Appendix C
Work Plan for Site Unit 9

March 2023
Former Reynolds Metals Reduction Plant – Longview

Work Plan for Site Unit 9

Prepared for
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Project Number: 220002-04.02
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TABLE OF CONTENTS

TABLES

FIGURES

ATTACHMENTS

ABBREVIATIONS

bgs	below ground surface
CAP	*Cleanup Action Plan*
CD	Consent Decree
COC	chain of custody
CVI	Chinook Ventures, Inc.
cy	cubic yard
Ecology	Washington State Department of Ecology
FC	field coordinator
Final EDR	*Final Engineering Design Report, Version 2*
HASP	*Health and Safety Plan*
HDPE	high-density polyethylene
HTM	heat transfer media
JSA	Job Safety Analysis
mg/kg	milligrams per kilogram
PAH	polycyclic aromatic hydrocarbon
QAPP	*Quality Assurance Project Plan for Site Unit 9*
RI/FS	remedial investigation/feasibility study
sf	square foot
SU9	Site Unit 9
TPH	total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
Work Plan	*Work Plan for Site Unit 9*

1 Introduction

This *Work Plan for Site Unit 9* (Work Plan) describes the soil and gravel removal procedures at Site Unit 9 (SU9, also called the former pitch storage area) at the former Reynolds Metals Reduction Plant in Longview, Washington. This Work Plan is an appendix of the *Final Engineering Design Report, Version 2* (Final EDR), prepared in accordance with the cleanup action as specified in the *Cleanup Action Plan* (CAP; Ecology 2018a) pursuant to Consent Decree (CD) No. 18-2-01312-08 (Ecology 2018b). The Washington State Department of Ecology (Ecology) reviewed the Work Plan on August 2, 2022, and provided comments. Additional comments were provided on March 17, 2023. The work specified in this version of the Work Plan addresses those comments.

Northwest Alloys, Inc., is demolishing unused buildings and other site infrastructure in 2022 and 2023. The pitch storage tanks were removed in November 2022. This Work Plan is updated to include the demolition and removal of the tank foundations, structural pile supports, and containment barriers. This demolition presents the opportunity for a removal action in the tank footprint areas as well as in the former containment areas that were inaccessible while the tanks and containment were in place. The soil and gravel removal and sample collection procedures described in this Work Plan will be executed following the demolition.

Performance monitoring soil samples will be collected from the final excavated areas and sent to an analytical laboratory for analysis for off-site disposal, in accordance with Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016). This Work Plan is supported by the *Quality Assurance Project Plan for Site Unit 9* (QAPP; Attachment C-1) and the Job Safety Analysis (JSA) documents in Attachment C-2. The Final EDR *Health and Safety Plan* (HASP; Appendix N of the Final EDR) is the overarching health and safety plan for the cleanup and will also be used for SU9.

1.1 Site Description

The site is located at 4029 Industrial Way near Longview, Washington, in unincorporated Cowlitz County (Figure C-1). The property includes approximately 460 acres. The site is approximately 10 feet above mean sea level and bounded by the Columbia River to the south; Consolidated Diking Improvement District drainage ditches to the north, west, and east; Industrial Way along the northern boundary; and private property to the east.

1.2 Background

Heat transfer media (HTM) oil is a heat transfer fluid similar in composition to mineral oil. It was used as part of an enclosed, recirculating heating system associated with storage tanks for anode and cathode pitch. Pitch is solid at cooler ambient temperatures and must be heated to allow product transfers. During Chinook Ventures, Inc. (CVI), operations at the site (2004 to 2011), a release of HTM oil was discovered within the SU9 containment area between the two easternmost pitch storage

tanks. CVI conducted soil sampling and removed accessible HTM oil-impacted soils from the release area (Anchor QEA 2011).

In addition to the historical release of HTM oil from the tank heating system, isolated surficial pitch deposits were observed to be present near the pitch storage tanks within the SU9 containment. With the demolition of the foundation, structural pile supports, and containment barrier, it should be possible to reach isolated surficial pitch and HTM oil for removal. This Work Plan includes the removal of gravel from the former containment area and soil from the former tank footprints. Some gravel may contain visible solidified pitch; however, all gravel will be managed together. HTM oil-contaminated soil will also be removed in three areas where total petroleum hydrocarbon (TPH) was found during the remedial investigation/feasibility study (RI/FS; Anchor QEA 2015).

1.3 Document Organization

The remainder of this Work Plan is organized into the following sections:

- Section 2 – Project Management and Responsibilities
- Section 3 – Gravel and Soil Removal and Management Procedures
- Section 4 – Performance Sample Collection Procedures
- Section 5 – Field Documentation, Sample Handling Procedures, and Decontamination Procedures
- Section 6 – Analytical Data Use
- Section 7- Health and Safety
- Section 8 – Schedule and Reporting
- Section 9 – References

Attachments to this document include the following:

- Attachment C-1 – Quality Assurance Project Plan for Site Unit 9
- Attachment C-2 – Job Safety Analysis Documents
- Attachment C-3 – Historical Soil Testing Results
- Attachment C-4 - Field Forms and Logs

2 Project Management and Responsibilities

This section describes the project management structure for implementing this Work Plan.

The project manager for Northwest Alloys is Kristin Gaines. All site access and field work will be coordinated in advance with Ms. Gaines. Anchor QEA, LLC, field staff will notify Ms. Gaines or her designee before the beginning of work at the site. All Anchor QEA staff must have Northwest Alloys safety training prior to working on the site.

The project manager for Anchor QEA is Nicole Forsberg. Ms. Forsberg will be responsible for overall project coordination, including production of all project deliverables and administrative coordination to ensure timely and successful completion of the project.

The field coordinator (FC) for Anchor QEA is Ben Uhl. He will provide overall direction for the field effort in terms of logistics and field operations, and he will supervise field collection of samples. Mr. Uhl (or designee under his direction) will be responsible for positioning samples accurately; recording sample locations, depths, and identification; ensuring conformance to sampling and handling requirements, including field decontamination procedures; and completing chain-of-custody (COC) forms.

Sampling and analysis will be completed with equipment owned or contracted by Anchor QEA. Anchor QEA will be responsible for the submittal of environmental samples to the designated laboratory for chemical analyses. The laboratory project manager will provide analytical support and be responsible for providing certified, pre-cleaned sample containers and sample preservatives (as appropriate) and ensuring that all chemical analyses meet the project data quality objectives and other quality specifications of the QAPP (Attachment C-1).

3 Gravel and Soil Removal and Management Procedures

SU9 will be remediated via gravel and soil removal following demolition of the containment barrier, tank foundations, and structural pile supports. Gravel and soil removal and backfilling will be conducted by an excavation contractor. The gravel and soil removal procedures are discussed in Sections 3.1 through 3.3. Gravel and soil will be managed for appropriate off-site disposal, as discussed in Section 3.4.

3.1 Site Preparation and Coordination

Before field work begins at the site, public and private utility locating services and other information sources (such as property-specific plans) will be used to check for underground utilities within the SU9 area. Anchor QEA will coordinate field work with on-site staff to define the locations of possible utilities and piping located in the area. The concrete containment barrier, tank foundations, and structural pile supports will be removed by others.

3.2 Excavation Procedures

Discrete areas of pitch (i.e., drips) are visible on the gravel used to fill the areas surrounding the pitch tanks and former aboveground piping that connected the tanks. For pitch removal, the gravel surface within the former containment area will be removed to the existing soil surface, assumed to be approximately 3 feet. It is estimated that approximately 850 cubic yards (cy) of gravel and/or soil will be removed from the gravel removal area.

As discussed in Section 1.2, there are three areas of TPH. The first is RI/FS location AQ-SSA6-10, near the containment wall, overhead pipe rack, and east pitch tank (see Figure C-2). The sample location had a depth of TPH detected in soil from 1 to 3 feet below ground surface (bgs). This area is part of the gravel removal area.

Deeper excavations will occur in two additional TPH areas, AQ-SSA6-01 and AQ-SSA6-11. Soil will be removed in an approximate 5- by 5-foot area down to 6 feet bgs in the location of AQ-SSA6-11 and in a 5- by 5-foot area down to 8 feet bgs in the vicinity of AQ-SSA6-01, unless groundwater is encountered first. During the RI/FS, TPH was detected between 5 and 6 feet bgs in AQ-SSA6-11 and between 3 and 8 feet bgs in AQ-SSA6-01 (Anchor QEA 2015). See Figure C-2 and Attachment C-3 for the locations and testing results from the historical sample locations. It is estimated that approximately 13 cy of soil will be removed from the two additional TPH areas.

The demolition of the pitch tank foundation, structural piles, and containment barrier will allow for the removal of additional soil. After gravel removal and TPH area removal, the structural piles will be cut off by the demolition contractor to a depth of 5 feet bgs. Soil will be removed to that depth as well, and the ground surface will be sampled to determine if HTM oil is present at depth. It is

estimated that approximately 730 cy of soil will be removed from the former pitch tank foundation areas.

The FC or their designee will generate a daily log (Attachment C-4) that records the areas of excavation.

All removed gravel and soil will be managed in lined and covered roll-off boxes, as discussed in Section 3.4.

3.3 Performance Sampling and Backfill

Following excavation, performance samples will be collected in the gravel removal area, TPH areas, and former tank footprints, as described in Section 4. The performance sampling program will be conducted in accordance with Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016). The collected samples will be compared to the cleanup levels defined in the CAP (Ecology 2018a) and included in Section 6.

Upon collection of required samples, the excavation areas, including the former tank footprints, will be backfilled with general fill and restored for general vehicle use.

3.4 Excavated Soil and Gravel Disposal

Soil and gravel will be characterized and profiled prior to being sent for off-site disposal at an appropriately permitted landfill approved for the waste.

4 Performance Sample Collection Procedures

This section presents the sample locations, sample identification, and sample collection methodology. The intent of these samples is to confirm that the cleanup levels are met. The sample handling requirements are detailed in Section 5.

4.1 Sample Locations

Soil sample locations are proposed in accordance with Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology 2016). Soil samples will be collected from the bottom of the excavation area in the gravel removal area, TPH areas, and former tank footprints. In addition, sidewall samples will be collected from the perimeter of the excavation of the former tank footprints. Ecology's guidance is summarized in Table C-1.

Table C-1
Soil Sample Interval Guidance

Sample Location	Sample Frequency
Bottom of Excavation	1 per 400 sf
Sidewall	1 per 20 feet horizontally

Note:
Source: Ecology 2016

4.1.1 Gravel Removal Area

The gravel removal area is approximately 7,620 square feet (sf). Based on Ecology guidance of 1 sample per 400 sf, 19 samples will be collected from the bottom of the gravel area excavation. See Figure C-3 for approximate sample locations.

4.1.2 TPH Areas

Two of the samples collected within the gravel removal area will be from the two TPH area excavations.

4.1.3 Former Tank Footprints

Soil samples will be collected so that there is at least one sample every 20 feet horizontally along the sidewalls and one sample for every 400 sf of exposed bottom (i.e., each 20-foot by 20-foot bottom area should have at least one soil sample). Soil samples will be collected from the bottom and sidewalls of each former tank footprint excavation. Sidewall samples will be collected from evenly spaced locations around the perimeter of the excavation. The first sample will be collected from the northern wall of the excavation. Additional samples will be collected clockwise from evenly spaced

locations along the perimeter of the excavation. Table C-2 summarizes the proposed sampling in each of the former tank footprints.

Table C-2
Former Tank Footprint Sampling Summary

Former Tank	Approximate Excavation Area (sf)	No. of Samples	Approximate Perimeter (feet)	No. of Sidewall Samples
Tank 01	1,160	3	120	6
Tank 02	1,160	3	120	6
Tank 03	1,160	3	120	6
Tank 04	440	1	76	4

Figure C-4 shows the proposed sampling locations at the bottom of each tank footprint excavation, and Figure C-5 shows the proposed sidewall sampling locations in each of the former tank footprints.

4.2 Sample Identification

Soil sampling locations and identification are presented in Figures C-3 through C-5.

Each soil sample will be assigned a unique alphanumeric identifier according to the following method:

- For soil samples from the bottom of the excavations within the gravel removal area and TPH areas (Figure C-3): Consultant (AQ)-Site Unit (SU9)-Sample Location No.-Date (month/day/year)
  - An example of a soil sample based on this nomenclature is as follows:
    - AQ-SU9-01-120122, indicating that a soil sample was collected from location No. 01 within SU9 on December 1, 2022
- For soil samples from the bottom of the former tank footprint excavations (Figure C-4): Consultant (AQ)-Site Unit (SU9)- Tank No.-Sample Location No.-Date (month/day/year)
  - An example of a soil sample based on this nomenclature is as follows:
    - AQ-SU9-T01-01-120122, indicating that a soil sample was collected from location No. 01 in former tank No. 01 on December 1, 2022
- For each sidewall soil sample (Figure C-5): Consultant (AQ)-Sidewall (SW)-Tank No.-Sidewall Sample No.-Date (month/day/year)
  - An example of a sidewall soil sample based on this nomenclature is as follows:
    - AQ-SW-01-01-120122, indicating that the first sidewall soil sample was collected from former tank No. 01, within SU9 on December 1, 2022

Field duplicates will be identified by adding 100 to the location ID. Sample "AQ-SU9-101-120122" is the field duplicate of sample "AQ-SU9-01-120122," and Sample "AQ-SW-01-101-120122" is the field duplicate of sample "AQ-SW-01-01-120122."

4.3 Soil Collection

Discrete soil samples will be collected using a decontaminated stainless-steel hand trowel or amendable hand-sampling device (e.g., a shovel). Grab samples will be taken from the base of the excavation areas and sidewalls of the former tank excavation areas. If samples cannot be safely collected from these locations, they will be collected from the center of the excavation bucket without contacting the sides of the bucket. If an excavation bucket is used to collect samples, it must be clean of other soil before sampling. Refer to Figures C-3 through C-5 for grab sample locations.

The FC, or their designee, will generate a field log (Attachment C-4) that records each soil sample in accordance with the sampling scheme presented in this Work Plan. Once collected, each soil sample will be placed into a decontaminated stainless-steel bowl, homogenized until a uniform color and texture is achieved, and spooned into laboratory-supplied jars for analysis. Containers will be placed in a cooler with ice and either hand-delivered to the analytical laboratory or the laboratory courier or shipped, no later than the day after collection. If samples are collected on Friday, they may be held until the following Monday for shipment, provided that this does not adversely impact holding time requirements and that the samples are properly refrigerated or stored in a cooler with ice. The COC form will be logged by the FC or designee and relinquished to the courier or directly to the laboratory staff. Otherwise, the COC form will be included in the cooler if samples are shipped to the analytical laboratory. Soil samples will be analyzed for the following:

- Polycyclic aromatic hydrocarbons (PAHs) by U.S. Environmental Protection Agency (USEPA) Method 8270
- Oil-range organics/diesel-range organics by USEPA Method Northwest Total Petroleum Hydrocarbons – Diesel Range

Field documentation and sample handling will be consistent with procedures described in Section 5. Analytical methods, practical quantitation limits, and target detection limits are defined in the QAPP (Attachment C-1).

5 Field Documentation, Sample Handling Procedures, and Decontamination Procedures

This section addresses the sampling program requirements for field documentation, sample handling, and equipment decontamination.

5.1 Field Documentation

A record of soil sampling activities will be maintained on a soil field sample record form. All on-site activities (including health and safety entries) and field observations will be documented on a daily field form. Entries will be made in indelible ink. The daily field form is intended to provide sufficient data and observations to enable readers to reconstruct events that occurred during the sampling period. The field form will include clear information concerning any modifications to the details and procedures identified in this Work Plan. Sample forms are presented in Attachment C-4.

Sampling collection forms will be maintained as samples are collected and will be correlated to the sampling location map. The following information will be included on these forms:

- Sample location number
- Date and time of collection of each sample
- Names of FC and person(s) collecting and logging in the sample
- Observations made during sample collection, including weather conditions, complications, and other details associated with the sampling effort
- Any deviation from this Work Plan

5.2 Sample Custody Procedures

Samples are considered to be in one's custody if any of the following apply: 1) they are in the custodian's possession or view; 2) they are in a secured location (under lock) with restricted access; or 3) they are in a container that is secured with an official seal such that the sample cannot be reached without breaking the seal.

COC procedures will be followed for all samples throughout the collection, handling, and analysis process. The principal document used to track possession and transfer of samples is the COC form. Each sample will be represented on a COC form the day it is collected. All data entries will be made using an indelible ink pen. Corrections will be made by drawing a single line through the error, writing in the correct information, then dating and initialing the change. Blank lines or spaces on the COC form will be lined out, dated, and initialed by the individual maintaining custody.

A COC form will accompany each cooler of samples to the analytical laboratories. Each person who has custody of the samples will sign the COC form and ensure that the samples are not left unattended unless properly secured. Copies of all COC forms will be retained in the project files.

5.3 Sample Shipping and Receipt Requirements

All sample containers will be hand-delivered to the analytical laboratory by the sampler or a courier on a daily basis. Sample containers will be shipped if neither of these options are available. Specific sample transportation procedures are as follows:

- Each cooler or container enclosing the samples for analysis will be transported via courier or hand-delivered by the sampler to the analytical laboratory. Following each delivery by courier, the FC will call the laboratory and verify that the samples were received and are in good condition.
- Coolant ice will be sealed in separate double plastic bags and placed in the sample coolers.
- A temperature blank will be placed in the cooler and sealed in a separate plastic bag.
- Individual sample containers will be placed in a sealable plastic bag, packed to prevent breakage, and transported in a sealed ice chest or other suitable container.
- Glass jars will be separated in the sample coolers by shock-absorbent material (i.e., bubble wrap) to prevent breakage.
- The sample coolers will be clearly labeled with sufficient information (name of project, time and date container was sealed, and person sealing the container with company name) to enable positive identification.
- The courier delivery will be documented on all COC forms accompanying the samples.
- A sealed envelope containing COC forms will be enclosed in a plastic bag and taped to the inside lid of each cooler.
- A minimum of two signed and dated COC seals will be placed on adjacent sides of each cooler prior to transporting.
- Each cooler will be wrapped securely with strapping tape and labeled "Glass – Fragile" and "This End Up." In addition, each cooler will be clearly labeled with the laboratory's address and Anchor QEA's return address.

Upon transfer of sample possession to the analytical laboratory, the persons transferring custody of the sample container will sign the COC form. Upon receipt of samples at the laboratory, the sample container seal will be broken, and the receiver will record the condition of the samples on a sample receipt form. COC forms will be used internally in the laboratory to track sampling handling and final disposition.

5.4 Field Equipment Decontamination

Sample containers, instruments, working surfaces, technician protective gear, and other items that may come into contact with sample material must meet high standards of cleanliness. Equipment and instruments used that are in direct contact with the soil for analysis must be made of glass,

stainless steel, or high-density polyethylene (HDPE). These items will be cleaned prior to each day's use and between sampling or compositing events. The decontamination procedure is as follows:

1. Perform a pre-wash rinse with tap water.
2. Wash with a solution of tap water and Alconox soap (using a brush).
3. Rinse with tap water.
4. Perform the first rinse with distilled water.
5. Rinse three additional times with distilled water.
6. Store in a clean, closed container for next use.

6 Analytical Data Use

6.1 Soil Sample Compared to Cleanup Levels

Performance samples will be compared to the cleanup levels defined in the CAP (Ecology 2018a) in accordance with data analysis procedures described in Washington Administrative Code 173-340-740(7). The soil cleanup level applicable to SU9 is shown in Table C-3.

Table C-3
Soil Cleanup Levels

Contaminant of Potential Concern	Soil Cleanup Level
PAHs[1]	18 mg/kg
TPH	2,000 mg/kg

Note:

1. Cleanup level developed for potential carcinogenic PAHs based on the approved Model Toxics Control Act Toxic Equivalence Factor procedure.

These analysis procedures require the following: 1) no single performance sample concentration will be greater than two times the cleanup level; 2) less than 10% of the sample concentrations will exceed the cleanup level; and 3) the 95% upper confidence limit will be less than the cleanup level. If comparison of performance sample results with cleanup levels does not demonstrate compliance with cleanup levels, additional excavation will be performed, and performance samples will be collected until compliance is demonstrated.

7 Health and Safety

The following section discusses the potential health and safety hazards associated with the field tasks described in this Work Plan. Controls of these hazards are addressed through the mechanical and physical control measures, using personal protective equipment, monitoring, training, decontamination, emergency response, and safety procedures. These health and safety hazards are discussed in the project HASP.

Tasks conducted beyond those identified in the HASP are evaluated through JSAs (Attachment C-2). As with the HASP, JSAs must be reviewed prior to conducting the work.

7.1 Job Safety Analysis

The contents of the JSA documents will be communicated to project staff during the site orientation meeting and during daily safety meetings when conducting work where the specific JSAs are applicable.

JSA documents applicable to this project are in Attachment C-2 and include the following field tasks:

- Field Activities
- Soil and Groundwater Sampling
- Decontamination Activities
- Motor Vehicle Operation
- Excavator Safety
- Excavation Safety
- Sample and Laboratory Glassware Handling

8 Schedule and Reporting

Consistent with the scope of work in Exhibit C to the CD (Ecology 2018b), the SU9 cleanup may be implemented following Ecology approval of the Final EDR to the extent that such construction does not require federal permits to be obtained. No federal permits are required for the gravel and soil removal at SU9. A summary of the SU9 removal activities will be included in a Completion Report upon completion of the full cleanup.

9 References

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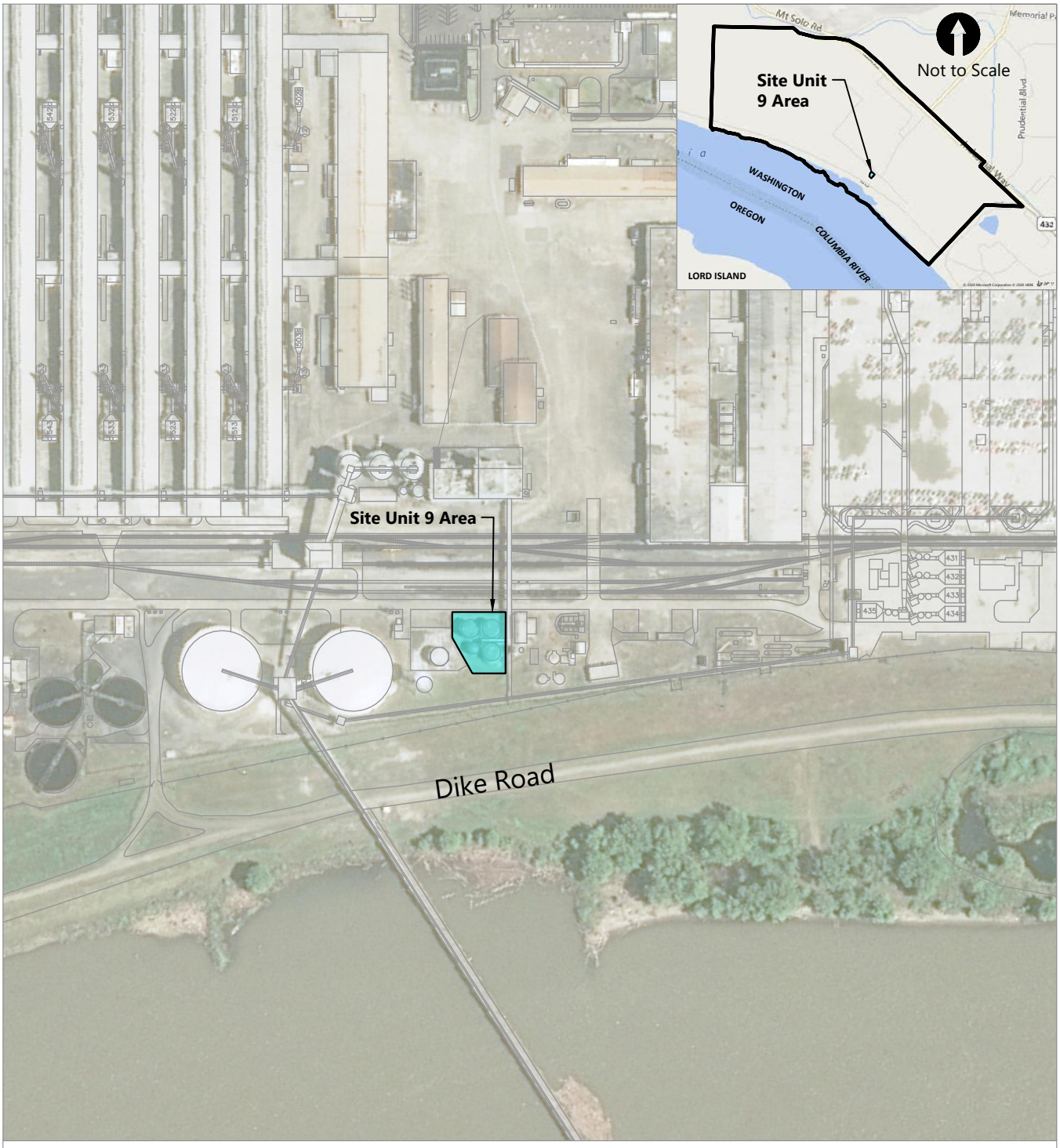
Ecology, 2018a. *Cleanup Action Plan*. Final. Former Reynolds Metals Reduction Plant – Longview. October 2018.

Ecology, 2018b. Consent Decree No. 18-2-01312-08. Former Reynolds Metals Reduction Plant – Longview. December 14, 2018.

Figures



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Feet

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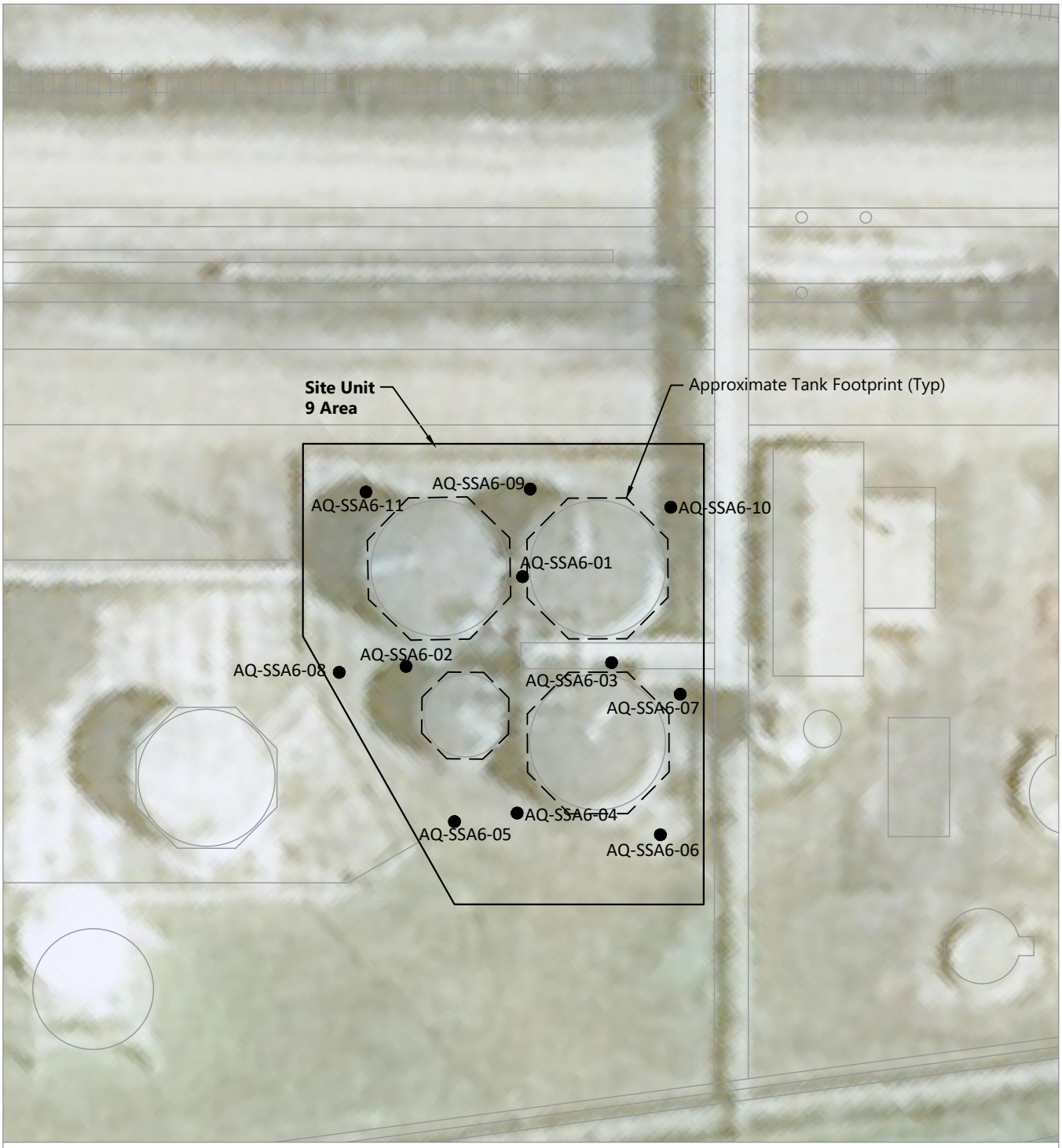
Filepath: K:\Projects\0730-MBT-Longview\0730-RP-057 (Location Map-SU9).dwg Figure C-1

ANCHOR QEA

Figure C-1
Site Unit 9 Location

Work Plan for Site Unit 9
Former Reynolds Metals Reduction Plant – Longview



SOURCE: Aerial from Bing Maps
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LEGEND:

● Historical Soil Sample Location

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Feet

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ANCHOR QEA

Figure C-2
Site Unit 9 Historical Soil Sample Locations

Work Plan for Site Unit 9
Former Reynolds Metals Reduction Plant – Longview

SOURCE: Aerial from Bing Maps
HORIZONTAL DATUM: Washington State Plane South Zone, North American Datum of 1983 (NAD83), U.S. Survey Feet

LEGEND:

- Proposed Soil Sample Location
- Approximate TPH Excavation Area
- Approximate 3-ft Gravel Removal Area

0 40
Feet

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Filepath: K:\Projects\0730-MBT-Longview\0730-RP-058 (Soil Samples-SU9).dwg Figure C-3

ANCHOR QEA

Figure C-3
Gravel Removal Area and TPH Areas – Proposed Soil Sample Locations

Work Plan for Site Unit 9
Former Reynolds Metals Reduction Plant – Longview

SOURCE: Aerial from Bing Maps
HORIZONTAL DATUM: Washington State Plane South Zone, North American Datum of 1983 (NAD83), U.S. Survey Feet

LEGEND:

- Proposed Soil Sample Location
- Approximate Former Tank Footprint Excavation Area

0 40
Feet

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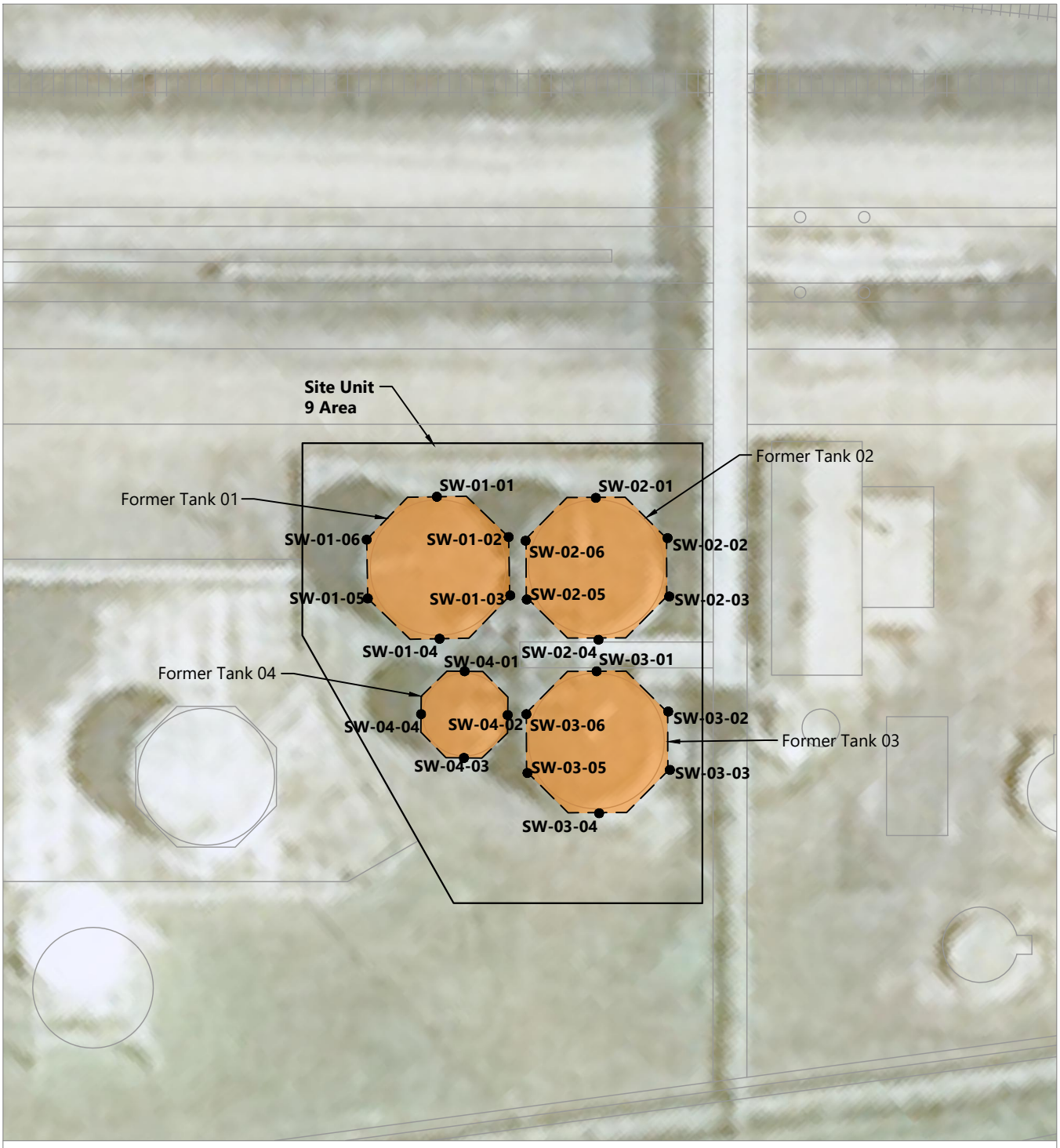
Figure C-4
Former Tank Footprint Area – Proposed Soil Sample Locations

Work Plan for Site Unit 9
Former Reynolds Metals Reduction Plant – Longview



SOURCE: Aerial from Bing Maps
HORIZONTAL DATUM: Washington State Plane South Zone, North American Datum of 1983 (NAD83), U.S. Survey Feet

LEGEND:

- Proposed Sidewall Soil Sample Location
- Approximate Former Tank Footprint Excavation Area

0 40
Feet

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Figure C-5
Former Tank Footprint Area – Proposed Sidewall Soil Sample Locations

Work Plan for Site Unit 9
Former Reynolds Metals Reduction Plant – Longview

Attachment C-1
Quality Assurance Project Plan for Site Unit 9

March 2023
Former Reynolds Metals Reduction Plant – Longview

Quality Assurance Project Plan for Site Unit 9

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TABLE OF CONTENTS

TABLES

ABBREVIATIONS

µg/kg	micrograms per kilogram
Apex	Apex Laboratories LLC
ASTM	ASTM International
CCV	continuing calibration verification
COC	chain of custody
cPAH	carcinogenic polycyclic aromatic hydrocarbons
DQO	data quality objective
Ecology	Washington State Department of Ecology
FC	field coordinator
LCS	laboratory control sample
MD	matrix duplicate
MDL	method detection limit
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
NA	not applicable
NIST	National Institute of Standards and Technology
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons – Diesel Range
OSHA	Occupational Safety and Health Act
oz	Ounce
PAH	polycyclic aromatic hydrocarbon
QA	quality assurance
QAPP	*Quality Assurance Project Plan*
QC	quality control
R	Recovery
RL	reporting limit
RPD	relative percent difference
SOP	standard operating procedure
SRM	standard reference material
SU11	Site Unit 11
TPH	total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency
WAC	Washington Administrative Code
WP for SU9	*Work Plan for Site Unit 9*

1 Introduction

This Quality Assurance Project Plan (QAPP) establishes the quality assurance (QA) objectives for conducting sampling activities at Site Unit 9 (SU9, also called the former pitch storage area) at the former Reynolds Metals Reduction Plant in Longview, Washington. The analytical methods and QA procedures described herein will be followed by Anchor QEA, LLC, and its contractors during sample collection activities described in the *Work Plan for Site Unit 9* (WP for SU9). This QAPP is Attachment C-1 of the WP for SU9.

The goal of this QAPP is to ensure that data of sufficiently high quality are generated to support the project data quality objectives (DQOs). This QAPP will address project management responsibilities, sampling and analytical procedures, assessment and oversight, and data reduction, validation, and reporting.

1.1 Document Organization

This QAPP was prepared in accordance with the Washington State Department of Ecology (Ecology) *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* (Ecology 2016) and the U.S. Environmental Protection Agency (USEPA) *Guidance for Quality Assurance Project Plans* (USEPA 2002). Additionally, the contract laboratory is an accredited laboratory under Ecology's Washington Administrative Code (WAC) 173-50, which requires laboratory QA manuals that contain laboratory standard operating procedures (SOPs) for analytical methods, data reduction, and equipment maintenance that are maintained and subject to approval through the laboratory accreditation program. Standard industry practices to establish laboratory measurements and assessment of data quality that meet project requirements have also been included to form a robust QAPP. These documents specify four groups of information that must be included in a QAPP: 1) Project Management; 2) Data Generation and Acquisition; 3) Assessment and Oversight; and 4) Data Validation and Usability. Each group is composed of several QAPP elements. Although the guidance documents provide a suggested outline for the QAPP elements, the guidance also indicates that certain elements may not be applicable to a given project and that the elements need not be presented in the order presented in the guidance.

The remainder of this QAPP is organized into the following sections:

- Section 2: Project Management
- Section 3: Data Quality Objectives and Criteria
- Section 4: Documentation and Records
- Section 5: Analytical Methods
- Section 6: Quality Assurance and Quality Control
- Section 7: Assessments and Response Actions

- Section 8: Data Validation, Usability, and Reporting
- Section 9: References

2 Project Management

This section describes the project management structure and key project personnel.

2.1 Project Organization

Responsibilities of the team members, as well as the laboratory project manager, are described in the following sections.

2.1.1 Project Managers

The project manager for Alcoa is Kristin Gaines. All site access and field work will be coordinated in advance with Ms. Gaines or her designee. Anchor QEA field personnel will notify Ms. Gaines or her designee before beginning work at the site. Upon arrival, each worker will register at the guard's office. All Anchor QEA staff must have Alcoa safety training prior to working on the site.

The project manager for Anchor QEA is Nicole Forsberg. Ms. Forsberg will be responsible for overall project coordination, including production of project deliverables. Ms. Forsberg will be involved in all aspects of this project, including discussion, review, approval, and implementation of the WP for SU9 and interpretation of analytical results.

2.1.2 Field Coordinator

Ben Uhl of Anchor QEA (or his designee) will serve as the field coordinator (FC) and provide direction to the field sampling team regarding logistics, personnel assignments, and field operations. Mr. Uhl will supervise the field collection of samples and will be responsible for ensuring the following:

- Accurate positioning and recording of sample locations and identification
- Conformity to sampling and handling requirements, including field decontamination procedures
- Coordinate delivery of the samples to the laboratory

Mr. Uhl will ensure that the samples are stored under proper conditions while in custody until delivery to the laboratory. He will be responsible for summarizing field sampling activities, including details of the sampling effort, sample preparation, sample storage and transport procedures, field QA, and documentation of deviations from this QAPP.

2.1.3 Quality Assurance/Quality Control Manager

Delaney Peterson will serve as the Anchor QEA QA/quality control (QC) manager. She will provide QA oversight for the laboratory program, coordinate with the analytical laboratory, verify data quality, oversee data validation, and supervise project QA coordination. Ms. Peterson will also perform internal data review and validation. She will be responsible for reviewing the data in accordance with

this QAPP along with *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020a) and *National Functional Guidelines for Organic Superfund Methods Data Review* (USEPA 2020b) to ensure all data verification and data validation criteria are met.

2.1.4 Laboratory Project Manager

Darwin Thomas is the Apex Laboratories LLC (Apex) project manager. He will provide analytical support and will be responsible for ensuring that all laboratory analyses meet the project DQOs and other specifications required by the QAPP and Ecology guidelines. Apex is an accredited laboratory with Ecology in accordance with WAC 173-50. Contact information for Apex is as follows:

Apex Laboratories LLC
6700 SW Sandburg Street
Tigard, Oregon 97223
(503) 718-2323

2.2 Special Training Requirements/Certifications

For sample collection tasks, it is important that field crews are trained in standardized data collection requirements so that data are collected consistently among field crews. Field crews will comprise individuals who are fully trained in the collection and processing of soil samples, decontamination protocols, and chain-of-custody (COC) procedures.

In addition, the 29 Code of Federal Regulations Part 1910 Subpart 120 Occupational Safety and Health Act (OSHA) regulations require training to provide employees with the knowledge and skills enabling them to perform their jobs safely and with minimum risk to their personal health. All field personnel will have completed the 40-hour HAZWOPER training course and 8-hour refresher courses as necessary to meet OSHA regulations.

3 Data Quality Objectives and Criteria

The DQOs for this project will ensure that data collected are of known and acceptable quality so that the project objectives described in this QAPP are achieved. The quality of laboratory data is assessed by precision, accuracy, representativeness, comparability, completeness, and sensitivity (the "PARCCS" parameters). Definitions of these parameters and the applicable QC procedures are described in the following subsections. Applicable objectives for these data quality parameters are listed or referenced in Table C1-1.

Table C1-1
Data Quality Objectives for Analytical Data

Parameter	Replicate and MS/MSD Precision	LCS and MS/MSD Accuracy	Completeness
cPAHs	± 35% RPD	50%–150% R	95%
Diesel, motor, and mineral oil-range organics	± 35% RPD	50%–150% R	95%

3.1 Precision

Precision is the ability of an analytical method or instrument to reproduce its own measurement. It is a measure of the variability, or random error, in sampling, sample handling, and laboratory analyses. ASTM International (ASTM) recognizes the following two levels of precision (ASTM 2002):

1. **Repeatability:** The random error associated with measurements made by a single test operator on identical aliquots of test material in a given laboratory with the same apparatus under constant operating conditions
2. **Reproducibility:** The random error associated with measurements made by different test operators in different laboratories using the same method but different equipment to analyze identical samples of test material

In the laboratory, "within-batch" precision is measured using duplicate samples or QC analyses and is expressed as the relative percent difference (RPD) between the measurements. The "batch-to-batch" precision is determined from the variance observed in the analyses of standard solutions or laboratory control samples (LCSs) from multiple analytical batches.

Laboratory precision control limits are listed in Table C1-1 for each analysis. The RPD equation used to express precision is shown in Equation C1-1.

Equation C1-1

$$RPD = \frac{(C_1 - C_2)x\ 100\%}{(C_1 + C_2)/2}$$

where:

RPD	=	relative percent difference
C_1	=	larger of the two observed values
C_2	=	smaller of the two observed values

Precision measurements can be affected by the nearness of a chemical concentration to the reporting limit (RL), where the percent error (expressed as RPD) increases. Parent and/or duplicate results that are less than five times the RL will be evaluated by using the difference between the results using a control limit of plus or minus two times the RL.

3.2 Accuracy

Accuracy is a measure of the closeness of an individual measurement (or an average of multiple measurements) to the true or expected value. Accuracy is determined by calculating the value of results from analyses of LCSs, standard reference materials (SRMs), and standard solutions. In addition, matrix spike (MS) samples are also measured, which indicate the accuracy or bias in the actual sample matrix. Accuracy is expressed as percent recovery of the measured value, relative to the true or expected value. If a measurement process produces results that are not the true or expected values, the process is said to be biased. Bias is the systematic error either inherent in a method of analysis (e.g., extraction efficiencies) or caused by an artifact of the measurement system (e.g., contamination). Analytical laboratories use several QC measures to eliminate analytical bias, including systematic analysis of method blanks, LCSs, and independent calibration verification standards. Because bias can be positive or negative, and because several types of bias can occur simultaneously, only the net, or total, bias can be evaluated in a measurement.

Laboratory accuracy will be evaluated using quantitative LCSs, MS, and SRM recoveries compared with method-specified performance criteria or criteria listed in Table C1-1. Accuracy can be expressed as a concentration compared to the true or reference value or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is shown in Equation C1-2.

Equation C1-2

$\%R = 100\%\ x\ (S - U)/Csa$

where:

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

Field accuracy will be controlled by adhering to sample collection procedures outlined in the WP for SU9.

3.3 Representativeness

Representativeness expresses the degree to which data accurately and precisely represent an environmental condition. Sample collection and handling procedures described in the WP for SU9 will be followed to ensure samples represent field conditions.

3.4 Comparability

Comparability expresses the confidence with which one dataset can be evaluated in relation to another dataset. For this program, comparability of data will be established by using standard analytical methodologies and reporting formats and through common traceable calibration standards and reference materials.

3.5 Completeness

Completeness is a measure of the amount of data determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{(Number\ of\ acceptable\ data\ points)x\ 100}{Total\ number\ of\ data\ points}$$

The DQO for completeness for all components of this project is 95%. Data qualified as estimated because QC criteria are not met will be considered valid for the purposes of assessing completeness. Data that are rejected will not be considered valid for the purposes of assessing completeness.

3.6 Sensitivity

Sensitivity is a measure of analytical detection and RLs. In general, the lowest method detection limits (MDLs) and RLs achievable by the specified method will be targeted for this project.

The MDL is defined as the minimum concentration at which a given target analyte can be measured and reported with 99% confidence that the analyte concentration is distinguishable from laboratory blanks. Laboratory RLs are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. Laboratory MDLs and RLs will be used to evaluate the method sensitivity and applicability prior to the acceptance of a method for this program. Method blanks will be analyzed to ensure target analytes are not introduced during sample preparation or analysis that would affect the analytical sensitivities.

The sample-specific MDLs and RLs will be reported by the laboratory and will account for any factors relating to the sample analysis that might decrease or increase these limits (e.g., dilution factor, percent moisture, or analytical mass/volume). If MDLs and RLs are elevated due to matrix interferences and subsequent dilutions or reductions in sample aliquots, then data will be evaluated by Anchor QEA and the laboratory to determine if an alternative course of action is required or possible. The sample-specific MDLs and RLs will be the values provided in the data transmittal from the laboratory.

4 Documentation and Records

This project will require central project files to be maintained at Anchor QEA. Project records will be stored and maintained in a secure manner. Each project team member is responsible for filing all necessary project information or providing it to the person responsible for the filing system. Individual team members may maintain files for individual tasks but must provide such files to the central project files upon completion of each task. Hard copy documents will be kept on file at Anchor QEA or at a document storage facility throughout the duration of the project, and all electronic data will be maintained in a database or in a designated directory at Anchor QEA. Field documentation procedures are described in the WP for SU9.

4.1 Analytical Records

The laboratory will retain analytical data records. Additionally, Anchor QEA will retain a copy of analytical data in the central project files. Data reporting requirements will include those items necessary to complete data validation. Elements to be reported in the laboratory data packages are listed in Section 6.3.6.

All instrument data will be fully restorable at the laboratory from electronic backup. The laboratory will be required to maintain records relevant to project sample analyses for a minimum of 5 years. Data validation reports will be maintained in the central project files with the analytical data reports.

4.2 Data Reduction

Data reduction is the process by which original data (analytical measurements) are converted or reduced to a specified format or unit to facilitate analysis of data. Data reduction requires that all aspects of sample preparation that could affect the test result (such as sample mass or volume analyzed, sample moisture content, and dilutions required) be considered in the final result. It is the laboratory analyst's responsibility to reduce data, which are subject to further review by the laboratory project manager, Anchor QEA project manager, QA/QC manager, and independent reviewers. Data reduction may be performed manually or electronically.

5 Analytical Methods

This section summarizes the target chemical methods that will be used for the samples collected. Sample analyses will be conducted in accordance with USEPA-approved methods, other commonly acceptable methods, or as described in the approved laboratory SOPs and this QAPP. Prior to analyses, all samples will be maintained according to the appropriate holding times and temperatures for each analysis as listed in Table C1-2. Analytes, analytical methods, and target detection limits for chemical testing are presented in Table C1-3. The laboratory will prepare reports in accordance with this QAPP.

Table C1-2
Guidelines for Sample Handling and Storage

Parameter	Sample Size	Container Size and Type[1]	Holding Time	Preservative
cPAHs; diesel, motor, and mineral oil-range organics	60 grams	8-oz glass	14 days until extraction	Cool <4°C
			1 year until extraction	Freeze -18°C
			40 days after extraction	Cool <4°C

Note:

1. Container size may vary based on laboratory preference and supply.

Table C1-3
Parameters for Analysis, Methods, and Target Quantitation Limits

Parameter	Analytical Method	Laboratory RL[1,2]
PAHs (µg/kg dry weight)		
Benz(a)anthracene	8270E	4.00
Benzo(a)pyrene	8270E	4.00
Benzo(b)fluoranthene	8270E	4.00
Benzo(k)fluoranthene	8270E	4.00
Chrysene	8270E	4.00
Dibenzo(a,h)anthracene	8270E	4.00
Indeno(1,2,3-cd)pyrene	8270	4.00
Total cPAHs	Calculated	--
TPH (mg/kg dry weight)		
Diesel range	NWTPH-Dx	20
Motor oil range	NWTPH-Dx	40
Heavy oil range	NWTPH-Dx	40

Notes:

--: not applicable

1. Actual laboratory RLs may vary based on sample aliquot size, moisture content, and required dilution factor. All detected results will be reported between the MDL and the RL as estimated.
2. Total cPAH is a calculated value; therefore, there is no RL.

Prior to the analyses of the samples, the laboratory will calculate MDLs and establish RLs for each analyte of interest, where applicable. RLs will be at or below the values specified in Table C1-3, if technically feasible.

Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) will be calculated by summing the results of the individual PAH compounds listed in Table C1-3. For results reported by the laboratory as below the RL (i.e., "U" qualified), zero will be used as the result value for that sample result in the calculation of totals.

Chemical preparation and testing will be conducted at Apex. All chemical testing will adhere to the most recent USEPA QA/QC procedures outlined in the approved analytical methods, the laboratory SOPs, and this QAPP. If more current analytical methods are available, the laboratory may use them.

In completing chemical analyses for this project, the laboratory subcontractors are expected to meet the following minimum requirements:

- Adhere to the methods outlined in this QAPP, including methods referenced for each analytical procedure (Table C1-3).
- Deliver electronic data as specified.
- Meet reporting requirements for deliverables.
- Meet turnaround times for deliverables.
- Implement QA/QC procedures discussed in this QAPP, including following DQOs, laboratory QC requirements, and performance evaluation testing requirements.
- Notify the project QA/QC manager of any QAPP QA/QC problems when they are identified to allow for quick resolution.
- Allow laboratory and data audits to be performed, if deemed necessary.

6 Quality Assurance and Quality Control

Field and laboratory activities will be conducted in such a manner that the results meet specified quality objectives and are fully defensible. Guidance for QA/QC is derived from the protocols developed for *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods* (USEPA 1986), *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020a), the laboratory SOPs, and the cited analytical methods.

6.1 Field Quality Control

Field team staff will identify and label samples in a consistent manner to ensure that field samples are traceable. Labels should be used in conjunction with the COC form, the WP for SU9, and this QAPP to provide all information necessary for the laboratory to conduct required analyses properly. QC samples will be collected in the field to ensure project DQOs are met. Samples will be placed in appropriate containers and preserved for shipment to the laboratory in accordance with the requirements presented in Table C1-2.

6.2 Field Quality Assurance Sampling

Field QA procedures will consist of the following procedures for acceptable practices for sample collection and handling, as well as periodic and routine equipment inspection:

- Field QC samples will include the collection of field duplicates at a frequency of one per sampling event or 1 per 20 samples collected, whichever is more frequent. Field QC will also include the collection of additional sample mass or volume as required to ensure that the laboratory has sufficient sample mass or volume to run the matrix-specified analytical QA/QC (matrix duplicate [MD]/MS) samples for analyses, as specified in Table C1-4. Additional mass/volume to meet this requirement will be collected at a frequency of one per matrix per sampling event or one per matrix per 20 samples collected, whichever is more frequent. The samples designated for MD/MS analyses should be clearly marked on the COC form.
- All field QC samples will be documented on the field forms and verified by the QA/QC manager.

Table C1-4
Laboratory Quality Assurance/Quality Control Criteria

Analysis Type	Field QC	Laboratory Quality Control Elements						
	Field Duplicate	Initial Calibration	Ongoing Calibration	MSs	LCS or SRM[2]	MDs/MSDs	Method Blanks	Surrogate Spikes
cPAHs	1 per 20 samples	As needed[1]	Every 12 hours	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample
TPH	1 per 20 samples	As needed[1]	Every 10 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	1 per 20 samples	Every sample

Notes:
--: not applicable

1. Initial calibrations are considered valid until the ongoing continuing calibration no longer meets method specifications. At that point, a new initial calibration is performed.
2. When SRM is available, it may be used in lieu of an LCS.

6.2.1 Sample Containers

Sample containers and preservatives will be provided by the laboratory. The laboratory will maintain documentation certifying the cleanliness of bottles and the purity of preservatives provided. Container requirements are listed in Table C1-2.

6.2.2 Sample Identification and Labels

Each sample will have an adhesive plastic or waterproof paper label affixed to the container and will be labeled at the time of collection. The following information will be recorded on the container label at the time of collection:

- Project name
- Sample identification
- Date and time of sample collection
- Preservative type (if applicable)
- Analysis to be performed

6.3 Laboratory Quality Control

Laboratory QC procedures, where applicable, include initial and continuing instrument calibrations, SRMs, LCSs, matrix replicates, MS samples, and method blanks. A summary of the DQOs is provided in Table C1-1. QA/QC sample analytical frequencies are provided in Table C1-4.

The analyst will review the results of the QC samples from each sample group immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine if control limits have been exceeded. If control limits are exceeded in the sample group, the QA/QC manager will be contacted immediately, and corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

6.3.1 Laboratory Instrument Calibration and Frequency

An initial calibration will be performed on each laboratory instrument to be used prior to the start of the project, after each major interruption to the analytical instrument, and when any ongoing calibration does not meet method control criteria. An initial calibration verification will be analyzed following each initial calibration and will meet method criteria prior to analyses of samples. Continuing calibration verifications (CCVs) will be analyzed at method-required frequencies to track instrument performance. CCVs will be analyzed at a frequency of once for every 10 field samples analyzed and at the end of each run. If the continuing calibration is out of control, the analysis will be terminated until the source of the control failure is eliminated or reduced to meet control

specifications, which may include analyzing a new initial calibration. Any project samples analyzed while the instrument calibration was out of control will be reanalyzed.

Instrument blanks or continuing calibration blanks provide information on the stability of the baseline established. Continuing calibration blanks will be analyzed immediately prior to or immediately following CCV at the instrument for each type of applicable analysis.

6.3.2 Laboratory Duplicates/Replicates

Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates and replicates are subsamples of the original sample that are prepared and analyzed as separate samples.

6.3.3 Matrix Spikes

Analyses of MS samples provide information on the extraction efficiency of the method on the sample matrix, as well as any interferences introduced by the sample matrix.

6.3.4 Method Blanks

Method blanks are prepared and analyzed in the same manner as project samples to assess possible laboratory contamination at all stages of sample preparation and analysis. The method blank for all analyses must be less than the method RL of any single target analyte. If a laboratory method blank exceeds this criterion for any analyte and the concentration of the analyte in any of the samples is less than five times the concentration found in the blank, analyses must stop, and the source of contamination must be eliminated or reduced. Affected samples should be prepared and analyzed again, if possible.

6.3.5 Laboratory Control Samples

LCSs are analyzed to assess possible laboratory bias at all stages of sample preparation and analysis. The LCS is a matrix-dependent spiked sample prepared at the time of sample extraction, along with the preparation of the sample, MD, MS, and method blank. The LCS will provide information on the accuracy of the analytical process and, when analyzed in duplicate, will provide precision information as well.

6.3.6 Laboratory Deliverables

Data packages will be checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/QC information requested are present. The analytical laboratory will be required, where applicable, to report the following:

- **Project Narrative.** This summary, in the form of a cover letter, will include a discussion of any problems encountered during analyses. This summary should include (but not be limited to)

QA/QC, sample receipt, sample storage, and analytical difficulties. Any problems encountered and their resolutions will be documented in as much detail as appropriate.

- **COC Forms.** Legible copies of the COC forms will be provided as part of the data package. This documentation will include the time of receipt and condition of the samples received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented on a sample receipt form. The form must include sample shipping container temperatures measured at the time of sample receipt.
- **Sample Results.** The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
  - Field sample identification code and the corresponding laboratory identification code
  - Sample matrix
  - Date of sample preparation/extraction
  - Date and time of analysis
  - Mass or volume used for preparation and analysis
  - Final dilution or concentration factors for the sample
  - Identification of the instrument used for analysis
  - MDLs and method RLs accounting for sample-specific factors (e.g., dilution and total solids)
  - Analytical results with reporting units identified
  - Data qualifiers and their definitions
- **QA/QC Summaries.** This section will contain the results of the laboratory QA/QC procedures. Each QA/QC sample analysis will be documented with the same information required for the sample results. No recovery or blank corrections will be made by the laboratory. The required summaries are as follows (additional information may be requested):
  - **Method Blank Analysis.** The method blank analysis associated with each sample and the concentration of all target analytes identified in these blanks will be reported.
  - **MS Recovery.** MS recovery data for all applicable analyses will be reported. The names and concentrations of analytes added, percent recoveries, and range of acceptable recoveries will be listed. The percent recoveries and RPD values for MS duplicate (MSD) analyses will be reported.
  - **Matrix Duplicates.** The RPD values for MD analyses will be reported.
  - **Laboratory Control Sample.** LCS recovery data will be reported. The names and concentrations of analytes added, percent recoveries, and range of acceptable recoveries will be included. The percent recoveries and RPD values for LCS duplicate analyses will be included.
- **Electronic Data Deliverable.** An electronic data deliverable in the Anchor QEA custom EQuIS format specified in advance will be prepared and submitted.

6.4 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

This section describes procedures for testing, inspection, and maintenance of field and laboratory equipment.

6.4.1 Field Instruments/Equipment

In accordance with the QA program, Anchor QEA will maintain an inventory of field instruments and equipment. The frequency and types of maintenance will be based on the manufacturer's recommendations and previous experience with the equipment.

The FC will be responsible for the preparation, documentation, and implementation of the preventative maintenance program. The equipment maintenance information will be documented in the instrument's calibration log. The frequency of maintenance is dependent on the type and stability of the equipment, the methods used, the intended use of the equipment, and the recommendations of the manufacturer. Detailed information regarding the calibration and frequency of equipment calibration is provided in each specific manufacturer's instruction manual.

All maintenance records will be verified prior to each sampling event. The FC will be responsible for verifying that required maintenance has been performed prior to using the equipment in the field. Any problems will be noted in the field log book and corrected prior to continuing sampling operations.

6.4.2 Laboratory Instruments/Equipment

In accordance with the QA program, the laboratory will maintain an inventory of instruments and equipment, and the frequency of maintenance will be based on the manufacturer's recommendations and/or previous experience with the equipment.

The laboratory preventative maintenance program, as detailed in the laboratory's QA plan, is organized to maintain proper instrument and equipment performance and to prevent instrument and equipment failure during use. The program considers instrumentation, equipment, and parts that are subject to wear, deterioration, or other changes in operational characteristics; the availability of spare parts; and the frequency at which maintenance is required. Any equipment that has given suspect results or been overloaded, mishandled, or determined to be defective will be taken out of service, tagged with the discrepancy noted, and stored in a designated area until the equipment has been repaired. After repair, the equipment will be tested to ensure that it is in proper operational condition. The client will be promptly notified in writing if defective equipment casts doubt on the validity of analytical data. The client will also be notified immediately regarding any delays due to instrument malfunctions that could impact holding or turnaround times.

The laboratory will be responsible for the preparation, documentation, and implementation of the preventative maintenance program. Maintenance records will be checked according to the schedule on an annual basis and recorded by laboratory personnel. The laboratory project manager or designees will be responsible for verifying compliance.

6.4.2.1 Laboratory Instrument/Equipment Calibration

As part of their QC programs, laboratories perform two types of calibrations. A periodic calibration is performed at prescribed intervals (e.g., balances, drying ovens, refrigerators, and thermometers), and operational calibrations are performed daily at a specified frequency or prior to analysis (i.e., initial calibrations) according to method requirements. Calibration procedures and frequency are discussed in the laboratory's QA plan. Calibrations are discussed in the laboratory SOPs for analyses.

The laboratory QA/QC manager will be responsible for ensuring that the laboratory instrumentation is calibrated in accordance with applicable specifications. Implementation of the calibration program will be the responsibility of the respective laboratory group supervisors. Recognized procedures (USEPA, ASTM, or manufacturer's instructions) will be used when available.

Physical standards (i.e., weights or certified thermometers) will be traceable to nationally recognized standards, such as those of the National Institute of Standards and Technology (NIST). Chemical reference standards will be NIST SRMs or vendor-certified materials traceable to these standards.

The calibration requirements for each method and respective corrective actions will be accessible, either in the laboratory SOPs or in the laboratory's QA plan for each instrument or analytical method in use. All calibrations will be preserved on electronic media.

6.5 Inspection/Acceptance of Supplies and Consumables

Inspection and acceptance of field supplies, including laboratory-prepared sampling bottles, will be performed by the FC or designee. All primary chemical standards and standard solutions used for this project, either in the field or laboratory, will be traceable to documented, reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities found in the standard will be documented.

6.6 Data Management

Field data sheets will be checked for completeness and accuracy by the FC prior to delivery to the QA/QC manager. Data generated in the field will be documented in electronic or hard copy. Manually entered data will be verified by a second party. Field documentation will be filed in the main project folder after data entry and verification are complete.

Laboratory data will be provided to the QA/QC manager in the EQuIS electronic format. Laboratory data that are electronically provided and loaded into a database will undergo a check against the

laboratory hard copy data. Data will be validated or reviewed manually, and qualifiers, if assigned, will be entered manually. The accuracy of all manually entered data will be verified. Data tables and reports will be exported from EQuIS to Microsoft Excel tables.

7 Assessments and Response Actions

Once data are received from the laboratory, several QC procedures will be followed to provide an accurate evaluation of the data quality. Specific procedures will be followed to assess data precision, accuracy, and completeness.

7.1 Compliance Assessments

Laboratory and field performance audits consist of on-site reviews of QA systems and equipment for sampling, calibration, and measurement. Laboratory audits will not be conducted as part of this study. However, all laboratory audit reports will be made available to the project QA/QC manager upon request. The laboratory is required to have written procedures addressing internal QA/QC, and these procedures will be made available upon request. The laboratory must ensure that personnel engaged in analytical tasks have appropriate training. The laboratory will provide written details for all method modifications planned prior to project commencement.

7.2 Response and Corrective Actions

Sections 7.2.1 and 7.2.2 identify the responsibilities of key project team members and actions to be taken in the event of an error, problem, or non-conformance of protocols identified in this document.

7.2.1 Field Activities

The FC or designee will be responsible for correcting equipment malfunctions during the field sampling effort. The project QA/QC manager will be responsible for resolving situations identified by the FC or designee that may result in non-compliance with this QAPP. All corrective measures will be immediately documented in the field log book.

7.2.2 Laboratory

The laboratory is required to comply with their SOPs. The laboratory project manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data.

The laboratory project manager will be notified if any QC sample grossly exceeds control limits and corrective action does not improve results. The analyst will identify and correct the anomaly before continuing with the sample analysis. If the laboratory internal corrective action does not resolve the non-conformance, the laboratory project manager will notify the QA/QC manager. A narrative describing the anomaly, the steps taken to identify and correct the anomaly, and the treatment of

the relevant sample batch (i.e., recalculation, reanalysis, and re-extraction) will be submitted with the data package in the form of a cover letter.

7.3 Reports to Management

QA reports to management include verbal status reports and data validation reports. These reports will be the responsibility of the QA/QC manager.

8 Data Validation, Usability, and Reporting

This section describes the processes that will be used to review project data quality.

8.1 Data Review, Validation, and Verification

During the validation process, analytical data will be evaluated for project, method, and laboratory QC compliance, and their validity and applicability for program purposes will be determined. Based on the findings of the validation process, data validation qualifiers may be assigned.

8.2 Validation and Verification Methods

Data validation includes signed entries by the field and laboratory technicians on field data sheets and laboratory data sheets, respectively; review for completeness and accuracy by the FC and laboratory project manager; review by the QA/QC manager for outliers and omissions; and the use of QC criteria to accept or reject specific data. If errors are found, further verification will be performed to ensure that all data are accurate. Any errors found will be corrected, and the laboratory will be notified of the errors.

All laboratory data will be reviewed and verified to determine whether DQOs have been met and that appropriate corrective actions have been taken, when necessary. The QA/QC manager will be responsible for the final review of data generated from analyses of samples.

The first level of review will take place in the laboratory as the data are generated. The laboratory department manager or designee will be responsible for ensuring that the data generated meet minimum QA/QC requirements and that the instruments were operating under acceptable conditions during data generation. DQOs will also be assessed at this point by comparing the results of QC measurements with pre-established criteria as a measure of data acceptability.

The analysts or laboratory department manager will prepare a preliminary QC checklist for each parameter and for each sample delivery group as soon as analysis of a sample delivery group has been completed. Any deviations from the DQOs listed on the checklist will be brought to the attention of the laboratory project manager to determine whether corrective action is needed and to determine the impact on the reporting schedule.

Data packages will be checked for completeness immediately upon receipt from the laboratory to ensure that data and QA/QC information requested are present. Stage 2A validations (USEPA 2009) will be conducted on all data packages. Data validation will be conducted by a reviewer using current National Functional Guidelines (USEPA 2020a, 2020b), the analytical methods, and this QAPP by considering the following information, as applicable:

- COC documentation and sample receipt condition
- Holding times

- Method blanks
- MDLs
- RLs
- LCSs
- MS samples
- Laboratory duplicates
- SRM results

The data will be validated in accordance with the project-specific DQOs described previously, analytical method criteria, and the laboratory's internal performance standards based on their SOPs.

8.3 Reconciliation with User Requirements

The QA/QC manager will review data after each survey to determine if DQOs have been met. If data do not meet the project's specifications, the QA/QC manager will review the errors and determine if the problem is due to calibration, maintenance, sampling techniques, or other factors and will suggest corrective action. Retraining, revision of techniques, or replacement of supplies/equipment should correct the problem; if not, the DQOs will be reviewed for feasibility. If specific DQOs are not achievable, the QA/QC manager will recommend appropriate modifications.

8.4 Data Reporting

Data will be reported in a completion report as discussed in Section 8 of the WP for SU9.

9 References

ASTM (ASTM International), 2002. *Standard Practices for Use of the Terms Precision and Bias in ASTM Test Methods*. E177-90a. 2002.

Ecology (Washington State Department of Ecology), 2016. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Environmental Assessment Program. Publication No. 04-03-030. December 2016.

USEPA (U.S. Environmental Protection Agency), 1986. *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods*. Office of Solid Waste and Emergency Response. EPA 530/SW-846. November 1986.

USEPA, 2002. *Guidance for Quality Assurance Project Plans*. EPA QA/G-5. Office of Environmental Information. EPA/240/R-02/009. December 2002.

USEPA, 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use*. Office of Solid Waste and Emergency Response. EPA 540-R-08-005. January 2009.

USEPA, 2020a. *National Functional Guidelines for Inorganic Superfund Methods Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA-540-R-20-006. November 2020.

USEPA, 2020b. *National Functional Guidelines for Organic Superfund Methods Data Review*. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation. EPA 540-R-20-005. November 2020.

Attachment C-2
Job Safety Analysis Documents

Job Safety Analysis

Field Activities

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**JSA Number:** 001	**Issue Date:** August 11, 2020
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Kendra Skellenger	**Analysis Date:** April 17, 2020
Work Operation: Field activities	**Superintendent/Competent Person:** Field team	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Modified Level D—Long pants, long sleeves, and/or Tyvek coveralls if handling potentially contaminated media, and steel-toed footwear conforming to ASTM International (ASTM) F2412-05/ASTM F2413-05 • Safety glasses/splash goggles and hard hat • Depending on activity, the following PPE may also be required: nitrile outer gloves and latex inner gloves.		**Reviewed by:** Tim Stone	**Reviewed Date:** May 15, 2020
		Approved by: Tim Stone	**Approved Date:** May 15, 2020

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor physical activity	Slips, trips, and falls	• Avoid walking while writing or texting—maintain a heads-up posture. • Be aware of potentially slippery surfaces and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. • Maintain good housekeeping practices. Clean up all spills immediately. • Be aware of weather effects on the work area, including wet or frozen ground. • Jumping, running, and horseplay are prohibited. • Keep all areas clean and free of debris to prevent any trips and falls. • Be aware of and limit loose clothing or untied shoelaces that may contribute to slips, trips, and falls. • Notify the field team members of any unsafe conditions.	• Routinely inspect work area for unsafe conditions.

Job Safety Analysis

Field Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor physical activity (continued)	Heat stress	• Adjust work schedules, as necessary, to avoid the hottest part of the day. • Take rest breaks as warranted. • Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. • Maintain body fluids at normal levels. • Train workers to recognize the symptoms of heat-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions. • Monitor outside temperature versus worker activity.
	Cold stress	• Provide shelter (enclosed, heated environment) to protect personnel during rest periods. • Educate workers to recognize the symptoms of frostbite and hypothermia. • Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. • Have a dry change of clothing available. • Train workers to recognize the symptoms of cold-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions and PPE. • Monitor outside temperature versus worker activity and PPE.
	Rain or snow	• Wear appropriate PPE (rain gear). • Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. • If extremely cold conditions are forecast, consider additional precautions or postponing work activity.	• Review weather forecast prior to field work. • Inspect PPE daily prior to use. • Routinely inspect work area for deteriorating conditions.
	Sunshine	• Have sunscreen available for ultraviolet protection. • Have abundant water available to prevent dehydration. • Consider wearing wide-brimmed headwear and light-colored, lightweight, sun-blocking clothing.	• Ensure that sunscreen and water are available.
	Lightning	• Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment. • Immediately head for shore if on the water and lightning is observed. If not able to get to shore, disconnect and do not use or touch major electronic equipment, including the radio, throughout the duration of the storm.	• Obtain weather forecast and updates as needed.

Job Safety Analysis

Field Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Outdoor physical activity (continued)	High winds	• Wear goggles or safety glasses if dust or debris are visible.	• Review weather forecast prior to field work. • Ensure that goggles or safety glasses are available.
	Biological hazards (flora [e.g., poison ivy or poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, or snakes])	• Be aware of likely biological hazards in the work area. • Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellent. • Wear hand and arm protection when clearing plants or debris from the work area. • Be aware of potential wildlife and defensive behavior (e.g., nesting birds, or animals with young).	• Ensure that insect repellent is available. • Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.
	Noise exposure	• Wear hearing protection in high noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	• Ensure that hearing protection is available.
Working near rail	Personal injury	• Be aware of work area. • Keep a careful lookout in both directions when working near rail. • Stand clear of tracks when trains are approaching and move away from tracks to avoid being struck by doors or protruding items.	• Look both directions before crossing or working near tracks.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.

Job Safety Analysis

Soil and Groundwater Sampling

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**JSA Number:** 002	**Issue Date:** August 11, 2020
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Kendra Skellenger	**Analysis Date:** April 17, 2020
Work Operation: Soil and Groundwater Sampling	**Superintendent/Competent Person:** Field team	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Modified Level D—Long pants, long sleeves, and/or Tyvek coveralls if handling potentially contaminated media, and steel-toed footwear conforming to ASTM International (ASTM) F2412-05/ASTM F2413-05 • Safety glasses/splash goggles, hard hat, nitrile outer gloves and latex inner gloves.		**Reviewed by:** Tim Stone	**Reviewed Date:** May 15, 2020
		Approved by: Tim Stone	**Approved Date:** May 15, 2020

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
If using glassware		• Follow the JSA for handling glassware.	
Soil and groundwater sampling	Injury from hand- and power-tool operation (e.g., spatula or drill)	• Be aware of sharp edges on hand tools (e.g., spatulas, knives, drill bits, and saw blades). • Be aware of electrical connections and water hazards when working with electric or battery-operated tools. • Ensure that all tools are working properly; repair or replace defective tools. Repair when unplugged and off. • Keep guards on power tools when not in use.	• Inspect tools to ensure that they are in good working order. • Inspect electrical connections (if applicable). • Inspect tools periodically to ensure dry and clean operation.
	Noise exposure	• Wear hearing protection in high-noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	• Ensure that hearing protection is available.

Job Safety Analysis

Soil and Groundwater Sampling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Soil and groundwater sampling (continued)	Slips, trips, and falls	• Avoid walking while writing or texting—maintain a heads-up posture. • Be aware of potentially slippery surfaces, including boat decks, riprap, muddy or algae-covered rocks, shoreline plants/seaweed, thick mud, and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. • Maintain good housekeeping practices. Clean up all spills immediately. • Be aware of weather effects on the work area, including wet or frozen ground. • Jumping, running, and horseplay are prohibited. • Be cautious when entering or exiting the vessel, and load/unload items onto or off of the pier or shore once boarded. • Keep all areas clean and free of debris to prevent any trips and falls. • Notify the field team members of any unsafe conditions.	• Routinely inspect work area for unsafe conditions.
	Ingestion of contaminants, or skin or eye contact with contaminants	• Wear appropriate PPE to prevent or reduce exposure. • Contact 911, as necessary; perform CPR if breathing stops. • Move exposed person away from source of contamination, and rinse mouth. If exposure to skin occurs, promptly wash contaminated skin using soap or mild detergent and water. Rinse eyes with large amounts of water. • Follow decontamination procedures as outlined in the Health and Safety Plan (HASP).	• Ensure that decontamination procedures are on hand and are reviewed. • Ensure that PPE and rinsing water are available.
	Muscle strain or injuries from improper lifting	• Use proper lifting techniques or ask for assistance with heavy objects. • If boating, avoid carrying objects directly onto or off the boat; rather, load/unload objects while on the boat to or from the pier or shore.	• Evaluate weight and center of gravity of heavier items prior to lifting or moving.
	Pinch points	• If boating, secure any unsecured objects on deck; they may shift on deck quickly in wave, current, or engine acceleration conditions. • Maintain a safe distance from closing mechanisms and moving parts on sampling gear. • Avoid placing hands or self between boat and dock or piles.	
Working outdoors	Heat stress	• Adjust work schedules, as necessary, to avoid the hottest part of the day. • Take rest breaks as warranted. • Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. • Maintain body fluids at normal levels. • Train workers to recognize the symptoms of heat-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions. • Monitor outside temperature versus worker activity.

Job Safety Analysis

Soil and Groundwater Sampling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working outdoors (continued)	Cold stress	• Provide shelter (enclosed, heated environment) to protect personnel during rest periods. • Educate workers to recognize the symptoms of frostbite and hypothermia. • Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. • Have a dry change of clothing available. • Train workers to recognize the symptoms of cold-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions and PPE. • Monitor outside temperature versus worker activity and PPE.
	Rain or snow	• Wear appropriate PPE (rain gear). • Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. • If extremely cold conditions are forecast, consider additional precautions or postponing work activity.	• Review weather forecast prior to field work. • Inspect PPE daily prior to use. • Routinely inspect work area for deteriorating conditions.
	Sunshine	• Have sunscreen available for ultraviolet protection. • Have abundant water available to prevent dehydration. • Consider wearing wide-brimmed headwear and light-colored, lightweight, sun-blocking clothing.	• Ensure that sunscreen and water are available.
	Lightning	• Do not begin or continue work until lightning subsides for 30 minutes. Disconnect and do not use or touch electronic equipment. • Immediately head for shore if on the water and lightning is observed. If not able to get to shore, disconnect and do not use or touch major electronic equipment, including the radio, throughout the duration of the storm.	• Obtain weather forecast and updates as needed.
	High winds	• Wear goggles or safety glasses if dust or debris are visible.	• Review weather forecast prior to field work. • Ensure that goggles or safety glasses are available.
	Biological hazards (flora [e.g., poison ivy or poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, or snakes])	• Be aware of likely biological hazards in the work area. • Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellent. • Wear hand and arm protection when clearing plants or debris from the work area.	• Ensure that insect repellent is available. • Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.

Job Safety Analysis

Soil and Groundwater Sampling

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.

Job Safety Analysis

Decontamination Activities

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**JSA Number:** 004	**Issue Date:** August 11, 2020
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Kendra Skellenger	**Analysis Date:** April 17, 2020
Work Operation: Decontamination activities	**Superintendent/Competent Person:** Field team	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • High-visibility safety vest • Hard hat where overhead hazards and/or heavy equipment are present • U.S. Coast Guard-approved personal flotation device (PFD), if boating (see cold stress section for cold-weather PFD information)		**Reviewed by:** Tim Stone	**Reviewed Date:** May 15, 2020
		Approved by: Tim Stone	**Approved Date:** May 15, 2020

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontamination area set up	Vehicle, heavy equipment traffic, or boat traffic in work area	• Wear high-visibility safety vest and hard hat PPE. • Be alert when working around heavy equipment and/or other boats, especially if wearing hearing protection.	• Ensure that safety vests are available for staff and visitors.
	Muscle strain or injuries from improper lifting	• Use proper lifting techniques or ask for assistance with heavy objects. • If boating, avoid carrying objects directly onto or off of the boat; rather, load/unload objects while on the boat to or from the pier or shore.	• Evaluate weight and center of gravity of heavier items prior to lifting or moving.
	Biological hazards (flora [e.g., poison ivy or poison oak] and fauna [e.g., ticks, bees, spiders, mosquitoes, or snakes])	• Be aware of likely biological hazards in the work area. • Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellent. • Wear hand and arm protection when clearing plants or debris from the work area.	• Ensure that insect repellent is available. • Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.

Job Safety Analysis

Decontamination Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Decontamination activities	Injury from hand- and power-tool operation (e.g., spatula or drill)	• Be aware of sharp edges on hand tools (e.g., spatulas, knives, drill bits, and saw blades). • Be aware of electrical connections and water hazards when working with electric or battery-operated tools. • Ensure that all tools are working properly; repair or replace defective tools. Repair when unplugged and off. • Keep guards on power tools when not in use.	• Inspect tools to ensure that they are in good working order. • Inspect electrical connections (if applicable). • Inspect tools periodically to ensure dry and clean operation.
	Noise exposure	• Wear hearing protection in high-noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	• Ensure that hearing protection is available.
	Slips, trips, and falls	• Avoid walking while writing or texting—maintain a heads-up posture. • Be aware of potentially slippery surfaces and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. • Maintain good housekeeping practices. Clean up all spills immediately. • Be aware of weather effects on the work area, including wet or frozen ground. • Jumping, running, and horseplay are prohibited. • Keep all areas clean and free of debris to prevent any trips and falls. • Notify the field team members of any unsafe conditions.	• Routinely inspect work area for unsafe conditions.
	Ingestion of contaminants or decontamination fluids, or skin or eye contact with contaminants or decontamination fluids	• Wear appropriate PPE to prevent or reduce exposure. • Contact 911, as necessary; perform CPR if breathing stops. • Move exposed person away from source of contamination, and rinse mouth. If exposure to skin occurs, promptly wash contaminated skin using soap or mild detergent and water. Rinse eyes with large amounts of water. • Follow decontamination procedures as outlined in the Health and Safety Plan (HASP).	• Ensure that decontamination procedures are on hand and are reviewed. • Ensure that PPE and rinsing water are available.
Working outdoors	Heat stress	• Adjust work schedules, as necessary, to avoid the hottest part of the day. • Take rest breaks as warranted. • Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. • Maintain body fluids at normal levels. • Train workers to recognize the symptoms of heat-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions. • Monitor outside temperature versus worker activity.

Job Safety Analysis

Decontamination Activities

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working outdoors (continued)	Cold stress	• Provide shelter (enclosed, heated environment) to protect personnel during rest periods. • Educate workers to recognize the symptoms of frostbite and hypothermia. • Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. • Consider additional precautions if working near water in cold weather. • Have a dry change of clothing available. • Train workers to recognize the symptoms of cold-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions and PPE. • Monitor outside and water temperature versus worker activity and PPE.
	Rain or snow	• Wear appropriate PPE (rain gear). • Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. • If extremely cold conditions are forecast, consider additional precautions or postponing work activity.	• Review weather forecast prior to field work. • Inspect PPE daily prior to use. • Routinely inspect work area for deteriorating conditions.
	Sunshine	• Have sunscreen available for ultraviolet protection. • Have abundant water available to prevent dehydration. • Consider wearing wide-brimmed headwear and light-colored, lightweight, sun-blocking clothing.	• Ensure that sunscreen and water are available.
	Lightning	• Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment.	• Obtain weather forecast and updates as needed.
	High winds	• Wear goggles or safety glasses if dust or debris are visible.	• Review weather forecast prior to field work. • Ensure that goggles or safety glasses are available.

Job Safety Analysis

Decontamination Activities

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**Job Safety Analysis Number:** 006	**Issue Date:** 7/30/21
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Ben Uhl	**Analysis Date:** 4/30/20
Work Operation: Anchor QEA motor vehicle operation	**Superintendent/Competent Person:** Vehicle Driver	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Wear a seatbelt at all times. • Make sure that clothing will not interfere with driving.		**Reviewed by:** Tim Shaner	**Reviewed Date:** 10/6/20
		Approved by: Kendra Skellenger	**Approved Date:** 7/30/21

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Anchor QEA motor vehicle operation	Unfamiliar with the vehicle	• Allow yourself some time to get familiar with an Anchor QEA vehicle, a rental vehicle, or one not used often. • Test the lights, windshield wipers, hazard lights, horn, parking brake, and other important functions. • Review the dashboard controls, steering radius, and overhead and side clearances. • Allow extra side, front, and back space around the vehicle while driving or parking an unfamiliar vehicle. • Adjust mirrors and the seat while the vehicle is in park. • Drive slowly in confined locations, as in parking garages, parking lots, or industrial settings. Confirm adequate clearances by sight before turning or backing up in tight or unfamiliar locations. • Use a second person to be a spotter outside the vehicle if needed in tight spaces.	• Inspect fluid levels and air pressure in tires. • Adjust mirrors and seat positions appropriately. • Monitor the fuel level. • Fill up when the fuel level is low.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Anchor QEA motor vehicle operation (continued)	Speed and braking	• Fasten and properly adjust the seatbelt. • Obey all posted and designated speed limits. • Radar detectors are prohibited in all company-owned, leased, or rented vehicles. • Reduce travel speed during hazardous conditions (e.g., rain, fog, or snow). • Identify whether your vehicle has an anti-lock braking system (ABS). If it does, DO NOT pump the brakes to stop when the vehicle has begun to skid. Apply steady pressure to the brakes. If the vehicle does not have an ABS, pump the brakes to stop during slippery conditions.	• Inspect seatbelts. • Identify designated speed limits. • Determine if vehicle has an ABS.
	Distance spacing	• Continually check your rearview and sideview mirrors. • Use the 3-second rule to keep a safe distance between vehicles. • Increase the 3-second rule as necessary during hazardous travel conditions. • Regularly scan the area you will be entering in the next 10 to 12 seconds. • Always leave yourself an "out" during travel. • When stopping, make sure that you leave enough distance between you and the car in front of you. You should be able to see the rear tires of the vehicle in front when stopped. • Obey the speed limit and traffic regulations. • When at a red light and it turns green, use the "delayed start" technique, by counting to three before you take your foot off the brake. • DO NOT TAILGATE. • Keep headlights (and running lights, if available) on for maximum visibility.	• Inspect seatbelts.
	Skids	• If the vehicle has begun to skid out of control, turn the steering wheel in the direction of the skid and re-adjust the wheel, as necessary. • Reduce speed during hazardous travel conditions. • Use 4-wheel drive, if available, when driving vehicles off-road, on steep inclines, or in muddy conditions. • Do not take vehicles off-road if they cannot be operated safely in such conditions.	• Inspect seatbelts.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Anchor QEA motor vehicle operation (continued)	Blind spots	• Become familiar with any blind spots associated with your vehicle. • Adjust mirrors to give the maximum viewing area. • Use your directional devices to signal all turns and when changing lanes; check rearview and sideview mirrors and glance over your shoulder to check that the lane is clear. • Avoid other driver's blind spots; slow down and let the other vehicle pass. • If parked for an extended period and staying in the vehicle, be sure to inspect the area for changed conditions (e.g., a car that moved in behind you) before leaving.	• Inspect seatbelts. • Inspect mirrors.
	Backing	• Back into parking spaces upon arrival whenever possible. • Perform a 360-degree walk around the vehicle before backing to identify any new conditions or obstructions. • Use a spotter when backing whenever possible. • Understand hand signals. • Sound the horn prior to backing. • Check the rearview and sideview mirrors prior to backing. • Back slowly in areas of obstructed vision. • Anticipate others who may be backing out into your pathway and adjust accordingly.	• Inspect seatbelts. • Inspect mirrors.
	Distractions (e.g., cell phones, reading maps or directions, or eating)	• Do not engage in distracted driving—focus on operating the vehicle and on your surroundings (e.g., road conditions and other drivers). • Obey state or local laws regarding cell phone use, at a minimum. • Certain clients prohibit cell phone use regardless of the state you are operating in—know your client's policy. • Use hands-free devices (not hand-held cellular phones) while driving. • Pull over to the side of the road when making a call or checking directions.	• Inspect seatbelts. • Ensure hands-free devices are connected and ready for use.
	Accidents	• In the event of an accident, use the following procedures: – Stop, call for medical assistance, notify police, and complete an accident report and submit it to your supervisor. – Notify the Project Manager and Field Lead. – Complete the appropriate incident investigation reports. – Contact Sara Weiskotten, Operations Liaison, at (857) 445-4987. – Contact Diana Reynolds, Insurance Liaison, at (302) 236-8403.	• Inspect seatbelts.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Anchor QEA motor vehicle operation (continued)	Influenced by drugs or alcohol	• NEVER DRIVE UNDER THE INFLUENCE OF DRUGS OR ALCOHOL. • Keep in mind that the person in another vehicle may be under the influence of controlled substances, and be prepared for erratic or sudden driving changes on their part.	• Inspect seatbelts.
	Driver attitude	• Do not operate any vehicle when abnormally tired, temporarily disabled (i.e., injured), or under the influence of drugs or alcohol. • Keep an even temper when driving. Do not let the actions of others affect your attitude. • Do not allow yourself to become frustrated, rushed, distracted, or drowsy.	• Inspect seatbelts.
	Fatigue	• Stop and rest if you are fatigued. Exit the road and enter a safe area. Rest until you are fully refreshed. • Be aware that certain medications (such as cold or allergy medicines) may make you drowsy when driving a vehicle.	• Inspect seatbelts.
	Vehicle loading	• DO NOT OVERLOAD THE VEHICLE. • Secure all equipment and supplies within the body of the vehicle using proper tie-downs. • Do not block sideview mirrors with the load. • Do not transport U.S. Department of Transportation-manifested hazardous materials. • Dispatch all equipment and personnel with proper forms and identification.	• Inspect seatbelts.
	Equipment failure	• Perform daily inspections of your vehicle. • Maintain vehicle safety equipment (e.g., mirrors, alarms, horns, wipers, lights, and brakes). • Maintain the vehicle (e.g., tire pressure and fluid levels). • Any vehicle with mechanical defects that may endanger the safety of the driver, passengers, or the public shall not be used. • Ensure that appropriate safety equipment is in the vehicle. Safety equipment should include a spare tire, jack, first-aid kit, fire extinguisher, and flashlight. Flares and/or reflective triangles should be available in larger trucks. • Ensure that the proper documentation is in the vehicle. Documentation should include an operations manual for the vehicle, insurance card, vehicle registration, and accident forms.	• Inspect and maintain the vehicle.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Training Requirements:

- All drivers are required to have a valid driver's license, and all vehicles must have appropriate state vehicle registration and inspection stickers. The use of hand-held wireless devices is prohibited while driving any vehicle for business use at any time, for personal use during business hours, and as defined by law.
- All assigned employees are required to read and familiarize themselves with the contents of this Job Safety Analysis and sign the signature page before the operation of an Anchor QEA vehicle, as well as review it with their supervisor during their daily safety meeting.
- All assigned employees are required to enroll and complete the Smith System Virtual Driving training programs (*Distracted Driving* and *Small Vehicle Forward – Five Keys to Safe Driving*) prior to driving an Anchor QEA vehicle.

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Vehicle Operation Job Safety Analysis Acknowledgement Form

The Anchor QEA Motor Vehicle Operation Job Safety Analysis must be read, understood, and signed before the operation of any Anchor QEA vehicle. My signature below certifies that I have read and understand the procedures presented in the Anchor QEA Motor Vehicle Operation Job Safety Analysis and have completed the Smith System Virtual Driving *Distracted Driving* and *Small Vehicle Forward – Five Keys to Safe Driving* training programs.

Date	Name (print)	Signature

Job Safety Analysis

Anchor QEA Motor Vehicle Operation

Date	Name (print)	Signature

Job Safety Analysis

Excavator Safety

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**Job Safety Analysis Number:** 007	**Issue Date:** 7/30/21
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Ben Uhl	**Analysis Date:** 4/30/20
Work Operation: Anchor QEA excavator safety	**Superintendent/Competent Person:** Operator/Field Staff	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Modified Level D—hard hat, traffic safety vest, safety glasses, and steel-toed footwear conforming to ASTM International (ASTM) F2412-05/ASTM F2413-05 • Depending on activity, the following PPE may also be required: long pants, long sleeves, and latex inner gloves if handling potentially contaminated media		**Reviewed by:** Tim Shaner	**Reviewed Date:** 10/6/20
		Approved by: Kendra Skellenger	**Approved Date:** 7/30/21

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working with an excavator	Injuries related to excavator operations	• Anyone who operates an excavator must be trained to do so and have access to the operator's manual. • Always **perform pre- and post-operation inspections** on the excavator. • Do not operate an excavator that has signs of damaged components, malfunctioning controls or safety features, or other problems. • Cabs are made for one operator only, so no additional people are permitted in the cab. • Operators should always buckle their seat belt. • Use a reliable communication system between the operator and ground crew. • Always stay clear of the articulated arm and bucket's span and swing radius. • Never stand beneath the arm of the excavator or an elevated load. • Do not ride in the bucket or ride on or hang from the arm. • Know the weight limit for bucket loads, and do not exceed it. • Do not lift the bucket higher than necessary.	• Review this Job Safety Analysis (JSA) with all staff working near the excavator. • Verify that the excavating contractor has reviewed and acknowledged the preventive or corrective measures identified in this JSA.

Job Safety Analysis

Excavator Safety

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working with an excavator (continued)	Injuries related to excavator operations (continued)	• Never dig beneath the machine. • Reduce speed on rough ground conditions and in crowded areas. • Turn the excavator slowly and gradually. • When going up an incline, extend the arm and carry the bucket close to the ground and rolled out. • When going down a slope, carry the bucket low and with its bottom parallel to the ground. • Level the machine when excavating a trench. • Keep the machine as far as possible from the edge of an excavation. • Work with the propel motors to the rear of the excavator for increased stability. • Dump loads as far from excavation sites as possible to reduce the risk of cave-ins. • When unloading into a truck, refrain from swinging the bucket over the truck's cab. • Park the excavator on a level surface with the bucket close to the ground. • Make sure all excavator **preventive maintenance** and repairs are performed on schedule and by qualified technicians.	• Review this JSA with all staff working near the excavator. • Verify that the excavating contractor has reviewed and acknowledged the preventive or corrective measures identified in this JSA.

Training Requirements:

- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.

Job Safety Analysis

Excavation Safety

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**Job Safety Analysis Number:** 008	**Issue Date:** 7/30/21
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Ben Uhl	**Analysis Date:** 4/30/20
Work Operation: Working with excavations	**Superintendent/Competent Person:** Field Team	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Modified Level D—hard hat, traffic safety vest, safety glasses, and steel-toed footwear conforming to ASTM International (ASTM) F2412-05/ASTM F2413-05 • Depending on activity, the following PPE may also be required: long pants, long sleeves, and latex inner gloves if handling potentially contaminated media, and, if boating, U.S. Coast Guard-approved personal flotation device (PFD; see cold stress section for cold-weather PFD information)		**Reviewed by:** Tim Shaner	**Reviewed Date:** 10/6/20
		Approved by: Kendra Skellenger	**Approved Date:** 7/30/21

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working near excavations	Cave-ins and falling into excavation	• A "competent person" is required per Occupational Safety and Health Act (OSHA), 29 Code of Federal Regulations (CFR) 1926.P. • Safeguard open excavations by restricting unauthorized access. • Highlight the work area using prominent warning signs (e.g., cones, sawhorses, or other barricades, and signage) placed a minimum of 10 feet back from the excavation opening. • Maintain zone definition along the perimeter with a continuous string of high-visibility caution tape. • Surround the entire perimeter with plastic or cloth construction net fencing. Anchor the fencing to the ground using steel posts driven into the ground. Space out posts no greater than 8 feet apart. The fence should be a minimum of 4 feet high. Fence material must be of a quality capable of withstanding a pressure of 200 pounds. Place the fencing a minimum of 10 feet back from the excavation opening.	• Review and implement preventive and protective measures listed in this Job Safety Analysis (JSA).

Job Safety Analysis

Excavation Safety

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working near excavations (continued)	Cave-ins and falling into excavation (continued)	• The depth of the trench must be kept at 36 inches or less unless the slopes are laid back at a maximum 2:1 slope. A competent person in excavation must evaluate the weather, soil, and work in progress to determine if a hazard related to trench collapse is possible. • Spoil pile will be at least 4 feet from the edge of the excavation. If soil is not suitable to be used for backfill, it will be immediately removed from the site and hauled to a designated area. • Excavations, adjacent areas, and protective systems must be inspected by a competent person daily before the start of work. • The competent person has the authority to remove employees from the excavation area immediately. • Surface encumbrances must be removed or supported. • Employees must be protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation. • Hard hats must be worn by all employees. • Warning vests or other highly visible clothing must be provided and worn by all employees. • Employees are required to stand away from vehicles being loaded or unloaded. • A warning system must be established and utilized when mobile equipment is operating near the edge of the excavation. • Utility companies must be contacted and/or utilities located. Exact location of utilities must be marked. • Ladders used in excavations must be secured and extended three feet above the edge of the trench. • Employees must be protected from cave-ins when entering or exiting the excavation. • Precautions must be taken to protect employees from the accumulation of water. • Surface water or runoff must be diverted or controlled to prevent accumulation in the excavation.	• Review and implement preventive and protective measures listed in this JSA.

Job Safety Analysis

Excavation Safety

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Working near excavations (continued)	Cave-ins and falling into excavation (continued)	• Inspections must be made after every rainstorm or other hazard-increasing occurrence. • Atmosphere within the excavation must be tested when there is a reasonable possibility of an oxygen deficiency, combustible, or other harmful contaminant exposing employees to a hazard. • Adequate precautions must be taken to protect employees from exposure to an atmosphere containing less than 19.5% oxygen and/or to other hazardous atmospheres. • Ventilation must be provided to prevent employee exposure to an atmosphere containing flammable gas in excess of 10% of the lower explosive limit of the gas. Testing must be conducted often to ensure that the atmosphere remains safe. • Emergency equipment, such as breathing apparatus, safety harness and lifeline, and/or basket stretcher must be readily available where hazardous atmospheres could or do exist. • Materials and/or equipment for support systems must be selected based on soil analysis, trench depth, and expected loads. • Materials and equipment used for protective systems must be inspected and in good condition. • Materials and equipment not in good condition must be removed from service. • Protective systems must be installed without exposing employees to the hazards of cave-ins, collapses, or threat of being struck by materials or equipment.	• Review and implement preventive and protective measures listed in this JSA.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 CFR 1910.120(e), including but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this Job Safety Analysis before starting a work activity and review it with their supervisor during their daily safety meeting.

Job Safety Analysis

Sample and Laboratory Glassware Handling

Project Name: Former Reynolds Metals Reduction Plant – Longview	**Project Number:** 210002-01.03	**JSA Number:** 009	**Issue Date:** August 11, 2020
Location: Northwest Alloys, Inc., Longview, Washington	**Contractor:** Anchor QEA, LLC	**Analysis by:** Kendra Skellenger	**Analysis Date:** April 17, 2020
Work Operation: Sample and laboratory glassware handling	**Superintendent/Competent Person:** Field team	**Revised by:** N/A	**Revised Date:** N/A
Required Personal Protective Equipment (PPE): • Modified Level D—Long pants, long sleeves, and/or Tyvek coveralls if handling potentially contaminated media, and steel-toed footwear conforming to ASTM International (ASTM) F2412-05/ASTM F2413-05 • Depending on activity, the following PPE may also be required: safety glasses/splash goggles, hard hat, nitrile outer gloves and latex inner gloves, and, if boating, U.S. Coast Guard-approved personal flotation device		**Reviewed by:** Tim Stone	**Reviewed Date:** May 15, 2020
		Approved by: Tim Stone	**Approved Date:** May 15, 2020

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Transporting and using glassware	Breakage of containers during field activities	• Use appropriately sized tubs or bottle carriers with dividers to prevent bottle-to-bottle contact during transport. • Consider using coated glassware, if practicable. • Carry oversize bottles in tubs or bottle carriers using both hands during transfer to the sampling vessel and whenever the vessel is underway.	• Ensure dividers are sufficient and will remain in place during transport.
	Faulty glassware	• Replace any glassware that is chipped, nicked, or cracked.	• Inspect glassware before use.
	Impact with equipment and other objects	• Use care when loading and unloading sampling equipment. • Minimize the handling of individual containers to the extent possible.	

Job Safety Analysis

Sample and Laboratory Glassware Handling

Work Activity	Potential Hazards	Preventive or Corrective Measures	Inspection Requirements
Filling sample containers	Overtightening of bottle lids causing breakage	• Avoid use of excessive force to tighten bottle caps (i.e., finger tight). • Secure lids with clear tape to prevent opening during transport.	
	Breakage during sample collection	• Place containers in plastic tubs between aliquots to limit contact with hard surfaces. • Place containers on a stable and non-slip surface during collection. • Use the buddy system as needed to hold bottles during filling.	
	Contact with sample preservatives (generally hydrochloric acid or sulfuric acid to lower pH to less than 2)	• Wear nitrile gloves and protective eyewear to prevent skin and eye contact if a container is damaged. • Do not open preserved bottles until necessary.	
Packing samples for shipment	Breakage during packing and shipment	• Use bottle wraps, foam sleeves, or bubble wrap to prevent bottle contact in the cooler. • Pack coolers snugly, but do not overpack.	• Ensure glass bottles do not touch to minimize potential breakage during transport.

Training Requirements:

- All personnel working on hazardous waste sites must receive appropriate training as required by 29 Code of Federal Regulations (CFR) 1910.120(e), including, but not limited to initial 40-hour, 8-hour supervisor, and annual 8-hour refresher trainings.
- Medical clearance must be received on an annual basis as required by 29 CFR 1910.120(f).
- If boating is involved, and a professional captained vessel is not in use, boat operators must take the appropriate state or provincial boater safety courses.
- All assigned employees are required to familiarize themselves with the contents of this JSA before starting a work activity and review it with their supervisor during their daily safety meeting.

Attachment C-3
Historical Soil Testing Results

Table 5-16
Soil Testing Results: TPH/EPH

	Location	HTM Oil Area								
	Location ID	AQ-SSA6-01		AQ-SSA6-02			AQ-SSA6-03		AQ-SSA6-04	
	Sample Date	AQ-SSA6-01-3-4	AQ-SSA6-01-7-8	AQ-SSA6-02-3-4	AQ-SSA6-02-4-5	AQ-SSA6-02-5-6	AQ-SSA6-03-3-4	AQ-SSA6-03-6-7	AQ-SSA6-04-1-2	AQ-SSA6-04-3-4
	Sample ID	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011
	Depth	3 - 4 ft	7 - 8 ft	3 - 4 ft	4 - 5 ft	5 - 6 ft	3 - 4 ft	6 - 7 ft	1 - 2 ft	3 - 4 ft
	Sample Type	D	D	D	D	D	D	D	D	D
Total Petroleum Hydrocarbons (mg/kg)	**Soil SL**									
Diesel range hydrocarbons	2,000	**6,580** [4]	**3,760** [4]	**144**	**105**	**64.4 J**	**338**	**450**	**18.6 J**	33.3 U
Oil range hydrocarbons		**3,090** [4]	**2,220** [4]	59.6 U	59.8 U	**68.1**	**163**	**219**	**52.8**	66.6 U
Extractable Petroleum Hydrocarbons (µg/kg)										
C8-C10 Aliphatics	--	14 U	13 U	--	--	--	16 U	--	--	--
C10-C12 Aliphatics	--	**47**	13 U	--	--	--	16 U	--	--	--
C12-C16 Aliphatics	--	**470**	**80**	--	--	--	16 U	--	--	--
C16-C21 Aliphatics	--	**2,800**	**2,000**	--	--	--	**130**	--	--	--
C21-C34 Aliphatics	--	**3,300**	**2,700**	--	--	--	**210**	--	--	--
C8-C10 Aromatics	--	14 U	13 U	--	--	--	16 U	--	--	--
C10-C12 Aromatics	--	14 U	13 U	--	--	--	16 U	--	--	--
C12-C16 Aromatics	--	**54**	13 U	--	--	--	16 U	--	--	--
C16-C21 Aromatics	--	**270**	**31**	--	--	--	16 U	--	--	--
C21-C34 Aromatics	--	**80**	**41**	--	--	--	**38**	--	--	--

Table 5-16
Soil Testing Results: TPH/EPH

	Location	HTM Oil Area								
	Location ID	AQ-SSA6-05			AQ-SSA6-06		AQ-SSA6-07		AQ-SSA6-08	
	Sample Date	AQ-SSA6-05-1-2	AQ-SSA6-05-3-4	AQ-SSA6-05-7-8	AQ-SSA6-06-1-2	AQ-SSA6-06-3-4	AQ-SSA6-07-1-2	AQ-SSA6-07-5-6	AQ-SSA6-08-4-5	AQ-SSA6-08-7-8
	Sample ID	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011	8/30/2011
	Depth	1 - 2 ft	3 - 4 ft	7 - 8 ft	1 - 2 ft	3 - 4 ft	1 - 2 ft	5 - 6 ft	4 - 5 ft	7 - 8 ft
	Sample Type	D	D	D	D	D	D	D	D	D
Total Petroleum Hydrocarbons (mg/kg)	**Soil SL**									
Diesel range hydrocarbons	2,000	25 U	**25.6**	37.6 U	25 U	29.3 U	**79.4**	**247**	33.8 U	**99.4**
Oil range hydrocarbons		50 U	**105**	75.2 U	50 U	58.5 U	**140**	**126**	67.6 U	**42.9 J**
Extractable Petroleum Hydrocarbons (µg/kg)										
C8-C10 Aliphatics	--	--	--	--	--	--	--	--	--	--
C10-C12 Aliphatics	--	--	--	--	--	--	--	--	--	--
C12-C16 Aliphatics	--	--	--	--	--	--	--	--	--	--
C16-C21 Aliphatics	--	--	--	--	--	--	--	--	--	--
C21-C34 Aliphatics	--	--	--	--	--	--	--	--	--	--
C8-C10 Aromatics	--	--	--	--	--	--	--	--	--	--
C10-C12 Aromatics	--	--	--	--	--	--	--	--	--	--
C12-C16 Aromatics	--	--	--	--	--	--	--	--	--	--
C16-C21 Aromatics	--	--	--	--	--	--	--	--	--	--
C21-C34 Aromatics	--	--	--	--	--	--	--	--	--	--

Table 5-16
Soil Testing Results: TPH/EPH

	Location	HTM Oil Area								
	Location ID	AQ-SSA6-09				AQ-SSA6-10	AQ-SSA6-10		AQ-SSA6-11	
	Sample Date	AQ-SSA6-09-2-3	AQ-SSA6-09-4-5	AQ-SSA6-09-11-12	AQ-SSA6-09-13-14	AQ-SSA6-10-0-1	AQ-SSA6-10-1-2	AQ-SSA6-10-2-3	AQ-SSA6-11-2-3	AQ-SSA6-11-5-6
	Sample ID	9/2/2011	9/2/2011	9/2/2011	9/2/2011	9/2/2011	9/2/2011	9/2/2011	9/2/2011	9/2/2011
	Depth	2 - 3 ft	4 - 5 ft	11 - 12 ft	13 - 14 ft	0 - 1 ft	1 - 2 ft	2 - 3 ft	2 - 3 ft	5 - 6 ft
	Sample Type	D	D	D	D	D	D	D	D	D
Total Petroleum Hydrocarbons (mg/kg)	**Soil SL**									
Diesel range hydrocarbons	2,000	25 U	**483**	25 U	25.1 U	**69.3**	**1,850**	**4,910** [4]	**31.5**	**514**
Oil range hydrocarbons		50 U	**1,710**	50 U	50.1 U	**93.6**	**2290** [4]	**4,510** [4]	**45.8 J**	**2,410** [4]
Extractable Petroleum Hydrocarbons (µg/kg)										
C8-C10 Aliphatics	--	--	--	--	--	--	--	--	--	--
C10-C12 Aliphatics	--	--	--	--	--	--	--	--	--	--
C12-C16 Aliphatics	--	--	--	--	--	--	--	--	--	--
C16-C21 Aliphatics	--	--	--	--	--	--	--	--	--	--
C21-C34 Aliphatics	--	--	--	--	--	--	--	--	--	--
C8-C10 Aromatics	--	--	--	--	--	--	--	--	--	--
C10-C12 Aromatics	--	--	--	--	--	--	--	--	--	--
C12-C16 Aromatics	--	--	--	--	--	--	--	--	--	--
C16-C21 Aromatics	--	--	--	--	--	--	--	--	--	--
C21-C34 Aromatics	--	--	--	--	--	--	--	--	--	--

Table 5-16
Soil Testing Results: TPH/EPH

Notes:
1 = USEPA Stage 2B data validation was completed by Laboratory Data Consultants (LDC).
2 = Results are reported in dry weight basis.
3 = All non-detect results are reported at the reporting limit.
4 = Detected concentrations exceeded the screening level but did not exceed the site-specific petroleum cleanup level as calculated based on the EPH analysis and Ecology's 4-phase model (See Appendix G)
= Detected concentration is greater than Soil screening level
Underlined = Non-detected concentration is above one or more identified screening levels
Bold = Detected result
D = Discrete sample
FD = Field duplicate
J = Estimated value
U = Compound analyzed, but not detected above detection limit
-- = Results not reported or not applicable
µg/kg = micrograms per kilogram
EPH = extractable petroleum hydrocarbons
TPH = total petroleum hydrocarbons
ft = feet
mg/kg = milligrams per kilogram
SL = screening level
USEPA = U.S. Environmental Protection Agency

RI Soil Sampling Details
HTM Oil Area

Station ID	Coordinates[1]		Sample ID	Sampling Interval[2]	Sample Method	Chemistry[3]
	Easting	Northing				
AQ-SSA6-01	1006749.20	303570.22	AQ-SSA6-01-3-4	3-4 feet bgs	Limited Access Direct Push Borings	NWTPH-Dx, EPH
			AQ-SSA6-01-7-8	7-8 feet bgs		
AQ-SSA6-02	1006710.32	303573.20	AQ-SSA6-02-3-4	3-4 feet bgs		NWTPH-Dx
			AQ-SSA6-02-4-5	4-5 feet bgs		
			AQ-SSA6-02-5-6	5-6 feet bgs		
AQ-SSA6-03	1006751.49	303537.47	AQ-SSA6-03-3-4	3-4 feet bgs		NWTPH-Dx, EPH
			AQ-SSA6-03-6-7	6-7 feet bgs		NWTPH-Dx
AQ-SSA6-04	1006706.17	303524.57	AQ-SSA6-04-1-2	1-2 feet bgs		
			AQ-SSA6-04-3-4	3-4 feet bgs		
AQ-SSA6-05	1006692.31	303534.01	AQ-SSA6-05-1-2	1-2 feet bgs		
			AQ-SSA6-05-3-4	3-4 feet bgs		
			AQ-SSA6-05-7-8	7-8 feet bgs		
AQ-SSA6-06	1006730.56	303494.88	AQ-SSA6-06-1-2	1-2 feet bgs		
			AQ-SSA6-06-3-4	3-4 feet bgs		
AQ-SSA6-07	1006759.41	303519.07	AQ-SSA6-07-1-2	1-2 feet bgs		
			AQ-SSA6-07-5-6	5-6 feet bgs		
AQ-SSA6-08	1006696.08	303583.89	AQ-SSA6-08-4-5	4-5 feet bgs		
			AQ-SSA6-08-7-8	7-8 feet bgs		
AQ-SSA6-09	1006766.27	303586.13	AQ-SSA6-09-2-3	2-3 feet bgs		
			AQ-SSA6-09-4-5	4-5 feet bgs		
			AQ-SSA6-09-11-12	11-12 feet bgs		
			AQ-SSA6-09-13-14	13-14 feet bgs		
AQ-SSA6-10	1006790.74	303557.61	AQ-SSA6-10-0-1	0-1 feet bgs		
			AQ-SSA6-10-1-2	1-2 feet bgs		
			AQ-SSA6-10-2-3	2-3 feet bgs		
AQ-SSA6-11	1006733.38	303614.70	AQ-SSA6-11-2-3	2-3 feet bgs		
			AQ-SSA6-11-5-6	5-6 feet bgs		

Notes:

1 Horizontal datum: Washington State Plane South, NAD83, US Survey feet.

2 bgs = below ground surface. Soil testing depth intervals were determined in the field based on visual observations.

3 Chemical testing: NWTPH-Dx = Diesel-range total petroleum hydrocarbons, EPH = extractable petroleum hydrocarbons

Attachment C-4
Field Forms and Logs

APEX LABS

6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323

CHAIN OF CUSTODY

Lab # _____ COC ___of___

Company:	Project Mgr:	Project Name:	Project #:
Address:	Phone:	Email:	PO #
Sampled by:			

ANALYSIS REQUEST

Site Location: OR WA CA AK ID ____ SAMPLE ID	LAB ID #	DATE	TIME	MATRIX	# OF CONTAINERS	NWTPH-HCID	NWTPH-Dx	NWTPH-Gx	8260 BTEX	8260 RBDM VOCs	8260 Halo VOCs	8260 VOCs Full List	8270 SIM PAHs	8270 Semi-Vols Full List	8082 PCBs	8081 Pest	RCRA Metals (8)	Priority Metals (13)	Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Hg, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Tl, V, Zn TOTAL DISS. TCLP	TCLP Metals (8)								Archive

Normal Turn Around Time (TAT) = 10 Business Days

SPECIAL INSTRUCTIONS:

TAT Requested (circle)

1 Day 2 Day 3 Day

4 DAY 5 DAY Other: _____

SAMPLES ARE HELD FOR 30 DAYS

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature: Date:	Signature: Date:	Signature: Date:	Signature: Date:
Printed Name: Time:	Printed Name: Time:	Printed Name: Time:	Printed Name: Time:
Company:	Company:	Company:	Company:

Daily Log

Anchor QEA, LLC
6720 S Macadam Ave., Suite 125
Portland, OR 97219
Phone 503.670.1108

PROJECT NAME: Former Reynolds Metals Reduction Plant - Longview **DATE:**

PROJECT NUMBER: 210002-01.03 **WORK:** SU9 Demolition

SITE ADDRESS: 4029 Industrial Way, Longview, WA **PERSONNEL:**

WEATHER: **WIND FROM:**

N	NE	E	SE	S	SW	W	NW

SUNNY	CLOUDY	RAIN	?

LIGHT	MEDIUM	HEAVY

TEMPERATURE: ° F . ° C
[Circle appropriate units]

TIME	COMMENTS

Signature: _____

ANCHOR QEA

Surface Soil Field Sample Record

Project Name: **Project No:**

Sampling Crew: _____

Sample Date: _____ Sampling Method: _____

Station Coordinates: N / Lat. _____ Weather: _____

E / Long. _____

Datum: NAD 83 / WGS 84

Sample Number: _____

Analysis: Metals / TBTs / SVOCs / VOCs / PCBs / Pest Other: _____

TS / TVS / Grain Size / TOC / Ammonia / Sulfides Other: _____

(Circle Appropriate Analyses)

Sample Depth: _____ Time:_____

Soil Type:	Soil Color:	Density:	Soil Odor:	
cobble	D.O.	Very soft/Loose	none	H2S
gravel	gray	soft/loose	slight	Petroleum
sand C M F	black	mod dense/stiff	moderate	other:
silt clay	brown	dense/stiff	strong	
organic matter	brown surface	very dense/stiff	overwhelming	

Comments:

Sample Location Sketch:

Sample Location Description:

Recorded by:_____