trichloroethene
Aqueous/Solid	EPA 8260B, C	GC/MS	Trichlorofluoromethane
Aqueous/Solid	EPA 8260B, C	GC/MS	Vinyl Chloride
Aqueous/Solid	EPA 8260B, C (BCORG045)	GC/MS	TPPH (G)
Aqueous/Solid	EPA 8270C	GC/MS	1-Chloronaphthalene
Aqueous/Solid	EPA 8270C	GC/MS	1,2,4-Trichlorobenzene
Aqueous/Solid	EPA 8270C	GC/MS	1,2-Dichlorobenzene
Aqueous/Solid	EPA 8270C	GC/MS	1,3-Dichlorobenzene (1,3-DCB)
Aqueous/Solid	EPA 8270C	GC/MS	1,4-Dichlorobenzene
Aqueous/Solid	EPA 8270C	GC/MS	1,4-Dioxane
Aqueous/Solid	EPA 8270C	GC/MS	2,3,4,6-Tetrachlorophenol

Certificate of Accreditation: Supplement

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BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8270C	GC/MS	2,4,5-Trichlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	2,4,6-Trichlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	2,4-Dichlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	2,4-Dimethylphenol
Aqueous/Solid	EPA 8270C	GC/MS	2, 4-Dinitrophenol
Aqueous/Solid	EPA 8270C	GC/MS	2,4-Dinitrotoluene
Aqueous/Solid	EPA 8270C	GC/MS	2,6-Dichlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	2,6-Dinitrotoluene
Aqueous/Solid	EPA 8270C	GC/MS	2-Chloronaphthalene
Aqueous/Solid	EPA 8270C	GC/MS	2-Chlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270C	GC/MS	2-Methylphenol
Aqueous/Solid	EPA 8270C	GC/MS	2-Nitroaniline
Aqueous/Solid	EPA 8270C	GC/MS	2-Nitrophenol
Aqueous/Solid	EPA 8270C	GC/MS	3- & 4-Methylphenol
Aqueous/Solid	EPA 8270C	GC/MS	3,3-Dichlorobenzidine
Aqueous/Solid	EPA 8270C	GC/MS	3-Nitroaniline
Aqueous/Solid	EPA 8270C	GC/MS	4,6-Dinitro-2-methylphenol
Aqueous/Solid	EPA 8270C	GC/MS	4-Bromophenyl phenyl ether
Aqueous/Solid	EPA 8270C	GC/MS	4-Chloro-3-methylphenol
Aqueous/Solid	EPA 8270C	GC/MS	4-Chloroaniline
Aqueous/Solid	EPA 8270C	GC/MS	4-Chlorophenyl phenyl ether
Aqueous/Solid	EPA 8270C	GC/MS	4-Nitroaniline
Aqueous/Solid	EPA 8270C	GC/MS	4-Nitrophenol
Aqueous/Solid	EPA 8270C	GC/MS	Acenaphthene
Aqueous/Solid	EPA 8270C	GC/MS	Acenaphthylene
Aqueous/Solid	EPA 8270C	GC/MS	Aniline
Aqueous/Solid	EPA 8270C	GC/MS	Anthracene
Aqueous/Solid	EPA 8270C	GC/MS	Benzidine
Aqueous/Solid	EPA 8270C	GC/MS	Benzo[a]anthracene
Aqueous/Solid	EPA 8270C	GC/MS	Benzo[a]pyrene
Aqueous/Solid	EPA 8270C	GC/MS	Benzo[b]fluoranthene
Aqueous/Solid	EPA 8270C	GC/MS	Benzo[g,h,i]perylene
Aqueous/Solid	EPA 8270C	GC/MS	Benzo[k]fluoranthene
Aqueous/Solid	EPA 8270C	GC/MS	Benzyl alcohol
Aqueous/Solid	EPA 8270C	GC/MS	Benzyl butyl phthalate

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8270C	GC/MS	bis(2-Chloroethoxy)methane
Aqueous/Solid	EPA 8270C	GC/MS	bis(2-Chloroethyl) ether
Aqueous/Solid	EPA 8270C	GC/MS	bis(2-Ethylhexyl)phthalate
Aqueous/Solid	EPA 8270C	GC/MS	Carbazole
Aqueous/Solid	EPA 8270C	GC/MS	Chrysene
Aqueous/Solid	EPA 8270C	GC/MS	Dibenzo[a,h]anthracene
Aqueous/Solid	EPA 8270C	GC/MS	Dibenzofuran
Aqueous/Solid	EPA 8270C	GC/MS	Diethyl phthalate
Aqueous/Solid	EPA 8270C	GC/MS	Dimethyl phthalate
Aqueous/Solid	EPA 8270C	GC/MS	Di-n-butyl phthalate
Aqueous/Solid	EPA 8270C	GC/MS	Di-n-octyl phthalate
Aqueous/Solid	EPA 8270C	GC/MS	Fluoranthene
Aqueous/Solid	EPA 8270C	GC/MS	Fluorene
Aqueous/Solid	EPA 8270C	GC/MS	Hexachlorobenzene
Aqueous/Solid	EPA 8270C	GC/MS	Hexachlorobutadiene
Aqueous/Solid	EPA 8270C	GC/MS	Hexachlorocyclopentadiene
Aqueous/Solid	EPA 8270C	GC/MS	Hexachloroethane
Aqueous/Solid	EPA 8270C	GC/MS	Indeno[1,2,3-cd]pyrene
Aqueous/Solid	EPA 8270C	GC/MS	Isophorone
Aqueous/Solid	EPA 8270C	GC/MS	Naphthalene
Aqueous/Solid	EPA 8270C	GC/MS	Nitrobenzene
Aqueous/Solid	EPA 8270C	GC/MS	N-Nitrosodimethylamine
Aqueous/Solid	EPA 8270C	GC/MS	N-Nitrosodi-N-propylamine
Aqueous/Solid	EPA 8270C	GC/MS	N-Nitrosodiphenylamine
Aqueous/Solid	EPA 8270C	GC/MS	Pentachlorophenol
Aqueous/Solid	EPA 8270C	GC/MS	Phenanthrene
Aqueous/Solid	EPA 8270C	GC/MS	Phenol
Aqueous/Solid	EPA 8270C	GC/MS	Pyrene
Aqueous/Solid	EPA 8270C	GC/MS	Pyridine
Aqueous/Solid	EPA 8270C SIM	GC/MS	Acenaphthene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Acenaphthylene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Anthracene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Benzo(a)anthracene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Benzo(a)pyrene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Benzo(b)fluroanthene

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308
Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous/Solid	EPA 8270C SIM	GC/MS	Benzo(g,h,i)perylene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Benzo(k)fluroanthene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Chrysene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Dibenzo(a,h)anthracene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Fluoranthene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Fluorene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Indeno(1,2,3-cd)pyrene
Aqueous/Solid	EPA 8270C SIM	GC/MS	2-Methylnaphthalene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Naphthalene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Phenanthrene
Aqueous/Solid	EPA 8270C SIM	GC/MS	Pyrene
Aqueous/Solid	EPA 8330A	HPLC/UV	1,3,5-Trinitrobenzene
Aqueous/Solid	EPA 8330A	HPLC/UV	1,3-Dinitrobenzene
Aqueous/Solid	EPA 8330A	HPLC/UV	2,4,6-Trinitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	2,4-Dinitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	2,6-Dinitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	2-Amino-4,6-dinitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	2-Nitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	3-Nitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	4-Amino-2,6-dinitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	4-Nitrotoluene
Aqueous/Solid	EPA 8330A	HPLC/UV	HMX
Aqueous/Solid	EPA 8330A	HPLC/UV	Nitrobenzene
Aqueous/Solid	EPA 8330A	HPLC/UV	RDX
Aqueous/Solid	EPA 8330A	HPLC/UV	Tetryl
Aqueous	EPA 9010	Distillation	Total Cyanide
Aqueous/Solid	EPA 9012	UV/VIS	Cyanide
Aqueous/Solid	EPA 9012A	UV/VIS	Total Cyanide
Aqueous/Solid	EPA 9040B	ISE	pH Determination
Solid	EPA 9045C	ISE	pH Determination
Aqueous	RSK 175	GC-FID	Methane, ethane, & ethene
Aqueous/Solids	SM 2540C	GRAV	Total Disovled Solids (TDS)
Aqueous/Solid	SM 2540G	GRAV	% Moisture

Certificate of Accreditation: Supplement

ISO/IEC 17025:2017 and DoD-ELAP

BC Laboratories, Inc.

4100 Atlas Court, Bakersfield, CA 93308

Contact Name: Sara Guron Phone: 661-327-4911

Accreditation is granted to the facility to perform the following testing:

Matrix	Standard /Method	Technology	Analyte
Aqueous	EPA 3005A	Acid Digestion	Digestion Prep Methods
Aqueous	EPA 3010A	Acid Digestion	Digestion Prep Methods
Aqueous	EPA 3510C	Separatory Funnel	Extraction Prep Methods
Aqueous	EPA 7470A	Acid Digestion	Digestion Prep Methods
Solid	EPA 300	Leaching	Prep
Solid	EPA 3050B	Acid Digestion	Digestion Prep Methods
Solid	EPA 3550B	Ultrasonic Extraction	Extraction Prep Methods
Solid	EPA 3580A	Solvent Extraction	Extraction Prep Methods
Solid	EPA 5035B	Purge & Trap	Volatile Prep Methods
Solid	EPA 7471A	Acid Digestion	Digestion Prep Methods
Solid	EPA 8330	Sonication	Extraction Prep Methods
Aqueous/Solid	EPA 5030A	Purge & Trap	Volatile Prep Methods
Aqueous/Solid	EPA 9010	Distillation	Distillation Prep Methods

CALIFORNIA STATE
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Fields of Accreditation

BC Laboratories, Inc.

4100 Atlas Court
Bakersfield, CA 93308
Phone: 6613274911

Certificate Number: 1186
Expiration Date: 5/31/2022

Field of Accreditation: 101 - Microbiology of Drinking Water

101.010	001	Heterotrophic Bacteria	SM 9215 B
101.020	001	Total Coliform P/A	SM 9221 B
101.020	002	Fecal Coliform P/A	SM 9221 B,E
101.020	004	Total Coliform (Enumeration)	SM 9221 B,C
101.020	005	Fecal Coliform (Enumeration)	SM 9221 B,E
101.020	006	E. coli (Enumeration)	SM 9221 B,F
101.050	001	Total Coliform P/A	SM 9223 B Colilert
101.050	002	E. coli P/A	SM 9223 B Colilert
101.050	003	Total Coliform (Enumeration)	SM 9223 B Colilert
101.050	004	E. coli (Enumeration)	SM 9223 B Colilert
101.050	005	Total Coliform P/A	SM 9223 B Colilert 18
101.050	006	E. coli P/A	SM 9223 B Colilert 18
101.050	007	Total Coliform (Enumeration)	SM 9223 B Colilert 18
101.050	008	E. coli (Enumeration)	SM 9223 B Colilert 18
101.170	001	Enterococci	Enterolert

Field of Accreditation: 102 - Inorganic Chemistry of Drinking Water

102.015	001	Hydrogen Ion (pH)	EPA 150.1
102.020	001	Turbidity	EPA 180.1
102.026	001	Calcium	EPA 200.7
102.026	002	Magnesium	EPA 200.7
102.026	003	Potassium	EPA 200.7
102.026	004	Silica	EPA 200.7
102.026	005	Sodium	EPA 200.7
102.030	001	Bromide	EPA 300.0
102.030	003	Chloride	EPA 300.0
102.030	005	Fluoride	EPA 300.0
102.030	006	Nitrate (as N)	EPA 300.0
102.030	009	Sulfate (as SO4)	EPA 300.0
102.045	001	Perchlorate	EPA 314.0
102.050	001	Cyanide, Total	EPA 335.4
102.061	001	Nitrite (as N)	EPA 353.2
102.070	001	Phosphate,Ortho (as P)	EPA 365.1
102.100	001	Alkalinity	SM 2320 B-1997

102.120	001	Hardness (Calculation)	SM 2340 B-1997
102.130	001	Specific Conductance	SM 2510 B-1997
102.140	001	Residue, Filterable TDS	SM 2540 C-1997
102.174	001	Chlorine, Free	SM 4500-Cl F-2000
102.180	001	Chlorine Dioxide	SM 4500-ClO2 D-2000
102.241	001	Phosphate,Ortho (as P)	SM 4500-P F-1999
102.262	001	Organic Carbon-Total (TOC)	SM 5310 C-2000
102.263	001	Dissolved Organic Carbon (DOC)	SM 5310 C-2000
102.270	001	Surfactants	SM 5540 C-2000

Field of Accreditation:103 - Toxic Chemical Elements of Drinking Water

103.130	001	Aluminum	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
103.140	001	Aluminum	EPA 200.8
103.140	002	Antimony	EPA 200.8
103.140	003	Arsenic	EPA 200.8
103.140	004	Barium	EPA 200.8
103.140	005	Beryllium	EPA 200.8
103.140	006	Cadmium	EPA 200.8
103.140	007	Chromium	EPA 200.8
103.140	008	Copper	EPA 200.8
103.140	009	Lead	EPA 200.8
103.140	010	Manganese	EPA 200.8
103.140	011	Mercury	EPA 200.8
103.140	012	Nickel	EPA 200.8
103.140	013	Selenium	EPA 200.8
103.140	014	Silver	EPA 200.8
103.140	015	Thallium	EPA 200.8
103.140	016	Zinc	EPA 200.8
103.140	017	Boron	EPA 200.8
103.140	018	Vanadium	EPA 200.8
103.160	001	Mercury	EPA 245.1
103.310	001	Chromium VI (Hexavalent Chromium)	EPA 218.6

Field of Accreditation:104 - Volatile Organic Chemistry of Drinking Water

104.030	001	1,2-Dibromoethane (EDB)	EPA 504.1

104.030	002	1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1
104.035	001	1,2,3-Trichloropropane (TCP)	SRL 524M-TCP
104.040	000	Volatile Organic Compounds	EPA 524.2
104.040	001	Benzene	EPA 524.2
104.040	007	n-Butylbenzene	EPA 524.2
104.040	008	sec-Butylbenzene	EPA 524.2
104.040	009	tert-Butylbenzene	EPA 524.2
104.040	010	Carbon Tetrachloride	EPA 524.2
104.040	011	Chlorobenzene	EPA 524.2
104.040	015	2-Chlorotoluene	EPA 524.2
104.040	016	4-Chlorotoluene	EPA 524.2
104.040	019	1,3-Dichlorobenzene	EPA 524.2
104.040	020	1,2-Dichlorobenzene	EPA 524.2
104.040	021	1,4-Dichlorobenzene	EPA 524.2
104.040	022	Dichlorodifluoromethane	EPA 524.2
104.040	023	1,1-Dichloroethane	EPA 524.2
104.040	024	1,2-Dichloroethane (Ethylene Dichloride)	EPA 524.2
104.040	025	1,1-Dichloroethylene (1,1-Dichloroethene)	EPA 524.2
104.040	026	cis-1,2-Dichloroethylene (cis 1,2 Dichloroethene)	EPA 524.2
104.040	027	trans-1,2-Dichloroethylene (trans- 1,2 Dichloroethene)	EPA 524.2
104.040	028	Dichloromethane (Methylene Chloride)	EPA 524.2
104.040	029	1,2-Dichloropropane	EPA 524.2
104.040	033	cis-1,3-Dichloropropylene (cis 1,3 Dichloropropene)	EPA 524.2
104.040	034	trans-1,3-Dichloropropylene (trans-1,3 Dichloropropen	EPA 524.2
104.040	035	Ethylbenzene	EPA 524.2
104.040	037	Isopropylbenzene	EPA 524.2
104.040	039	Naphthalene	EPA 524.2
104.040	041	N-propylbenzene	EPA 524.2
104.040	042	Styrene	EPA 524.2
104.040	043	1,1,1,2-Tetrachloroethane	EPA 524.2
104.040	044	1,1,2,2-Tetrachloroethane	EPA 524.2
104.040	045	Tetrachloroethylene (Tetrachloroethene)	EPA 524.2
104.040	046	Toluene	EPA 524.2
104.040	047	1,2,3-Trichlorobenzene	EPA 524.2
104.040	048	1,2,4-Trichlorobenzene	EPA 524.2
104.040	049	1,1,1-Trichloroethane	EPA 524.2
104.040	050	1,1,2-Trichloroethane	EPA 524.2
104.040	051	Trichloroethylene (Trichloroethene)	EPA 524.2
104.040	052	Trichlorofluoromethane	EPA 524.2
104.040	054	1,2,4-Trimethylbenzene	EPA 524.2
104.040	055	1,3,5-Trimethylbenzene	EPA 524.2
104.040	056	Vinyl Chloride	EPA 524.2

104.040	057	Xylenes, Total	EPA 524.2
104.040	061	Carbon Disulfide	EPA 524.2
104.040	062	Methyl isobutyl ketone (MIBK, 4-Methyl-2-pentanone)	EPA 524.2
104.045	000	Trihalomethanes, Total	EPA 524.2
104.045	001	Bromodichloromethane	EPA 524.2
104.045	002	Bromoform	EPA 524.2
104.045	003	Chloroform	EPA 524.2
104.045	004	Dibromochloromethane (Chlorodibromomethane)	EPA 524.2
104.050	000	Gasoline Additives	EPA 524.2
104.050	002	Methyl tert-butyl Ether (MTBE)	EPA 524.2
104.050	003	tert-Amyl Methyl Ether (TAME)	EPA 524.2
104.050	004	Ethyl tert-butyl Ether (ETBE)	EPA 524.2
104.050	005	Trichlorotrifluoroethane	EPA 524.2
104.050	006	t-Butyl alcohol (2-Methyl-2-propanol)	EPA 524.2

Field of Accreditation:105 - Semi-volatile Organic Chemistry of Drinking Water

105.035	000	Organochlorine Pesticides and PCBs	EPA 508
105.035	001	Aldrin	EPA 508
105.035	002	Endosulfan I	EPA 508
105.035	003	Endosulfan II	EPA 508
105.035	004	Endosulfan Sulfate	EPA 508
105.035	005	Endrin	EPA 508
105.035	006	Endrin Aldehyde	EPA 508
105.035	007	Heptachlor	EPA 508
105.035	008	Heptachlor Epoxide	EPA 508
105.035	009	Hexachlorobenzene	EPA 508
105.035	010	Lindane (HCH-gamma)	EPA 508
105.035	011	Methoxychlor	EPA 508
105.035	013	Chlordane	EPA 508
105.035	014	Toxaphene	EPA 508
105.035	015	PCBs as Aroclors	EPA 508
105.035	016	Aroclor 1016	EPA 508
105.035	017	Aroclor 1221	EPA 508
105.035	018	Aroclor 1232	EPA 508
105.035	019	Aroclor 1242	EPA 508
105.035	020	Aroclor 1248	EPA 508
105.035	021	Aroclor 1254	EPA 508
105.035	022	Aroclor 1260	EPA 508
105.070	000	Chlorinated Acids	EPA 515.1
105.070	001	Bentazon	EPA 515.1
105.070	002	2,4-D	EPA 515.1
105.070	003	Dalapon	EPA 515.1
105.070	004	Dicamba	EPA 515.1

105.070	005	Dinoseb	EPA 515.1
105.070	006	Pentachlorophenol	EPA 515.1
105.070	007	Picloram	EPA 515.1
105.070	008	2,4,5-TP (Silvex)	EPA 515.1
105.090	000	Semi-volatile Organic Compounds	EPA 525.2
105.090	001	Alachlor	EPA 525.2
105.090	002	Aldrin	EPA 525.2
105.090	003	Atrazine	EPA 525.2
105.090	004	Benzo(a)pyrene	EPA 525.2
105.090	005	Butachlor	EPA 525.2
105.090	008	Di(2-ethylhexyl) Adipate	EPA 525.2
105.090	009	Di(2-ethylhexyl) Phthalate	EPA 525.2
105.090	013	Endrin	EPA 525.2
105.090	014	Heptachlor	EPA 525.2
105.090	015	Heptachlor Epoxide	EPA 525.2
105.090	016	Hexachlorobenzene	EPA 525.2
105.090	017	Hexachlorocyclopentadiene	EPA 525.2
105.090	018	Lindane (HCH-gamma)	EPA 525.2
105.090	019	Methoxychlor	EPA 525.2
105.090	022	Molinate	EPA 525.2
105.090	025	Simazine	EPA 525.2
105.090	028	Thiobencarb	EPA 525.2
105.101	000	Carbamates	EPA 531.2
105.101	001	Carbofuran (Furadan)	EPA 531.2
105.101	002	Oxamyl	EPA 531.2
105.101	003	Aldicarb (Temik)	EPA 531.2
105.101	004	Aldicarb Sulfone	EPA 531.2
105.101	005	Aldicarb Sulfoxide	EPA 531.2
105.101	006	Carbaryl (Sevin)	EPA 531.2
105.101	007	3-Hydroxycarbofuran	EPA 531.2
105.101	008	Methomyl (Lannate)	EPA 531.2
105.120	001	Glyphosate	EPA 547
105.140	001	Endothall	EPA 548.1
105.150	001	Diquat	EPA 549.2
105.201	001	Haloacetic Acids (HAA5)	EPA 552.3
Field of Accreditation: 106 - Radionuclides in Drinking Water			
106.092	001	Uranium	EPA 200.8
Field of Accreditation: 107 - Microbiological Methods for Non-Potable Water and Sewage Sludge			
107.001	001	Total Coliform (Enumeration)	SM 9221 B,C-2006
107.001	002	Fecal Coliform (Enumeration)	SM 9221 C,E-2006
107.001	003	E. coli (Enumeration)	SM 9221 C,F-2006
107.005	001	E. coli (Enumeration)	SM 9223 B-2004

107.011	001	Enterococci	SM 9230 D-2007
107.013	001	E. coli (Enumeration)	Colilert
107.015	001	E. coli (Enumeration)	Colilert 18
107.017	001	Enterococci	Enterolert

Field of Accreditation:108 - Inorganic Constituents in Non-Potable Water

108.001	001	Specific Conductance	EPA 120.1 (1982 Rev.1.0)
108.007	001	Residue, Volatile	EPA 160.4 (1971)
108.009	001	Turbidity	EPA 180.1 (1993 Rev. 2.0)
108.013	001	Calcium	EPA 200.7 (1994 Rev. 4.4)
108.013	002	Magnesium	EPA 200.7 (1994 Rev. 4.4)
108.013	004	Potassium	EPA 200.7 (1994 Rev. 4.4)
108.013	005	Silica, Dissolved	EPA 200.7 (1994 Rev. 4.4)
108.013	006	Sodium	EPA 200.7 (1994 Rev. 4.4)
108.017	001	Bromide	EPA 300.0 (1993 Rev. 2.1)
108.017	002	Chloride	EPA 300.0 (1993 Rev. 2.1)
108.017	003	Fluoride	EPA 300.0 (1993 Rev. 2.1)
108.017	004	Nitrate (as N)	EPA 300.0 (1993 Rev. 2.1)
108.017	008	Sulfate (as SO4)	EPA 300.0 (1993 Rev. 2.1)
108.023	001	Cyanide, Total	EPA 335.4 (1993 Rev. 1.0)
108.025	001	Ammonia (as N)	EPA 350.1 (1993 Rev. 2.0)
108.029	001	Kjeldahl Nitrogen,Total (as N)	EPA 351.2 (1993 Rev. 2.0)
108.033	001	Nitrate-Nitrite (as N)	EPA 353.2 (1993 Rev. 2.0)
108.033	002	Nitrite (as N)	EPA 353.2 (1993 Rev. 2.0)
108.035	001	Phosphate,Ortho (as P)	EPA 365.1 (1993 Rev. 2.0)
108.039	001	Phosphorus,Total	EPA 365.4 (1974)
108.045	001	Chemical Oxygen Demand	EPA 410.4 (1993 Rev. 2.0)
108.049	001	Phenols, Total	EPA 420.4 (1993 Rev. 2.0)
108.053	002	Oil & Grease Total	EPA 1664 B
108.055	001	Color	SM 2120 B-2011
108.059	001	Turbidity	SM 2130 B-2011
108.063	001	Alkalinity	SM 2320 B-2011
108.069	001	Specific Conductance	SM 2510 B-2011
108.071	001	Residue, Total	SM 2540 B-2011
108.073	001	Residue, Filterable TDS	SM 2540 C-2011
108.075	001	Residue, Non-filterable TSS	SM 2540 D-2011
108.079	001	Residue, Settleable	SM 2540 F-2011
108.109	001	Chlorine, Total Residual	SM 4500-Cl F-2011
108.137	001	Hydrogen Ion (pH)	SM 4500-H+ B-2011
108.147	001	Ammonia (as N)	SM 4500-NH3 G-2011
108.173	001	Oxygen, Dissolved	SM 4500-O G-2011
108.177	001	Phosphate,Ortho (as P)	SM 4500-P F-2011
108.177	002	Phosphorus,Total	SM 4500-P F-2011

108.201	001	Sulfide (as S)	SM 4500-S D-2011
108.207	001	Biochemical Oxygen Demand	SM 5210 B-2011
108.207	002	Carbonaceous BOD	SM 5210 B-2011
108.213	001	Chemical Oxygen Demand	SM 5220 D-2011
108.217	001	Organic Carbon-Total (TOC)	SM 5310 C-2011
108.225	001	Surfactants	SM 5540 C-2011

Field of Accreditation: 109 - Metals and Trace Elements in Non-Potable Water

109.623	001	Aluminum	EPA 200.7 (1994 Rev. 4.4)
109.623	002	Antimony	EPA 200.7 (1994 Rev. 4.4)
109.623	003	Arsenic	EPA 200.7 (1994 Rev. 4.4)
109.623	004	Barium	EPA 200.7 (1994 Rev. 4.4)
109.623	005	Beryllium	EPA 200.7 (1994 Rev. 4.4)
109.623	006	Boron	EPA 200.7 (1994 Rev. 4.4)
109.623	007	Cadmium	EPA 200.7 (1994 Rev. 4.4)
109.623	008	Chromium	EPA 200.7 (1994 Rev. 4.4)
109.623	009	Cobalt	EPA 200.7 (1994 Rev. 4.4)
109.623	010	Copper	EPA 200.7 (1994 Rev. 4.4)
109.623	011	Iron	EPA 200.7 (1994 Rev. 4.4)
109.623	012	Lead	EPA 200.7 (1994 Rev. 4.4)
109.623	013	Manganese	EPA 200.7 (1994 Rev. 4.4)
109.623	014	Molybdenum	EPA 200.7 (1994 Rev. 4.4)
109.623	015	Nickel	EPA 200.7 (1994 Rev. 4.4)
109.623	016	Selenium	EPA 200.7 (1994 Rev. 4.4)
109.623	017	Silver	EPA 200.7 (1994 Rev. 4.4)
109.623	018	Thallium	EPA 200.7 (1994 Rev. 4.4)
109.623	019	Tin	EPA 200.7 (1994 Rev. 4.4)
109.623	020	Titanium	EPA 200.7 (1994 Rev. 4.4)
109.623	021	Vanadium	EPA 200.7 (1994 Rev. 4.4)
109.623	022	Zinc	EPA 200.7 (1994 Rev. 4.4)
109.625	001	Aluminum	EPA 200.8 (1994 Rev. 5.4)
109.625	002	Antimony	EPA 200.8 (1994 Rev. 5.4)
109.625	003	Arsenic	EPA 200.8 (1994 Rev. 5.4)
109.625	004	Barium	EPA 200.8 (1994 Rev. 5.4)
109.625	005	Beryllium	EPA 200.8 (1994 Rev. 5.4)
109.625	006	Boron	EPA 200.8 (1994 Rev. 5.4)
109.625	007	Cadmium	EPA 200.8 (1994 Rev. 5.4)
109.625	008	Chromium	EPA 200.8 (1994 Rev. 5.4)
109.625	009	Cobalt	EPA 200.8 (1994 Rev. 5.4)
109.625	010	Copper	EPA 200.8 (1994 Rev. 5.4)
109.625	013	Lead	EPA 200.8 (1994 Rev. 5.4)
109.625	014	Manganese	EPA 200.8 (1994 Rev. 5.4)
109.625	015	Molybdenum	EPA 200.8 (1994 Rev. 5.4)

109.625	016	Nickel	EPA 200.8 (1994 Rev. 5.4)
109.625	017	Selenium	EPA 200.8 (1994 Rev. 5.4)
109.625	018	Silver	EPA 200.8 (1994 Rev. 5.4)
109.625	019	Thallium	EPA 200.8 (1994 Rev. 5.4)
109.625	022	Vanadium	EPA 200.8 (1994 Rev. 5.4)
109.625	023	Zinc	EPA 200.8 (1994 Rev. 5.4)
109.629	001	Chromium VI (Hexavalent Chromium)	EPA 218.6 (1994 Rev. 3.3)
109.635	001	Mercury	EPA 245.1 (1994 Rev. 3.0)
109.693	001	Iron	SM 3500-Fe B-2011

Field of Accreditation: 110 - Volatile Organic Constituents in Non-Potable Water

110.040	001	Acetone	EPA 624.1
110.040	002	Acetonitrile	EPA 624.1
110.040	003	Acrolein	EPA 624.1
110.040	004	Acrylonitrile	EPA 624.1
110.040	005	Benzene	EPA 624.1
110.040	006	Bromodichloromethane	EPA 624.1
110.040	007	Bromoform	EPA 624.1
110.040	008	Bromomethane (Methyl Bromide)	EPA 624.1
110.040	009	t-Butyl alcohol (2-Methyl-2-propanol)	EPA 624.1
110.040	010	Carbon Tetrachloride	EPA 624.1
110.040	011	Chlorobenzene	EPA 624.1
110.040	012	Chloroethane	EPA 624.1
110.040	013	2-Chloroethyl vinyl Ether	EPA 624.1
110.040	014	Chloroform	EPA 624.1
110.040	015	Chloromethane (Methyl Chloride)	EPA 624.1
110.040	016	Dibromochloromethane (Chlorodibromomethane)	EPA 624.1
110.040	017	1,2-Dichlorobenzene	EPA 624.1
110.040	018	1,3-Dichlorobenzene	EPA 624.1
110.040	019	1,4-Dichlorobenzene	EPA 624.1
110.040	020	1,1-Dichloroethane	EPA 624.1
110.040	021	1,2-Dichloroethane (Ethylene Dichloride)	EPA 624.1
110.040	022	1,1-Dichloroethylene (1,1-Dichloroethene)	EPA 624.1
110.040	023	trans-1,2-Dichloroethylene (trans- 1,2 Dichloroethene)	EPA 624.1
110.040	024	1,2-Dichloropropane	EPA 624.1
110.040	025	cis-1,3-Dichloropropylene (cis 1,3 Dichloropropene)	EPA 624.1
110.040	026	trans-1,3-Dichloropropylene (trans-1,3 Dichloropropen	EPA 624.1
110.040	027	Ethanol	EPA 624.1
110.040	029	Ethylbenzene	EPA 624.1
110.040	031	Methylene Chloride (Dichloromethane)	EPA 624.1
110.040	032	4-Methyl-2-pentanone (Methyl Isobutyl Ketone)	EPA 624.1
110.040	034	1,1,2,2-Tetrachloroethane	EPA 624.1
110.040	035	Tetrachloroethylene (Tetrachloroethene)	EPA 624.1

110.040	036	Tetrahydrofuran	EPA 624.1
110.040	037	Toluene	EPA 624.1
110.040	038	1,1,1-Trichloroethane	EPA 624.1
110.040	039	1,1,2-Trichloroethane	EPA 624.1
110.040	040	Trichloroethylene (Trichloroethene)	EPA 624.1
110.040	041	Vinyl Chloride	EPA 624.1
110.040	043	o-Xylene	EPA 624.1
110.040	045	Trichlorofluoromethane	EPA 624.1
110.040	046	m+p-Xylene	EPA 624.1
110.040	047	2-Butanone (MEK)	EPA 624.1

Field of Accreditation:111 - Semi-volatile Organic Constituents in Non-Potable Water

111.055	001	Aldrin	EPA 608.3
111.055	002	alpha-BHC	EPA 608.3
111.055	003	beta-BHC	EPA 608.3
111.055	004	delta-BHC	EPA 608.3
111.055	005	gamma-BHC (Lindane)	EPA 608.3
111.055	006	Chlordane	EPA 608.3
111.055	007	4,4'-DDD	EPA 608.3
111.055	008	4,4'-DDE	EPA 608.3
111.055	009	4,4'-DDT	EPA 608.3
111.055	010	Dieldrin	EPA 608.3
111.055	011	Endosulfan I	EPA 608.3
111.055	012	Endosulfan II	EPA 608.3
111.055	013	Endosulfan Sulfate	EPA 608.3
111.055	014	Endrin	EPA 608.3
111.055	015	Endrin Aldehyde	EPA 608.3
111.055	016	Heptachlor	EPA 608.3
111.055	017	Heptachlor Epoxide	EPA 608.3
111.055	019	PCB-1016 (Aroclor-1016)	EPA 608.3
111.055	020	PCB-1221 (Aroclor-1221)	EPA 608.3
111.055	021	PCB-1232 (Aroclor-1232)	EPA 608.3
111.055	022	PCB-1242 (Aroclor-1242)	EPA 608.3
111.055	023	PCB-1248 (Aroclor-1248)	EPA 608.3
111.055	024	PCB-1254 (Aroclor-1254)	EPA 608.3
111.055	025	PCB-1260 (Aroclor-1260)	EPA 608.3
111.055	038	Chlorothalonil	EPA 608.3
111.055	048	Mirex	EPA 608.3
111.055	050	Pentachloronitrobenzene (PCNB)	EPA 608.3
111.055	060	Toxaphene	EPA 608.3
111.070	001	Acenaphthene	EPA 610
111.070	002	Acenaphthylene	EPA 610
111.070	003	Anthracene	EPA 610

111.070	004	Benzo(a)anthracene	EPA 610
111.070	005	Benzo(a)pyrene	EPA 610
111.070	006	Benzo(b)fluoranthene	EPA 610
111.070	007	Benzo(g,h,i)perylene	EPA 610
111.070	008	Benzo(k)fluoranthene	EPA 610
111.070	009	Chrysene	EPA 610
111.070	010	Dibenz(a,h)anthracene	EPA 610
111.070	011	Fluoranthene	EPA 610
111.070	012	Fluorene	EPA 610
111.070	013	Indeno(1,2,3-c,d)pyrene	EPA 610
111.070	014	Naphthalene	EPA 610
111.070	015	Phenanthrene	EPA 610
111.070	016	Pyrene	EPA 610
111.120	001	2,4-D	EPA 615
111.120	002	2,4-DB	EPA 615
111.120	003	Dicamba	EPA 615
111.120	004	Dichloroprop	EPA 615
111.120	005	Dinoseb	EPA 615
111.120	008	2,4,5-T	EPA 615
111.120	009	2,4,5-TP (Silvex)	EPA 615
111.160	001	Acenaphthene	EPA 625.1
111.160	002	Acenaphthylene	EPA 625.1
111.160	003	Anthracene	EPA 625.1
111.160	004	Benzidine	EPA 625.1
111.160	005	Benzo(a)anthracene	EPA 625.1
111.160	006	Benzo(a)pyrene	EPA 625.1
111.160	007	Benzo(b)fluoranthene	EPA 625.1
111.160	008	Benzo(g,h,i)perylene	EPA 625.1
111.160	009	Benzo(k)fluoranthene	EPA 625.1
111.160	010	Bis(2-chloroethoxy) Methane	EPA 625.1
111.160	011	Bis(2-chloroethyl) Ether	EPA 625.1
111.160	012	bis(2-Chloroisopropyl) ether (2,2'-Oxybis[1-chloroprop	EPA 625.1
111.160	013	Bis(2-ethylhexyl)phthalate (Di(2-ethylhexyl) phthalate	EPA 625.1
111.160	014	4-Bromophenyl Phenyl Ether	EPA 625.1
111.160	015	Butyl Benzyl Phthalate	EPA 625.1
111.160	016	2-Chloronaphthalene	EPA 625.1
111.160	017	4-Chlorophenyl Phenyl Ether	EPA 625.1
111.160	018	Chrysene	EPA 625.1
111.160	019	Dibenz(a,h)anthracene	EPA 625.1
111.160	020	3,3'-Dichlorobenzidine	EPA 625.1
111.160	021	Diethyl Phthalate	EPA 625.1
111.160	022	Dimethyl Phthalate	EPA 625.1

111.160	023	Di-n-butyl Phthalate	EPA 625.1
111.160	024	2,4-Dinitrotoluene	EPA 625.1
111.160	025	2,6-Dinitrotoluene	EPA 625.1
111.160	026	Di-n-octyl Phthalate	EPA 625.1
111.160	027	Fluoranthene	EPA 625.1
111.160	028	Fluorene	EPA 625.1
111.160	029	Hexachlorobenzene	EPA 625.1
111.160	030	Hexachlorobutadiene	EPA 625.1
111.160	031	Hexachloroethane	EPA 625.1
111.160	032	Indeno(1,2,3-c,d)pyrene	EPA 625.1
111.160	033	Isophorone	EPA 625.1
111.160	034	Naphthalene	EPA 625.1
111.160	035	Nitrobenzene	EPA 625.1
111.160	036	N-nitroso-di-n-propylamine	EPA 625.1
111.160	037	Phenanthrene	EPA 625.1
111.160	038	Pyrene	EPA 625.1
111.160	039	1,2,4-Trichlorobenzene	EPA 625.1
111.160	040	4-Chloro-3-methylphenol	EPA 625.1
111.160	041	2-Chlorophenol	EPA 625.1
111.160	042	2,4-Dichlorophenol	EPA 625.1
111.160	043	2,4-Dimethylphenol	EPA 625.1
111.160	044	2,4-Dinitrophenol	EPA 625.1
111.160	045	2-Methyl-4,6-dinitrophenol	EPA 625.1
111.160	046	2-Nitrophenol	EPA 625.1
111.160	047	4-Nitrophenol	EPA 625.1
111.160	048	Pentachlorophenol	EPA 625.1
111.160	049	Phenol	EPA 625.1
111.160	050	2,4,6-Trichlorophenol	EPA 625.1
111.160	052	Aldrin	EPA 625.1
111.160	058	alpha-BHC	EPA 625.1
111.160	059	beta-BHC	EPA 625.1
111.160	060	delta-BHC	EPA 625.1
111.160	061	gamma-BHC (Lindane)	EPA 625.1
111.160	076	4,4'-DDD	EPA 625.1
111.160	077	4,4'-DDE	EPA 625.1
111.160	078	4,4'-DDT	EPA 625.1
111.160	083	Dieldrin	EPA 625.1
111.160	085	Disulfoton	EPA 625.1
111.160	086	Endosulfan I	EPA 625.1
111.160	087	Endosulfan II	EPA 625.1
111.160	088	Endosulfan Sulfate	EPA 625.1
111.160	089	Endrin	EPA 625.1

111.160	090	Endrin Aldehyde	EPA 625.1
111.160	096	Heptachlor	EPA 625.1
111.160	097	Heptachlor Epoxide	EPA 625.1
111.160	098	Hexachlorocyclopentadiene	EPA 625.1
111.160	102	Methoxychlor	EPA 625.1
111.160	108	N-nitrosodimethylamine	EPA 625.1
111.160	110	N-nitrosodiphenylamine	EPA 625.1
111.160	112	Parathion Methyl	EPA 625.1
111.160	122	Phorate	EPA 625.1
111.210	002	Barban	EPA 632
111.210	003	Carbaryl (Sevin)	EPA 632
111.210	004	Carbofuran (Furadan)	EPA 632
111.210	005	Chloropropham	EPA 632
111.210	006	Diuron	EPA 632
111.210	007	Fenuron	EPA 632
111.210	009	Linuron	EPA 632
111.210	011	Methomyl (Lannate)	EPA 632
111.210	015	Neburon	EPA 632
111.210	016	Propham	EPA 632
111.210	017	Propoxur (Baygon)	EPA 632
111.210	018	Siduron	EPA 632

Field of Accreditation:114 - Inorganic Constituents in Hazardous Waste

114.010	001	Antimony	EPA 6010 B
114.010	002	Arsenic	EPA 6010 B
114.010	003	Barium	EPA 6010 B
114.010	004	Beryllium	EPA 6010 B
114.010	005	Cadmium	EPA 6010 B
114.010	006	Chromium	EPA 6010 B
114.010	007	Cobalt	EPA 6010 B
114.010	008	Copper	EPA 6010 B
114.010	009	Lead	EPA 6010 B
114.010	010	Molybdenum	EPA 6010 B
114.010	011	Nickel	EPA 6010 B
114.010	012	Selenium	EPA 6010 B
114.010	013	Silver	EPA 6010 B
114.010	014	Thallium	EPA 6010 B
114.010	015	Vanadium	EPA 6010 B
114.010	016	Zinc	EPA 6010 B
114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020

114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020
114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.025	001	Mercury	EPA 6020 A
114.103	001	Chromium VI (Hexavalent Chromium)	EPA 7196 A
114.106	001	Chromium VI (Hexavalent Chromium)	EPA 7199
114.140	001	Mercury	EPA 7470 A
114.141	001	Mercury	EPA 7471 A
114.221	001	Cyanide, Total	EPA 9012 A
114.240	001	Corrosivity - pH Determination	EPA 9040 B
114.241	001	Corrosivity - pH Determination	EPA 9045 C

Field of Accreditation:115 - Leaching/Extraction Tests and Physical Characteristics of Hazardous Waste

115.020	001	Toxicity Characteristic Leaching Procedure (TCLP)	EPA 1311
115.021	001	TCLP Inorganics	EPA 1311
115.022	001	TCLP Extractables	EPA 1311
115.023	001	TCLP Volatiles	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II
115.040	001	Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312

Field of Accreditation:116 - Volatile Organic Compounds in Hazardous Waste

116.020	031	Ethanol and Methanol	EPA 8015 B
116.030	001	Gasoline Range Organics (GRO)	EPA 8015 B
116.040	041	Methyl tert-butyl Ether (MTBE)	EPA 8021 B
116.040	061	Aromatic Volatiles	EPA 8021 B
116.040	062	BTEX	EPA 8021 B
116.080	000	Volatile Organic Compounds	EPA 8260 B
116.080	120	Oxygenates	EPA 8260 B
116.100	001	Total Petroleum Hydrocarbons - Gasoline (GRO)	LUFT GC/MS
116.100	010	BTEX and MTBE	LUFT GC/MS
116.110	001	Total Petroleum Hydrocarbons - Gasoline (GRO)	LUFT

Field of Accreditation:117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010	001	Diesel Range Organics (DRO)	EPA 8015 B
117.015	001	Diesel Range Organics (DRO)	LUFT GC/MS
117.016	001	Diesel Range Organics (DRO)	LUFT

117.110	000	Extractable Organics	EPA 8270 C
117.111	071	Pesticides	EPA 8270 C
117.140	000	Polynuclear Aromatic Hydrocarbons	EPA 8310
117.170	000	Nitroaromatics and Nitramines	EPA 8330
117.210	000	Organochlorine Pesticides	EPA 8081 A
117.220	000	PCBs	EPA 8082
117.240	000	Organophosphorus Pesticides	EPA 8141 A
117.250	000	Chlorinated Herbicides	EPA 8151 A

Field of Accreditation:120 - Physical Properties of Hazardous Waste

120.010	001	Ignitability	EPA 1010
120.022	001	Ignitability	EPA 1030
120.040	001	Reactive Cyanide	Section 7.3 SW-846
120.050	001	Reactive Sulfide	Section 7.3 SW-846
120.070	001	Corrosivity - pH Determination	EPA 9040 B
120.080	001	Corrosivity - pH Determination	EPA 9045 C

Field of Accreditation:126 - Microbiological Methods for Ambient Water

126.003	001	Total Coliform (Enumeration)	SM 9221 B,C-2006
126.003	002	Fecal Coliform (Enumeration)	SM 9221 C,E-2006
126.003	003	E. coli (Enumeration)	SM 9221 C,F-2006
126.007	001	E. coli (Enumeration)	SM 9223 B-2004
126.013	001	Enterococci	SM 9230 D-2007
126.015	001	E. coli (Enumeration)	Colilert
126.017	001	E. coli (Enumeration)	Colilert 18
126.019	001	Enterococci	Enterolert