Quality Assurance Project Plan for Phase II Site Assessment – Chevak Riverside Bluff Site Chevak, AK

Prepared for:

U.S. Environmental Protection Agency, Region 10
Brownfields & Land Revitalization Program
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TITLE AND APPROVAL SHEET

Quality Assurance Project Plan for Phase II Site Assessment - Chevak Riverside Bluff Site, Chevak, AK

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Brook McKeown - ERG Task Order Manager Date

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Molly Vaughan – EPA Region 10 Targeted Brownfields Assessment Coordinator Date

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Cindy Fields – EPA Region 10 Regional Quality Assurance Manager Date

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Sarah Weppner – Alta Project Manager Date

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Allison Marshall – Alta Quality Assurance Officer Date

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1. INTRODUCTION

Region 10 of the U.S. Environmental Protection Agency (EPA) is directing Eastern Research Group, Inc. (ERG) to conduct an environmental assessment of the Chevak Riverside Bluff Site (hereinafter, referred to as the Site) in Chevak, Alaska (AK) on portions of Lots 1 and 2, Block 5 and Block 1 of U.S. Survey No. 5023. The support will consist of a Phase II Environmental Site Assessment (ESA) including the collection of subsurface soil samples from up to 20 test pits and/or auger boring locations across the Site, groundwater samples from up to five shallow temporary monitoring wells in the vicinity of the former tank farm and fuel bladder, up to one seep water sample in the vicinity of Landfill Site 3 near the Ninglikfak River, and up to four sediment samples located along the Ninglikfak River. All soil, groundwater, seep, and sediment samples will be delivered to the selected laboratory for analyses. The task is to perform investigative sampling at the Chevak Riverside Bluff Site (Figure 2-2). ERG has subcontracted with Alta Science & Engineering, Inc. (Alta) to provide technical and field support in conducting this Phase II ESA. Sampling data will be used to evaluate the presence of constituents of concern (COCs) at the Site and, if COCs are present, inform potential cleanup alternatives.

2. PROJECT MANAGEMENT ELEMENTS

This section addresses project management, which includes project objectives, roles, responsibilities, and goals. In addition, this section discusses the mechanisms ERG will use to ensure that all participants understand the goals and the approach used in the Chevak Riverside Bluff Site sampling activities.

In its *Requirements for Quality Assurance Project Plans QA/R-5* (EPA 2001), EPA has identified elements to be discussed in this section. ERG provided Element A1, Title and Approval Sheet, and Element A2, Table of Contents, earlier in this document. Table 2-1 presents the remaining elements and corresponding document sections.

Table 2-1. Crosswalk Between Document Sections and EPA Quality Assurance Project Plan Elements

Quality Assurance Project Plan Element		Document Section
A1 and A2	Title and Approval Sheet, Table of Contents	Title Page and Approval Sheet Table of Contents
A3 through A9	Distribution List, Project Organization, Problem Definition/Background, Project/Task Description, Quality Objectives and Criteria, Special Training/Certification, Documents and Records	2
B1 through B10	Sampling Process Design; Sampling Methods; Sample Handling and Custody; Analytical Methods; Quality Control; Instrument/Equipment Testing, Inspection, Maintenance, and Calibration; Inspection/Acceptance of Supplies and Consumables; Non-Direct Measurements (not applicable to this project and not presented); Data Management	3
C1 and C2	Assessments and Response to Actions, Reports to Management	4
D1, D2, and D3	Data Review, Data Verification and Validation, Reconciliation with User Requirements	**Error! Reference source not found.**

2.1 Element A.3: Distribution List

Table 2-2 presents the distribution list for this Quality Assurance Project Plan (QAPP). The Alta Project Manager will be responsible for ensuring that the QAPP and any QAPP revisions are distributed to everyone in Table 2-2.

Table 2-2. QAPP Distribution List

Name Organization	Email Address	Role
Molly Vaughan EPA Region 10	Vaughan.Molly@epa.gov	Targeted Brownfields Assessment (TBA) Coordinator
Cindy Fields EPA Region 10	Fields.Cindy@epa.gov	Regional Quality Assurance Manager (QAM)

Table 2-2. QAPP Distribution List

Name Organization	Email Address	Role
Krista Rave-Perkins EPA Region 10	Rave-Perkins.Krista@epa.gov	Task Order Contracting Officer's Representative
Marc Thomas Alaska Dept. of Environmental Conservation (ADEC)	marc.thomas@alaska.gov	ADEC Brownfields Program Contact
Reggie Tuluk Chevak Native Village	Rtuluk16@gmail.com	Chevak Native Village
Richard Tuluk City of Chevak	Cityofchevak.rtuluk@yahoo.com	Property Owner, City of Chevak Project Manager
Roy Atchak Chevak Company Corporation	chevakco@hotmail.com	Property Owner
Cynthia Paniyak Chevak Native Village	chevakigap@yahoo.com	Chevak Native Village Environmental Coordinator
Jordan Finney Yukon River Inter-Tribal Watershed Council (YRITWC)	jfinney@yritwc.org	TBA Applicant, YRITWC Brownfields Environmental Technician
Brook McKeown ERG	Brook.McKeown@erg.com	ERG Task Order Manager
Tiffany Brackett	Tiffany.Brackett@erg.com	ERG Project Manager
Lori Weiss ERG	Lori.Weiss@erg.com	Project QAM
Sarah Weppner Alta	Sarah.Weppner@alta-se.com	Project Manager
Brett McLees Alta	Brett McLees@alta-se.com	Field Team Lead
Allison Marshall Alta	Allison.Marshall@alta-se.com	Project Quality Assurance Officer (QAO)
Angelo Ward Alta	Angelo.Ward@alta-se.com	Field Team Member
Sedrek Kovar ERG	Sedrek.Kovar@erg.com	Field Team Member
Kelly Mercer Pace	Kelly.Mercer@pacelabs.com	Pace National Analytical, Inc. Laboratory Coordinator

2.2 Element A.4: Project Organization

Figure 2-1. ERG Project Level QA Organization for the Chevak Riverside Bluff Site Phase II Activities depicts the project organization for ERG to conduct the Chevak Riverside Bluff Site support activities. Ms. Molly Vaughan will serve as EPA's Targeted Brownfields Assessment (TBA) Coordinator and Technical Point of Contact for the Site support activities. ERG's Project Manager and/or Task Order Manager will keep EPA apprised of any status changes in logistics or issues with project activities. The ERG Project Manager will also keep the TBA Coordinator apprised of any issues collecting or delivering the samples to the lab, any quality control (QC) issues identified, or any changes to the project schedule.

Ms. Jordan Finney and Ms. Cynthia Paniyak, as the TBA Applicant and Chevak Native Village contact, respectively, will be kept apprised of the project schedule, intended scope of work, and other logistics, so that they can provide input.

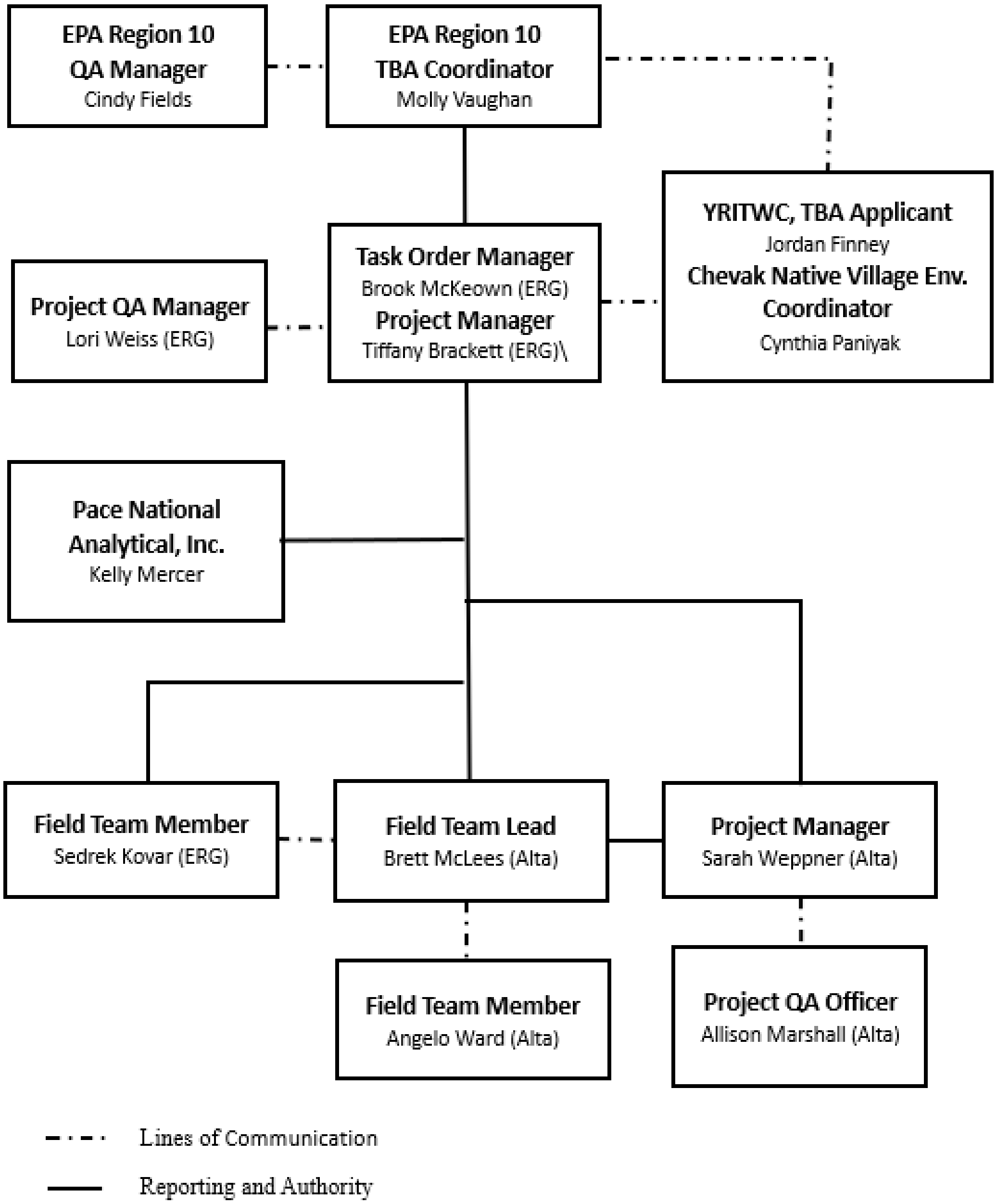
Ms. Sarah Weppner will serve as the Alta Project Manager. The Alta Project Manager will coordinate project activities, provide technical support and oversight, and coordinate with Alta Project Team members so that the resources necessary to complete the project are available when needed. The Alta Project Manager will communicate with Team members, coordinate daily operations, and maintain control over the schedule and technical aspects of the project. The Alta Project Manager will review all deliverables, including verifying the transcription of laboratory data into report text and summary tables, so that high-quality work products are produced. The Alta Project Manager will be responsible for distributing the approved QAPP to each of the project personnel via email.

Ms. Lori Weiss will serve as the ERG Project Quality Assurance Manager (QAM) responsible for ensuring that the requirements of this QAPP are implemented and documented pertaining to ERG's project responsibilities. She is independent from the day-to-day activities of the project. Ms. Allison Marshall will serve as the Alta Project QA Officer (QAO) responsible for ensuring that the requirements of this QAPP are implemented and documented pertaining to Alta's project responsibilities. Cindy Fields will serve as the EPA Region 10 QAM and will be responsible for reviewing and approving the QAPP.

Mr. Brett McLees will serve as the Alta Field Team Lead, responsible for coordinating project field activities, providing onsite technical support and oversight, and coordinating with Alta and ERG Project Team members to complete field work in accordance with the project schedule (see section 2.4).

Pace National Analytical, Inc., located in Mt. Juliet, TN (henceforth, Pace), will provide analytical support for this investigation. Soil, sediment, and water samples will be sent to Pace for analyses as described in this QAPP. Additional details on ERG's project QA organization can be found in ERG's Quality Management Plan (QMP): Section 2.3 ERG Quality Management System Organizational Structure, and Section 2.4 Quality Assurance at the Program and Project Levels (ERG 2019).

Figure 2-1. ERG Project Level QA Organization for the Chevak Riverside Bluff Site Phase II Activities



2.3 Element A.5: Problem Definition/Background

The Chevak Riverside Bluff Site is located within the City of Chevak in southwest AK, 520 miles west of Anchorage, AK, 120 miles northwest of Bethel, AK, and 20 miles east of Hopper Bay, AK. The subject property totals approximately 3 acres and consists of two separate areas next to the Ninglikfak River.

The first area is defined by the former landfill sites. There are four former landfill sites and a potential fifth former landfill site within the Site (Figure 2-2). Boundaries for these former landfill sites were identified during the June 2024 Site visit and based on visible subsidence and exposed waste material on the ground surface. The landfill sites are located on portions of Lots 1 and 2, Block 5 and Block 1 of US Survey No 5023, Chevak, Alaska, which are owned by the City of Chevak.

The second area is defined by the former Chevak Company Corporation Tank Farm (former Tank Farm) and Fuel Bladder area. This area is inland from the former landfill areas and is directly north of Landfill 1 and east of Landfill 2 (Figure 2-2). The boundaries of this area are based on the footprint of the former aboveground storage tank (AST) Tank Farm and Fuel Bladder shown in Figure 2-2. The former Tank Farm and Fuel Bladder site is located on portions of Lot 2, Block 5, US Survey No. 5023, Chevak, Alaska and is owned by the Chevak Company Corporation.

The subject property is accessible from Ninglikfak Street, which defines the property's northern border, or Mukluk Street, which makes up the western border (Figure 2-2). The Ninglikfak River borders the Site to the south and no formal or natural structure defines the subject property's eastern border.

2.3.1 Historical and Current Site Uses

The subject property has been used as a landfill since the early 1970s and operated until 1985. Historical remediation consisted of burying/capping the landfill materials with dirt. Since the initial remedial effort, the landfill sites, which are adjacent to and on the Ninglikfak riverbank, have been eroding and exposing the landfill materials. The former landfill areas are currently vacant. A footpath crosses this area of the Site and is used by the community to access the Ninglikfak River, where fishing boats are moored.

The area of the Site containing the former Chevak Company Corporation Tank Farm and Fuel Bladder was reportedly used from the 1970s until 2010. Most of the ASTs and the Fuel Bladder have been removed. Two 26,000-gallon horizontal fuel tanks remain in the Tank Farm and Fuel Bladder area. These ASTs are in good condition and are currently out of commission.

2.3.2 Known Areas of Contamination on the Site

In 2002, a 50-gallon diesel fuel release was documented at the Fuel Bladder near the former Tank Farm. The Fuel Bladder was owned by Quality Asphalt and Paving (QAP). The spill was cleaned up and received a No Further Action (NFA) status from the Alaska Department of Environmental Conservation (ADEC) in March 2023. During the investigation of this spill, staining in the vicinity of the former Tank Farm owned by the Chevak Company Corporation, as well as integrity issues with the tank liner, indicated that releases from the tanks may have occurred.

The 2003 site characterization report identified total petroleum hydrocarbons (TPHs) as gasoline range organics (GRO), diesel range organics (DRO), and volatile organic compounds (VOCs) including benzene, toluene, ethylbenzene, and xylenes (BTEX) in soils near the former Chevak Company Corporation Tank Farm and Fuel Bladder above the most stringent ADEC cleanup levels from Table B1 or B2, 18 AAC 75 (ADEC 2023). TPH-GRO, TPH-DRO, and VOCs including benzene and toluene were also detected above ADEC groundwater cleanup levels in groundwater monitoring wells during the 2003 site characterization. The Fuel Bladder and most ASTs have been removed; however, during the 2024 Site visit, ERG/Alta field staff observed drums of heating oil and fuel as well as soil staining.

Additionally, there are other suspected environmental contaminants due to historic Site landfill operations. Metal and non-metal debris, such as steel drums, car axles, ASTs, and metal/plastic oil containers were observed at the Site. Discussions with Chevak community members indicate that the Site is prone to erosion during heavy flooding events. A 2014 ADEC Site visit report documented buried waste that had been exposed due to erosion and the site was eroding into the Ninglikfak River. Additionally, Typhoon Merbok impacted the community in September 2022, further accelerating the rate of erosion at the landfill sites.

The former Site uses coupled with community members' observations indicate the likelihood of soil contamination on the Site, which could also impact groundwater or nearby surface water. In general, unregulated landfill sites can leave behind various environmental contaminants, such as heavy metals, TPHs, polychlorinated biphenyls (PCBs), and polycyclic aromatic hydrocarbons (PAHs), depending on the historic operations, maintenance practices, and waste management. Contamination associated with the release of diesel fuel may include TPHs, VOCs including benzene, toluene, ethylbenzene, total xylenes, naphthalene (BTEXN), and PAHs. Metal contamination in soils may be present based on Site observations.

2.3.3 Proposed Brownfields Assessment Sampling Scenario

The intent of this ESA is to build on the previous assessments to identify, characterize, and delineate the extent of potential hazards associated with the former Tank Farm, the former Fuel Bladder, and historic unregulated landfill sites. The proposed future use of the Site is the re-development of the land as a space for community members to use for walking and as an overlook to the River. Members of the community would like to see an established bench and safety rail on the revitalized land. In addition, the community would like a developed access road leading to the Ninglikfak River to access fishing boats.

The purpose of this QAPP is to outline environmental assessment activities at the Site, which includes subsurface soil sampling from the former landfill sites and the former Tank Farm and Fuel Bladder areas, shallow groundwater sampling from the former Tank Farm and Fuel Bladder areas, and seep water and sediment sampling near the former landfill sites. This QAPP outlines assessment activities, data quality objectives (DQOs), sample collection procedures, analytical methods, and QA/QC procedures that ERG will use for the Site Assessment Report.

Figure 2-2. General Site Layout

2.4 Element A.6: Project/Task Description

ERG will perform assessment monitoring for subsurface soil (in excavated test pits and hand auger borings), shallow groundwater throughout the former landfill sites and the former Tank Farm and Fuel Bladder areas, and seep water and sediments in the vicinity of the former landfills.

Soil sampling performed during this Site Assessment will measure COC concentrations from up to 20 total proposed sample locations. Subsurface soil samples will be collected from test pits or hand auger borings. Eight (8) proposed locations will be sampled using an excavator (approximately 2- to 4-feet wide and up to 15-feet deep) and twelve (12) proposed locations will be sampled using a hand auger (approximately 4-inches in diameter and up to 15-feet deep). Hand auger sample locations are proposed in the landfill areas that cannot be accessed by excavator because they are unstable and/or subsiding and in the vicinity of the former Tank Farm and Fuel Bladder and. Up to eight test pits and seven hand auger borings will be advanced near the former landfill sites and up to five hand auger borings will be advanced near the former Tank Farm and Fuel Bladder areas (Figure 2-2).

Shallow groundwater sampling performed during this Site Assessment will measure COC concentrations from up to five shallow (i.e., less than 15-feet below ground surface [bgs]) temporary groundwater monitoring wells in the vicinity of the former Tank Farm and Fuel Bladder in areas where a photo-ionization detector (PID) indicates that soils have been impacted by petroleum releases.

Seep water sampling performed during this Site Assessment will measure COC concentrations from up to one seep observed during the 2024 Site visit in the vicinity of Landfill Site 3, near the Ninglikfak River.

Sediment sampling performed during this Site Assessment will measure COC concentrations from up to four composite sediment samples (up to 6-inches deep) located along the Ninglikfak River at the base of the Chevak riverside bluff and the former landfill area. ERG will summarize fieldwork activities and present data in an ESA Report. The ESA Report will also include a discussion of work performed, any deviation(s) from the QAPP, a Stage 2A data quality assessment (EPA 2009), sample location maps, and data summary tables. The ERG Team will provide conclusions and recommendations based upon the field observations and analytical data.

In addition to this QAPP, ERG has developed site-specific planning documents to prepare for the sampling activities, including: (1) QAPP Scoping Packet (see Appendix F) and (2) Chevak Riverside Bluff Site Health and Safety Plan (see Appendix B). These documents will be the primary sources of procedural information and a guide for the ERG sampling team. Table 2-3 presents the project schedule for the major project activities, such as field sampling, data review, and report generation.

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[1] Per Alaska Administrative Code 18 AAC 75.990, surface soil is defined as soil that extends no more than 2 feet bgs and subsurface soil is defined as soil that is more than 2 feet bgs. Soil will be screened at depths ranging

between 0.5 feet to 15 feet bgs. Samples will be determined to be surface or subsurface samples in the field based on the depth at which the samples are taken.

Table 2-3. Project Schedule

Activity	Date	Comments
Submit QAPP and Sampling Plan to EPA for Review and Approval.	August 2024	Approved prior to fieldwork.
Conduct Phase II ESA at Chevak Riverside Bluff Site.	September/October 2024	Depends on when Site owner, EPA Region 10, access agreements, and ERG/Alta field personnel are available.
Submit Field Samples to Laboratory for Analyses.	Immediately following fieldwork.	
Submit Field Work Summary Report to EPA with Field Notes.	Within 2 weeks of completion of fieldwork.	
Receive Analytical Results for Field Samples from Laboratory.	Within 3 weeks of completion of fieldwork.	
Submit Draft Phase II ESA Report to EPA	November/December 2024	Delivered no later than 6 weeks following receipt of the final laboratory data.

2.5 Element A.7: Quality Objectives and Criteria

The goals of the sampling event are to establish whether soil, shallow groundwater, seep water, and/or sediments at the Site are contaminated with hazardous or toxic materials that pose an unacceptable risk to human health or the environment. The intent of this assessment is to build on data and information from the previous assessments to identify, characterize, and delineate the extent of potential hazards identified within the previous reports and assessments discussed in Section 2.3.

ERG will use the data collected for this Site investigation to assess the potential threat posed to human health and the environment due to possible contamination originating from the historic Site use. The outcome of the assessment will help evaluate the need for remediation and guide the development of remedial options should cleanup be necessary.

The following samples will be collected and analyzed in accordance with this QAPP (Table 2-4):

Soil:

- Subsurface soil samples (test pits and hand auger; grab)
  - Subsurface soil samples from all test pit and hand auger sample locations will be analyzed for the following COCs:
    - TPH-GRO using Method AK 101 (ADEC 2002a).
    - TPH-DRO using Method AK 102 (ADEC 2002b).
    - TPH-RRO using Method AK 103 (ADEC 2002c).
    - VOCs including BTEXN using EPA Method 8260B (EPA 1996a).

        - PAHs including acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]perylene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, and pyrene using EPA Method 8270C-selected ion monitoring (SIM) (EPA 2018).
        - Priority pollutant metals (PPMs) including arsenic, cadmium, total chromium, lead, selenium, silver, beryllium, copper, nickel, thallium, antimony, and zinc using EPA Method 6010B (EPA 1996c) and mercury using EPA Method 7471B (EPA 2007a).
    - In addition to the petroleum COCs listed above, subsurface soil samples from the test pits and hand auger locations <u>in the former landfill area</u> will also be analyzed for the following COCs:
        - PCBs using EPA Method 8082A (EPA 2007b).

Shallow Groundwater:

- Shallow groundwater samples collected from shallow temporary groundwater monitoring wells in test pits near the former Tank Farm and Fuel Bladder will be analyzed for the following COCs:
    - TPH-GRO using Method AK 101 (ADEC 2002a).
    - TPH-DRO using Method AK 102 (ADEC 2002b).
    - TPH-RRO using Method AK 103 (ADEC 2002c).
    - VOCs including BTEXN using EPA Method 8260B (EPA 1996a).
    - PAHs using EPA Method 8270C-SIM (EPA 2018).
    - Total lead using EPA Method 6010B (EPA 1996c).

Seep Water:

- The seep sample will be analyzed for the following COCs:
    - TPH-GRO using Method AK 101 (ADEC 2002a).
    - TPH-DRO using Method AK 102 (ADEC 2002b).
    - TPH-RRO using Method AK 103 (ADEC 2002c).
    - VOCs including BTEXN using EPA Method 8260B (EPA 1996a).
    - PAHs using EPA Method 8270C-SIM (EPA 2018).
    - PPMs and mercury using EPA Methods 6010B and 7470A (EPA 1996c and EPA 1994, respectively).
    - Total PCBs using EPA Method 8082A (EPA 2007b).

Riverbank Sediment:

- Riverbank sediment samples from all locations will be analyzed for the following COCs:

- TPH-GRO using Method AK 101 (ADEC 2002a).
- TPH-DRO using Method AK 102 (ADEC 2002b).
- TPH-RRO using Method AK 103 (ADEC 2002c).
- VOCs including BTEXN using EPA Method 8260B (EPA 1996a).
- PAHs using EPA Method 8270C-SIM (EPA 2018).
- PPMs and mercury using EPA Methods 6010B and 7470A (EPA 1996c and EPA 1994, respectively).
- PCBs using EPA Method 8082A (EPA 2007b).

All sampling results for soil, sediment, shallow groundwater, and seep water will be compared to ADEC Method 2 Cleanup Criteria (under 40-inch precipitation zone), listed in 18 AAC 75.341 for soil and sediment, and 18 AAC 75.345 for groundwater (ADEC 2023) and/or EPA Regional Screening Levels (RSLs; EPA 2024a and 2024b).

Table 2-5 lists the COCs along with their analytical methods, reporting limits, method detection limits, and appropriate screening levels for this Site Assessment. Table 2-5 also notes the anticipated number of samples for each sample procedure and additional QA/QC samples to be collected. All onsite activities will comply with the Site-specific Health and Safety Plan, included in Appendix B.

Appendix A provides a summary of regulatory thresholds and the laboratory reporting limits for the project COCs. For the analysis results to be "fit for use," the laboratory reporting limits must be below the regulatory threshold for the COCs.

Table 2-4. Laboratory and Associated Matrices to be Analyzed

Laboratory	Matrix
Pace	Soil grab samples
	Sediment composite samples
	Shallow groundwater samples
	Seep water samples

Table 2-5. Proposed Samples and Constituents of Concern (COCs)

Constituents of Concern	Number of Proposed Samples
Soil Samples	
Grab Samples of subsurface soils from excavated test pits in the former landfill sites: TPHs (GRO, DRO, RRO), VOCs, PAHs, PPMs (with mercury), and total PCBs.	Up to 8 [1, 2, 3]
Grab Samples of subsurface soils from hand auger borings in the former landfill sites: TPHs (GRO, DRO, RRO), VOCs, PAHs, PPMs (with mercury), and total PCBs.	Up to 7 [1, 2, 3]

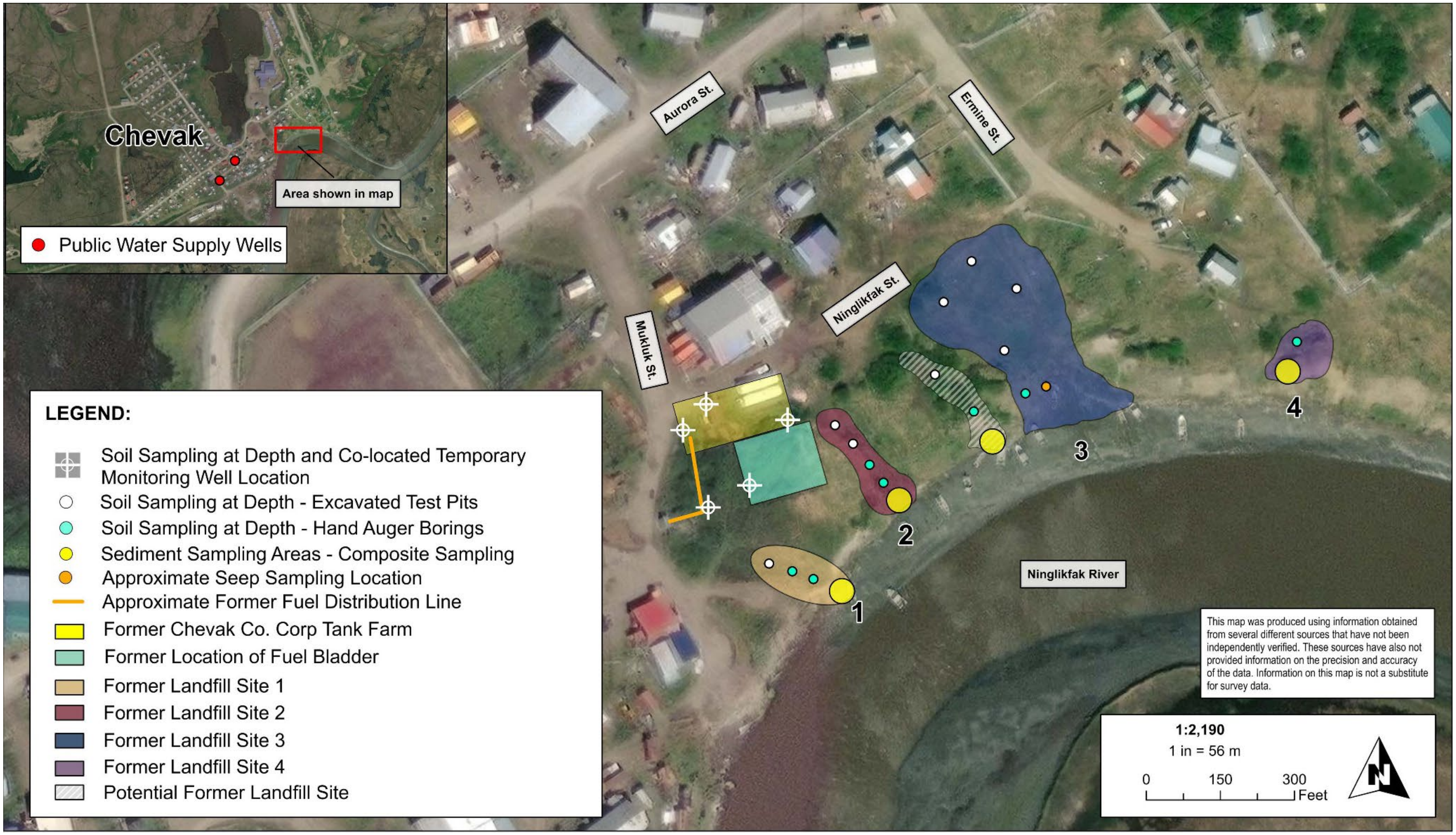
Table 2-5. Proposed Samples and Constituents of Concern (COCs)

Constituents of Concern	Number of Proposed Samples
Grab Samples of subsurface soils from hand auger borings in the former Tank Farm and Fuel Bladder areas: TPHs (GRO, DRO, RRO), VOCs, PAHs, and PPMs (with mercury).	Up to 5 [1, 2, 3]
Groundwater Samples (Temporary Shallow Groundwater Monitoring Wells)	
Samples from temporary shallow groundwater monitoring wells in test pits near the former Tank Farm and Fuel Bladder areas: TPHs (GRO, DRO, RRO), VOCs, PAHs, and total lead.	Up to 5 [1, 2, 3]
Seep Water Samples	
Samples from a seep in the vicinity of Landfill Site 3, near the Ninglikfak River: TPHs (GRO, DRO, RRO), VOCs, PAHs, PPMs (with mercury), and total PCBs.	Up to 1 [1, 2, 3]
Riverbank Sediment Samples	
Composite samples from surface sediments along the Ninglikfak River near the former landfill sites: TPH (GRO, DRO, RRO), VOCs, PAHs, PPMs (and mercury), and total PCBs.	Up to 4 [1, 2, 3]

Notes:
[1] Plus one duplicate per ten samples.
[2] Plus one trip blank sample per sample cooler for VOCs and TPH-GRO.
[3] Plus one Site-specific matrix spike/matrix spike duplicate (MS/MSD) sample (1 MS/MSD per 20 samples).

TPH-GRO = total petroleum hydrocarbons as gasoline range organics.
TPH-DRO = total petroleum hydrocarbons as diesel range organics.
TPH-RRO = total petroleum hydrocarbons as residual range organics.
VOC = volatile organic compound including benzene, toluene, ethylbenzene, total xylenes, and naphthalene.
PAH = polycyclic aromatic hydrocarbon including acenaphthene, acenaphthylene, anthracene, benz[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[g,h,i]pyrene, chrysene, dibenz[a,h]anthracene, fluoranthene, fluorene, indeno[1,2,3-c,d]pyrene, naphthalene, phenanthrene, and pyrene.
PPM = priority pollutant metal including arsenic, cadmium, total chromium, lead, selenium, silver, beryllium, copper, nickel, thallium, antimony, zinc, and mercury.
PCB = polychlorinated biphenyl

Figure 2-3. Proposed Sampling Locations



Summary of Quality Objectives. This project's data collection efforts and intended use of the data are based on the systematic planning efforts of EPA and ERG. Project DQOs are presented in Appendix F. The primary goal of this assessment is to obtain analytical results representative of the physical and chemical compositions of the soil, sediment, shallow groundwater, and seep water at the Site.

To ensure that data quality is sufficient to achieve this goal, sampling, analyses, and data review will follow strict protocols. The Alta Project Manager and QAO will guide various stages of the project to ensure the proper methodology has been followed. In addition, ERG will assess the data quality using the following data quality indicators (DQIs) defined in Table 2-6.

The analytical laboratory, Pace, provided estimated reporting limits and method detection limits (Appendix A). Actual reporting limits and method detection limits may differ slightly and will depend on sample dilution, sample concentrations, sample matrix interference effects, and analytical procedures performed in the laboratory.

Table 2-6. Data Quality Indicators for Field Investigations

DQI	Definition	Evaluation Procedure
Precision	A measure of data variation quantified by repeating measurements of a characteristic on a single sample or co-located sample set.	Evaluated based on field duplicate samples, laboratory duplicates, laboratory control sample duplicates (LCSDs), and matrix spike duplicates (MSDs), if used. Appendix C lists analyte-specific precision criteria and goals in terms of relative percent difference (RPD). Generally, LCSD and/or MSD precision goals are 20% but are analyte specific. Field duplicate RPD goals are 50% for soil/sediment and 30% for groundwater/seep water.
Accuracy/Bias	A measure of the closeness of the agreement between a true, or reference, value and the associated measured value.	Quantified by testing field and laboratory samples spiked with a known concentration of a known analyte and will be evaluated based on laboratory control sample (LCS), matrix spike (MS), and surrogate recoveries. Appendix C lists analyte-specific accuracy criteria. Generally, surrogate accuracy goals, and LCS and/or MS accuracy goals are ±25% but are analyte specific.
Sensitivity	The capability of a method or instrument to discriminate between measurement responses representing different level (e.g., concentrations) of a variable of interest.	Comparing the reporting limits or the method detection limits to demonstrate that where possible, they are at or below the regulatory standards: ADEC Method 2 (18 AAC 75.341 and 18 AAC 75.345), EPA RSLs, and/or other appropriate screening values (Appendix A).

Table 2-6. Data Quality Indicators for Field Investigations

DQI	Definition	Evaluation Procedure
Representativeness	The degree to which the sample data accurately and precisely represent Site conditions. It is best satisfied by confirming that sample locations are appropriately defined, sample collection procedures are appropriate and consistently followed, a sufficient number of samples are collected, and analytical results meet the DQIs.	Representativeness is evaluated based on data review, verification, validation, and reconciliation efforts by comparing the combination of data accuracy, precision, appropriate measurement range, and methods, and assessing other potential sources of bias including sample holding times, results of blank samples, and laboratory QA review.
Reproducibility / Comparability	Comparability is a qualitative expression of the measure of confidence that two or more data sets may contribute to a common analysis. Using standard EPA accepted protocols, the ERG Team will collect the samples and measure field parameters for comparison with previous project data, if available.	The laboratory will process and analyze all samples according to this QAPP at sufficient detection limits, precision, accuracy, and reproducibility (the closeness of agreement between independent results obtained with the same method on identical test material but under different conditions).
Completeness	The percentage of valid data relative to the total possible data points. A measure of whether enough samples were obtained to support the decision to be made.	Evaluated for each analyte based on the total number of project samples, excluding QA/QC samples. The ERG Team's goal for completeness is ≥90%. If the sampling event does not meet the quality assurance goal of ≥90%, the data will be discussed with the Program Manager and a course of action agreed upon.

2.6 Element A.8: Special Training/Certification

This QAPP was drafted by the Alta Project Manager and the final review and preparation was conducted by the ERG Task Order Manager identified in Figure 2-1. Both individuals meet the definition of a Qualified Environmental Professional. Ms. Sarah Weppner holds an M.S. in Environmental Health from the University of Washington and has more than two decades of professional work experience conducting contaminated site characterization and managing cleanup activities. Ms. McKeown holds a B.S. in Chemical Engineering from Washington University in St. Louis and ten years of professional work experience conducting ESAs and supporting field sampling.

Sampling will be conducted by the Field crew identified in Figure 2-1. Mr. McLees holds a B.S. in Geoscience from Boise State University, is a Licensed/Professional Geologist (WA and ID) and has nine years of professional experience conducting contaminated site characterization and managing cleanup activities. Mr. Ward holds a B.S. in Geology from Boise State University and has one year of professional experience conducting contaminated site characterization. Mr. Kovar holds an M.S. in Environmental Studies from Virginia Commonwealth University and has three years of professional experience conducting contaminated site cleanup and characterization activities and meets the definition of a Qualified Environmental Professional. In addition, Field Team members performing sampling activities at the Site will have completed a minimum of an Occupational Safety and Health Administration (OSHA) 24- or 40-hour Hazardous Materials Technician course, in compliance with 29 Code of Federal Regulations 1910.120: OSHA

Hazardous Waste Operations and Emergency Response and have current certification. Documentation of necessary training and certifications is available upon request.

Pace will be performing the analyses and is part of the National Environmental Laboratory Accreditation Program. Copies of laboratory accreditations are provided in Appendix D.

2.7 Element A.9: Documents and Records

Field Documentation. The ERG Task Order Manager, or designee, is responsible for ensuring that the most current approved revision of the project QAPP is available to the Field Team.

The Field Team will document each day's activities in field notebooks and will record information as follows:

- Record project data directly, promptly, and legibly.
- Make field notebook or field sheet entries in permanent ink and sign/initial and date by the data entrant.
- Indicate changes or corrections to data with a single line through the original entry.
- Initial, date, and explain changes.
- Include a reference to the sampling procedures in the field notes.

ERG developed a sample numbering scheme to allow each sample to be uniquely identified and to provide a means of tracking the sample from collection through analysis. The numbering scheme indicates the sampling location. The Field Team will enter the unique sample number in the field notebook, chain-of-custody forms, and any other records documenting sampling activities (e.g., boring logs, test pit logs, etc.), where applicable. Subsection 3.1.2 further describes the numbering scheme.

Laboratory Data Management and Storage. ERG will store the data in electronic form and retain the data on a secure server. The laboratory will email analytical data to the Alta Project Manager and Field Team Lead as Microsoft® Excel© and .pdf files. ERG will provide laboratory result reports to EPA in an appendix to the ESA Report.

ERG has developed and instituted document control mechanisms for the review, revision, and distribution of QAPPs. Each QAPP has a signed approval form, title page, table of contents, and EPA-approved document control format that appears in the upper left-hand corner of each page. Table 2-2 presents the distribution list for this QAPP. The EPA QAM, or designee, will maintain a copy of the approved QAPP. The ERG Task Order Manager will circulate any revision to the QAPP to everyone on the distribution list during the project and shall maintain the finalized QAPP.

Section 3.6 of this QAPP provides further discussion of the management of project-related information.

3. DATA GENERATION AND ACQUISITION

This section describes the project data collection activities, assumptions, sampling Site selection, the number of samples to be obtained from the number of sampling locations, and any other relevant project-specific information. The ERG Team will present sampling results in an ESA Report. ERG will not use existing analytical data as part of this investigation. Since all data collected will be direct observation and/or measurement, Element B.9 Non-direct Measurements does not apply.

3.1 Element B.1 Sampling Process Design and B.2 Sampling Methods

3.1.1 Sampling Process Design

ERG and EPA based the sampling approach detailed in this QAPP on professional judgment using knowledge of the Site to identify specific sample locations.

3.1.1.1 Sample Design Logistics

The ERG Team will notify the one-call agency (Alaska Digline, Inc.) at least 10 days prior to field activities. The appropriate utility companies will mark the utilities at locations where the underground lines enter the property. Private underground utilities will be located and marked at the Site by GeoTek Alaska (GeoTek) using ground penetrating radar prior to conducting field activities. GeoTek conducted a survey of the site in August 2024 to identify the locations of buried utilities and the general extent of buried materials in the landfill areas. At the time of drafting this QAPP, the results of the survey have not been received, and the exact locations of the samples may change based upon the information provided.

3.1.1.2 Grab Soil Sampling at Depth (Excavation Test Pits)

The ERG Team will utilize an excavator to expose soil in test pits up to 15 feet bgs. Grab samples will be collected from up to eight test pits collected throughout the former landfill sites. Test pit locations were selected based upon areas of suspected or known risk to the environment or human health, such as the former landfill sites. Test pits will be screened for organic vapors with a PID to determine the presence or absence of petroleum contaminated soil and test pit depth will be determined based on PID readings. Up to one soil sample for petroleum COCs will be collected from each test pit at depths exhibiting the highest PID readings. If field screening indicates the absence of elevated PID readings, then one parent soil sample for petroleum COCs will be collected from the groundwater interface, if encountered, or based on field observations.

Up to one grab soil sample for PPMs and up to one grab soil sample for PCBs will be collected from test pits located in the former landfill sites. Soils samples for PPMs and total PCBs will be collected based on visual evidence and/or other field observations and may or may not be collected in the same sample interval as the petroleum COCs.

Duplicate samples will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:10 ratio (Table 2-5). MS/MSD samples will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and PCBs) at a 1:20 ratio for a total of two MS/MSD samples per COC. Grab soil sampling will be conducted to evaluate potential soil risk pathways including the migration of free-phase, vapor-phase, and dissolved-phase hydrocarbons and other COCs.

The ERG Team's field crew will collect the samples for VOC analysis in accordance with EPA Method 5035 (EPA 1996b).

The ERG Team will send soil samples to Pace (with a standard turnaround time) for analyses for the COCs listed in Table 2-5.

3.1.1.3 Grab Soil Sampling at Depth (Hand Auger Borings)

The ERG Team will utilize hand auger sampling techniques to expose soil in borings up to 15 feet bgs. Grab samples will be collected from up to seven hand auger borings throughout the former landfill sites and five hand auger borings in the vicinity of the former Tank Farm and Fuel Bladder. Hand auger boring locations were selected based upon areas of suspected or known petroleum releases, such as the former Tank Farm and areas of suspected or known risk to the environment or human health, such as the former landfill sites. Hand auger borings will be screened for organic vapors with a PID to determine the presence or absence of petroleum contaminated soil and boring depths will be determined based on PID readings. Up to one grab soil sample for petroleum COCs will be collected from each hand auger boring at depths exhibiting the highest PID readings. If field screening indicates the absence of elevated PID readings, then one parent grab soil sample for petroleum COCs will be collected from the groundwater interface, if encountered, or based on field observations.

Up to one grab soil sample for PPMs will be collected from all hand auger borings and up to one grab soil sample for PCBs will be collected from hand auger borings located in the former landfill sites. Soils samples for PPMs and total PCBs will be collected based on visual evidence and/or other field observations and may or may not be collected in the same sample interval as the petroleum COCs.

The field duplicate and Site-specific MS/MSD sample collection frequency for grab soil samples is the same as outlined in subsection 3.1.1.2.

The ERG Team's field crew will collect the samples for VOC analysis in accordance with EPA Method 5035 (EPA 1996b).

The ERG Team will send soil samples to Pace (with a standard turnaround time) for analyses for the COCs listed in Table 2-5.

3.1.1.4 Shallow Groundwater Sampling

Shallow groundwater sampling is described in detail in the following sections and includes sampling from up to five temporary shallow groundwater monitoring wells, which will be conducted to evaluate potential groundwater risk pathways including the migration of dissolved-phase hydrocarbons.

After temporary monitoring wells MW-1 through MW-5 are installed and are allowed at least 48-hours for groundwater recovery and stabilization, the ERG Team will collect groundwater samples using low-flow sampling techniques (EPA 2017). Duplicate samples will be collected for each COC group (TPHs, VOCs, PAHs, and total lead) at a 1:10 ratio for a total of one duplicate sample. Site-specific MS/MSD samples will be collected for each COC group (TPHs, VOCs, PAHs, and total lead) at a 1:20 ratio for a total of one Site-specific MS/MSD sample.

Figure 2-3 notes the approximate temporary shallow groundwater monitoring well locations.

Samples will be submitted to Pace (with a standard turnaround time) for analyses for the COCs listed in Table 2-5 above.

3.1.1.5 Seep Water Sampling

Seep water sampling is described in detail in the following sections and includes sampling from one location where seep water is observed at the Site. Seep water sampling will be conducted to evaluate potential seep water risk pathways including the migration of dissolved-phase hydrocarbons.

The ERG Team will collect a seep water sample from the Site. One duplicate sample will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:10 ratio. One Site-specific MS/MSD sample will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:20 ratio.

Figure 2-3 notes the approximate location of the seep water observed during a Site visit conducted in July 2024 by the ERG Team. Samples will be submitted to Pace (with a standard turnaround time) for analyses for the COCs listed in Table 2-5 above.

3.1.1.6 Sediment Sampling Along Riverbank

The ERG Team's field crew will collect composite sediment samples from approximately the top 6-inches of the surface sediments along the riverbank of the Ninglikfak River. One duplicate sample will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:10 ratio. One Site-specific MS/MSD sample will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:20 ratio.

The ERG Team will collect the composite sediment samples with either a coring tool (e.g., TerraCore or similar) or a scooping technique, if the sediment is loose or sandy.

The ERG Team's field crew will send the parent and duplicate composite sediment samples to Pace (with a standard turnaround time) for analyses for COCs listed in Table 2-5.

3.1.2 Sample Identification

A unique sample number will be developed for each sample following the conventions described below. The sample number will be entered in the field notebook, chain-of-custody forms, and other records documenting sampling activities.

Soil Samples:

- CRB- TP#-SG-HA/E-depth

  - Where:

    TP# = defines which test pit is being sampled (e.g., TP1, TP2, etc.)

    SG = soil grab

    HA = hand auger

    E = excavation
  - Example:

    CRB-TP1-SG-HA-5’ = Chevak Riverside Bluff, Test Pit 1, soil grab, hand auger, 5-foot depth

Temporary Shallow Groundwater Monitoring Well Samples:

- CRB-MW#
  - Where:

    MW#= defines which temporary shallow monitoring well is being sampled (e.g., MW-1, MW-2, etc.)
  - Example:

    CRB-MW-1 = Chevak Riverside Bluff, Monitoring Well 1

Seep Water Sample:

- CRB-SW#
  - Where:

    SW#= defines which seep water site is being sampled (e.g., SW-1)
  - Example:

    CRB-SW-1 = Chevak Riverside Bluff, seep water sample 1

Riverbank Sediment Samples:

- CRB-SED-Sample #
  - Where:

    CRB = Chevak Riverside Bluff

    SED= sediment
  - Example:

    CRB-SED-1 = Chevak Riverside Bluff Site, Sediment Sample #1

3.1.3 Sampling Methods

This section describes the procedures the ERG Team field crew will use to obtain project samples. The ERG Team’s field crew will send samples to Pace with an accompanying complete chain-of-custody form upon completion of sampling (see Section 3.3).

Personal protective equipment (PPE) necessary to perform the field work for this project will be consistent with the requirements of the Site Health and Safety Plan (Appendix B), in compliance with applicable OSHA standards.

In addition to these PPE requirements, the following specific PPE is required for field work associated with this project:

- Nitrile gloves
- Safety glasses
- Hearing protection
- Safety vest
- Steel toe boots
- Hard hat
- Long sleeve shirt (if necessary)

QA/QC procedures as specified for sample collection will be followed by sampling personnel. The QA/QC procedures will be fulfilled by adhering to all requirements detailed in this QAPP and the sampling procedures described below. Such adherence will be demonstrated through appropriate documentation of sampling procedures within the field notebook or field sheets as described herein. Field audits by the project QAO may also be part of QA/QC procedures.

3.1.3.1 Soil Grab Sample Methodology (Excavator)

The ERG Team field crew will collect grab soil samples from up to eight proposed test pits located in the former landfill sites. The field crew will excavate test pits up to 15 feet bgs (or to the maximum extent of the excavator, whichever is less). The field crew will screen soils from the excavator bucket for VOCs using a PID and will document the readings in the test pit logs.

After all soils are screened with a PID, the field crew will collect up to one soil sample for petroleum COCs from each test pit at depths exhibiting the highest PID readings. If field screening indicates the absence of elevated PID readings, then one parent soil sample for petroleum COCs will be collected from the groundwater interface, if encountered, or based on field observations. Up to one soil sample for PPMs and one soil sample for PCBs will be collected from each test pit. Soils samples for PPMs and total PCBs will be collected based on field observations and may or may not be collected in the same sample interval as the petroleum COCs. Samples will be collected while wearing clean nitrile gloves.

The ERG Team field crew will collect soil samples for VOCs in accordance with EPA Method 5035 (EPA 1996b). Samples will be collected in the following manner and order:

1. A disposable TerraCore (or equivalent) soil sampler will be used to collect one 5-gram sample directly from the excavator bucket and the soil will then be extruded into one prepared laboratory-supplied 40-milliliter (mL) volatile organic analysis (VOA) vial preserved with methanol (MeOH).

2. Material around the 5-gram sample location will be collected using a gloved hand to fill laboratory-supplied jars for VOCs pre-analysis and total solids analysis. Each sample jar will be capped with a Teflon®-lined lid to minimize air space for volatilization.

The ERG Team field crew will collect soil samples for TPHs, PAHs, PPMs, and total PCBs by using a gloved hand to fill laboratory-supplied jars. Soil samples for TPHs and PAHs will be collected from the same locations as the VOC samples.

The field crew will place the collected samples into clean, clearly labeled, laboratory-provided sampling containers. The field crew will store all samples in a container cooled to 0°C-6°C in the field and store them at 0°C-6°C, but not freeze them, until analysis. Table 3-2 describes sample containers and preservation requirements.

3.1.3.2 Soil Grab Sample Methodology (Hand Auger)

The ERG Team field crew will collect grab soil samples from up to twelve proposed onsite hand auger borings. Up to five borings will be located in the vicinity of the former Tank Farm and Fuel Bladder areas and up to seven borings will be located in the former landfill sites. The field crew will hand auger borings up to 15 feet bgs (or to the maximum extent of the field crew, whichever is less) by place a driving shoe into the hole, and manually driving the shoe at least 6 inches below the sample depth to allow for the collection of an undisturbed soil sample. If refusal occurs at depths shallower than 15 feet bgs, the sample location may be offset slightly in order to attain greater sampling depth, depending on field observations. If sloughing occurs from the auger shoe during sample collection, the soil may be placed in a bowl or bucket for screening and sampling. The field crew will screen soils for VOCs using a PID and will document the readings in the boring logs.

After all soils are screened with a PID, the field crew will collect up to one soil sample for petroleum COCs from each hand auger boring at depths exhibiting the highest PID readings. If field screening indicates the absence of elevated PID readings, then one parent grab soil sample for petroleum COCs will be collected from the groundwater interface, if encountered, or based on visual and/or olfactory evidence and/or field observations. Up to one soil sample for PPMs will be collected from all borings and up to one soil sample for total PCBs will be collected only from borings located in the former landfill sites. Soils samples for PPMs and total PCBs will be collected based on field observations and may or may not be collected in the same sample interval as the petroleum COCs. Samples will be collected while wearing clean nitrile gloves.

The ERG Team field crew will collect soil samples for VOCs in accordance with EPA Method 5035 (EPA 1996b). Samples will be collected in the following manner and order:

1. A disposable TerraCore (or equivalent) soil sampler will be used to collect one 5-gram sample directly from the hand auger boring and the soil will then be extruded into one prepared laboratory-supplied 40-mL VOA vial preserved with MeOH.
2. Material around the 5-gram sample location will be collected using a gloved hand to fill laboratory-supplied jars for VOC pre-analysis and total solids analysis. Each sample jar will be capped with a Teflon®-lined lid to minimize air space for volatilization.

The ERG Team field crew will collect grab soil samples from hand auger borings for TPHs, PAHs, PPMs and total PCBs by using a gloved hand to fill laboratory-supplied jars. Soil samples for TPHs and PAHs will be collected from the same locations as the VOC samples.

The field crew will place the collected samples into clean, clearly labeled, laboratory-provided sampling containers. The sampling crew will store all samples in a container cooled to 0°C-6°C in the field and store them at 0°C-6°C, but not freeze them, until analysis. Table 3-2 describes sample containers and preservation requirements.

3.1.3.3 Temporary Shallow Groundwater Monitoring Well Installation and Sampling Methodology

The ERG Team will install up to five temporary shallow groundwater monitoring wells in the vicinity of the former Tank Farm and Fuel Bladder in areas where PID readings indicate that soils have been impacted by petroleum releases. The temporary monitoring wells will be installed within a hand auger boring and will be placed, backfilled, developed, purged, and sampled as traditional monitoring wells. The ERG Team will utilize 1-inch prepack well casings for temporary wells and will locate the screened interval within the desired sampling interval.

The wells will be advanced up to approximately 15 feet bgs, depending on field observations, and will be completed with 1-inch schedule 40 polyvinyl chloride (PVC) casing with 10 feet of 0.010-inch slots.

The ERG Team field crew will sample the five temporary groundwater monitoring wells (MW-1, MW-2, MW-3, MW-4, and MW-5; Figure 2-3) using low-flow minimal drawdown methods in accordance with *Low Stress (low-flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (EPA 2017). Prior to collection of elevation measurements and sampling, the ERG Team's field crew will remove all monitoring well caps to allow water-level equalization. Groundwater elevations will be measured relative to the north top-of-casing in all shallow groundwater monitoring wells to assist with shallow groundwater gradient mapping. Measurements will be to the nearest hundredth of a foot and will be collected with an interface probe in the event unexpected light non-aqueous phase liquid (LNAPL) is present in any of the wells. If LNAPL is present, the ERG Team will note LNAPL thickness (wells with LNAPL present will not be sampled).

Following collection of groundwater levels, a peristaltic pump and multi-parameter instrument housed in a flow-through cell will be utilized to purge at a low flow (i.e., 200-1,000 milliliters per minute [mL/min]) and the field crew will measure for stabilization of water quality parameters, which include water level, temperature, pH, dissolved oxygen (DO), specific electrical conductance (SEC), oxidation-reduction potential (ORP), and turbidity.

Stabilization is defined as three consecutive readings at 5-minute intervals that are within the listed stabilization criteria in the table below (Table 3-1). If the field crew exhausts groundwater in a well while waiting for water quality parameters to stabilize, the field crew will allow the well to recharge such that sufficient volume is present to collect samples without stabilization of water quality parameters (EPA 2017). If field parameter stabilization cannot be obtained after 45 minutes, the field crew will collect a sample and record on the field sheet that stabilization could not be achieved.

Table 3-1. Stabilization Criteria for Water Quality Indicator Parameters

Parameter	Stabilization Criteria*	Reference
Drawdown	< 0.3 feet over three consecutive 5-minute intervals	EPA 2017
pH	± 0.1	EPA 2017; Wilde 2008
Temperature	± 0.2°C or 3%	EPA 2017; Wilde 2008
SEC	± 3%	EPA 2017
ORP	± 10 mV	EPA 2017; Wilde 2008
DO	± 10% for values >0.5 mg/L. If three DO values <0.5 mg/L, consider the value stabilized or ± 0.2 mg/L	EPA 2017; Wilde 2008
Turbidity	10% for values > 5 NTU; if 3 values are <5 NTU, consider the value stabilized	EPA 2017

Notes:
In general, the order of stabilization is pH, temperature, and specific electrical conductance (SEC), followed by oxidation-reduction potential (ORP), and dissolved oxygen (DO).
°C = degrees Celsius
mg/L = milligrams per liter
mV = millivolt
NTU = Nephelometric Turbidity Unit
*If field parameter stabilization cannot be obtained after 45 minutes, the field crew will collect a sample and record on the field sheet that stabilization could not be achieved.

Up to five parent shallow groundwater samples will be collected from the temporary groundwater wells, in addition to QA/QC samples, which includes duplicate and Site-specific MS/MSD samples that will be collected for each COC group (TPHs, VOCs, PAHs, and total lead) at a 1:10 ratio for duplicate and a 1:20 ratio for Site-specific MS/MSD samples. Samples will be collected through new Teflon®-lined tubing. VOC samples will be collected with no headspace and in a manner to minimize volatilization. The field crew will place samples immediately on ice after collection and will hold them in a cooler. Groundwater (temporary well) samples will be analyzed for the COCs listed in Table 2-5 and will be sent to Pace for analyses. Table 3-2 describes sample containers and preservation requirements.

3.1.3.4 Seep Water Sampling Methodology

Seep water samples will be collected using the dip sampling method from the *Techniques of Water-Resources Investigations (TWRI), Book 9, Chapter A4, Collection of Water Samples* (USGS 2006). This method consists of using a non-metallic grab sampler or narrow-mouthed sampling bottle to collect the sample. The ERG Team field crew will stand downstream of the sampler/bottle while it is being filled and will take care to avoid collecting particulates that are re-suspended as a result of wading or bumping the sampler. The seep sample will be collected from the main flow of the seep. In the event of an extremely low flow or ponding, the field crew will use their best judgment to collect representative samples. After collection, the sampler will be emptied into a churn sample splitter and then directly into the sample containers from the churn sample splitter. The volume of water collected for each seep water sampling location is dependent on the analytes being tested and the sample volumes required by the analytical laboratory (see Table 3-2).

Water quality parameters will be measured at each seep water sample location immediately after the sample is collected. Standard water quality parameters to be measured in the field include SEC, temperature, pH, DO, ORP, and turbidity. These parameters will be measured using a multi-parameter water quality probe (YSI ProDSS or similar). The water quality probe will be calibrated each morning prior to sampling according to manufacturers' instructions. Once the samples from a sample location have been collected, the remaining portion of the water retrieved using the pole-grab sampler will be used for measuring water quality parameters. Water will be dispensed into the storage cup (or other appropriate container) of the water quality meter. Water quality measurements will be observed and recorded in a field notebook or sampling record for the sample location. Once the water quality measurements have been recorded, the water in the storage cup will be discarded.

Up to one parent seep water sample will be collected in addition to QA/QC samples, which include duplicate and Site-MS/MSD samples that will be collected for each COC group (TPHs, VOCs, PAHs, PPMs, and total PCBs) at a 1:10 ratio for duplicate and a 1:20 ratio for Site-specific MS/MSD samples. VOC samples will be collected with no headspace and in a manner to minimize volatilization. The field crew will place samples immediately on ice after collection and will hold them in a cooler. Seep water samples will be analyzed for the COCs listed in Table 2-5. Seep water samples will be sent to Pace for analyses. Table 3-2 describes sample containers and preservation requirements.

3.1.3.5 Riverbank Sediment Sampling Methodology

The ERG Team's field crew will collect composite sediment samples from up to four locations along the riverbank of the Ninglikfak River.

Composite sediment samples will be collected following the methods summarized below:

- Composite samples will consist of up to 10 subsamples per area impacted by surface runoff and erosions from the former landfill sites. Subsamples will be collected in the vicinity of the Ninglikfak River, above the high-water mark.
- All sediment subsamples will be collected using a dedicated plastic scoop or disposable plastic spoon.
- Subsamples will be placed in a bag and mixed, prior to the collection of the composite sample in laboratory-supplied jars.
- Sampling will be aimed at the sand and finer material within the cobble-sized material.

The ERG Team's field crew will collect composite sediment samples for VOCs in accordance with EPA Method 5035 (EPA 1996b). The ERG Team's field crew will collect composite sediment samples for TPHs, PAHs, PPMs, and total PCBs by using a gloved hand to fill laboratory-supplied jars from the same location as the VOC samples.

The sampling crew will store all samples in a container cooled to 0°C-6°C in the field and store them at 0°C-6°C, but not freeze them, until analysis. Table 3-2 describes sample containers and preservation requirements.

3.1.3.6 Decontamination

In order to prevent the introduction of contaminants into samples from sampling equipment or other collected/stored samples, the ERG Team field crew will decontaminate non-dedicated sampling equipment before and after each use.

To the greatest extent possible, the field crew will use disposable and/or dedicated PPE and sampling equipment to avoid cross-contamination. When required, the field crew will conduct decontamination in a central location, upwind, and away from suspected contaminant sources. The field crew will use the following procedures for all non-dedicated sampling equipment:

1. Clean with tap water and non-phosphate detergent (Liquinox®) and use a brush, if necessary, to remove particulate matter and surface films.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with de-ionized/distilled water.
4. Air dry the equipment completely.

Disposable items such as paper towels, disposable gloves, and washcloths will be deposited into a garbage bag and disposed of in a solid waste landfill.

3.1.3.7 Investigation-Derived Waste (IDW)

Investigation-derived waste (IDW) consists of soil excavated from the test pits and purge water from shallow groundwater sampling activities. IDW generated during test pit excavation will be managed onsite by stockpiling the excavated soil on a clean tarp or plastic sheet near the test pit and returning them to the pit immediately after sampling. Excavated soils will be returned to the depth from which they were removed and compacted to grade.

The following steps summarize the approach to managing and documenting IDW generated during shallow groundwater sampling (purge water):

1. Containerize the waste in 55-gallon DOT-approved drums.
2. Store onsite until available for transportation and off-site disposal.
3. Document the waste determination, transportation, and disposal.

General Responsibilities.

The Project Manager, as identified in the flow chart of this QAPP, is responsible for ensuring that the ERG Team's field crew conducts field activities in accordance with the ERG

Team's IDW standard procedure. The field crew is responsible for implementing the IDW standard procedure and communicating any unusual or unplanned condition to the ERG Team Field Lead's attention.

Waste Accumulation on Site.

The ERG Team Field Lead will predetermine staging areas for IDW containers that are easily accessible to the field crew and potential waste haulers. The methods and personnel required to safely transport IDW containers to the staging area will be determined before field mobilization. Handling and transport equipment will be consistent with the associated weight for both lifting and transporting. IDW containers will be stored onsite in a manner so that the field crew or potential waste haulers can easily read the labels.

IDW Container Movement.

The ERG Team will coordinate with a state-certified hazardous waste hauler to dispose of all waste from the site. ERG will transport IDW containers from the Site by plane to Anchorage where the waste hauler will hold the waste until disposal. IDW will be inventoried, stored as securely as possible, and inspected regularly.

The ERG Team will submit the ADEC Transport Treatment and Disposal (TTD) form to obtain ADEC approval before moving contaminated soil or water off-site (from Chevak to Anchorage), per 18 AAC 75.325(i) (ADEC 2023).

IDW that is classified as nonhazardous or "characterization pending analysis" will be disposed of as soon as possible. IDW that is classified as hazardous will not be stored onsite longer than 14 days after receipt of final analytical results.

Once final analytical results are received, the ERG Team will submit a second ADEC TTD form to obtain ADEC approval before moving contaminated soil or water to the disposal facility, per 18 AAC 75.325(i) (ADEC 2023).

All waste manifests will be signed either by the client, or the client's designee, which can, in special circumstances, be the ERG Team's Project Manager if acting as an authorized agent for the client.

Documentation.

Documentation requirements apply to all IDW during project activities. The ERG Team's field crew will keep field records of all waste generation activities in the field notebook including, but not limited to:

- Description of waste generating activities,
- Location of waste generation (including depth, if applicable),
- Type and volume of waste,
- Date and time of generation,
- Description of any waste sampling,

- Name of person recording information, and
- Name of field lead at time of generation.

After the waste is disposed of offsite via transportation, the ERG Team field crew will document proper disposal of IDW in the field notebook. Throughout the project, the Field Lead will maintain an inventory itemizing the type and quantity of the IDW. The ERG Team will keep all manifests with the project file and will attach a copy of the manifest as an appendix to the ESA Report.

3.2 Element B.3 Sample Handling and Custody

The ERG Team field crew will collect samples into laboratory-supplied sampling containers (i.e., from the analytical laboratory, laboratory supplier, or laboratory equipment provider) or clean plastic bags, label them, place them in a protective container/cooler (to isolate the sample in case the container breaks), place them in an ice-chilled cooler, and transport them directly to the shipment location.

The field crew will ensure proper storage and handling of all collected samples until they are transferred to the appropriate analytical facility or until they are properly discarded. The field crew will hold samples under chain of custody per ASTM D4840-99 *Standard Guide for Sampling Chain-of-Custody Procedures* (ASTM 2018). The field crew will use chain-of-custody forms to document sample custody and transfer. Chain-of-custody forms will accompany the samples beginning from sample collection throughout the shipping process. These chain-of-custody forms will document sample custody transfer from the field crew to the laboratory and will contain the following information:

- Site name and location,
- Sample number for each sample in shipment,
- Collection date and time for each sample in shipment,
- Preservation (yes or no) for each sample in shipment,
- Number of containers of each sample,
- Sample description (environmental matrix),
- Analyses required for each sample,
- Sample condition or comments for laboratory instruction, and
- The name of the courier transferring the samples to the laboratory (if applicable).

While on Site, the field crew will secure (e.g., store in a locked vehicle) samples or sampling equipment that is not in the physical possession or view of at least one member of the crew.

To maintain a record of sample collection, sample transfer between personnel, and sample receipt by the laboratory, the field crew will complete a chain-of-custody form for each cooler or box that is transferred to the laboratory.

The field crew is responsible for completing the chain-of-custody forms, signing the chain-of-custody forms, and noting the date and time the samples are dropped off, picked up by courier, or shipped. The crew members will also inspect the chain-of-custody forms for completeness and accuracy. A field crew member will initial any changes made to the forms. The original chain-of-custody forms will accompany the sample shipment while the field crew will retain a copy. Appendix E contains a sample copy of a field chain-of-custody form ERG will use during this investigation. The location for sample shipping or drop off is:

Pace Analytical
Pace Sample Receiving
12065 Lebanon Road
Mt. Juliet, TN 37122

When the laboratory receives the samples, the laboratory sample custodian will check all bottles against the chain-of-custody forms, record the condition of the samples, and sign, date, and mark the time of receipt on the chain-of-custody forms. Table 3-2 lists the holding times and preservation requirements including sample temperatures. The laboratory will provide completed chain-of-custody forms with the analytical results. The Field Team Lead will retain any paperwork generated in collecting and shipping samples (e.g., air bills) as part of the permanent documentation.

The laboratory will also follow a written Standard Operating Procedure (SOP) for sample custody. The laboratory will log all samples into a sample receipt logbook or computerized laboratory information system and will document the following information:

- Date and time of sample receipt,
- Project number and name,
- Field sample number,
- Laboratory sample number,
- Sample matrix,
- Analytical parameters,
- Storage location,
- Log-in person's initials, and
- Log-in sample temperature.

Laboratory personnel will secure all information relevant to the samples at the end of each business day. They will store all samples in a designated storage refrigerator with restricted access. The laboratory will properly dispose of the samples once the data quality review of the project data is completed.

3.3 Element B.4 Analytical Methods and B.5 Quality Control

Table 3-2 lists the analytical method(s), container type(s), preservative(s), and holding time(s) applicable to all samples obtained under this project. All sample containers, labels, and preservatives will be obtained from Pace. Samples must be preserved as directed and analyzed within the holding times. The ERG Team Project Manager will notify the laboratory prior to sample shipment to ensure a holding time is not exceeded. The ERG Team field crew will follow all sample collection and preparation instructions provided by the analytical laboratory for the duration of this project.

Table 3-2. Analytical Method(s), Container Type(s), Preservation Method(s), and Sample Holding Time(s)

Analyte Group	Analytical Method	Sample Container	Preservative(s)	Holding Time
Grab Soil and Composite Riverbank Sediment Samples (all test pits, hand auger borings, and riverbank sediment samples)				
VOCs *(as listed in Table 2-5)*	EPA 8260B (EPA 1996a)	(1) EPA 5035 (EPA 1996b) TerraCore kit (plastic T-bar plunger tool) (1) MeOH-preserved 40mL VOA vial	methanol (MeOH), Ice to 0°C-6°C	14 days
		(1) non-preserved 4-ounce (oz) glass soil jar (moisture content)	None	14 days
	EPA 8260B (EPA 1996a; water trip blank)	(1 per VOC cooler) HCl-preserved 40-mL amber glass vial	hydrochloric acid (HCl), Ice to 0°C-6°C	14 days
TPH-GRO	AK 101 (ADEC 2002a)	(1) 60-mL amber glass vial	MeOH, Ice to 0°C-6°C	14 days
	AK 101 (ADEC 2002a; water trip blank)	(1 per VOC cooler) HCl-preserved 40-mL amber glass vial	HCl, Ice to 0°C-6°C	14 days
TPH-DRO and TPH-RRO	AK 102 (ADEC 2002b) and AK 103 (ADEC 2002c)	(1) non-preserved 8-oz amber glass soil jar	No preservative, Ice to 0°C-6°C	14 days
PAHs *(as listed in Table 2-5)*	EPA 8270C-SIM (EPA 2018)	(1) non-preserved 4-oz amber glass soil jar	No preservative, Ice to 0°C-6°C	14 days
PPMs (with mercury)	EPA 6010B (EPA 1996c)	(1) non-preserved 4-oz glass soil jar	No preservative, Ice to 0°C-6°C	180 days
	mercury by EPA 7471B (EPA 1994)	(1) non-preserved 4-oz glass soil jar		

Table 3-2. Analytical Method(s), Container Type(s), Preservation Method(s), and Sample Holding Time(s)

Analyte Group	Analytical Method	Sample Container	Preservative(s)	Holding Time
Grab Soil and Composite Riverbank Sediment Samples (all test pits and hand auger borings throughout the former landfill sites and riverbank sediment samples)				
Total PCBs	EPA 8082 (EPA 2007b)	(1) non-preserved 4-oz glass soil wide-mouth jar with Teflon®-lined cap	No preservative, Ice to 0ºC-6°C	40 days
Groundwater Samples (all temporary shallow groundwater monitoring wells)				
VOCs *(as listed in Table 2-5)*	EPA 8260B (EPA 1996a)	(3) HCl-preserved 40-mL amber glass VOA vial	HCl (pH <2), Ice to 0ºC-6°C	14 days
	EPA 8260B (EPA 1996a; water trip blank)	(1 per VOC cooler) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
TPH-GRO	AK 101 (ADEC 2002a)	(3) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
	AK 101 (ADEC 2002a; water trip blank)	(1 per VOC cooler) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
TPH-DRO and TPH-RRO	AK 102 (ADEC 2002b) and AK 103 (ADEC 2002c)	(1) HCl-preserved 100-mL amber glass vial	HCl (pH<2), Ice to 0°C-6°C	14 days
PAHs *(as listed in Table 2-5)*	EPA 8270C-SIM (EPA 2018)	(2) 40-mL amber glass non-preserved vials per sample	No preservative, Ice to 0°C-6°C	7 Days
Total lead	EPA 6010B (EPA 1996c)	(1) HNO_3-preserved 250-mL HDPE	nitric acid (HNO_3; pH <2), Ice to 0°C-6°C	180 days

Table 3-2. Analytical Method(s), Container Type(s), Preservation Method(s), and Sample Holding Time(s)

Analyte Group	Analytical Method	Sample Container	Preservative(s)	Holding Time
Seep Water Samples				
VOCs *(as listed in Table 2-5)*	EPA 8260B (EPA 1996a)	(3) HCl-preserved 40-mL amber glass VOA vial	HCl (pH <2), Ice to 0ºC-6°C	14 days
	EPA 8260B (EPA 1996a; water trip blank)	(1 per VOC cooler) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
TPH-GRO	AK 101 (ADEC 2002a)	(3) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
TPH-DRO and TPH-RRO	AK 102 (DEC 2002b) and AK 103 (DEC 2002c)	(1) HCl-preserved 100-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
PAHs *(as listed in Table 2-5)*	EPA 8270C-SIM (EPA 2018)	(2) 40-mL amber glass non-preserved vials per sample	No preservative, Ice to 0°C-6°C	7 Days
PPMs *(as listed in* Table 2-5*)*	EPA 6010B (EPA 1996c)	(1) HNO_3-preserved 250mL HDPE	HNO_3 (pH <2), Ice to 0°C-6°C	180 days
PCBs	EPA 8082A (EPA 2007b)	(2) 100-mL amber glass non-preserved vials	None	365 days
IDW Samples – Groundwater				
VOCs *(as listed in Table 2-5)*	EPA 8260B (EPA 1996a)	(3) HCl-preserved 40-mL amber glass VOA vial	HCl (pH <2), Ice to 0°C-6°C	14 days

Table 3-2. Analytical Method(s), Container Type(s), Preservation Method(s), and Sample Holding Time(s)

Analyte Group	Analytical Method	Sample Container	Preservative(s)	Holding Time
RCRA 8 metals	EPA 6010B (EPA 1996c)	(1) HNO_3-preserved 250-mL HDPE	HNO_3 (pH <2), Ice to 0°C-6°C	180 days
	EPA 7470A (EPA 1994)			28 days
TPH-GRO	AK 101 (ADEC 2002a)	(3) HCl-preserved 40-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
TPH-DRO and TPH-RRO	AK 102 (ADEC 2002b) and AK 103 (ADEC 2002c)	(1) HCl-preserved 100-mL amber glass vial	HCl (pH <2), Ice to 0°C-6°C	14 days
PAHs *(as listed in Table 2-5)*	EPA 8270C-SIM (EPA 2018)	(2) 40-mL amber glass non-preserved vials per sample	No preservative, Ice to 0°C-6°C	7 Days
Flashpoint/Ignitability	EPA 1010A (EPA 2004)	(1) non-preserved 250-mL glass soil jar	No preservative, Ice to 0°C-6°C	28 days

Notes:

RCRA	=	Resource Conservation and Recovery Act
EPA	=	U.S. Environmental Protection Agency
PAH	=	polycyclic aromatic hydrocarbon
PPM	=	priority pollutant metal
SIM	=	selected ion monitoring
mL	=	milliliter
TPH-GRO	=	total petroleum hydrocarbon as gasoline range organics
TPH-DRO	=	total petroleum hydrocarbon as diesel range organics
TPH-RRO	=	total petroleum hydrocarbons as residual range organics
VOA	=	volatile organic analysis
VOC	=	volatile organic compound

The ERG Team will use QC samples to evaluate data quality. QC samples are controlled samples introduced into the analysis stream and whose results the ERG Team will use to review data quality and evaluate the accuracy, precision, and representativeness of the data. This section describes the purposes of each type of QC sample.

The ERG Team will accomplish field QC checks through the analysis of controlled samples that are introduced to the laboratory from the field. Table 3-3 shows the frequency for each type of field QC sample used for this project and Table 3-2 lists the analytical method(s), container type(s), preservative(s), and holding time(s) applicable to the QC samples for this project.

Table 3-3. Field Quality Control Samples

Quality Control Check	Frequency	Total Number	Quality Assurance Purpose
Trip Blank	1 per shipping container	3* total (for VOCs)	Assesses the potential for in-transit contamination of VOC samples.
Field Duplicate	1:10 samples	2 for soil grab samples (1/analytical method) 1 for composite sediment samples (1/analytical method)	Evaluates sample precision and ensures reliable estimates represented by a relative percent difference.
		1 for temporary monitoring well shallow groundwater samples (1/analytical method) 1 for seep water samples (1/analytical method)	
Site-specific MS/MSD	1:20 samples	1 for grab soil samples (1/analytical method) 1 for composite sediment samples (1/analytical method)	Measures the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question. The MSD documents the precision and the bias of a method in a given sample matrix.
		1 for temporary monitoring well shallow groundwater samples (1/analytical method) 1 for seep water samples (1/analytical method)	

* The ERG Team expects three shipping containers (two for soil and one for groundwater/seep water).

To ensure that analyses of samples collected during the sampling activities are of known and documented quality, the ERG Team will:

- Use laboratories that possess National Environmental Laboratories Accreditation Conference or appropriate state certification, with appropriate capability and QA performance[1];
- Specify turnaround times for the laboratory to process the samples and deliver the data package in the statement of work;
- Use performance criteria for the sampling in this episode as specified in Element A.7 (Section 2.5);
- Specify the analytical methods, which are identified by method number and in Appendix A, that are used in sample analysis (the EPA methods identify the equipment and instrumentation required to conduct the analyses and all SOPs that must be followed in performing the analyses);
- Specify that the laboratory report all method-required QC results, at a minimum, analytical detection limit achieved, trip blank, field blank, duplicates, and recoveries of any method-required spikes;
- Collect and analyze trip, field, and duplicate samples to verify that sampling equipment and environmental conditions have not contaminated the samples (see Table 3-3 for type and frequency);
- Follow procedures identified in the user manuals provided by the equipment manufacturers for each piece of equipment supporting the field analysis; and
- Conduct duplicate analyses or use second analyst confirmation (where applicable) to ensure that the results are reproducible.

A reagent HCl trip blank is prepared by the laboratory in the same manner as the sample vials and must contain surrogated HCl. One trip blank must be included with each shipping container carrying VOC samples and must be stored and analyzed with the field samples.

The field crew will collect an additional equal volume of soil, sediment, groundwater, and seep water from one of the samples following the same techniques listed in subsections 3.1.3.1 through 3.1.3.4 but will place an additional portion of soil, sediment, groundwater, and seep water into another set of sample containers and will mark them as a duplicate sample.

Formulas for calculating QC statistics are provided at the bottom of Table 2-6. The ERG Team discusses QC procedures and corrective actions for exceedances of control limits in Section 4.1. The ERG Team's field crew will ensure that all corrective actions are taken, and the team will convey all information to the Project Manager. The ERG Team will document the review of project deliverables, such as summary analytical data, in an e-mail tracking system.

[1] Section 5 of the ERG QMP (ERG 2019) details ERG's standard procurement procedures for project-related services that meet technical and quality requirements.

Pace will use the required QC procedures for laboratory analyses as described in their standard operating procedures and QA manual (included in Appendix D). The reported laboratory QC will include the types of samples shown in Table 3-4 to assess the project's DQIs (see Table 2-6 of this QAPP). The reported laboratory QC will also include the actual reporting limits, holding times, dilutions, etc. Table 3-5 shows the calculations for the DQIs.

Table 3-4. Laboratory Quality Control Samples

Quality Control Check		Frequency	Total Number	Quality Assurance Purpose
Blanks	Lab method blank	1/analyte group and media type	1 for soil grab samples (1/analytical method) 1 for sediment composite samples (1/analytical method) 1 for temporary monitoring well shallow groundwater samples (1/analytical method) 1 for seep samples (1/analytical method)	Identifies errors or contamination in sample collection, preparation, and analysis.
	Trip blank	1 per shipping container (soil, groundwater, sediment and seep water)	3*	
Spikes	MS or LCS	1:20 samples	1 for grab soil samples (1/analytical method) 1 for composite sediment samples (1/analytical method) 1 for temporary monitoring well shallow groundwater samples (1/analytical method) 1 for seep water samples (1/analytical method)	Evaluates accuracy and precision of the method.
	MSD or LCSD		1 for grab soil samples (1/analytical method) 1 for composite sediment samples (1/analytical method) 1 for temporary monitoring well shallow groundwater samples (1/analytical method) 1 for surface water samples (1/analytical method)	

Table 3-4. Laboratory Quality Control Samples

Quality Control Check	Frequency	Total Number	Quality Assurance Purpose
Surrogates	Method specific requirement	Equal to the total number of analyses per sample requiring surrogates.	Indicates bias and accuracy of monitoring compounds.

*The ERG Team expects four shipping containers (three for soil and one for groundwater/seep water).

Laboratory QC checks are routinely performed as part of the analysis process. The frequency and type of QC samples are often analysis method-dependent and include method blanks, laboratory spikes, and internal laboratory splits. The analyzing laboratory will report any variance from QC limits impacting the quality of sample results and may report details of internal laboratory QC if requested. The analytical laboratory may provide appropriate sample containers, chain-of-custody forms, sample labels, and any necessary custody seals.

A laboratory blank or method blank is a sample of known matrix where the specific constituents requested for analysis are known to be absent or are present at concentrations less than the laboratory minimum limit of detection. The laboratory blank is analyzed to evaluate the accuracy of the analysis.

An LCS is a sample that contains a known concentration of analytes and is analyzed to assess the overall method performance. An LCS undergoes the same preparatory and determinative procedures as the project samples and is the primary indicator of laboratory performance. LCS percent recoveries are used to measure accuracy. Accuracy goals for this project are analyte specific (Appendix C) but are generally ±25%. The RPD for the LCSD is used to measure precision. Precision will be based on field, LCSD, and, if used, a Site-specific MSD, with an RPD goal of 20%. The maximum RPD allowed for this project is 50% for soil field duplicates and 30% for groundwater/seep water field duplicates.

An MS sample has a known amount of the target analyte added to project matrix before analysis to assess possible matrix interferences on the analysis. Percent recoveries on MS samples should be compared to percent recoveries of LCS samples. An MS/MSD pair can be used to assess precision. During the soil, groundwater, and surface water sampling, the field crew will collect an additional equal volume of substrate from the sample location determined in the field. The field crew will follow the same technique as listed in subsections 3.1.3.1 through 3.1.3.4 but will place an additional portion of substrate into another set of sample containers and will notify the laboratory on the chain-of-custody form that the additional volume collected is for use in the MS/MSD analysis.

Surrogates are most commonly used to monitor the performance of organic analyses. Surrogate spikes are added to field samples and QC samples for organic analyses at known amounts, and their recoveries are used to assess matrix effects and, to some extent, verify proper processing and instrument performance for each sample. The analytes used as surrogates mimic the behavior of the target analyte(s) throughout sample preparation and instrument determination. Surrogates are organic compounds that are similar to the target analytes in chemical composition and behavior in the analytical process but are not naturally found (deuterated compounds) in the environmental samples. Surrogates added to LCS samples and blanks are used to assess recovery in a matrix known to be free from interference. This information can be used to determine the magnitude of matrix interference effects on environmental sample results.

Table 3-5. Precision, Accuracy and Completeness Calculation Equations

Characteristic	Formula	Symbols
Precision (as relative percent difference [RPD])	$RPD = \frac{\lvert x_i - x_j \rvert}{\left(\frac{x_i + x_j}{2}\right)} \times 100$	x_i, x_j: replicate values of x
Accuracy (as percent recovery, R, for measurements in which a known measurement in which a known amount of analyte, a spike, is added to an environmental sample)	$R = \frac{x_s - x}{t} \times 100$	x_s: value of spiked sample x: value of unspiked sample t: true or assumed value
Completeness (as a percentage, C)	$C = \frac{n}{N} \times 100$	n: number of valid data points produced N: total number of samples taken excluding QC samples

QC data may be checked/reviewed for quality by the Project Manager or QAO at any time during the project and must be checked after all the data are collected. Corrective actions, as needed, will be documented in the event that control limits are exceeded. Data qualifiers will be assigned following appropriate data verification/validation procedures. Any qualifiers added will be defined in the ESA Report and will be consistent with EPA guidance (EPA 2002a, 2020a, and 2020b).

3.4 Elements B.6 and B.7 Instrument/Equipment Testing, Inspection, Maintenance, and Calibration

Laboratory instrument calibration and maintenance frequency will follow their individual standard operating procedures and certification requirements. Laboratory instrument/equipment testing, inspection, and maintenance are performed and documented by the laboratory. Procedures and schedules for preventive maintenance of sampling equipment are the responsibility of the laboratory. Each instrument or item of laboratory equipment will be maintained periodically to ensure accuracy. These procedures and frequency of performance are designated in the individual instrument manuals (see attached QA Manual for Pace, Appendix D).

Calibrations and maintenance of relevant field instruments will be completed by the ERG Team as required by and in accordance with the equipment user manuals.

All ERG equipment is inspected and calibrated before going into the field and ERG will remove any equipment from service that does not meet calibration requirements or is identified as defective by the Team. As a result, no corrective action is required. To ensure that the Team knows that these devices will work properly when needed, the Team will:

- Read the users manuals and follow any instructions for calibration and testing prior to the investigations;
- Be familiar with the use of all field equipment;
- Ensure that batteries are fully recharged before each day's work;
- Carry extra batteries and photo storage memory units to the Site; and
- Confirm factory calibration with equipment inspection prior to use in the field.

The laboratory will perform instrument calibration consistent with the procedures set forth in the analytical method.

3.5 Element B.8 Inspection/Acceptance of Supplies and Consumables

The ERG Team and Pace will use services and supplies of adequate quality. The ERG Team will select the supplies and consumables used for this project based on manufacturer and laboratory recommendations and/or on the standard of practice for the accomplished service. Pace will maintain a procedure for the purchase, storage, and evaluation of supplies and services, as well as records of inspections, verifications, and supplies as stated in their QA Manual (Appendix D).

Section 5 of the ERG QMP (ERG 2019) details ERG's standard procurement procedures for project-related supplies and consumables, including inspection and acceptance criteria and procedures for tracking, storage, and receiving supplies. The ERG Team is responsible for ensuring all materials meet project requirements.

3.6 Element B.10 Data Management

Figure 3-1 shows the data management flow chart. Data management will follow the *EPA Region 10 Data Management Plan for Environmental Monitoring and Associated Geospatial Data* (EPA 2014).

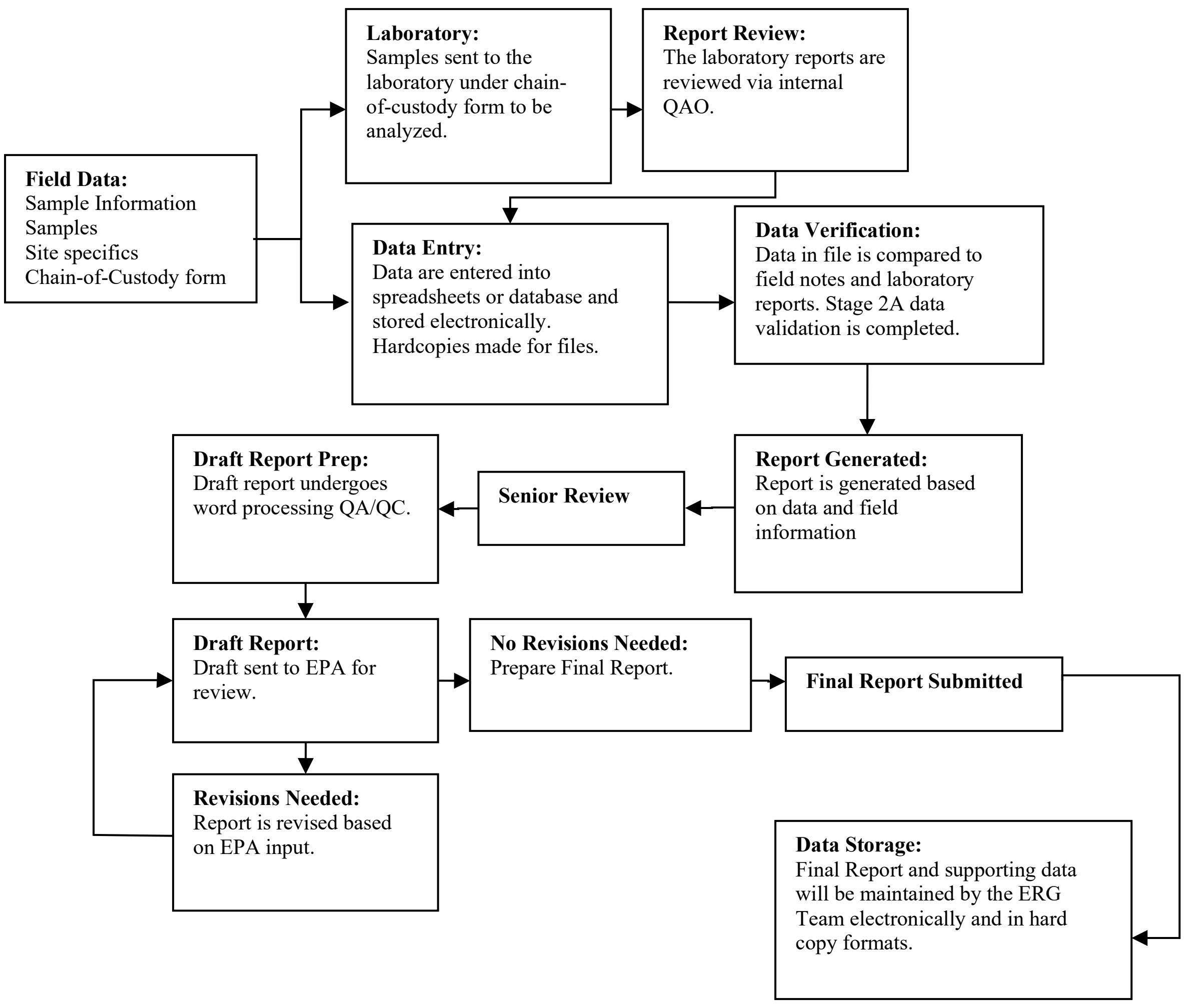


Figure 3-1. Data Management Diagram

The ERG Team's Project Manager, QAO, and supporting staff will review field documents for consistency, completeness, and accuracy. They will return any issues discovered in review to the field crew for clarification or resolution. Staff will review shipping documents prior to final shipping preparations. Original field documents will be stored in the project file for the duration of the project as well as scanned and stored electronically.

The ERG Team will pair data from the laboratory with the previously entered field information in preparation for summary and analysis. The combined field and laboratory data will be reviewed for accuracy and completeness prior to use.

On request, the ERG Team will make available the raw or validated data for third party data transformation. In addition, the ERG Team will maintain all data files in their originally received form and make them available upon request.

ERG's standard controls for project-related data, documents, and records are presented in Section 6 of the ERG QMP (ERG 2019). This also includes standard controls for project-related data, documents, and records claimed as confidential business information. Section 2.7 of this QAPP discusses the document storage and retrieval process as it relates to the ERG-Chantilly network. ERG maintains a backup of all project files stored on the ERG-Chantilly network.

The ERG Team will record data acquired in the field, including sampling locations (with GPS readings), Site and visual information into bound field notebooks. Each team member will sign their notebook and pertinent information from the team member notebooks will be included in the final summary report. The ERG Team will archive field notebooks after the final summary report is finalized for future reference if needed.

The ERG Team will manage digital photographs acquired in the field according to the digital camera guidance provided by EPA (EPA 2006). A team member will download all photographs from the digital camera onto a computer at the end of each day. The team lead will download all photographs to the ERG-Chantilly network when the team lead returns from the field. Since ERG does not use custom hardware or software during the investigation, there are no required procedures for demonstrating acceptability of hardware or software configurations.

4. ASSESSMENT AND OVERSIGHT ELEMENTS

This section describes the methods the ERG Team will use to assess the effectiveness of the sampling activities implemented at the Chevak Riverside Bluff Site and the associated QA and QC activities.

4.1 Element C.1: Assessments and Response Actions

The QAO will assess project compliance with this QAPP by reviewing field documentation and laboratory reports to ensure quality procedures were followed and documented. The ERG Team will perform detailed reviews of analytical data following the procedures documented in this QAPP. If unexpected analytical results are reported for any reason, the ERG Team will contact the laboratories to perform an additional quality review of the data in question. The QAO will provide a written data usability memorandum as described in Section 4.2 and Section 5 to the ERG Team Project Manager; the ERG Team will include this usability memorandum as an appendix to the ESA Report.

Additionally, if the ERG Team Project Manager makes a decision necessary in the field that might deviate from the QAPP as a result of an unforeseen challenge or field limitation, the responses will be documented, and the ERG Team Project Manager will immediately notify the EPA Project Manager.

The ERG Team will subject all work products generated during the sampling activities to technical and QA review. As discussed in ERG's QMP (ERG 2019), technical review is a documented critical review of work that has been performed. The ERG Team will compare the results of our data quality review to the data quality criteria specified in Section 2.5. The ERG Team will provide a comprehensive report for the investigation to EPA. The ERG Team will verify that analytical results, datafiles collected, and monitoring measurements meet the data quality goals, and if not, the ERG Team will document the findings. The technical review will be conducted by a senior scientist proficient in the work area of interest. The reviewer will report information related to this assessment of analytical data quality and any necessary corrective actions to the ERG Project Manager, and the ERG Project Manager will be responsible for conveying this information to the EPA Region 10 QAM. The ERG Project Manager will document the issues identified and all corrective actions taken. The ERG Team will document the review of project deliverables in an email tracking system.

Ms. Lori Weiss will serve as the ERG QAM for this project. She is independent from the data generation for this project and the day-to-day activities. Ms. Weiss has the authority to issue a stop work order at any point during her assessment process. She will use the following tools to assess the implementation of QA/QC procedures on this project:

- Review of the QAPP (this document) for completeness and applicability; and
- Audit of project files to ensure project staff are using appropriate checklists, standard operating procedures, and that the email log documents the deliverable review process.

At any time or at the end of the project or work assignment, she, or her designee, may inspect the project QA files. Periodically, throughout the course of this project, the QAM may assess any subject relevant to QC of the ERG Team work products.

4.2 Element C.2: Reports to Management

The ERG Team will prepare an ESA Report for EPA detailing investigation results. Raw data from the laboratory and a QA/QC memorandum will be included in the ESA Report as appendices. The ERG Team will summarize field and laboratory data from the Site investigation, will include an assessment of investigation data quality in a memorandum, and will submit electronic copies to appropriate EPA personnel.

5. DATA VERIFICATION/VALIDATION AND USABILITY ELEMENTS

This section describes the data validation and usability elements the ERG Team will use to assess the usability of information collected under the Chevak Riverside Bluff Site investigation and sampling activities.

5.1 Element D.1: Data Review

The ERG Team will conduct a data review to ensure that project data have been recorded, transmitted, and processed correctly. This is to ensure that QAPP requirements were met, and that data produced by this project are of acceptable quality to be used for assessment in determining future remedial strategies.

The QAO or designee will compare the precision, accuracy/bias, completeness, and sensitivity for all data collected for this project to the acceptance criteria listed in Section 2.5 and Appendix C. Precision, accuracy/bias, and sensitivity will be evaluated as data are received from the laboratory. Completeness, representativeness, and comparability will be evaluated after all data have been received. Representativeness and comparability will be evaluated by the QAO and verified by the Project Manager.

The data for this project plan will be evaluated using criteria specified in the EPA National Functional Guidelines for Inorganic Superfund Methods Data Review (EPA 2020a) and EPA National Functional Guidelines for Organic Superfund Methods Data Review (EPA 2020b). The laboratory will analyze and report data so the ERG Team can perform a Stage 2A data validation (EPA 2009). The ERG Team will produce a QA/QC memorandum documenting the evaluation of the quality objectives after all data have been received and appropriately validated and will include it as an appendix to the ESA Report.

Data review is an in-house data examination, performed to ensure that data have been calculated, recorded, and transmitted correctly; for example, by checking for transcription and calculation errors. The ERG Team will perform 100 percent check (proofread) for all data transcribed from existing spreadsheets, field notebooks, and laboratory reports to the ERG Team's summary report for the sampling. The ERG Team technical reviewers, or their designees, are responsible for review of the data.

To review reproducibility and other QC checks for calculation errors, the ERG Team will use its standard operating procedures for engineering calculations, spreadsheet calculations, and database manipulations as appropriate for the calculation method used.

5.2 Element D.2: Data Verification and Validation

Data verification methods relate to the process of evaluating the completeness and correctness of the data and conformance of this QAPP. The ERG Team will compare relevant field records with sample containers and labels prior to sample shipment to ensure accurate sample documentation and to verify conformance to the QAPP. If inconsistencies are found, the reviewer will consult the field crew to gather additional information in an attempt to resolve the discrepancy. If the discrepancy either cannot be resolved or is found to be due to deviation from or inability to meet sampling protocol, the reviewer will inform the QAO and Project Manager, as needed, who will determine whether and how to qualify the data.

Parameter data collected are stored in Excel© and reviewed for consistency and adherence to procedures outlined in this QAPP.

Upon data receipt, the ERG Team will verify chain-of-custody forms, sample preservation records, analytical holding times, case narratives, sample data as compared to QC sample data, requested turnaround time, and reporting requirements. The QAO will discuss problems or questions for further resolution and/or documentation with the laboratory if necessary.

A team member will review laboratory quality control checks (provided in the Level II data package), including:

- Chain-of-custody,
- Sample receipt logs and checklists,
- Cover letter/sheet with authorized Project Manager signature,
- Data qualifier definitions and legend;
- Batch QC data summary (laboratory blank, method blank, LCS, Site-specific MS/MSD),
- Field blank contamination,
- Analytical results summary, and
- Case narrative (if needed).

The ERG Team will compare the reported results to requirements of the analytical method(s) and identify any results that do not meet the requirements and are unusable or that should be flagged as "best available," because of quality control deficiencies. All sampling result reports will include these flags.

Data validation is an analyte- and measurement-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the quality of a specific data set.[2] The ERG sampling team will review laboratory data using engineering judgment to verify that the data appear reasonable based on knowledge of the facility's processes and pollutants with the potential to be present in the samples collected. The ERG Team field crew will also identify any sample results where the laboratory indicated a high or low bias based on the limitations of the analysis. Laboratory data validation will be performed according to the Pace and the EPA Laboratory QA plans.

For all sample data provided by Pace, the ERG Team will conduct a stage 2A data validation of all laboratory-supplied data in accordance with the EPA data validation guidance (EPA 2009). The laboratory's technical staff and QAO will review analytical data. The case narrative will identify whether any laboratory QC data are outside the laboratory's QC criteria. Data deliverables will include a memorandum noting a case narrative, analytical results, and

[2] EPA Guidance for Quality Assurance Project Plans EPA QA/G-5 (EPA 2002b).

laboratory QC sample results that will enable a stage 2A level of validation/verification to be performed.

Additionally, the ERG Team will review the sample data and case narratives to evaluate the laboratory and field QC data to determine the data quality and assess data usability relative to the project's DQIs presented in Table 2-5 and Appendix C. This process will provide a basis for meaningful interpretation of the data quality and evaluate the need for corrective actions and/or comprehensive data validation. The ERG Team will document data exceeding QAPP DQIs and will qualify and potentially reject data not meeting precision or accuracy requirements.

If the QAO determines the data do not meet the criteria given in Table 2-6 and Appendix C, the data will be qualified appropriately based on applicable EPA guidance documents (EPA 2002a, 2009, 2020a, and 2020b) and/or the professional opinion of the reviewer; any limitations will be detailed in the QA/QC memorandum.

To evaluate the variability in the lab's results and in the sampled stream, the ERG Team will use the equations listed at the top of Table 3-5 to calculate RPD for each analyte and compare the calculated RPD to control limits.

The ERG Project Manager is responsible for conveying the issue resolution process to the data users and documenting it via email. The issue resolution process has been documented in Section 4, Element C.1 and Element C.2.

5.3 Element D.3: Reconciliation with User Requirements

The ERG Team Project Manager and QAO will perform the data quality assessment to determine if the project data set is of the right type, quality, and quantity to achieve the objectives of the project and can confidently be used to make informed decisions. Information and findings associated with the project data review, verification, and validation efforts shall be considered during the data assessment process.

If the ERG Team Project Manager or QAO decide the project data do not meet the project needs or the QAPP objectives and/or if the conclusions drawn from the data do not appear to be reasonable, the ERG Team will document data limitations in the summary report for the sampling/investigation. The ERG Team will also notify EPA of any results that did not meet the data quality criteria listed in Table 2-6. The ERG Project Manager will convey data quality issues to data users to identify results that did not meet the data quality criteria in Section 2.5. If failure to meet project specifications occurs, the cause of the failure will be evaluated and corrected.

6. REFERENCES

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APPENDIX A–
LABORATORY REPORTING LIMITS,
METHOD DETECTION LIMITS, AND APPLICABLE SCREENING LEVELS

APPENDIX B–
SITE HEALTH AND SAFETY PLAN

APPENDIX C–
LABORATORY QUALITY CONTROL CRITERIA

APPENDIX D–
PACE ANALYTICAL
QUALITY ASSURANCE MANUAL

APPENDIX E–
PACE CHAIN-OF-CUSTODY FORMS

APPENDIX F–
QAPP SCOPING PACKET