Supplemental Investigation Report

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington
Ecology Cleanup Site ID 15545

Prepared for:

Forterra Roslyn LLC

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Project No. M1122.05.006

Prepared by:

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The material and data in this report were prepared under the supervision and direction of the undersigned.

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Abbreviations

bgs	below ground surface
Commerce	Washington State Department of Commerce
COPC	chemical of potential concern
COC	chemical of concern
CSM	conceptual site model
CUL	cleanup level
DAPH	Washington State Department of Archaeology & Historic Preservation
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESA	environmental site assessment
FCB	fecal coliform bacteria
Forterra	Forterra Roslyn LLC
HC	Hart Crowser, Inc.
ICE	Icicle Creek Engineers, Inc.
MFA	Maul Foster & Alongi, Inc.
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
the Property	Roslyn No. 4 Mine
RLR	RLR Cultural Resources, LLC
TCLP	Toxicity Characteristic Leaching Procedure
TEE	terrestrial ecological evaluation
TMDL	Total Maximum Daily Load
TPH	total petroleum hydrocarbons
ug/L	micrograms per liter
WAC	Washington Administrative Code

1 Introduction

Maul Foster & Alongi, Inc. (MFA), has prepared this supplemental investigation report for Forterra Roslyn LLC (Forterra) summarizing the results of the subsurface investigation conducted at the Roslyn No. 4 Mine, located at 205 E Dakota Avenue in Roslyn, Washington (the Property; see Figure 1-1). Forterra is the owner of the Property. The Property is listed with the Washington State Department of Ecology (Ecology) under facility site ID 66921 and cleanup site ID 15545.

The Property is currently vacant but was formerly used for a variety of operations, including a coal mine (referred to as the No. 4 Mine); a foundry that remained active through the mid-1970s; a powerhouse with large transformers; and a small building foundation that was reportedly used as a pad by the townspeople of Roslyn to change oil and conduct vehicle maintenance. The coal mine was active from the 1880s until about 1909, when it was shut down.

The supplemental investigation was conducted to characterize the nature and extent of environmental impacts at the Property, building upon prior investigations completed at the Property (MFA 2023).

1.1 Regulatory Framework

The Property is currently enrolled in Ecology's Voluntary Cleanup Program as project number CE0558. Forterra received a grant from the Washington State Department of Commerce (Commerce) (Capital Agreement contract No. 24-62310-001), with an effective date of June 3, 2024. The grant supports Forterra's environmental site assessment, analysis of cleanup alternatives, and site planning for redevelopment to transform the Property for attainable housing and community benefit.

This supplemental investigation report has been prepared in accordance with the grant contract between Commerce and Forterra. Investigation activities were conducted in general accordance with guidance put forth in the Model Toxics Control Act (MTCA) (Washington Administrative Code [WAC] 173-340); with the supplemental investigation work plan (work plan) (MFA 2024a); and updates via email communication with the Ecology (Ecology 2024; MFA 2024b). This supplemental investigation report has been updated based on comments received from Ecology (2025).

1.2 Purpose and Objectives

The purpose of the supplemental investigation was to characterize environmental conditions and generate data sufficient for evaluating the nature and extent of impacts and developing potential cleanup actions. The investigation scope of work was developed to achieve the following specific project objectives:

- Investigate hazardous substances in environmental media to identify nature and extent of contamination above MTCA cleanup levels (CULs).
- Refine the conceptual site model (CSM) for the Property.
- Evaluate the potential risks to current and reasonably likely future human and ecological receptors.

- Collect sufficient information and data to support evaluation of potential cleanup options for impacted environmental media on the Property.
- Collect sufficient information and data to prepare a supplemental investigation report consistent with the grant contract.

1.3 Report Organization

This document is organized as follows:

- **Section 2** discusses background information, including the Property history, previous investigations, and the physical setting.
- **Section 3** describes the updated conceptual site model.
- **Section 4** discusses field and analytical methods of the supplemental investigation.
- **Section 5** describes the analytical results of the supplemental investigation.
- **Section 6** describes conclusions and recommendations based on the analytical results.

2 Background and Physical Setting

The background and physical setting information summarized below for the Property has been obtained from a Phase I environmental site assessment (ESA) conducted in 2020 (MFA 2020) and from several environmental assessments completed by Hart Crowser, Inc. (HC), Icicle Creek Engineers, Inc. (ICE), and MFA between 2004 and 2024 (HC 2004, 2006, 2007; ICE 2020; MFA 2023, 2024b).

2.1 Property Description

The Property is located in section 17 of township 20 north and range 15 east of the Willamette Meridian. The Property consists of one 30.4-acre parcel (Kittitas County parcel 456234) and is currently vacant and undeveloped (see Figures 1-1 and 2-1). The Property is situated in the southeast portion of the City of Roslyn and is zoned as light industrial with a development overlay (City of Roslyn 2010). In general, the Property is covered with low lying vegetation, trees, and open grass. Dirt and gravel roads are present throughout the Property. Remnant foundations of former structures, including a foundation used for auto maintenance, former pump house, an unidentified brick structure, and slag pile are present on the Property.

2.2 Property History

An underground coal mine, the No. 4 Mine, was active at the Property from the 1880s until about 1909 when the mine was shut down. Historical structures on the Property included a powerhouse, wash house, two barns, two warehouses, a foundry, the tipple and entrance shaft for the No. 4 Mine, the tipple for the No. 6 and No. 8 Mines, and several small buildings. The powerhouse and foundry were fueled by coal and coke. Although the mine was no longer active after 1909, the foundry remained operational through the mid-1970s to service the remaining mines in Roslyn that operated through the mid-1960s. Electrical transformers were formerly located northeast of the powerhouse between the 1960s and 1980s, until a new power substation was constructed off-property in the town of Roslyn. All remaining structures on the Property were removed in the 1980s.

2.3 Physical Setting

The Property is generally flat with a slight increase in slope to the north. A tailings pile represents a topographic high on the southeast portion of the Property. The Property is bordered by forested land and the Coal Mines Trail, a recreational walking and biking trail, to the northeast. Residential and commercial properties border the Property to the north and the southwest. Crystal Creek, located adjacent to the northeast of the Property, generally flows south in the vicinity. Tributaries of Crystal Creek, Stream A and Stream B are present on the western and southwestern portions of the Property. Wetlands A through I are located on the Property (see Figure 2-1).

2.4 Geology and Hydrogeology

According to the 2000 U.S. Geological Survey Geologic Map of the Snoqualmie Pass Quadrangle, Washington, the Property is predominantly underlain by unconsolidated deposits consisting of dense, glacially overridden material of alternating till (very dense sand and gravel), outwash (dense sand and gravel), and lacustrine (hard silt and sand) deposits (Tabor 2000).

Based on investigation activities conducted by MFA at the Property in 2023 and 2024, soil encountered during explorations were predominantly sandy silt and silty sand, with varying amounts of gravel up to 19.5 feet below ground surface (bgs). Coal was noted to be present in some sampling locations down to approximately 3 feet bgs.

Groundwater was encountered in temporary reconnaissance wells at depths varying between 2.70 to 3.40 feet bgs at the Property in April 2023. During supplemental investigation activities conducted at the Property in September 2024, depth to groundwater in newly installed permanent monitoring wells ranged from approximately 5.5 feet bgs in MW-01 and 12.0 feet bgs in MW-03. During additional groundwater monitoring in April 2025, depth to groundwater ranged from approximately 1.1 feet bgs in MW-01 and 7.7 feet bgs in MW-03 (see Table 2-1). In general, the depth to groundwater in April 2025 was approximately 4 feet shallower than September 2024. Groundwater was determined to flow south-southwest on the Property in both September 2024 and April 2025 (see Figure 2-2 and Figure 2-3).

2.5 Previous Environmental Investigation

Multiple environmental assessments have been completed at the Property, including the following:

- Phase I and Phase II ESAs completed in 2004, 2006, and 2007 by HC (2004, 2006, 2007).
- Follow-up investigation in 2020 by ICE (2020).
- A Phase I ESA completed in 2020 by MFA (MFA 2020).
- A data gaps investigation completed in 2023 by MFA (MFA 2023).

An overview of the Property's history and environmental conditions based on prior assessment activities is provided in a site conditions memorandum prepared by MFA (MFA 2022). In addition, brief summaries of the previous investigations are provided in the data gaps investigation report and the supplemental investigation work plan (MFA 2023, 2024a). A summary of the 2023 data gaps investigation is provided below:

2023 MFA Data Gaps Investigation. MFA conducted a data gaps investigation at the Property in April 2023 to characterize potential environmental impacts based on identified features of interest associated with historical operations and areas of contamination identified during previous sampling activities (MFA 2023). A total of 22 direct-push borings were advanced across the Property from the ground surface down to a maximum depth of 19.5 feet bgs for collection of samples from continuous soil cores. Groundwater samples were collected from three of the borings, completed as temporary reconnaissance wells.

Soil and groundwater samples were analyzed for a combination of metals and diesel- and oil-range petroleum. MFA used a tiered approach to analyze soil at the laboratory. The analytical results of the data gaps investigation completed for the Property indicated the vertical extent of metals in soil was delineated at all features of interest (i.e., the vehicle maintenance area, former foundry, slag pile, vegetated area, former powerhouse, and former transformers). The lateral extent of metals in soil was delineated for the vegetated area; however, the extent of metals was not delineated for the remaining features of interest (i.e., the vehicle maintenance area, former foundry, slag pile, former powerhouse, and former transformers) (see Figure 2-4).

In addition, MTCA Method A CUL exceedances for total and dissolved metals were observed in the reconnaissance groundwater sample collected at location SP-DP-2, east of the slag pile. However, the turbidity of the sample was highly elevated, and the soil samples collected from this boring did not have elevated metals concentrations. It was concluded that the elevated metals concentrations in the reconnaissance groundwater sample were not anticipated to be representative of groundwater conditions at the Property (see Figure 2-5).

Based on the conclusions, MFA recommended additional soil investigation to delineate the lateral extent of metals impacts, that a terrestrial ecological evaluation (TEE) should be completed for the site, and that the preliminary CSM should be updated based on the findings of additional investigation.

3 Features of Interest and Chemicals of Potential Concern

Features of interest have been identified based on activities, conveyances, and physical features associated with former operations that may have resulted in a release of hazardous substances to environmental media at the Property.

Vehicle maintenance area. A small building foundation on the Property was reportedly used as a pad by the townspeople of Roslyn to change oil and conduct vehicle maintenance. Concentrations of metals in soil samples collected near the building foundation exceed MTCA Method A CULs. Total petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds were below MTCA Method A CULs.

Former foundry. The No. 4 Mine was active at the Property from the 1880s until about 1909 when the mine was shut down. Although the mine was no longer active after the explosion, the foundry remained operational through the mid-1970s to service the remaining mines in Roslyn that operated through the mid-1960s. The foundry was fueled by coal and coke. Concentrations of metals in soil samples in the vicinity of the former foundry exceed MTCA Method A CULs. TPH and PAHs were below MTCA Method A CULs.

Slag pile. A slag pile associated with waste from the former foundry is located on the Property. Concentrations of metals in soil samples in the vicinity of the slag pile area exceed MTCA Method A CULs. PAHs were below MTCA Method A CULs.

Former powerhouse. The former powerhouse was fueled by coal and coke. Soil samples collected in the vicinity of the former powerhouse had concentrations of oil-range petroleum and metals that exceed their respective MTCA Method A CULs. PAHs and polychlorinated biphenyls (PCBs) were below MTCA Method A CULs.

Former transformers. Large electrical transformers were formerly located northeast of the powerhouse between the 1960s and 1980s, until a new power substation was constructed off-property in the City of Roslyn. Soil samples collected in the vicinity of the former transformers have concentrations of metals exceeding MTCA Method A CULs. TPH, PAHs, and PCBs were below MTCA Method A CULs.

Vegetated area. The concentration of arsenic in a soil sample collected in the vicinity of the vegetated area exceeded the MTCA Method A CUL. The extent of metals in the vicinity of the vegetated area was delineated based on soil samples collected in 2023.

Tailings pile. A mine tailings pile is present on the southeastern portion of the Property. No MTCA Method A CUL exceedances for metals or TPH have been identified in the tailings pile area.

Perched groundwater. Groundwater samples were collected in August 2007 from miniwells that went dry during development and purging. The samples were observed to be turbid, and concentrations of metals in the groundwater samples exceeded MTCA Method A CULs. The miniwells were not observed during site activities conducted in 2020 by ICE or in 2023 by MFA. Reconnaissance groundwater samples collected in April 2023 were observed to have significant sediment in sample bottles, including field-filtered sample bottles. The groundwater sample collected from SP-DP-2 had MTCA Method A CUL exceedances for total and dissolved metals, likely attributable to turbidity.

4 Field and Analytical Methods

The supplemental data gaps investigation was conducted in general accordance with the methods and protocols described in the work plan (MFA 2024a). Standard field operating procedures for collecting soil and groundwater samples, monitoring well installation and development, decontaminating equipment, and managing waste are described in the sampling and analysis plan, included as an appendix to the work plan (MFA 2024a). Representative photographs from the supplemental investigation are provided in Appendix A.

MFA coordinated a public utility locate before advancing exploratory borings. MFA used a global positioning system to mark sampling locations at the Property on September 9, 2024. Applied Professional Services, Inc., of North Bend, Washington, conducted a private utility locate on the Property on September 16, 2024, to identify the presence of underground utilities near the proposed boring locations. If necessary, boring locations were positioned less than 20 feet from the proposed location in the field based on the presence of subsurface utilities or access limitations from dense vegetation.

The data gaps investigation fieldwork was conducted between September 17 and 20, 2024. MFA subcontracted Anderson Environmental Contracting, LLC, of Kelso, Washington, a driller licensed in the state of Washington, to advance the borings using direct-push methods. RLR Cultural Resources, LLC (RLR), conducted cultural resources monitoring of each boring, in accordance with the archaeological monitoring permit no. 2024-50 issued by the Washington State Department of Archaeology & Historic Preservation (DAHP) (DAHP 2024).

The borings were placed in association with the following features of interest (see Figure 4-1):

- Foundation for vehicle maintenance: VM-DP-5 through VM-DP-10
- Former foundry: FO-DP-5 through FO-DP-8
- Slag pile: SP-DP-4 through SP-DP-11
- Former powerhouse: PH-DP-6 through PH-DP-9
- Former transformers: TF-DP-3 through TF-DP-12

Additionally, three borings were completed as permanent monitoring wells, (MW-01. MW-02, and MW-03), to assess groundwater conditions at the Property during the September 2024 sampling event. The location of MW-01 is upgradient of the Property to assess background groundwater conditions (see Figure 2-2). MFA conducted groundwater monitoring at the three monitoring wells in April 2025 to further characterize groundwater conditions (see Figure 2-3). Samples collected in September 2024 and April 2025 represent low- and high-groundwater conditions, respectively.

The elements of the supplemental investigation are described in the following sections.

4.1 Soil Sampling

Using a track-mounted direct-push drill rig, 35 borings were advanced across the Property. At 32 of the boring locations, continuous soil cores were collected from the ground surface down to a maximum depth of 2.0 feet bgs. Discrete soil samples were collected from the following target depths:

- 0 to 1 feet bgs
- 1 to 2 feet bgs

Soil characteristics, visual or olfactory observations, and sample information were recorded and are presented in Table 4-1.

At the remaining three locations, continuous soil cores were collected from the ground surface down to a maximum depth of 20 feet bgs for installation of three permanent monitoring wells. Soil characteristics and visual or olfactory observations were recorded on geologic boring logs (included as Appendix B).

MFA used a tiered laboratory soil analysis approach in accordance with the work plan (MFA 2024a). There were generally two tiers of locations relative to known areas of soil exceedances. The uppermost sample from the boring placed closest to the prior exceedance was initially selected for analysis. If the sample from that boring indicated an elevated result for chemicals of potential concern (COPCs), the deeper archived soil sample from that boring, as well as the initially archived sample from the boring location further from the known exceedance location, was selected for analysis to delineate the vertical and lateral extent of contamination.

The soil samples were submitted under chain-of-custody procedures to Friedman & Bruya, Inc., of Seattle, Washington, and analyzed for one or more of the following COPCs:

- Total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) by EPA Method 6020B
- Lead by EPA method 6020B with TCLP method

4.2 Groundwater Sampling

The three monitoring wells were constructed with a 2-inch diameter, schedule 40, 0.010-inch machine slot polyvinyl chloride well casing. MW-01 and MW-02 were screened from approximately 10 to 20 feet bgs; MW-03 was screened from 8.4 to 13.4 feet bgs due to the drill rig encountering refusal (see monitoring well completion details on the boring logs in Appendix B).

The monitoring wells were developed with a peristaltic pump and dedicated, disposable tubing. A water quality meter and turbidity meter were used at the three locations to record water quality parameters (see well development forms in Appendix C). Prior to collection of groundwater samples, water level measurements from each monitoring well were recorded (see Table 2-1).

Groundwater samples were collected from the three monitoring wells in September 2024 and April 2025 using low-flow sampling methods with a peristaltic pump and dedicated, disposable tubing. A water quality meter and turbidity meter were used at the three locations to record water quality parameters. Prior to sample collection, the monitoring wells were purged at low flow rate until water quality parameters (i.e., temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity) generally stabilized for at least three consecutive readings. Groundwater samples were collected directly into laboratory-supplied bottles. Samples collected for dissolved constituents were field-filtered using a 0.45-micron filter during sample collection. Field sampling data sheets for groundwater are provided in Appendix D.

During the September 2024 and April 2025 sampling event, MFA submitted unpreserved and unfiltered fractions of samples collected from each monitoring well in addition to the field-filtered fractions. The unpreserved and unfiltered fractions were filtered and preserved at the laboratory upon sample receipt. At MFA's request, the laboratory reported both the field- and laboratory-filtered EPA Method 6020B dissolved metals results for these samples.

The groundwater samples were submitted under chain-of-custody procedures to Friedman & Bruya, Inc. of Seattle, Washington, and analyzed for one or more of the following laboratory analyses:

- Total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) by EPA Method 6020B
- Dissolved metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc) by EPA Method 6020B

4.3 Investigation-Derived Waste

Investigation-derived waste included one 55-gallon drum (approximately one-quarter full) of soil cuttings and two 55-gallon drums (one full and one approximately one-third full) of groundwater and decontamination fluids. Investigation-derived waste is stored in secured, Washington State Department of Transportation-approved drums on the southwest portion of the Property and will be disposed of off-Property at an appropriately permitted facility. Based on analytical results, the containerized soil investigation-derived waste was characterized as nonhazardous waste.

4.4 Archaeological Monitoring

During ground-disturbing activities, an archaeologist with RLR conducted cultural resources monitoring. Archaeological monitoring was required due to the Property's location within a known, potentially National Register of Historic Places eligible archaeology site 45KT2784 (i.e., the No. 4 Mine). As requested by Ecology, archaeological monitoring was conducted to observe and document cultural resources that may have been exposed during all ground-disturbing activities.

RLR concluded that no specific cultural materials were identified, but varying degrees of darkening from coal dust, patches of ash, and/or small coal or slag fragments were observed. Additionally, small brick fragments were identified in several soil borings during drilling. RLR recommended continued monitoring for any activities involving ground disturbing activities in the vicinity of archaeological site 45KT2784.

5 Analytical Results

Laboratory analytical reports are provided as Appendix E. Analytical data and the laboratory's internal quality assurance and quality control data were reviewed to assess whether they met project-specific data quality objectives. A data validation memorandum summarizing data evaluation procedures, data usability, and deviations from specific field or laboratory methods is included as Appendix F. The data are considered acceptable for their intended use, with the appropriate data qualifiers assigned.

Per WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840: Data Submittal Requirements (Ecology 2005), data generated shall be submitted simultaneously in both written and electronic formats. The data presented in this report collected during the September 2024 and April 2025 sampling activities were submitted by MFA to Ecology's Environmental Information Management System in November 2024 and April 2025, respectively.

The following subsections summarize screening levels and analytical results for soil and groundwater.

5.1 Screening Levels

Analytical results for soil and groundwater are included in Tables 5-1 and 5-2, respectively. Soil and groundwater analytical results were compared to MTCA Method A CULs for unrestricted land use, as well as natural background metals concentration in soil (Ecology 1994) and groundwater (Ecology 2022) for Yakima Basin, Washington. Where MTCA Method A CULs were not available for specific analytes, the results were screened against the lower of MTCA Method B CULs for noncancer and cancer values.

Values for Yakima Basin, Washington, natural background metals concentrations in soil (Ecology 1994) and natural background arsenic concentrations in groundwater (Ecology 2022) are provided in Table 5-1 and Table 5-2, respectively. The natural arsenic concentration in groundwater for the Yakima Basin, Washington has been established at 6.0 micrograms per liter (ug/L).

Soil samples collected were screened against the EPA toxicity characteristic rule of 20 to determine if the material is nonhazardous. If a waste is 100 percent solid, as defined by the toxicity characteristic leaching procedure (TCLP) method, then the results of the total constituent analysis may be divided by 20 to convert the total results into the maximum leachable concentration. This factor is derived from the 20:1 liquid-to-solid ratio employed in the TCLP.

For establishing final CULs at the site, additional considerations, including screening criteria for protection of ecological receptors at the Property, may be considered. A site-specific TEE was conducted and is summarized in Appendix G.

5.2 Soil

The subsurface soils at the Property during the supplemental investigation activities generally consisted of sandy silt and silty sand, with varying amounts of gravel. Additionally, various amounts of coal were encountered in most borings to approximately 2 feet bgs and are described in Table 4-1. Coal is known to be present throughout the region due to historical mining operations.

Soil samples submitted for laboratory analysis were analyzed to evaluate the concentration of metals in soils. The location of all borings placed during the supplemental investigation are provided in Figure 4-1. A tiered approach was used for soil analysis at the laboratory. Soil samples that were selected for analysis, as well as current and previous MTCA Method A exceedances, are shown in Figure 5-1.

There were no MTCA CUL exceedances in borings advanced in the vicinity of the former powerhouse, slag pile, or former vehicle maintenance area (see Table 5-1). A summary of soil samples that exceed applicable CULs or the TCLP rule of 20 are provided below for each feature of interest (see Figure 5-1).

Former foundry. Total arsenic, cadmium, and lead were detected in the soil samples collected at FO-DP-5 that exceed their respective MTCA Method A CULs at both 0.5 feet bgs and 1.5 feet bgs. In FO-DP-5, the maximum concentrations of metals were detected in the sample collected at 1.5 feet bgs, including arsenic at 69 mg/kg, cadmium at 15 mg/kg, and lead at 9,700 mg/kg. These concentrations exceed the MTCA Method A CULs of arsenic (20 mg/kg), cadmium (2 mg/kg), and lead (250 mg/kg).

Soil samples from borings FO-DP-8, adjacent to FO-DP-5, were analyzed to delineate the initial exceedances identified. Total arsenic was detected in the soil sample collected from 0.3 feet bgs at FO-DP-8 below the MTCA Method A CUL for arsenic. Cadmium and lead were detected in samples from 0.3 feet bgs and 1.1 feet bgs at FO-DP-8 at concentrations that exceed their respective MTCA Method A CULs.

All total lead concentrations in samples from FO-DP-5, FO-DP-6, and FO-DP-8 exceed the TCLP rule of 20 concentration (100 mg/kg). At least one sample from each boring was analyzed for lead by the TCLP method for informational purposes to assess whether the material could be classified as a federal characteristic hazardous waste if transported for disposal of off-site. The EPA TCLP regulatory criteria is 5 milligrams per liter (mg/L). In FO-DP-5, lead was detected in the TCLP extract at 4.4 mg/L and 9.7 mg/L, from 0.5 feet bgs and 1.5 feet bgs, respectively. Lead was not detected in the TCLP extract for FO-DP-6 and FO-DP-8.

Former transformers. Total arsenic was detected in soil samples collected from TF-DP-4 at 0.4 feet bgs and 1.3 feet bgs, at concentrations of 22 mg/kg and 34 mg/kg, respectively. These concentrations exceed the MTCA Method A CUL of 20 mg/kg.

Soil samples from borings TF-DP-8 and TF-DP-9, adjacent to TF-DP-4, were analyzed to delineate the initial exceedances identified. Total arsenic was detected in the soil samples collected from TF-DP-8 at 0.4 feet bgs and from TF-DP-9 at 0.3 feet bgs, at concentrations of 5.4 mg/kg and 7.1 mg/kg, respectively. These concentrations are below the MTCA Method A CUL for arsenic.

Vehicle maintenance area. The total lead detection in sample VM-DP-6 at 0.5 feet bgs (130 mg/kg) is below the MTCA Method A CUL (250 mg/kg) but exceeds the TCLP rule of 20 concentration (100 mg/kg). This sample was analyzed for lead by the TCLP method to assess whether the material should be classified as hazardous waste. Lead was not detected at a concentration above 0.5 mg/L in the TCLP extract, and therefore this material is not classified as hazardous waste.

5.3 Groundwater

September 2024. Groundwater samples were collected from MW-01 through MW-03 during inferred low-groundwater conditions for the Property in September 2024 (see Table 5-2). Total arsenic was detected in MW-02 at a concentration of 35 ug/L and dissolved arsenic was detected at a concentration of 38 ug/L in the field-filtered sample, both above the MTCA Method A CUL of 5 ug/L and the natural background for the Yakima Basin of 6 ug/L (Ecology 2022). Dissolved arsenic was detected in the laboratory-filtered MW-02 sample at a concentration of 1.5 ug/L, below the MTCA Method A CUL. However, the laboratory-filtered samples may not be representative of groundwater conditions because of the elapsed time (i.e., greater than 24 hours) between sample collection and subsequent preservation and filtration by the laboratory minimizing potential changes in water chemistry. Total and dissolved arsenic were detected in MW-01 at concentrations below the MTCA Method A CUL and were not detected in MW-03. All other metal COPCs were below method reporting limits or detected at concentrations below applicable MTCA CULs at all three wells.

April 2025. Groundwater samples were collected from MW-01 through MW-03 during inferred high-groundwater conditions for the Property in April 2025 (see Table 5-2). Total arsenic was detected in MW-02 at a concentration of 55 ug/L and dissolved arsenic was detected at a concentration of 52 ug/L in the field-filtered sample, above the MTCA Method A CUL of 5 ug/L and the natural background for the Yakima Basin of 6 ug/L. In the laboratory-filtered sample, dissolved arsenic was detected in MW-02 at a concentration of 14 ug/L. Total and dissolved arsenic were detected in MW-01 at a concentration below the MTCA Method A CUL and was not detected in MW-03. All other metal COPCs were below method reporting limits or detected at concentrations below applicable MTCA CULs at all three wells.

Groundwater samples were collected from MW-01, MW-02, and MW-03 in September 2024 and April 2025 to evaluate metal concentrations at low- and high-groundwater conditions, respectively. The analytical results from the two groundwater sampling events are generally consistent. Higher arsenic concentrations were observed in MW-02 during the high-groundwater conditions in April 2025 than in September 2024. This may be attributed to a greater extent of groundwater contact with metal-impacted soil closer to the surface due to high-groundwater conditions, resulting in increased leaching of metals from soil to groundwater. Groundwater sample locations and exceedances, including prior reconnaissance and mini-well sample results that are considered not representative of groundwater conditions due to being reconnaissance samples, are provided in Figure 5-2.

6 Conceptual Site Model

The primary purpose of a CSM is to identify potential pathways by which human and ecological receptors could be exposed to site-related chemicals. A complete exposure pathway consists of four necessary elements: (1) a source and mechanism of chemical release to the environment; (2) an environmental transport medium for a released chemical; (3) a point of potential contact with the impacted medium (referred to as the exposure point); and (4) an exposure route (e.g., soil ingestion) at the exposure point. The potential releases mechanisms and pathways are described below.

A CSM was developed to describe release mechanisms, environmental transport processes, exposure routes, and receptors for sources of contamination identified on the Property. The CSM is based on information collected during previous investigations and MFA's understanding of the proposed future use of the Property. The CSM reflects the current understanding of the Property based on the data collected in September 2024 and April 2025 (see Figure 6-1).

6.1 Potential Sources and Release Mechanisms

The following features of interest are known to have exceedances of chemicals, including metals (arsenic, cadmium, lead, and mercury) and oil-range hydrocarbons, in soil above MTCA Method A CULs. The areas of soil contamination associated with the features of interest have been delineated and are shown on Figure 6-2.

Vehicle maintenance area. Concentrations of metals in soil samples collected near the building foundation exceed MTCA Method A CULs. Petroleum hydrocarbons were not detected in the soil samples. The extent of metals in soil is delineated laterally and vertically.

Former foundry. Concentrations of metals in soil samples in the vicinity of the former foundry exceed MTCA Method A CULs. In general, the extent of metals in soil is delineated laterally and vertically, except for an area to the east of the former foundry.

Slag pile. Concentrations of metals in soil samples in the vicinity of the slag pile area exceed MTCA Method A CULs. The extent of metals in soil is delineated laterally and vertically.

Former powerhouse. Soil samples collected in the vicinity of the former powerhouse had concentrations of oil-range petroleum and metals that exceed their respective MTCA Method A CULs. The extent of metals and petroleum in soil is delineated laterally and vertically.

Former transformers. Soil samples collected in the vicinity of the former transformers have concentrations of metals exceeding MTCA Method A CULs. In general, the extent of metals in soil is delineated laterally and vertically, except for one location vertically undefined.

Vegetated area. The concentration of arsenic in a soil sample collected in the vicinity of the vegetated area exceeded the MTCA Method A CUL. The extent of metals in soil is delineated laterally and vertically.

Perched groundwater. Groundwater samples collected from miniwells in August 2007 and reconnaissance groundwater samples collected in April 2023 were observed to be highly turbid. Groundwater samples from both sampling events had MTCA Method A CUL exceedances of metals, likely attributable to turbidity.

Monitoring wells were installed and sampled as part of the September 2024 supplemental investigation activities. The analytical results of groundwater samples collected from the wells indicate lab-filtered dissolved metals in groundwater are below MTCA Method A CULs.

6.2 Fate and Transport Processes

Fate and transport mechanisms include natural biodegradation of organic chemicals, sorption of chemicals to soil, physical dispersion of adsorbed chemicals, leaching of chemicals from soil to groundwater, and volatilization from soil to air. The relative importance of these processes varies, depending on the chemical and physical properties of the released contaminant. The properties of the soil and the dynamics and elevation of groundwater also affect contaminant fate and transport.

Contaminants in shallow soil may volatilize and impact indoor air quality; however, volatile and semivolatile chemicals were generally non-detect or below MTCA Method A CULs. One soil location identified volatile contaminants (oil-range hydrocarbons) above the MTCA Method A CUL; however, the proposed development plan does not include building construction in the vicinity. Therefore, the indoor air exposure pathway is considered insignificant. Volatilization of chemicals to outdoor air would likely dissipate and not cause significant impacts to air quality.

The Property is primarily undeveloped land with gravel access roads and vegetation. Precipitation and infiltration through unpaved areas on the Property into vadose-zone soil may cause leaching of chemicals to shallow groundwater. The soil-to-groundwater leaching pathway is considered potentially complete. Data from the September 2024 and April 2025 groundwater sampling events indicate concentrations of dissolved arsenic in groundwater is above the MTCA Method A CUL and the natural background for the Yakima Basin.

6.3 Potential Receptors and Exposure Pathways

The Property is currently undeveloped; however, redevelopment plans for the Property include preserving approximately 17 acres for community benefit and natural space and developing approximately 13.4 acres with attainable housing. Therefore, human receptors may include construction workers, occupational workers (including visitors), and residents based on current and potential future uses of the Property. In addition, ecological receptors are expected to be present under current and future conditions.

Potable water provided by the City of Roslyn is available for use in the vicinity of the Property and groundwater beneath the Property is not currently used as a drinking water source. However, unless it can be demonstrated that groundwater is not a future potential source of drinking water based on the criteria set forth in WAC 173-340-720(2), groundwater is classified as potable to protect drinking water beneficial uses.

The following are the potentially complete exposure pathways for human receptors at the Property:

- Direct skin contact, incidental ingestion, or inhalation of windborne particulates from impacted shallow soil.

- Ingestion of impacted groundwater, if used for potable purposes.

Ecological receptors, including mammals, birds, plants, and soil biota, may be exposed through the following pathways:

- Direct contact, ingestion, and inhalation of impacted soil
- Ingestion of chemicals in the tissue of prey species

6.4 Terrestrial Ecological Evaluation

Ecological receptors could potentially be exposed to chemical impacts at the Property via the exposure pathways discussed above. Large portions of the Property are vegetated, and it abuts undeveloped forested land. To determine potential for adverse effects to ecological receptors, a site-specific TEE was conducted (see Appendix G). Based on the site-specific TEE, cleanup planning will incorporate ecological-based cleanup levels of 250 mg/kg for lead and 360 mg/kg for zinc in soil, protective of ecological receptors. No ecological risk is anticipated for the remaining COPCs. Areas on the Property that exceed for lead and zinc in soil include the foundry, slag pile, and the vehicle maintenance areas. Exceedances will be addressed as part of final cleanup actions at the Property.

6.5 Chemicals of Concern

Soil. Total arsenic, cadmium, lead, mercury, and oil-range petroleum concentrations exceed MTCA Method A CULs in soil for protection of human health. Total lead and zinc exceed CULs developed in the site-specific TEE for protection of ecological receptors at the Property. Arsenic, cadmium, lead, mercury, zinc, and oil-range petroleum are considered chemicals of concern (COCs) for soil. Other chemicals detected at the site do not exceed applicable screening criteria and are therefore not carried forward as COCs.

Groundwater. Arsenic exceeds the natural background for the Yakima Basin and the MTCA Method A CUL in groundwater for protection of human health at the Property. Arsenic is considered a COC for groundwater. Other chemicals detected at the site do not exceed applicable screening criteria or are not considered representative of groundwater conditions at the Property and are therefore not carried forward as COCs.

6.6 Crystal Creek

Crystal Creek originates in the hills above the City of Roslyn, runs along the historic Coal Mine Trail, through the city of Cle Elum, and then joins the Yakima River (Ecology 2018). It drains over eight square miles of forested foothills in its four-mile course. Crystal Creek averages two to six feet wide, with an average depth of 0.5 foot. It often dries up in several sections in late summer through early fall.

Crystal Creek is listed on the 303(d) list of impaired waters and a Total Maximum Daily Load (TMDL) has been developed. The goal of a TMDL is to ensure the impaired water will attain water quality standards. Crystal Creek has a Category 4a designation for having an U.S. Environmental Protection Agency (EPA)-approved TMDL being implemented for fecal coliform bacteria (FCB). FCB in water indicates the presence of waste from humans and other warm-blooded animals. Crystal Creek surface water sampling conducted in 2009 and 2010 indicates FCB levels generally met criteria, except for a slight exceedance at the most downstream sampling site, which is also the site furthest from the Property. Ecology's recommendations to address the FCB TMDL include:

- Conduct additional sampling for FCB in Crystal Creek, including all tributaries, from within the City of Roslyn to the creek's confluence with the Yakima River. Use results from this sampling to determine where additional FCB reduction activities should occur.
- Work with Kittitas County Environmental Health Department to identify potential leaking on-site septic systems. Work with property owners to correct problems, by providing financial and technical assistance.
- Identify properties near Crystal Creek that graze or house livestock. Work with property owners to prevent livestock pollution to Crystal Creek.

The Property has no known sources contributing FCB to Crystal Creek. Wastewater discharges from the Property as part of the planned development will be connected to the City of Roslyn sewer system and this and redevelopment activities therefore will not contribute adversely to FCB in Crystal Creek.

7 Conclusions and Recommendations

The purpose of this supplemental investigation was to:

- Investigate hazardous substances in environmental media to identify nature and extent of contamination above MTCA CULs.
- Refine the CSM for the Property.
- Evaluate the potential risks to current and reasonably likely future human and ecological receptors.
- Collect sufficient information and data to support evaluation of potential cleanup options for impacted environmental media on the Property.
- Collect sufficient information and data to prepare a supplemental investigation report consistent with the grant contract.

The analytical results and information gathered from the supplemental investigation support the following conclusions:

- The nature and extent of impacts to soil have been delineated laterally and vertically in all areas (see Figures 5-1 and 6-2). The exceptions are one area to the east of the former foundry, and one area near the former transformers; additional testing in these areas will be conducted as part of the cleanup action for the Property.
- Results from the September 2024 and April 2025 groundwater sampling events indicate concentrations of arsenic are above the natural background for the Yakima Basin and the MTCA Method A CUL. Cleanup planning will include consideration of arsenic in groundwater for protection of human health receptors.
- There is a sufficient level of site characterization from the environmental site investigations performed to date for remediation planning and work to begin.

A site-specific TEE for the Property as described in WAC 173-340-7493 was completed and is summarized in a separate report (see Appendix G). Updates to the CSM were completed based on the findings from the supplemental investigation (see Section 6). Based on the site-specific TEE, cleanup planning will incorporate ecological-based cleanup levels for lead and zinc. No ecological risk is anticipated for the remaining COPCs. Exceedances will be addressed as part of final cleanup actions at the Property.

Recommendations

Based on these conclusions, MFA recommends the following:

- Potential cleanup actions for impacted soil on the Property should be evaluated in concert with redevelopment plans.
- As part of future earth-moving, construction, and development work at the Property, a soil management plan that includes consideration of coal should be prepared that describes the handling and disposal requirements for soil on the Property.
- A cleanup plan should be prepared to identify the cleanup approach and establish final CULs at the site.
- A wetland protection plan should be prepared to support cleanup activities.

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Limitations

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

Figures

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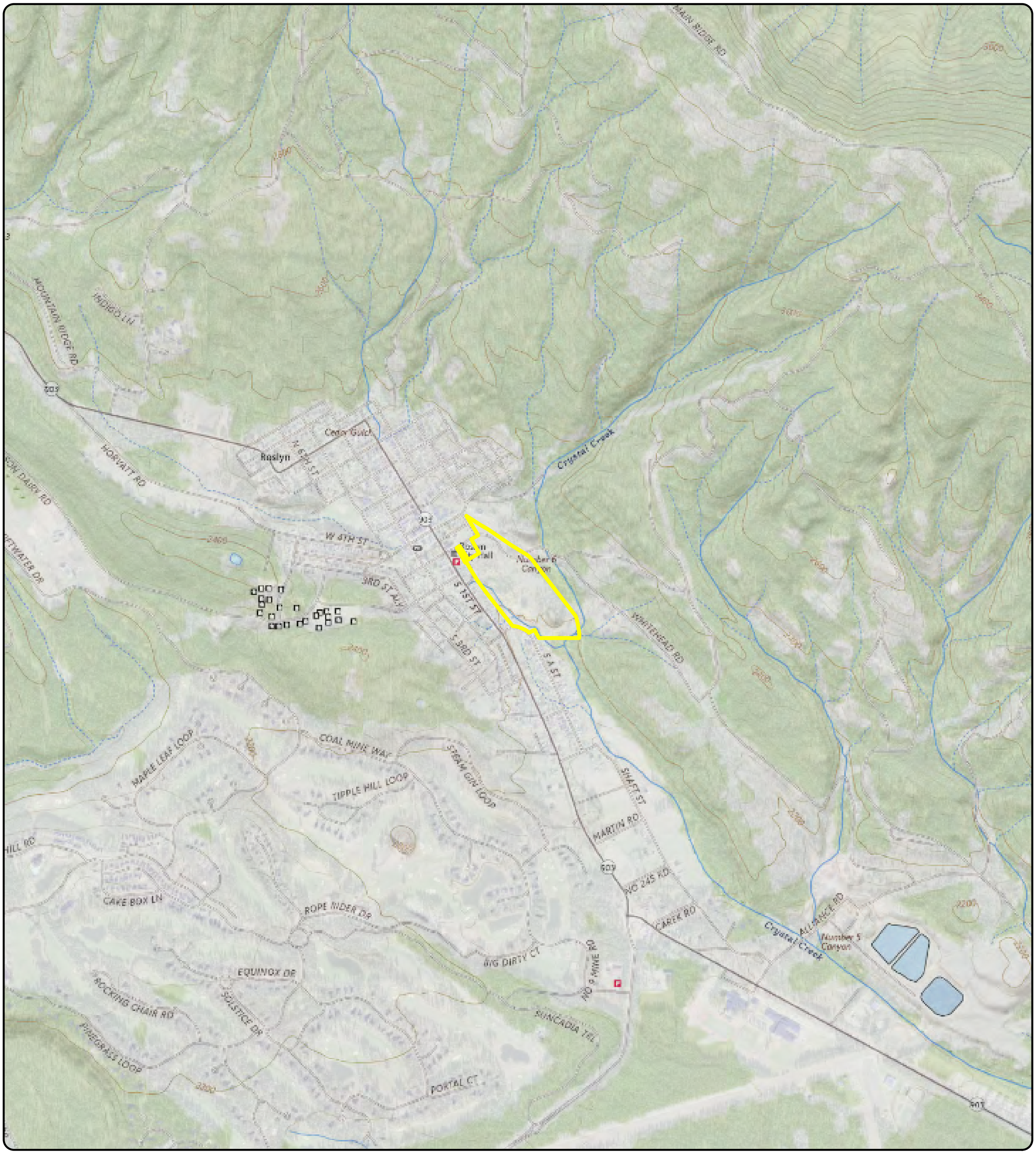
Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 1-1 Property Location

Print Date: 10/10/2024

Reviewed By: ehess

Produced By: bmurphy

Project: M1122.05.006



Notes
U.S. Geological Survey 7.5-minute topographic
quadrangle (2020): Cle Elum.
Township 20 north, range 15 east, section 17.

Data Source
Property boundary obtained from Kittitas County.

Legend

□ Property Boundary

Figure 1-1
Property Location

Roslyn No. 4 Mine
205 E Dakota Ave
Roslyn, WA

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0 2,000
Feet

Path: X:\1122.05\006\Pro\M1122_05_006_010.aprx\Fig 2-1 Property Overview
Print Date: 4/11/2025
Reviewed By: ehess
Produced By: jroberts
Project: M1122.05.006

Figure 2-1
Property Overview

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

- ▭ Property Boundary
- ▭ Feature of Interest
- ⬭ Wetland
- ◌ Wetland Buffer (Seawall-generated)
- ◌ Wetland Buffer (Determined by RMC)
- ∿ Stream

Notes
Property features are approximate.
RMC = Roslyn Municipal Code.

0 200
Feet

Data Sources
Aerial photograph obtained from the U.S. National Agriculture Imagery Program; property boundary obtained from Kittitas County; wetland extent, wetland buffer, and select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance. Hydrography data obtained from U.S. Geological Survey National Hydrography Dataset.

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Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 2-2 GW Elevation Contours Sept2024

Project: M1122.05.006 Produced By: bmurphy Reviewed By: ehess Print Date: 4/23/2025

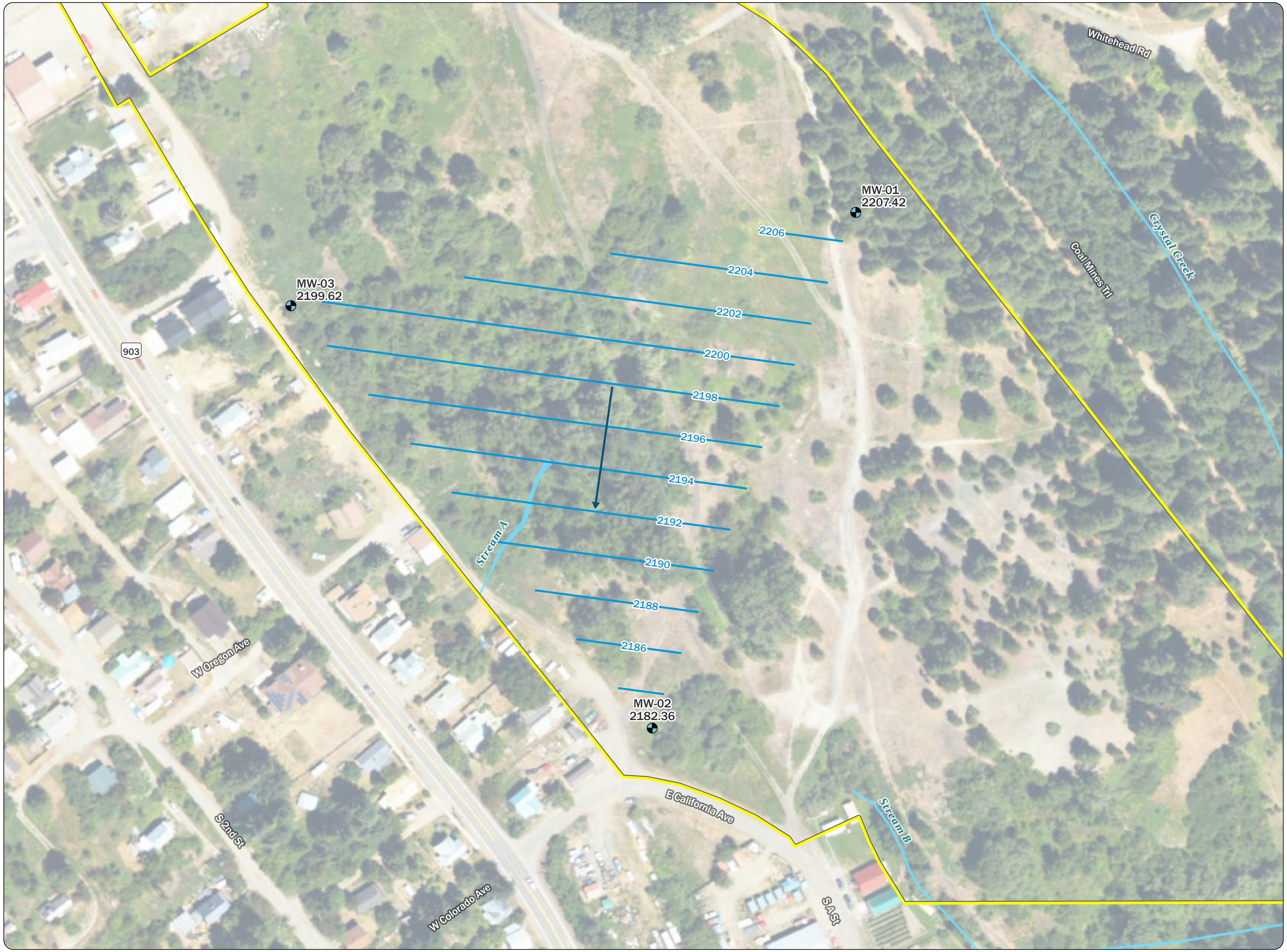

Figure 2-2
Groundwater Elevation Contours: September 2024

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

→ Approximate Groundwater Flow Direction

● Monitoring Well

— Groundwater Elevation Contour (feet NAVD 88)

☐ Property Boundary

∿ Stream

Notes

Water levels measured on September 20, 2024.
All features are approximate.
NAVD 88 = North American Datum of 1988.

0 120
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Streams obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Hydrography data obtained from U.S. Geological Survey National Hydrography Dataset.

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Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 2-3 GW Elevation Contours Apr2025

Project: M1122.05.006 Produced By: bmurphy Reviewed By: ehess Print Date: 4/23/2025

Figure 2-3
Groundwater Elevation Contours: April 2025

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

→	Approximate Groundwater Flow Direction
●	Monitoring Well
—	Groundwater Elevation Contour (feet NAVD 88)
▭	Property Boundary
∿	Stream

Notes
Water levels measured on April 1, 2025.
All features are approximate.
NAVD 88 = North American Datum of 1988.

0 120
Feet

Data Sources
Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Streams obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Hydrography data obtained from U.S. Geological Survey National Hydrography Dataset.

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Figure 2-4
Previous Soil Sample Locations and Exceedances

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

- ▢ Property Boundary
- ▢ Feature of Interest
- ● Soil Sample (2023)
- ● Soil Sample (2004-2020)

Exceedance Type

- ◐ MTCA Method A: Metals and TPH
- ● MTCA Method A: Metals
- ∿ Stream

Notes

Boring locations from 2023 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
GPS = global positioning system.
MTCA = Model Toxics Control Act.
TPH = diesel- and oil-range total petroleum hydrocarbons.

0 100
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Figure 2-5
Previous Groundwater Sample Locations and Exceedances

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

- ▭ Property Boundary
- ▭ Feature of Interest
- ● Groundwater Boring (2023)
- ◐ Soil and Groundwater Boring (2023)
- ⊕ Miniwell (HC 2007)
- ∿ Stream

Exceedance Type

- ● Not Representative

Notes

Boring locations from 2023 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
Exceedances are shown for dissolved metal results.
GPS = global positioning system.

0 90
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 2-5 Previous GW Locs and Exceedances
Print Date: 4/23/2025
Reviewed By: ehess
Produced By: bmurphy
Project: M1122.05.006

Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 4-1 Supplemental Investigation Boring Locs
Print Date: 4/24/2025
Reviewed By: ehess
Produced By: bmurphy
Project: M1122.05.006

Figure 4-1 Supplemental Investigation Boring Locations

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

- ▭ Property Boundary
- ▭ Feature of Interest
- ∿ Stream

Boring Location (2024)

- ⊕ Monitoring Well
- ● Soil Sample, Analyze
- ● Soil Sample, Archive

Previous Boring Location

- ● Soil Sample (2023)
- ● Soil Sample (2004-2020)

Exceedance Type

- ◐ MTCA Method A: Metals and TPH
- ● MTCA Method A: Metals

Notes

Boring locations from 2023 and 2024 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
The MTCA exceedances shown are only for results from 2004 through 2023.
GPS = global positioning system.
MTCA = Model Toxics Control Act.
TPH = diesel- and oil-range total petroleum hydrocarbons.

0 100
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Figure 5-1
Soil Sample Locations and MTCA Exceedances

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

☐	Property Boundary
☐	Feature of Interest
◕	Monitoring Well (2024)
●	Soil Sample (2024)
●	Soil Sample (2023)
●	Soil Sample (2004-2020)
∿	Stream

Exceedance Type

◐	MTCA Method A: Metals and TPH
●	MTCA Method A: Metals

Notes

Boring locations from 2023 and 2024 were recorded on a handheld GPS with sub-meter accuracy.

Sample locations from 2004-2020 and property features obtained by others are approximate.

Metal exceedances include arsenic, cadmium, lead, and mercury.

GPS = global positioning system.

MTCA = Model Toxics Control Act.

TPH = diesel- and oil-range total petroleum hydrocarbons.

0 100
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Project: M1122.05.006 Produced By: bmurphy Reviewed By: ehess Print Date: 4/24/2025 Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 5-1 Soil Locs and MTCA Exceedances

Figure 5-2
Groundwater Sample Locations and MTCA Exceedances

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

- 🟨 Property Boundary
- ☐ Feature of Interest
- ⊕ Monitoring Well (2024)
- ● Groundwater Boring (2023)
- ◐ Soil and Groundwater Boring (2023)
- ✛ Miniwell (HC 2007)
- ∿ Stream

Exceedance Type

- ● Not Representative
- ● Arsenic MTCA Method A CUL and Yakima Basin Natural Background

Notes

Boring locations from 2023 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
Exceedances are shown for dissolved metal results.
CUL = cleanup level.
GPS = global positioning system.
MTCA = Model Toxics Control Act.

0 90
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Project: M1122.05.006 Produced By: bmurphy Reviewed By: ehess Print Date: 4/23/2025 Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 5-2 GW Locs and MTCA Exceedances

Figure 6-1
Conceptual Site Model
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

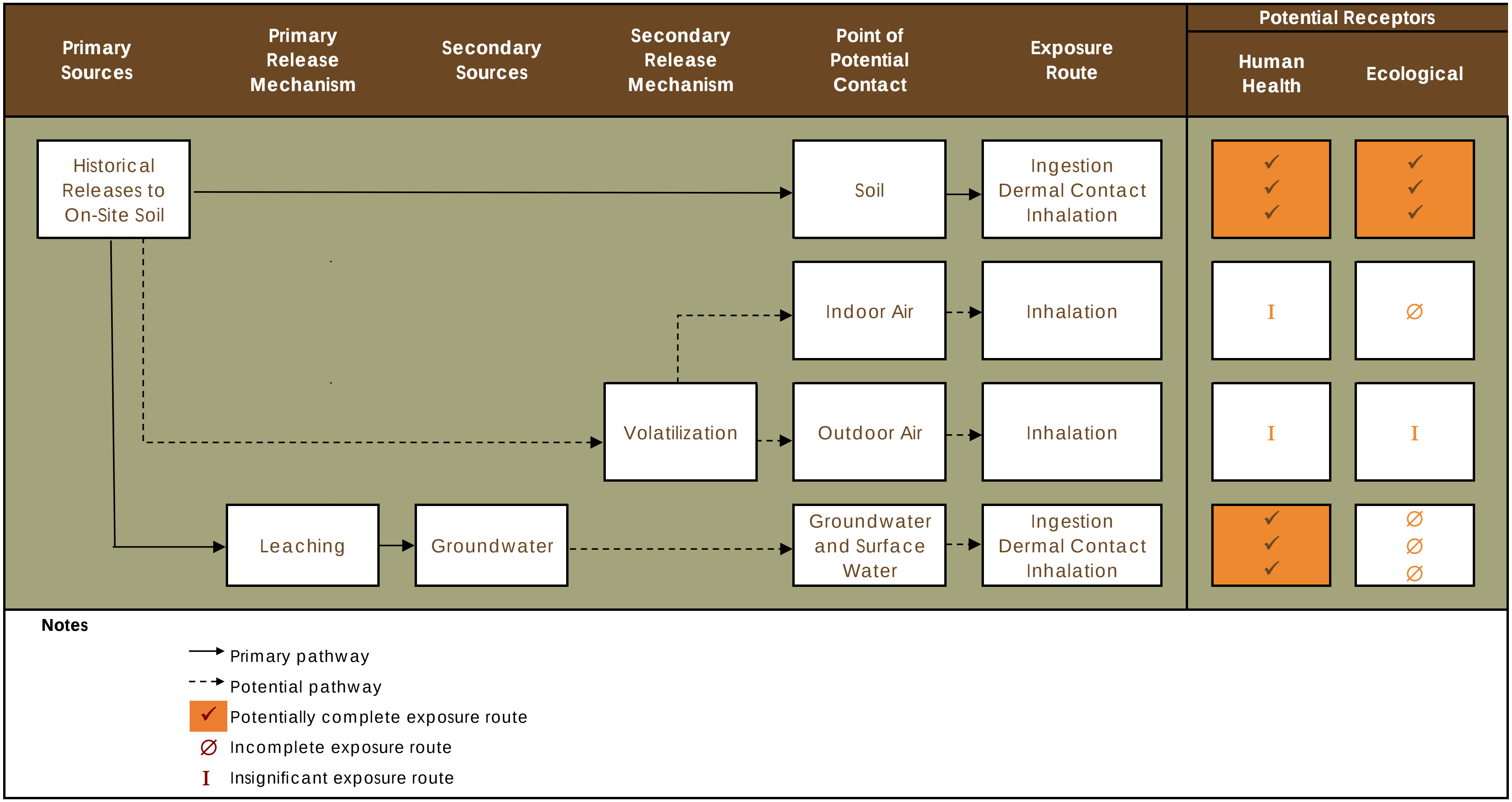

Figure 6-2
Soil Contamination Extent

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

▭	Property Boundary
▭	Feature of Interest
◯	Extent of Contamination
●	Soil Sample (2004-2024)
●	MTCA Method A CUL Exceedance
▨	Wetland
◌	Wetland Buffer (Seawall-generated)
◌	Wetland Buffer (Determined by RMC)
∿	Stream

Notes

Boring locations from 2023 and 2024 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
Estimated lateral extent of soil contamination is based on concentrations of soil samples greater than the MTCA Method A CUL.
Lateral extent of soil contamination was presumed to be the midpoint between sample locations with an exceedance and locations without an exceedance.
Extent of vertical contamination is estimated to extend up to 3 feet below ground surface.
CUL = cleanup level.
GPS = global positioning system.
MTCA = Model Toxics Control Act.
RMC = Roslyn Municipal Code.

0 100
Feet

Data Sources

Aerial photograph obtained from National Agriculture Imagery Program; tax lot data obtained from Kittitas County. Select features, including wetland and wetland buffers, obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Tables

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Table 2-1
Water Level Measurements
Forterra Roslyn No. 4 Mine
Roslyn, Washington

Well ID	Measuring Point Elevation (feet NAVD 88)	Date	Time	Depth to Water (feet)	Depth to Bottom (feet)	Groundwater Elevation (feet NADV 88)
MW-01	2212.88	9/20/2024	8:38	5.46	19.64	2207.42
		4/1/2025	15:40	1.12	19.65	2211.76
MW-02	2190.78	9/20/2024	8:52	8.42	19.78	2182.36
		4/1/2025	11:05	1.92	19.78	2188.86
MW-03	2211.67	9/20/2024	9:06	12.05	13.37	2199.62
		4/1/2025	13:35	7.70	13.35	2203.97

Notes

Depth to water and depth to bottom are measured from top of well casing.

ID = identification.

NAVD 88 = North American Verticle Datum of 1988.

Table 4-1
Soil Sample Descriptions
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Feature of Interest	Location ID	Recovery (%)	Sample Name	Collection Depth Interval (feet bgs)[a]	Lithologic Description[b]
Foundry	FO-DP-5	100	FO-DP-5-SB-0.5 FO-DP-5-SB-0.5-DUP	0-1	Sand with Silt and Gravel (SW-SM); dark brown; 10% fines; 80% sand, fine to coarse; 10% gravel, fine to medium; medium dense; coal present; dry.
			FO-DP-5-SB-1.5	1-2	Sand with Silt and Gravel (SW-SM); same as above. Ceramic fragments present at 1.3 feet; becomes moist at 1.5 feet; woody debris present at 1.8 feet.
	FO-DP-6	80	FO-DP-6-SB-0.5	0-1	Coal with Sand; dark gray; 80% coal and coal ash; 20% sand, fine to coarse; trace organic material; loose.
			FO-DP-6-SB-1.3	1-2	Sandy Coal; dark brown; 50% coal and coal ash; 10% fines; 40% sand, fine to coarse; loose.
	FO-DP-7	55	FO-DP-7-SB-0.3	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; loose; organic material present in upper 0.2 feet; coal present; dry.
			FO-DP-7-SB-1.1	1-2	Sand with Silt (SW-SM); same as above.
	FO-DP-8	60	FO-DP-8-SB-0.3	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; loose; low quality brick fragments present; coal present; dry.
			FO-DP-8-SB-1.1	1-2	Silty Sand (SM); same as above; areas of orange coloration; light gray ash present from 1.0 to 1.2 feet.
Power House	PH-DP-6	100	PH-DP-6-SB-0.5	0-1	Sand(SW); light gray and tan; 100% sand, fine to coarse; loose; organic material present in upper 0.1 feet; dry.
			PH-DP-6-SB-1.5	1-2	Sand(SW); same as above; becomes light gray at 1.6 feet.
	PH-DP-7	70	PH-DP-7-SB-0.3	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; loose; rootlets present; coal present; dry.
			PH-DP-7-SB-1.3	1-2	Sand with Silt (SW-SM); same as above.
	PH-DP-8	80	PH-DP-8-SB-0.4	0-1	Pulverized Brick and Sand; brownish-gray; 60% pulverized brick; 40% sand, fine to coarse; loose; organic material present in upper 0.1 feet; dry.
			PH-DP-8-SB-1.3	1-2	Pulverized Concrete; light gray; minor coal fragments present.
	PH-DP-9	80	PH-DP-9-SB-0.5	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; loose; rootlets present; coal present; wood at 0.8 feet; dry.
			PH-DP-9-SB-1.3	1-2	Sand with Silt (SW-SM); same as above.

Table 4-1
Soil Sample Descriptions
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Feature of Interest	Location ID	Recovery (%)	Sample Name	Collection Depth Interval (feet bgs)[(a)]	Lithologic Description[(b)]
Slag Pile	SP-DP-4	90	SP-DP-4-SB-0.5	0-1	Silty Sand (SM); dark brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; very loose; coal present; moist.
			SP-DP-4-SB-1.5	1-2	Silty Sand (SM); brown; 35% fines, nonplastic; 65% sand, fine to coarse; loose; orange mottling; moist.
	SP-DP-5	60	SP-DP-5-SB-0.4	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; coal present; dry.
			SP-DP-5-SB-1.2	1-2	Silty Sand (SM); same as above.
	SP-DP-6	80	SP-DP-6-SB-0.5 SP-DP-6-SB-0.5-DUP	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace gravel, fine to coarse, subangular to subrounded; trace rootlets; coal present; dry.
			SP-DP-6-SB-1.3	1-2	Silty Sand (SM); same as above.
	SP-DP-7	65	SP-DP-7-SB-0.4	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; coal present; dry.
			SP-DP-7-SB-1.2	1-2	Silty Sand (SM); same as above; fines increase to 30%.
	SP-DP-8	100	SP-DP-8-SB-0.5	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; loose; coal present; moist.
			SP-DP-8-SB-1.5	1-2	Silty Sand (SM); light brown; 20% fines, nonplastic; 80% sand, fine to medium; medium dense; coal present; moist.
	SP-DP-9	75	SP-DP-9-SB-0.5	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; very loose; ceramic fragments present; coal present; dry.
			SP-DP-9-SB-1.2	1-2	Silty Sand (SM); same as above; ceramics no longer present.
	SP-DP-10	80	SP-DP-10-SB-0.5	0-1	Silty Sand (SM); brown; 25% fines, nonplastic; 75% sand, fine to coarse; dense; coal present; dry.
			SP-DP-10-SB-1.3	1-2	Silty Sand (SM); same as above.
	SP-DP-11	85	SP-DP-11-SB-0.5	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; trace rootlets; coal present; dry.
			SP-DP-11-SB-1.4	1-2	Silty Sand (SM); same as above.

Table 4-1
Soil Sample Descriptions
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Feature of Interest	Location ID	Recovery (%)	Sample Name	Collection Depth Interval (feet bgs)[a]	Lithologic Description[b]
Transformer	TF-DP-3	90	TF-DP-3-SB-0.5	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; trace organics; loose; coal present; dry.
			TF-DP-3-SB-1.5	1-2	Sand with Silt (SW-SM); same as above; light brown.
	TF-DP-4	75	TF-DP-4-SB-0.4	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; trace organics; loose; coal fragments present; areas of orange coloration; dry.
			TF-DP-4-SB-1.3	1-2	Sand with Silt (SW-SM); same as above.
	TF-DP-5	65	TF-DP-5-SB-0.3	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.2 feet; coal present; dry.
			TF-DP-5-SB-1.2	1-2	Sand with Silt (SW-SM); same as above; pulverized red brick from 0.8 to 1.1 feet.
	TF-DP-6	80	TF-DP-6-SB-0.4	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.2 feet; coal present; dry.
			TF-DP-6-SB-1.3	1-2	Sand with Silt (SW-SM); same as above; larger coal fragments.
	TF-DP-7	80	TF-DP-7-SB-0.4	0-1	Sand (SW); grayish brown; 100% sand, fine to coarse; loose; coal present; light gray pulverized brick from 0.5 to 0.6 feet; dry.
			TF-DP-7-SB-1.3	1-2	Sand (SW); same as above.
	TF-DP-8	75	TF-DP-8-SB-0.4	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; coal present; dry.
			TF-DP-8-SB-1.3	1-2	Sand with Silt (SW-SM); same as above; coarse gravel at 1.1 to 1.2 feet.
	TF-DP-9	70	TF-DP-9-SB-0.3	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.1 feet; coal present; dry.
			TF-DP-9-SB-1.3	1-2	Sand with Silt (SW-SM); same as above; compacted sand fragments at 1.0 feet.
	TF-DP-10	65	TF-DP-10-SB-0.3	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.2 feet; coal present; pulverized red brick from 0.6 to 0.7 feet; dry.
			TF-DP-10-SB-1.2	1-2	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; loose; coal present; dry.
	TF-DP-11	95	VM-DP-11-SB-0.5	0-1	Sand with Silt (SW-SM); dark brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.2 feet; coal present; dry.
			VM-DP-11-SB-1.5	1-2	Sand with Silt (SW-SM); same as above; little to no coal present.
	TF-DP-12	90	VM-DP-12-SB-0.5	0-1	Sand (SW); grayish brown; 100% sand, fine to coarse; loose; coal present; dry.
			VM-DP-12-SB-1.5	1-2	Sand with Silt and Gravel (SW-SM); grayish brown; 10% fines; 80% sand, fine to coarse; 10% gravel, fine to medium; loose; coal present; dry; becomes moist at 1.7 feet.

Table 4-1
Soil Sample Descriptions
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Feature of Interest	Location ID	Recovery (%)	Sample Name	Collection Depth Interval (feet bgs)[(a)]	Lithologic Description[(b)]
Vehicle Maintenance	VM-DP-5	100	VM-DP-5-SB-0.5	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; coal present; dry.
			VM-DP-5-SB-1.5	1-2	Silty Sand (SM); tannish brown; 20% fines, nonplastic; 80% sand, fine to coarse; medium dense; coal present; dry.
	VM-DP-6	85	VM-DP-6-SB-0.5 VM-DP-6-SB-0.5-DUP	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; coal present; dry.
			VM-DP-6-SB-1.5	1-2	Silty Sand (SM); tannish brown; 20% fines, nonplastic; 80% sand, fine to coarse; medium dense; coal present; dry.
	VM-DP-7	80	VM-DP-7-SB-0.4	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; coal present; dry.
			VM-DP-7-SB-1.3	1-2	Coal; black; 90% coal and coal ash; 10% sand; tan, brick-like substance at 1.6 feet.
	VM-DP-8	100	VM-DP-8-SB-0.5	0-1	Sand with Silt and Coal (SW-SM); blackish brown; 10% fines; 70% sand; fine to coarse; 20% coal; loose; dry.
			VM-DP-8-SB-1.5	1-2	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; medium dense; coal present; dry to moist.
	VM-DP-9	85	VM-DP-9-SB-0.5	0-1	Sand with Silt (SW-SM); brown; 10% fines; 90% sand, fine to coarse; loose; organics in upper 0.2 feet; coal present; dry.
			VM-DP-9-SB-1.5	1-2	Silty Sand (SM); tannish brown; 20% fines, nonplastic; 80% sand, fine to coarse; medium dense; coal present; dry.
	VM-DP-10	85	VM-DP-10-SB-0.5	0-1	Silty Sand (SM); brown; 20% fines, nonplastic; 80% sand, fine to coarse; medium dense; coal and organics present in up 0.4 feet; dry.
			VM-DP-10-SB-1.4	1-2	Silty Sand (SM); tan; 40% fines, nonplastic; 60% sand, fine to coarse; dense; dry.

Notes

Depths are relative to feet below ground surface.

% = percent.

bgs = below ground surface.

ID = identification.

[(a)] All borings were advanced to 2 feet below ground surface. Samples were collected within the specified depth intervals. Not all samples were analyzed.

[(b)] Lithologic descriptions are representative of the upper and lower halves of the recovered core interval.

Table 5-1
Summary of Soil Analytical Results
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Total Metals (mg/kg)								TCLP Metals (mg/L)
				Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Lead
MTCA Method A, Unrestricted Land Use:(a)(1)				20	2	2,000(b)	NV	250	2	NV	NV	NV
MTCA Method B, Noncancer:(a)(1)				NA	NA	NA	3,200	NV	NV	1,600	24,000	NV
MTCA Method B, Cancer:(a)(1)				NA	NV	NV	NV	NV	NV	NV	NV	NV
EPA Hazardous Waste Regulatory Level:(c)				NV	NV	NV	NV	NV	NV	NV	NV	5
Washington State Background Metals, Yakima Basin:(2)				5	1	38	27	11	0.05	46	79	NV
Former Foundry												
FO-DP-5	FO-DP-5-SB-0.5	09/19/2024	0.5	23	4.3	40	240	2,600	1.8	89	1,600	4.4
	FO-DP-5-SB-0.5-DUP	09/19/2024	0.5	31	5.6	39	220	2,000	1.4	86	1,800	--
	FO-DP-5-SB-1.5	09/19/2024	1.5	69	15	--	420	9,700	1 U	140	7,800	9.7
FO-DP-6	FO-DP-6-SB-0.5	09/19/2024	0.5	6.8	1 U	13	55	200	1 U	23	180	0.5 U
	FO-DP-6-SB-1.3	09/19/2024	1.3	--	--	--	--	200	--	--	150	0.5 U
FO-DP-8	FO-DP-8-SB-0.3	09/19/2024	0.3	15	3.0	--	--	1,000	--	--	--	0.5 U
	FO-DP-8-SB-1.1	09/19/2024	1.1	--	5.1	--	--	2,400	--	--	--	1.3
Former Powerhouse												
PH-DP-6	PH-DP-6-SB-0.5	09/19/2024	0.5	2.2	1 U	7.7	6.3	5.4	1 U	7.7	49	--
PH-DP-7	PH-DP-7-SB-0.3	09/19/2024	0.3	8.8	1 U	10	49	13	1 U	23	23	--
PH-DP-8	PH-DP-8-SB-0.4	09/19/2024	0.4	4.0	1 U	7.7	30	81	1 U	8.6	190	--
	PH-DP-8-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	16	--
Slag Pile												
SP-DP-4	SP-DP-4-SB-0.5	09/19/2024	0.5	4.6	1 U	11	57	13	1 U	28	25	--
SP-DP-5	SP-DP-5-SB-0.4	09/19/2024	0.4	7.7	1.0	10	53	85	1 U	23	120	--
SP-DP-6	SP-DP-6-SB-0.5	09/19/2024	0.5	3.8	1 U	20	20	28 J	1 U	23	53	--
	SP-DP-6-SB-0.5-DUP	09/19/2024	0.5	4.4	1 U	24	28	53 J	1 U	26	61	--
SP-DP-7	SP-DP-7-SB-0.4	09/19/2024	0.4	4.4	1 U	22	20	19	1 U	18	52	--

Table 5-1
Summary of Soil Analytical Results
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Total Metals (mg/kg)								TCLP Metals (mg/L)
				Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Lead
MTCA Method A, Unrestricted Land Use:(a)(1)				20	2	2,000(b)	NV	250	2	NV	NV	NV
MTCA Method B, Noncancer:(a)(1)				NA	NA	NA	3,200	NV	NV	1,600	24,000	NV
MTCA Method B, Cancer:(a)(1)				NA	NV	NV	NV	NV	NV	NV	NV	NV
EPA Hazardous Waste Regulatory Level:(c)				NV	NV	NV	NV	NV	NV	NV	NV	5
Washington State Background Metals, Yakima Basin:(2)				5	1	38	27	11	0.05	46	79	NV
Former Transformers												
TF-DP-3	TF-DP-3-SB-0.5	09/19/2024	0.5	7.5	1 U	17	28	42	1 U	20	57	--
TF-DP-4	TF-DP-4-SB-0.4	09/19/2024	0.4	22	1 U	18	51	61	1 U	24	90	--
	TF-DP-4-SB-1.3	09/19/2024	1.3	34	--	--	--	--	--	--	--	--
TF-DP-5	TF-DP-5-SB-0.3	09/19/2024	0.3	7.9	1 U	10	37	26	1 U	20	42	--
TF-DP-6	TF-DP-6-SB-0.4	09/19/2024	0.4	5.0	1 U	9.3	44	24	1 U	17	34	--
TF-DP-8	TF-DP-8-SB-0.4	09/19/2024	0.4	5.4	--	--	--	--	--	--	--	--
TF-DP-9	TF-DP-9-SB-0.3	09/19/2024	0.3	7.1	--	--	--	--	--	--	--	--
Vehicle Maintenance												
VM-DP-5	VM-DP-5-SB-0.5	09/19/2024	0.5	3.8	1 U	13	28	99 J	1 U	14	100	--
VM-DP-6	VM-DP-6-SB-0.5	09/19/2024	0.5	5.0	1 U	13	38	110	1 U	15	130	--
	VM-DP-6-SB-0.5-DUP	09/19/2024	0.5	4.1	1 U	12	31	180	1 U	13	130	0.5 U
	VM-DP-6-SB-1.5	09/19/2024	1.5	--	--	--	--	75 J	--	--	--	--
VM-DP-7	VM-DP-7-SB-0.4	09/19/2024	0.4	8.3	1 U	8.7	47	44	1 U	16	34	--

Table 5-1
Summary of Soil Analytical Results
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Notes

Shading (color key below) indicates values that exceed screening criteria; non-detects (U) were not compared with screening criteria.

MTCA Method A, Unrestricted Land Use

EPA Hazardous Waste Regulatory Level

Washington State background metals values are shown for reference only and are not shaded for exceedances.

-- = not analyzed.

ft bgs = feet below ground surface.

J = result is estimated.

mg/kg = milligrams per kilogram.

mg/L = milligrams per liter.

MTCA = Model Toxics Control Act.

NA = not applicable.

NV = no value.

TCLP = toxicity characteristic leaching procedure.

U = result is non-detect at the method reporting limit.

(a) When MTCA Method A value is available, value is not screened to MTCA Method B.

(b) Screening level for trivalent chromium.

(c) Toxicity characteristic regulatory limit from EPA 40 CFR Part 261.24 Table 1.

References

(1) Ecology. 2025. *Cleanup Levels and Risk Calculation (CLARC) table.* Washington State Department of Ecology, Toxics Cleanup Program. February.

(2) Ecology. 1994. *Natural Background Soil Metals Concentrations in Washington State.* Publication 94-115. Washington State Department of Ecology. October.

Table 5-2
Summary of Groundwater Analytical Results
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location:	MTCA Method A(a)(1)	MTCA Method B(a)(1)		Washington State Background Arsenic, Yakima Basin(2)	MW-01			MW-02			MW-03	
Sample Name:					MW-01-GW-15.0	MW-01-GW-15.0-DUP	MW-01-GW-15.0	MW-02-GW-15.0	MW-02-GW-15.0	MW-02-GW-15.0-DUP	MW-03-GW-13.0	MW-03-GW-11.5
Collection Date:		Cancer	Noncancer		09/20/2024	09/20/2024	04/01/2025	09/20/2024	04/01/2025	04/01/2025	09/20/2024	04/01/2025
Collection Depth (ft bgs):					15.0	15.0	15.0	15.0	15.0	15.0	13.0	11.5
Total Metals (ug/L)												
Arsenic	5	NA	NA	6	2.9	2.5	2.3	35	54	55	1 U	1.7
Cadmium	5	NV	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chromium	50	NV	NV	NA	1.6 J-	1.6 J-	1 U	2 U	4 U	4 U	2.5	16
Copper	NV	NV	640	NA	5 UJ	5 UJ	5 U	10 U	20 U	20 U	5 U	8.3
Lead	15	NV	NV	NA	1 U	1 U	1 U	1 U	1 U	1 U	2.5	12
Mercury	2	NV	NV	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Nickel	NV	NV	320	NA	2 UJ	2 UJ	2 U	4 U	8 U	4 U	9.8	28
Zinc	NV	NV	4,800	NA	5 UJ	5 UJ	5 U	10 U	20 U	20 U	8.1	30
Dissolved Metals—Field-Filtered (ug/L)												
Arsenic	5	NA	NA	6	2.5	2.5	2.1	38	50	52	1 U	1 U
Cadmium	5	NV	NA	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chromium	50	NV	NV	NA	2 U	2 U	1 U	2 U	2 U	4 U	1 U	1 U
Copper	NV	NV	640	NA	10 UJ	10 UJ	5 U	25 U	10 U	20 U	5 U	5 U
Lead	15	NV	NV	NA	1 U	1 U	1 U	1 U	1 U	1 U	1.6	1 U
Mercury	2	NV	NV	NA	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Nickel	NV	NV	320	NA	2 UJ	2 UJ	2 U	4 U	4 U	4 U	8.3	22
Zinc	NV	NV	4,800	NA	10 UJ	10 UJ	5 U	10 U	10 U	20 U	5 U	7.9
Dissolved Metals—Laboratory-Filtered (ug/L)												
Arsenic	5	NA	NA	6	1 UJ	1 UJ	2.2	1.5 J	13	14	1 UJ	1 U
Cadmium	5	NV	NA	NA	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ	1 U
Chromium	50	NV	NV	NA	1 UJ	1 UJ	1 U	2 UJ	2 U	1 U	1 UJ	1 U
Copper	NV	NV	640	NA	5 UJ	5 UJ	5 U	10 UJ	10 U	5 U	5 UJ	5 U
Lead	15	NV	NV	NA	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ	1 U
Mercury	2	NV	NV	NA	1 UJ	1 UJ	1 U	1 UJ	1 U	1 U	1 UJ	1 U
Nickel	NV	NV	320	NA	2 UJ	2 UJ	2 U	4 UJ	4 U	2 U	9.6 J	22
Zinc	NV	NV	4,800	NA	5 UJ	5 UJ	5 U	10 UJ	10 U	5 U	5 UJ	7.5

Table 5-2
Summary of Groundwater Analytical Results
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Notes

Shading (color key below) indicates values that exceed screening criteria; non-detects (U and UJ) were not compared with screening criteria.

▨ MTCA Method A and Washington State Background Arsenic, Yakima Basin

ft bgs = feet below ground surface.

J- = result is estimated, but the result may be biased low.

MTCA = Model Toxics Control Act.

NA = not applicable.

NV = no value.

U = result is non-detect at the method reporting limit.

ug/L = micrograms per liter.

UJ = result is non-detect with an estimated method reporting limit.

(a)When MTCA Method A value is available, value is not screened to MTCA Method B.

Reference

(1)Ecology. 2025. Cleanup Levels and Risk Calculation (CLARC) table. Washington State Department of Ecology, Toxics Cleanup Program. February.

(2)Ecology. 2022. Natural Background Groundwater Arsenic Concentrations in Washington State, Publication No. 14-09-044. Washington State Department of Ecology. January.

Appendix A

Field Photographs

MAUL
FOSTER
ALONGI

Photographs

Project Name: Roslyn No. 4 Mine Supplemental Investigation
Project Number: M1122.05.006
Location: Roslyn, Washington
Date: September 2024 and April 2025

Photo No. 1.

Description

Representative photo of soil on the Property. Core barrel collected from MW-02 location.

Photo No. 2.

Description

Preparation for well development at MW-01.

Photographs

Project Name: Roslyn No. 4 Mine Supplemental Investigation
Project Number: M1122.05.006
Location: Roslyn, Washington
Date: September 2024 and April 2025

Photo No. 3.

Description

Red brick material observed in soil from core barrel at PH-DP-8 at approximately 0.5 feet below the ground surface.

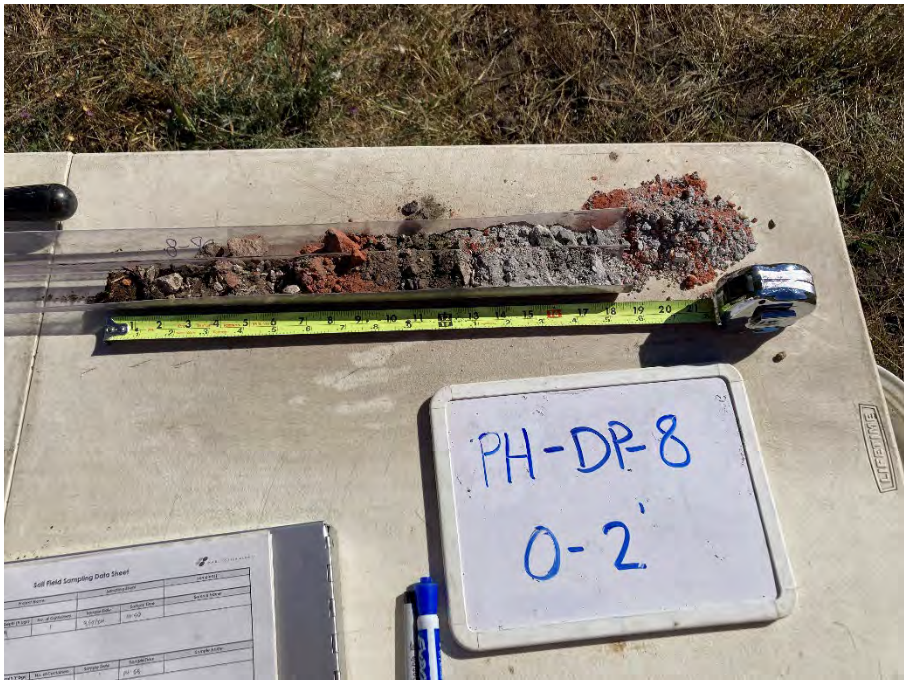

Photo No. 4.

Description

Coal observed in soil from core barrel at VM-DP-7 between approximately 1 to 2 feet below the ground surface.

Photographs

Project Name: Roslyn No. 4 Mine Supplemental Investigation
Project Number: M1122.05.006
Location: Roslyn, Washington
Date: September 2024 and April 2025

Photo No. 5.

Description

Drilling in progress at boring locations associated with former transformers on the Property, looking southeast.

Photo No. 6.

Description

Groundwater sampling in progress at MW-03 during September 2024 sampling event.

Photo No. 7.

Description

Vicinity of MW-01 location during April 2025 groundwater sampling.

Photo No. 8.

Description

Groundwater sampling in progress at MW-03 during April 2024 groundwater sampling.

Photographs

Project Name: Roslyn No. 4 Mine Supplemental Investigation
Project Number: M1122.05.006
Location: Roslyn, Washington
Date: September 2024 and April 2025

Photo No. 9.

Description

Labeled investigation-derived waste, 55-gallon drums located on the southwest portion of the Property.

Appendix B

Boring Logs

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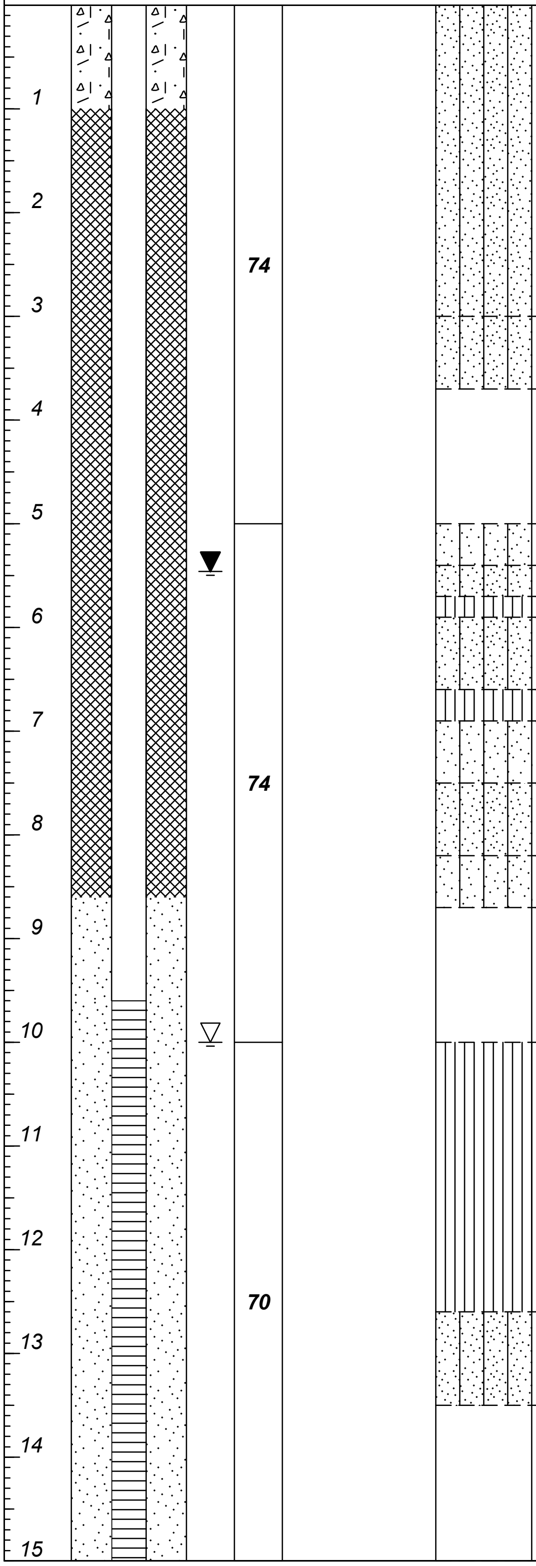
Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	**MW-01**	**1 of 2**

Project Name	**Forterra Roslyn No. 4 Mine**	TOC Elevation (feet)	**2212.88**
Project Location	**205 E Dakota Ave, Roslyn, WA**	Surface Elevation (feet)	**2213.2**
Start/End Date	**9/18/2024 to 9/18/2024**	Northing	**688982.0**
Driller/Equipment	**Anderson Environmental Contracting, LLC/Geoprobe 7822DT**	Easting	**1519476.4**
Geologist/Engineer	**B. Murphy**	Total Depth of Borehole	**20.0 feet**
Sample Method	**Core Barrel**	Outer Hole Diam	**4.25 inch**

Depth (feet, bgs)	Well Details	Water Levels	Sample Data: Percent Recovery	Sample Data: Sample ID	Lithologic Column	Soil Description



0.0 to 3.0 feet: SILTY SAND (SM); tannish brown; 20% fines, nonplastic; 80% sand, fine to coarse; loose; pine needles in upper 0.1 feet; no odor; dry.

@ 2.8 feet: Becomes moist.

3.0 to 3.7 feet: SILTY SAND (SM); brown; 40% fines, low plasticity; 60% sand, fine to coarse; medium dense; no odor; moist.

3.7 to 5.0 feet: NO RECOVERY.

5.0 to 5.4 feet: SANDY SILT (ML); brown; 60% fines, medium plasticity; 40% sand, fine to coarse; firm; orange mottling; no odor; moist.

5.4 to 5.7 feet: SILTY SAND (SM); brown; 40% fines, low plasticity; 60% sand, fine to coarse; medium dense; orange mottling; no odor; moist.

5.7 to 5.9 feet: SILT (ML); brown; 90% fines, medium plasticity; 10% sand, fine; very stiff; orange mottling; no odor; moist.

5.9 to 6.6 feet: SILTY SAND (SM); brown; 40% fines, low plasticity; 60% sand, fine to coarse; medium dense; orange mottling; no odor; moist.

@ 6.2 to 6.3 feet: Layer of 90% fines, medium plasticity; 10% sand, fine; very stiff.

6.6 to 6.9 feet: SILT (ML); brown; 90% fines, medium plasticity; 10% sand, fine; very stiff; orange mottling; no odor; moist.

6.9 to 7.5 feet: SANDY SILT (ML); brown; 70% fines, medium plasticity; 30% sand, fine to medium; firm; no odor; moist.

7.5 to 8.2 feet: SILTY SAND (SM); brown; 30% fines, low plasticity; 70% sand, fine to coarse; dense; no odor; moist.

8.2 to 8.7 feet: SANDY SILT (ML); brown; 70% fines, medium plasticity; 30% sand, fine to medium; firm; no odor; moist.

8.7 to 10.0 feet: NO RECOVERY.

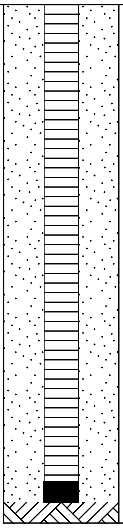
10.0 to 12.6 feet: SILT WITH SAND (ML); gray; 80% fines, medium plasticity; 20% sand, fine to medium; soft; no odor; moist to wet.

12.6 to 13.5 feet: SILTY SAND (SM); gray; 30% fines, low plasticity; 70% sand, fine to coarse; medium dense; no odor; moist to wet.

13.5 to 15.0 feet: NO RECOVERY.

Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	**MW-01**	**2 of 2**

Depth (feet, bgs)	Well Details	Water Levels	Percent Recovery	Sample ID	Lithologic Column	Soil Description
16 17			**100**	**MW-01-GW-15.0** **MW-01-GW-15.0-DUP**		15.0 to 17.2 feet: SANDY SILT (ML); gray; 70% fines, medium plasticity; 30% sand, fine to coarse; soft; no odor; moist to wet.
18						17.2 to 18.7 feet: SILTY SAND (SM); gray; 30% fines, low plasticity; 70% sand, fine to coarse; dense; no odor; moist.
19						18.7 to 19.2 feet: SANDY SILT (ML); gray; 70% fines, medium plasticity; 30% sand, fine to coarse; very stiff; no odor; moist.
20						19.2 to 20.0 feet: SILTY SAND (SM); brown; 40% fines, nonplastic; 60% sand, fine to coarse; very dense; no odor; moist.

Total Depth = 20.0 feet bgs

NOTES:

1) Depths are relative to feet bgs. 2) bgs = below ground surface. 3) ID = identification. 4) PVC = polyvinyl chloride. 5) TOC = top of casing.

Borehole Completion Details
0 to 20.0 feet: 4.25-inch-diameter borehole.
0 to 1.0 feet: Concrete.
1.0 to 8.1 feet: Bentonite chips hydrated with potable water.
8.1 to 19.6 feet: 12x20 silica sand filter pack.
19.6 to 20.0: Slough.

Monitoring Well Completion Details
Washington State Department of Ecology Well No. BQU487.
Traffic grade, flush-mounted monitoring well monument.
0 to 9.6 feet bgs: 2-inch diameter, schedule 40, PVC blank riser pipe.
9.6 to 19.6 feet bgs: 2-inch diameter, schedule 40, 0.010-inch machine slot PVC well screen with threaded PVC well cap.

∇ Soil becomes wet at approximately 10.0 feet as observed in core sample at time of drilling. ▼ Water level measured at 5.46 feet below TOC on 9/20/2024 prior to sampling.

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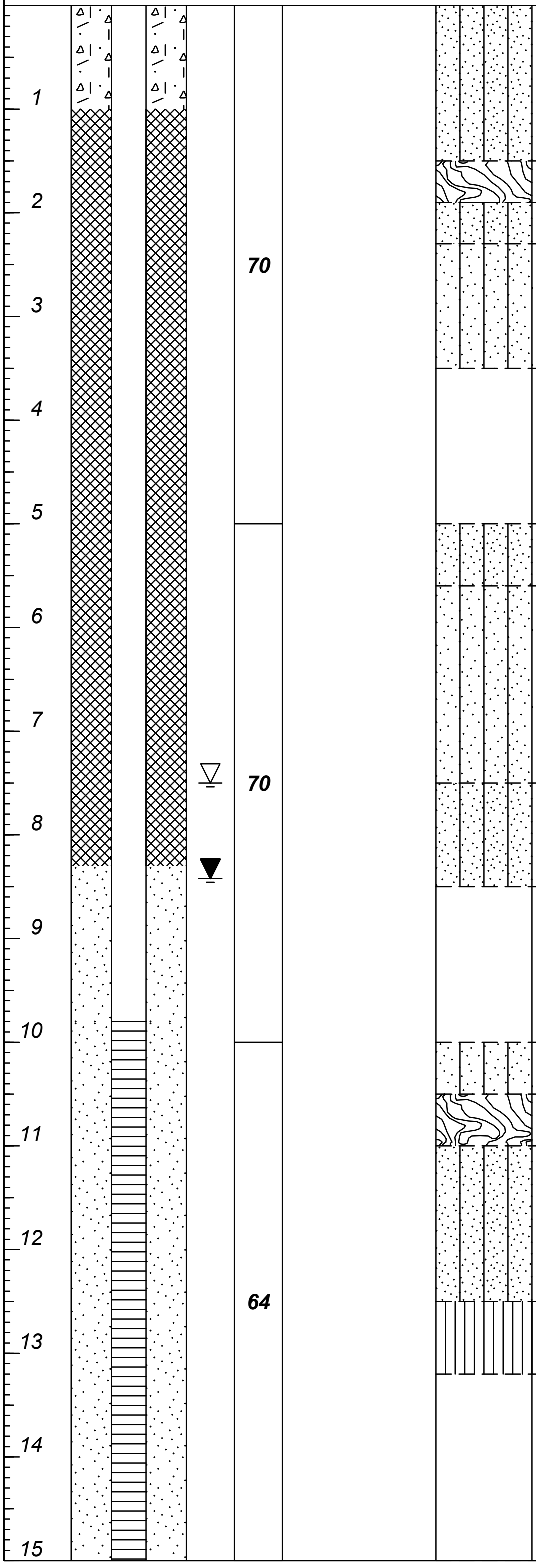
Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	**MW-02**	**1 of 2**

Project Name	**Forterra Roslyn No. 4 Mine**	TOC Elevation (feet)	**2190.78**
Project Location	**205 E Dakota Ave, Roslyn, WA**	Surface Elevation (feet)	**2190.9**
Start/End Date	**9/18/2024 to 9/18/2024**	Northing	**688298.4**
Driller/Equipment	**Anderson Environmental Contracting, LLC/Geoprobe 7822DT**	Easting	**1519203.7**
Geologist/Engineer	**B. Murphy**	Total Depth of Borehole	**20.0 feet**
Sample Method	**Core Barrel**	Outer Hole Diam	**4.25 inch**

Depth (feet, bgs) | Well Details | Water Levels | Sample Data: Percent Recovery, Sample ID | Lithologic Column | Soil Description



0.0 to 1.5 feet: SILTY SAND WITH GRAVEL (SM); brownish gray; 20% fines, nonplastic; 70% sand, fine to coarse; 10% gravel, fine to medium, subangular to subrounded; trace organic material (rootlets, grass); loose; no odor; dry.

1.5 to 1.9 feet: WOODY DEBRIS; dark brown; 100% organic material (woody debris); loose; no odor; dry.

1.9 to 2.3 feet: SILTY SAND (SM); dark gray; 40% fines, low plasticity; 60% sand, fine to medium; medium dense; no odor; moist.

2.3 to 3.5 feet: SANDY SILT (ML); gray; 60% fines, low plasticity; 40% sand, fine to medium; firm; orange mottling; no odor; moist.

@ 2.9 feet: Coal fragments present.

3.5 to 5.0 feet: NO RECOVERY.

5.0 to 5.6 feet: SILTY SAND (SM); brown; 30% fines, nonplastic; 70% sand, fine to coarse; medium-dense; no odor; moist.

5.6 to 7.5 feet: SANDY SILT (ML); brown; 60% fines, medium plasticity; 40% sand, fine to coarse; trace gravel, fine, subangular to subrounded; firm; no odor; moist.

@ 6.3 feet: Coal fragments present.

@ 6.8 feet: Coal fragments present.

@ 7.2 feet: Fines increase to 80%; becomes soft.

7.5 to 8.5 feet: SILTY SAND (SM); brown; 30% fines, nonplastic; 70% sand, fine to coarse; dense; black coal fragments present; no odor; moist to wet.

8.5 to 10.0 feet: NO RECOVERY.

10.0 to 10.5 feet: SANDY SILT (ML); gray; 60% fines, medium plasticity; 40% sand, fine to coarse; trace gravel, fine, subangular to subrounded; firm; no odor; moist.

10.5 to 11.0 feet: WOODY DEBRIS; dark brown; 100% organic material (woody debris); loose; no odor; dry.

11.0 to 12.5 feet: SILTY SAND (SM); gray; 40% fines, low plasticity; 60% sand, medium to coarse; dense; no odor; moist.

@ 11.9 feet: Coal fragments present.

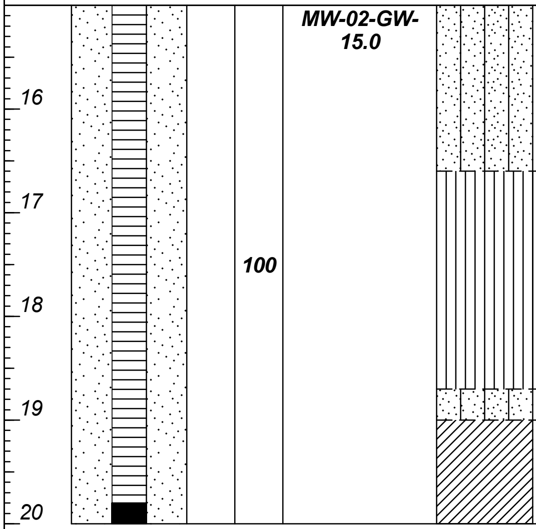
12.5 to 13.2 feet: SILT WITH SAND (ML); gray; 80% fines, medium plasticity; 20% sand, fine to medium; soft; organic-like odor; moist.

13.2 to 15.0 feet: NO RECOVERY.

Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	**MW-02**	**2 of 2**

Depth (feet, bgs)	Well Details	Water Levels	Sample Data: Percent Recovery	Sample Data: Sample ID	Lithologic Column	Soil Description
15.0–20.0			**100**	**MW-02-GW-15.0**		



15.0 to 16.6 feet: SILTY SAND WITH GRAVEL (SM); brown; 30% fines, nonplastic; 60% sand, coarse; 10% gravel, fine, subangular to subrounded; very loose; no odor; wet.

16.6 to 18.7 feet: SILT WITH SAND (ML); gray; 80% fines, medium plasticity; 20% sand, fine to medium; soft; organic-like odor; wet.

@ 17.7 feet: Becomes firm and moist.

@ 18.0 feet: Sand increases to 30%.

18.7 to 19.0 feet: SILTY SAND (SM); gray; 40% fines, low plasticity; 60% sand, medium to coarse; dense; no odor; moist to wet.

19.0 to 20.0 feet: CLAY WITH SAND (CL); gray; 80% fines, high plasticity; 20% sand, fine to medium; firm; no odor; moist.

Total Depth = 20.0 feet bgs

NOTES:

1) Depths are relative to feet bgs. 2) bgs = below ground surface. 3) ID = identification. 4) PVC = polyvinyl chloride. 5) TOC = top of casing.

Borehole Completion Details
0 to 20.0 feet: 4.25-inch-diameter borehole.
0 to 1.0 feet: Concrete.
1.0 to 8.8 feet: Bentonite chips hydrated with potable water.
8.8 to 19.8 feet: 12x20 silica sand filter pack.
19.8 to 20.0: Slough.

Monitoring Well Completion Details
Washington State Department of Ecology Well No. BQU488.
Traffic grade, flush-mounted monitoring well monument.
0 to 9.8 feet bgs: 2-inch diameter, schedule 40, PVC blank riser pipe.
9.8 to 19.8 feet bgs: 2-inch diameter, schedule 40, 0.010-inch machine slot PVC well screen with threaded PVC well cap.

⊻ Soil becomes wet at approximately 7.5 feet as observed in core sample at time of drilling. ▼ Water level measured at 8.42 feet below TOC on 9/20/2024 prior to sampling.

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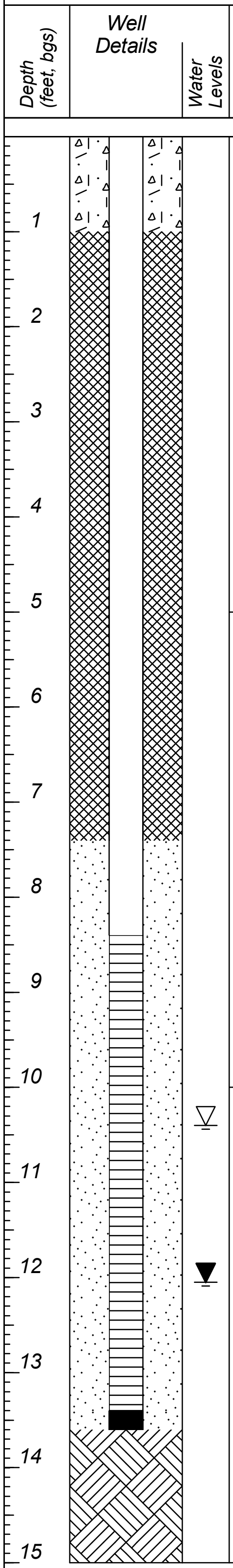
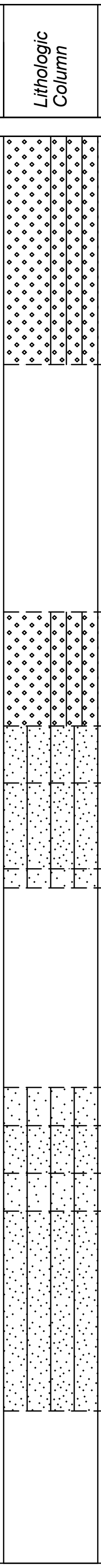
Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	**MW-03**	**1 of 2**

Project Name	**Forterra Roslyn No. 4 Mine**	TOC Elevation (feet)	**2211.67**
Project Location	**205 E Dakota Ave, Roslyn, WA**	Surface Elevation (feet)	**2211.7**
Start/End Date	**9/18/2024 to 9/18/2024**	Northing	**688860.7**
Driller/Equipment	**Anderson Environmental Contracting, LLC/Geoprobe 7822DT**	Easting	**1518724.7**
Geologist/Engineer	**B. Murphy**	Total Depth of Borehole	**15.0 feet**
Sample Method	**Core Barrel**	Outer Hole Diam	**4.25 inch**



Sample Data: Percent Recovery	Sample Data: Sample ID	Soil Description
48		0.0 to 2.4 feet: GRAVELLY SAND WITH SILT (SW-SM); brown; 10% fines, nonplastic; 70% sand, fine to coarse; 20% gravel, fine to medium, subangular to subrounded; loose; trace rootlets in upper 0.2 feet; no odor; dry. @ 1.2 feet: Coal fragments present. @ 2.4 feet: Rock.
		2.4 to 5.0 feet: NO RECOVERY.
58		5.0 to 6.2 feet: GRAVELLY SAND WITH SILT (SW-SM); brown; 10% fines, nonplastic; 70% sand, fine to coarse; 20% gravel, fine to medium, subangular to subrounded; loose; coal fragments present; no odor; dry.
		6.2 to 6.8 feet: SILTY SAND WITH GRAVEL (SM); brown; 30% fines, nonplastic; 60% sand, fine to coarse; 10% gravel, fine to medium, subangular to subrounded; dense; coal fragments present; no odor; moist.
		6.8 to 7.7 feet: SILTY SAND (SM); brown; 30% fines, low plasticity; 70% sand, fine to medium; medium dense; no odor; moist.
		7.7 to 7.9 feet: SANDY SILT (ML); gray; 60% fines, medium plasticity; 40% sand, fine to medium; firm; no odor; moist. @ 7.8 feet: Black coal substance.
		7.9 to 10.0 feet: NO RECOVERY.
68		10.0 to 10.4 feet: SANDY SILT (ML); gray; 60% fines, medium plasticity; 40% sand, fine to medium; soft; orange mottling; no odor; moist.
		10.4 to 10.9 feet: SILTY SAND (SM); gray; 35% fines, medium plasticity; 65% sand, fine to coarse; medium dense; no odor; wet.
		10.9 to 11.3 feet: SANDY SILT (ML); brown; 60% fines, low plasticity; 40% sand, fine to coarse; firm; no odor; moist. @ 11.1 feet: Pulverized red brick.
	MW-03-GW-13.0	11.3 to 13.4 feet: SILTY SAND (SM); gray; 20% fines, nonplastic; 80% sand, medium to coarse; very dense; no odor; dry to low moisture. @ 12.5 to 13.0 feet: Becomes light gray.
		13.4 to 15.0 feet: NO RECOVERY.



Total Depth = 15.0 feet bgs

Geologic Borehole Log

Project Number	Well Number	Sheet
M1122.05.006	***MW-03***	***2 of 2***

NOTES:

1) Depths are relative to feet bgs. 2) bgs = below ground surface. 3) ID = identification. 4) PVC = polyvinyl chloride. 5) TOC = top of casing.

Borehole Completion Details
0 to 15.0 feet: 4.25-inch-diameter borehole.
0 to 1.0 feet: Concrete.
1.0 to 7.4 feet: Bentonite chips hydrated with potable water.
7.4 to 13.4 feet: 12x20 silica sand filter pack.
13.4 to 15.0: Slough.

Monitoring Well Completion Details
Washington State Department of Ecology Well No. BQU489.
Traffic grade, flush-mounted monitoring well monument.
0 to 8.4 feet bgs: 2-inch diameter, schedule 40, PVC blank riser pipe.
8.4 to 13.4 feet bgs: 2-inch diameter, schedule 40, 0.010-inch machine slot PVC well screen with threaded PVC well cap.

∇ *Soil becomes wet at approximately 10.4 feet as observed in core sample at time of drilling.* ▼ *Water level measured at 12.05 feet below TOC on 9/20/2024 prior to sampling.*

Appendix C

Well Development Forms

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Well Development Field Form

MAUL FOSTER ALONGI

Project No.: M1122.05.006	Date: 9/19/2024
Project Location: Roslyn, WA	Well ID: MW-01
Project Name: Roslyn #4 Mine	Initial DTB: 19.65 Final DTB: 19.65
MFA Staff Name: F. Bellows	Initial DTW: 5.40 Final DTW: 18.9
Development Method: Surge Bailer and Peristaltic Pump	Well Casing Vol.: 2.32
Total Water Purged: 11.0 gal	Casing Diameter: 2 inches

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Time	Purge Vol. (gal)	Pump Rate (L/min)	Turbidity (NTUs)	pH	Temp. (°C)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	DTW (ft)	Comments
12:10	0	--	--	--	--	--	--	--	--	Begin surging with bailer.
12:22	0	--	--	--	--	--	--	--	--	Complete surging. Begin purging with bailer.
12:30	3.0	--	OR	--	--	--	--	--	17.6	Complete purging with bailer. Extremely turbid.
12:40	3.0	0.3	OR	--	--	--	--	--	14.4	Begin purging with peristaltic pump.
13:07	5.0	0.3	OR	--	--	--	--	--	16.0	Continue purging with peristaltic pump.
13:10	5.2	0.3	792	6.44	13.4	690	--	--	16.5	Continue purging with peristaltic pump.
13:20	6.0	0.3	426	6.35	12.3	380	--	--	17.4	Continue purging with peristaltic pump.
13:30	7.0	0.3	OR	6.33	11.6	310	--	--	18.8	Pause purging. Wait for well to recharge.
13:50	7.0	--	--	--	--	--	--	--	13.8	Restart purging with peristaltic pump.
14:05	8.5	0.3	65.0	6.40	12.4	350	--	--	16.4	Continue purging with peristaltic pump.
14:20	9.5	0.3	99.0	6.38	12.0	290	--	--	18.5	Continue purging with peristaltic pump.
14:32	10.5	0.3	739	6.43	12.3	320	--	--	19.2	Continue purging with peristaltic pump.
14:42	10.7	0.3	69.0	6.42	11.7	290	--	--	18.8	Continue purging with peristaltic pump.
14:50	11.0	0.3	43.7	6.40	11.8	300	--	--	19.1	Complete well development after purging about 5 casing volumes.

Notes

Depths are relative to ft below top of casing.
°C = degrees Celsius.
DO = dissolved oxygen.
DTB = depth to bottom.
DTW = depth to water.
ft = feet.
gal = gallon.
L/min = liters per minute.
mg/L = milligrams per liter.
mV = millivolts.
NTUs = nephelometric turbidity units.
OR = over range.
ORP = oxygen reduction potential.
vol. = volume.
uS/cm = microsiemens per centimeter.

Well Development Field Form

MAUL FOSTER ALONGI

Project No.: M1122.05.006	Date: 9/19/2024
Project Location: Roslyn, WA	Well ID: MW-02
Project Name: Roslyn #4 Mine	Initial DTB: 19.80 Final DTB: 19.80
MFA Staff Name: F. Bellows	Initial DTW: 8.38 Final DTW: 18.1
Development Method: Surge Bailer and Peristaltic Pump	Well Casing Vol.: 1.86
Total Water Purged: 9.5 gal	Casing Diameter: 2 inches

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Time	Purge Vol. (gal)	Pump Rate (L/min)	Turbidity (NTUs)	pH	Temp. (°C)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	DTW (ft)	Comments
8:45	0	--	--	--	--	--	--	--	--	Begin surging with bailer.
9:05	0	--	--	--	--	--	--	--	--	Complete surging. Begin purging with bailer.
9:12	1.6	--	OR	--	--	--	--	--	12.0	Complete purging with bailer. Extremely turbid.
9:25	2.0	0.3	OR	--	--	--	--	--	10.5	Begin purging with peristaltic pump.
9:35	2.5	0.3	OR	--	--	--	--	--	11.0	Continue purging with peristaltic pump.
9:50	3.0	0.3	140	6.82	11.0	480	--	--	12.0	Continue purging with peristaltic pump.
10:10	4.5	0.3	295	6.67	12.6	580	--	--	15.7	Continue purging with peristaltic pump.
10:30	6.0	0.3	OR	6.62	12.5	670	--	--	18.7	Continue purging with peristaltic pump. Lowered tubing.
10:45	7.0	0.3	154	6.77	11.4	490	--	--	18.2	Continue purging with peristaltic pump.
10:55	7.5	0.3	OR	6.58	11.7	470	--	--	19.3	Pause purging. Wait for well to recharge.
11:10	7.5	--	--	--	--	--	--	--	16.6	Restart purging with peristaltic pump.
11:15	8.0	0.3	21.3	6.54	11.8	460	--	--	16.7	Continue purging with peristaltic pump.
11:25	8.5	0.3	4.48	6.67	11.6	470	--	--	17.4	Continue purging with peristaltic pump.
11:38	9.5	0.3	2.86	6.53	11.8	490	--	--	18.1	Complete well development after purging about 5 casing volumes.

Notes

Depths are relative to ft below top of casing.

°C = degrees Celsius.

DO = dissolved oxygen.

DTB = depth to bottom.

DTW = depth to water.

ft = feet.

gal = gallon.

L/min = liters per minute.

mg/L = milligrams per liter.

mV = millivolts.

NTUs = nephelometric turbidity units.

OR = over range.

ORP = oxygen reduction potential.

vol. = volume.

uS/cm = microsiemens per centimeter.

Well Development Field Form

MAUL FOSTER ALONGI

Project No.: M1122.05.006	Date: 9/19/2024
Project Location: Roslyn, WA	Well ID: MW-03
Project Name: Roslyn #4 Mine	Initial DTB: 13.35 Final DTB: 13.35
MFA Staff Name: F. Bellows	Initial DTW: 12.15 Final DTW: 13.33
Development Method: Surge Bailer and Peristaltic Pump	Well Casing Vol.: 0.20
Total Water Purged: 0.4 gal	Casing Diameter: 2 inches

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Time	Purge Vol. (gal)	Pump Rate (L/min)	Turbidity (NTUs)	pH	Temp. (°C)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	DTW (ft)	Comments
15:25	0	--	--	--	--	--	--	--	--	Begin surging with bailer.
15:28	0	--	--	--	--	--	--	--	--	Complete surging. Begin purging with bailer.
15:35	0.2	--	OR	--	--	--	--	--	12.9	Continue purging with bailer. Extremely turbid.
15:45	0.2	0.2	OR	--	--	--	--	--	12.95	Begin purging with peristaltic pump.
15:48	0.3	0.1	OR	--	--	--	--	--	13.33	Well dry. Pause for recharge.
16:08	0.3	0.1	OR	--	--	--	--	--	13.30	Restart purging with peristaltic pump.
16:17	0.3	0.1	OR	--	--	--	--	--	13.31	Continue purging with peristaltic pump.
16:32	0.4	0.1	OR	--	--	--	--	--	13.33	Well dry.

Notes

Depths are relative to ft below top of casing.
°C = degrees Celsius.
DO = dissolved oxygen.
DTB = depth to bottom.
DTW = depth to water.
ft = feet.
gal = gallon.
L/min = liters per minute.
mg/L = milligrams per liter.
mV = millivolts.
NTUs = nephelometric turbidity units.
OR = over range.
ORP = oxygen reduction potential.
vol. = volume.
uS/cm = microsiemens per centimeter.

Appendix D

Field Sampling Data Sheets

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Groundwater Field Sampling Data Sheet

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Forterra Roslyn	September 2024	B. Murphy

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-01	Monitoring	Flush-mount	Top of Casing	2.0	10-20	15.0

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	*DTP*	*DTW*	*DTW - DTP*	*DTB - DTW*	*(gal/ft x water column)*
09/20/2024	8:38	19.64	--	5.46	0.00	14.18	2.31

0.75" = 0.023 gal/ft
1'' = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method	Peristaltic Pump		*Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, othe*						
Purge Start Time	10:01		*ideally < 0.3 ft drawdown*	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
Time	**Cumulative Purge Volume**	**Flowrate**	**Water Level**	**pH**	**Temperature**	**Conductivity**	**Dissolved Oxygen**	**ORP**	**Turbidity**
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
10:22	0.8	0.1	6.79	6.27	9.8	286.1	1.09	-128.3	39.4
10:25	0.8	0.1	6.82	6.26	9.8	285.1	0.98	-133.4	42.8
10:28	0.9	0.1	6.85	6.27	9.9	283.4	0.87	-138.2	45.7
10:31	1.1	0.1	6.87	6.30	9.8	280.3	0.81	-141.8	49.0
10:39	1.3	0.1	6.93	6.36	9.8	278.4	0.64	-147.1	47.3
10:42	1.4	0.1	6.96	6.37	9.9	278.8	0.60	-146.8	43.2
10:45	1.5	0.1	6.99	6.39	9.8	278.5	0.59	-147.1	39.3
10:48	1.6	0.1	7.02	6.39	9.8	279.3	0.53	-146.6	32.4
10:51	1.7	0.1	7.04	6.39	9.8	279.6	0.51	-145.9	30.5
10:54	1.8	0.1	7.05	6.40	9.9	279.7	0.46	-146.3	29.3
10:57	1.9	0.1	7.07	6.41	9.8	279.6	0.48	-145.9	29.7
11:00	2.0	0.1	7.11	6.40	9.8	279.7	0.50	-145.8	29.1

Groundwater Field Sampling Data Sheet

MAUL FOSTER ALONGI

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Forterra Roslyn	September 2024	B. Murphy

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*: Clear; colorless; moderate organic-like odor; no sheen.

Sample Information

Sampling Method	Peristaltic Pump		
Sample Name	MW-01-GW-15.0		
Sample Date	09/20/2024	**Sample Time**	11:00
Container Type	**Preservative**	**Filtered (Y/N)**	**No. Containers**
Poly	HNO3	Y	2
Poly	HNO3	N	2
Poly	None	N	2
		Total No. Containers:	6

General Comments

Duplicate sample MW-01-GW-15.0-DUP collected here.

Groundwater Field Sampling Data Sheet

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Forterra Roslyn	September 2024	B. Murphy

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-02	Monitoring	Flush-mount	Top of Casing	2.0	10-20	15.0

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	DTP	DTW	DTW - DTP	DTB - DTW	(gal/ft x water column)
09/20/2024	8:52	19.78	--	8.42	0.00	11.36	1.85

0.75" = 0.023 gal/ft
1" = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method Peristaltic Pump

Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, other

Purge Start Time 12:01

			ideally < 0.3 ft drawdown	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
Time	**Cumulative Purge Volume**	**Flowrate**	**Water Level**	**pH**	**Temperature**	**Conductivity**	**Dissolved Oxygen**	**ORP**	**Turbidity**
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
12:42	1.5	0.1	10.38	6.65	12.1	469.1	0.42	-119.8	23.6
12:45	1.6	0.1	10.43	6.65	12.1	473.4	0.35	-121.6	19.3
12:48	1.7	0.1	10.48	6.67	12.1	474.3	0.32	-123.2	17.9
12:51	1.8	0.1	10.53	6.65	12.1	477.2	0.29	-125.1	15.2
12:54	1.9	0.1	10.57	6.67	12.1	476.8	0.29	-126.6	14.5
12:57	2.0	0.1	10.61	6.66	12.1	478.1	0.26	-128.1	11.2
13:00	2.2	0.1	10.65	6.65	12.2	477.9	0.26	-129.8	11.8
13:03	2.3	0.1	10.67	6.65	12.1	478.7	0.24	-130.7	12.5
13:06	2.4	0.1	10.70	6.65	12.1	479.2	0.23	-131.7	11.7
13:09	2.5	0.1	10.72	6.65	12.2	479.5	0.22	-132.9	9.51
13:12	2.6	0.1	10.73	6.65	12.3	479.2	0.22	-133.7	10.5
13:15	2.7	0.1	10.75	6.66	12.2	479.7	0.21	-133.9	9.19

Groundwater Field Sampling Data Sheet

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Forterra Roslyn	September 2024	B. Murphy

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*	Clear; very slight brown tint; no odor; no sheen.

General Comments

Sample Information

Sampling Method	Peristaltic Pump		
Sample Name	MW-02-GW-15.0		
Sample Date	09/20/2024	**Sample Time**	13:15
Container Type	**Preservative**	**Filtered (Y/N)**	**No. Containers**
Poly	HNO3	Y	1
Poly	HNO3	N	1
Poly	None	N	1
		Total No. Containers:	3

Groundwater Field Sampling Data Sheet

MAUL FOSTER ALONGI

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Forterra Roslyn	September 2024	B. Murphy

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-03	Monitoring	Flush-mount	Top of Casing	2.0	8.4-13.4	13.0

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	*DTP*	*DTW*	*DTW - DTP*	*DTB - DTW*	*(gal/ft x water column)*
09/20/2024	9:06	13.37	--	12.05	0.00	1.32	0.22

0.75" = 0.023 gal/ft
1'' = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method: Peristaltic Pump

Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, othe

Purge Start Time: 9:30

Time	Cumulative Purge Volume	Flowrate	Water Level	pH	Temperature	Conductivity	Dissolved Oxygen	ORP	Turbidity
			ideally < 0.3 ft drawdown	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
9:35	0.1	0.1	12.21	6.57	10.9	600	--	--	169
9:38	0.2	0.1	12.28	6.42	11.1	520	--	--	--
13:59	0.3	0.1	12.17	6.64	13.4	560	--	--	64.2

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*: Slightly cloudy; slight brown tint; no odor; no sheen.

Sample Information

Sampling Method	Peristaltic Pump
Sample Name	MW-03-GW-13.0
Sample Date	09/20/2024
Sample Time	14:00

Container Type	Preservative	Filtered (Y/N)	No. Containers
Poly	HNO3	Y	1
Poly	HNO3	N	1
Poly	None	N	1
		Total No. Containers:	3

General Comments

Well ran dray at 9:40. Waited for well to recharge. Restarted purging at 13:58. Collected sample prior to stabilization due to limited water volume.

Groundwater Field Sampling Data Sheet

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Roslyn No. 4 Mine	April 2025	F. Bellows

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-01	Monitoring	Flush-mount	Top of Casing	2.0	10-20	15.0

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	*DTP*	*DTW*	*DTW - DTP*	*DTB - DTW*	*(gal/ft x water column)*
04/01/2025	15:40	19.65		1.12		18.53	3.02

0.75" = 0.023 gal/ft
1'' = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method Peristaltic Pump

Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, other

Purge Start Time	15:41		*ideally < 0.3 ft drawdown*	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
Time	**Cumulative Purge Volume**	**Flowrate**	**Water Level**	**pH**	**Temperature**	**Conductivity**	**Dissolved Oxygen**	**ORP**	**Turbidity**
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
15:49	0.3	0.13	2.15	6.44	7.8	193.7	0.30	1.7	142.0
16:03	0.8	0.13	2.76	6.44	7.7	195.2	0.25	-17.6	217.0
16:25	1.9	0.18	3.02	6.40	8.0	199.1	0.16	-42.0	47.8
16:37	2.4	0.18	3.12	6.44	8.2	200.0	0.15	-47.1	35.2
16:47	2.7	0.18	3.12	6.42	8.1	199.9	0.13	-51.4	41.3
16:59	3.2	0.20	3.25	6.47	7.9	198.7	0.13	-52.6	29.7
17:06	3.5	0.20	3.12	6.44	7.9	198.3	0.22	-52.1	23.8
17:09	3.7	0.20	3.19	6.45	7.9	198.5	0.15	-51.1	20.7
17:12	3.9	0.20	3.24	6.45	7.9	199.0	0.15	-52.0	23.5

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*

Lots of orange sediment at first flush, cloudy, no sheen, slight organic odor, no tint, clear with tawny particulates.

Sample Information

Sampling Method	Peristaltic Pump		
Sample Name	MW-01-GW-15.0		
Sample Date	04/01/2025	**Sample Time**	17:13
Container Type	**Preservative**	**Filtered (Y/N)**	**No. Containers**
Poly	HNO3	Y	1
Poly	HNO3	Y	1
Poly	None	N	1
		Total No. Containers:	3

General Comments

Hard bottom.

All wells: collected unpreserved and unfiltered poly for lab filtration per PM.

Groundwater Field Sampling Data Sheet

MAUL FOSTER ALONGI

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Roslyn No. 4 Mine	April 2025	F. Bellows

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-02	Monitoring	Flush-mount	Top of Casing	2.0	10-20	15.0

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	*DTP*	*DTW*	*DTW - DTP*	*DTB - DTW*	*(gal/ft x water column)*
04/01/2025	11:05	19.78		1.92		17.86	2.91

0.75" = 0.023 gal/ft
1'' = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method	Peristaltic Pump	*Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, other*
Purge Start Time	11:06	

			ideally < 0.3 ft drawdown	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
Time	**Cumulative Purge Volume**	**Flowrate**	**Water Level**	**pH**	**Temperature**	**Conductivity**	**Dissolved Oxygen**	**ORP**	**Turbidity**
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
11:14	0.1	0.12	2.50	6.68	8.3	353.8	0.17	-138.8	40.0
11:31	0.8	0.12	3.41	6.71	8.5	353.8	0.19	-141.7	32.1
11:45	1.3	0.12	3.77	6.76	8.5	353.5	0.14	-141.0	29.8
11:56	1.7	0.12	3.97	6.71	8.5	352.8	0.14	-139.9	28.0
12:17	2.6	0.12	4.15	6.73	8.6	353.2	0.12	-137.6	33.2
12:27	3.0	0.12	4.20	6.68	8.4	350.6	0.12	-136.5	15.5
12:37	3.3	0.12	4.22	6.70	8.4	348.8	0.11	-135.9	12.8
12:40	3.5	0.12	4.22	6.69	8.4	349.7	0.11	-135.5	12.1
12:43	3.6	0.12	4.23	6.71	8.5	350.8	0.12	-135.4	15.9
12:46	3.7	0.12	4.23	6.71	8.6	351.1	0.12	-135.2	11.3

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*

Red and black flecks, slightly cloudy at first purge, cleared after 0.5 gal. Biosheen, no color, slight organic odor, clear with brown small particulates.

Sample Information

Sampling Method	Peristaltic Pump		
Sample Name	MW-02-GW-15.0		
Sample Date	04/01/2025	**Sample Time**	12:48
Container Type	**Preservative**	**Filtered (Y/N)**	**No. Containers**
Poly	HNO3	Y	2
Poly	HNO3	Y	2
Poly	None	N	2
		Total No. Containers:	6

General Comments

Hard bottom. Purge water has tawny tint.
Field duplicate collected here, MW-02-GW-15.0-DUP same number of bottles.

All wells: collected unpreserved and unfiltered poly for lab filtration per PM.

Groundwater Field Sampling Data Sheet

MAUL FOSTER ALONGI

Project Information

Project No.	Client Name	Project Name	Sampling Event	Sampler(s)
M1122.05.006	Forterra	Roslyn No. 4 Mine	April 2025	F. Bellows

Well Information

Location ID	Well Type	Monument Type	Depth Measuring Point	Well Diameter (in)	Screen Interval (ft)	Sample Depth (ft)
MW-03	Monitoring	Flush-mount	Top of Casing	2.0	8.4-13.4	11.5

Hydrology/Level Measurements

Date	Time	Depth to Bottom (ft)	Depth to Product (ft)	Depth to Water (ft)	Product Thickness (ft)	Water Column (ft)	Well Casing Volume (gal)
		DTB	*DTP*	*DTW*	*DTW - DTP*	*DTB - DTW*	*(gal/ft x water column)*
04/01/2025	13:37	13.35		7.70		5.65	0.92

0.75" = 0.023 gal/ft
1'' = 0.041 gal/ft
1.5" = 0.092 gal/ft
2" = 0.163 gal/ft
3" = 0.367 gal/ft
4" = 0.653 gal/ft
6" = 1.469 gal/ft
8" = 2.611 gal/ft

Water Quality Data

Purge Method Peristaltic Pump

Purge/Sampling Methods: peristaltic pump, submersible pump, vacuum pump, inertia pump, dedicated pump, disposable bailer, bladder pump, other

Purge Start Time 13:38

Time	Cumulative Purge Volume	Flowrate	Water Level	pH	Temperature	Conductivity	Dissolved Oxygen	ORP	Turbidity
			ideally < 0.3 ft drawdown	*± 0.1*	*± 3%*	*± 3%*	*± 10% if > 0.5*	*± 10*	*< 5 or ± 10% if > 5*
	gal	*L/min*	*ft*	*SU*	*degrees C*	*uS/cm*	*mg/L*	*mV*	*NTU*
13:48	0.2	0.10	9.00	6.21	7.6	1,124	0.71	141.3	13.5
13:58	0.4	0.08	9.55	6.33	8.2	1,163	0.68	120.4	8.71
14:05	0.6	0.08	9.71	6.31	8.2	1,163	0.58	117.0	8.05
14:08	0.7	0.08	9.81	6.28	8.0	1,151	0.53	115.9	9.04
14:11	0.8	0.08	9.90	6.32	8.1	1,151	0.50	115.4	12.2
14:14	0.9	0.08	9.97	6.29	8.3	1,156	0.54	117.2	10.8

Last row of water quality data are considered final field parameters unless otherwise noted.

Water Quality Observations *(clarity, tint, odor, sheen, etc.)*

White and red particulates at first purge, cleared after 0.4 gal. No odor, no color, clear, no sheen.

Sample Information

Sampling Method	Peristaltic Pump		
Sample Name	MW-03-GW-11.5		
Sample Date	04/01/2025	**Sample Time**	14:15
Container Type	**Preservative**	**Filtered (Y/N)**	**No. Containers**
Poly	HNO3	Y	1
Poly	HNO3	Y	1
Poly	None	N	1
		Total No. Containers:	3

General Comments

Hard bottom. Well historically has low recharge and excess drawdown. Reduced flow rate <0.1 L/min.

All wells: collected unpreserved and unfiltered poly for lab filtration per PM.

Appendix E

Analytical Laboratory Reports

MAUL
FOSTER
ALONGI

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

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www.friedmanandbruya.com

October 17, 2024

Emily Hess, Project Manager
Maul Foster Alongi
2815 2nd Ave, Suite 540
Seattle, WA 98121

Dear Ms Hess:

Included are the additional results from the testing of material submitted on September 20, 2024 from the Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. There are 16 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Fiona Bellows, Brendan Murphy MFA1017R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2024 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
409307 -01	VM-DP-5-SB-0.5
409307 -02	VM-DP-5-SB-1.5
409307 -03	VM-DP-6-SB-0.5
409307 -04	VM-DP-6-SB-1.5
409307 -05	VM-DP-7-SB-0.4
409307 -06	VM-DP-7-SB-1.3
409307 -07	VM-DP-8-SB-0.5
409307 -08	VM-DP-8-SB-1.5
409307 -09	VM-DP-9-SB-0.5
409307 -10	VM-DP-9-SB-1.5
409307 -11	VM-DP-10-SB-0.5
409307 -12	VM-DP-10-SB-1.4
409307 -13	FO-DP-5-SB-0.5
409307 -14	FO-DP-5-SB-1.5
409307 -15	FO-DP-6-SB-0.5
409307 -16	FO-DP-6-SB-1.3
409307 -17	FO-DP-7-SB-0.3
409307 -18	FO-DP-7-SB-1.1
409307 -19	FO-DP-8-SB-0.3
409307 -20	FO-DP-8-SB-1.1
409307 -21	SP-DP-4-SB-0.5
409307 -22	SP-DP-4-SB-1.5
409307 -23	SP-DP-5-SB-0.4
409307 -24	SP-DP-5-SB-1.2
409307 -25	SP-DP-6-SB-0.5
409307 -26	SP-DP-6-SB-1.3
409307 -27	SP-DP-7-SB-0.4
409307 -28	SP-DP-7-SB-1.2
409307 -29	SP-DP-8-SB-0.5
409307 -30	SP-DP-8-SB-1.5
409307 -31	SP-DP-9-SB-0.5
409307 -32	SP-DP-9-SB-1.2
409307 -33	SP-DP-10-SB-0.5
409307 -34	SP-DP-10-SB-1.3
409307 -35	SP-DP-11-SB-0.5
409307 -36	SP-DP-11-SB-1.4

CASE NARRATIVE (continued)

Laboratory ID	Maul Foster Alongi
409307 -37	TF-DP-3-SB-0.5
409307 -38	TF-DP-3-SB-1.5
409307 -39	TF-DP-4-SB-0.4
409307 -40	TF-DP-4-SB-1.3
409307 -41	TF-DP-5-SB-0.3
409307 -42	TF-DP-5-SB-1.2
409307 -43	TF-DP-6-SB-0.4
409307 -44	TF-DP-6-SB-1.3
409307 -45	TF-DP-7-SB-0.4
409307 -46	TF-DP-7-SB-1.3
409307 -47	TF-DP-8-SB-0.4
409307 -48	TF-DP-8-SB-1.3
409307 -49	TF-DP-9-SB-0.3
409307 -50	TF-DP-9-SB-1.3
409307 -51	TF-DP-10-SB-0.3
409307 -52	TF-DP-10-SB-1.2
409307 -53	TF-DP-11-SB-0.5
409307 -54	TF-DP-11-SB-1.5
409307 -55	TF-DP-12-SB-0.5
409307 -56	TF-DP-12-SB-1.5
409307 -57	PH-DP-6-SB-0.5
409307 -58	PH-DP-6-SB-1.5
409307 -59	PH-DP-7-SB-0.3
409307 -60	PH-DP-7-SB-1.3
409307 -61	PH-DP-8-SB-0.4
409307 -62	PH-DP-8-SB-1.3
409307 -63	PH-DP-9-SB-0.5
409307 -64	PH-DP-9-SB-1.3
409307 -65	TF-DP-3-SB-0.5-DUP
409307 -66	PH-DP-6-SB-0.5-DUP
409307 -67	TF-DP-6-SB-0.4-DUP
409307 -68	VM-DP-6-SB-0.5-DUP
409307 -69	FO-DP-5-SB-0.5-DUP
409307 -70	SP-DP-6-SB-0.5-DUP
409307 -71	SP-DP-11-SB-0.5-DUP

All quality control requirements were acceptable.

Date of Report: 10/17/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307
Date Extracted: NA
Date Analyzed: 10/14/24

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR PERCENT MOISTURE USING ASTM D2216-98

Sample ID Laboratory ID	% Moisture
FO-DP-8-SB-1.1 409307-20	12

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-8-SB-1.1	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-20
Date Analyzed:	10/14/24	Data File:	409307-20.243
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Cadmium	5.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-8-SB-1.1	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-20 x100
Date Analyzed:	10/16/24	Data File:	409307-20 x100.150
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2,400

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	I4-874 mb
Date Analyzed:	10/14/24	Data File:	I4-874 mb.125
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Cadmium	<1
Lead	<1

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-5-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-13
Date Analyzed:	10/15/24	Data File:	409307-13.069
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	4.4	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-5-SB-1.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-14 x10
Date Analyzed:	10/15/24	Data File:	409307-14 x10.252
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	9.7	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-15
Date Analyzed:	10/15/24	Data File:	409307-15.071
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<0.5	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-6-SB-1.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-16
Date Analyzed:	10/15/24	Data File:	409307-16.075
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<0.5	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-8-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-19
Date Analyzed:	10/15/24	Data File:	409307-19.076
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<0.5	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	VM-DP-6-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	409307-68
Date Analyzed:	10/15/24	Data File:	409307-68.077
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<0.5	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	10/14/24	Lab ID:	I4-876 mb
Date Analyzed:	10/15/24	Data File:	I4-876 mb.063
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<0.5	5.0

Date of Report: 10/17/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 410254-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Cadmium	mg/kg (ppm)	10	<1	97	98	75-125	1
Lead	mg/kg (ppm)	50	10.5	149 b	101 b	75-125	38 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Cadmium	mg/kg (ppm)	10	94	80-120
Lead	mg/kg (ppm)	50	92	80-120

Date of Report: 10/17/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/SOLID SAMPLES FOR TCLP METALS USING EPA METHODS 6020B AND 1311

Laboratory Code: 410260-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Lead	mg/L (ppm)	1.0	<1	95	97	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/L (ppm)	1.0	96	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brendan Murphy

PROJECT NAME
Roslyn No. 4 Mine

PO #
M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

Page # 1 of 8

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Pb	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-5-SB-0.5	01	9/19/2024	1235	Soil	1							X				● per EH
VM-DP-5-SB-1.5	02	9/19/2024	1240		1							H				9/30/24 ME
VM-DP-6-SB-0.5	03	9/19/2024	1210		1							X				
VM-DP-6-SB-1.5	04	9/19/2024	1215		1							~~H~~		●		
VM-DP-7-SB-0.4	05	9/19/2024	1150		1							X				
VM-DP-7-SB-1.3	06	9/19/2024	1155		1							H				
VM-DP-8-SB-0.5	07	9/19/2024	1245		1							H				
VM-DP-8-SB-1.5	08	9/19/2024	1250		1							H				
VM-DP-9-SB-0.5	09	9/19/2024	1225		1							H				
VM-DP-9-SB-1.5	10	9/19/2024	1230		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Brendan Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Page # 2 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	TCLP Pb ~~PCBs EPA 8082~~	Total Metals 6020B**	As, Cd, Pb ~~Dissolved Metals 6020B**~~	As, Cd, Pb, Zn, Cu, Hg, Ni	Zn, Pb	# = Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-10-SB-0.5	11	9/19/2024	1140	Soil	1							#				
VM-DP-10-SB-1.4	12	9/19/2024	1145		1							#				
FO-DP-5-SB-0.5	13	9/19/2024	1025		1						A	X				
FO-DP-5-SB-1.5	14	9/19/2024	1030		1						A	~~#~~		●		
FO-DP-6-SB-0.5	15	9/19/2024	1055		1						A	X				
FO-DP-6-SB-1.3	16	9/19/2024	1100		1						A	~~#~~			●	
FO-DP-7-SB-0.3	17	9/19/2024	1110		1							#				
FO-DP-7-SB-1.1	18	9/19/2024	1115		1							#				
FO-DP-8-SB-0.3	19	9/19/2024	1040		1						A	~~#~~	●			
FO-DP-8-SB-1.1	20	9/19/2024	1045		1							#	Cd+Pb			

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

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Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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SAMPLE CHAIN OF CUSTODY

09/20/24 M3

[redacted]

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

[redacted]

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO accounting@maulfoster.com

Page # 3 of 8

TURNAROUND TIME

[✓ Standard Turnaround]

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Dispose after 30 days

Archive Samples

Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	TCLP Pb		H = Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-4-SB-0.5	21	9/19/2024	0850	Soil	1								X			
SP-DP-4-SB-1.5	22	9/19/2024	0855		1								H			
SP-DP-5-SB-0.4	23	9/19/2024	0915		1								X			
SP-DP-5-SB-1.2	24	9/19/2024	0920		1								H			
SP-DP-6-SB-0.5	25	9/19/2024	1010		1								X			
SP-DP-6-SB-1.3	26	9/19/2024	1015		1								H			
SP-DP-7-SB-0.4	27	9/19/2024	0920		1								X			
SP-DP-7-SB-1.2	28	9/19/2024	0925		1								H			
SP-DP-8-SB-0.5	29	9/19/2024	0905		1								H			
SP-DP-8-SB-1.5	30	9/19/2024	0910		1								H			

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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[redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) [redacted]

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@maulfoster.com

Page # 4 of 8

TURNAROUND TIME
X Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	As	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-9-SB-0.5	31	9/19/2024	0835	Soil	1							H				
SP-DP-9-SB-1.2	32	9/19/2024	0840		1							H				
SP-DP-10-SB-0.5	33	9/19/2024	1000		1							H				
SP-DP-10-SB-1.3	34	9/19/2024	1005		1							H				
SP-DP-11-SB-0.5	35	9/19/2024	0935		1							H				
SP-DP-11-SB-1.4	36	9/19/2024	0940		1							H				
TF-DP-3-SB-0.5	37	9/19/2024	1540		1							X				
TF-DP-3-SB-1.5	38	9/19/2024	1545		1							H				
TF-DP-4-SB-0.4	39	9/19/2024	1605		1							X				
TF-DP-4-SB-1.3	40	9/19/2024	1610		1							~~H~~		●		

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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SAMPLE CHAIN OF CUSTODY

09/20/24 M3 [redacted]

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Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	As	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-5-SB-0.3	AP ~~31~~ 41	9/19/2024	1320	Soil	1							X				
TF-DP-5-SB-1.2	~~32~~ 42	9/19/2024	1325		1							H				
TF-DP-6-SB-0.4	~~33~~ 43	9/19/2024	1350		1							X				
TF-DP-6-SB-1.3	~~34~~ 44	9/19/2024	1355		1							H				
TF-DP-7-SB-0.4	~~35~~ 45	9/19/2024	1420		1							H				
TF-DP-7-SB-1.3	~~36~~ 46	9/19/2024	1425		1							H				
TF-DP-8-SB-0.4	~~37~~ 47	9/19/2024	1550		1							~~H~~		●		
TF-DP-8-SB-1.3	~~38~~ 48	9/19/2024	1555		1							H				
TF-DP-9-SB-0.3	~~39~~ 49	9/19/2024	1615		1							~~H~~		●		
TF-DP-9-SB-1.3	~~40~~ 50	9/19/2024	1620		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FDI	09/20/24	09:35

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409307

[redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

[redacted]

Page # 6 of 8

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Bub Myz

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	TCLP Pb		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-10-SB-0.3	AP ~~41~~ 51	9/19/2024	1310	Soil	1							H				
TF-DP-10-SB-1.2	~~42~~ 52	9/19/2024	1315		1							H				
TF-DP-11-SB-0.5	~~43~~ 53	9/19/2024	1340		1							H				
TF-DP-11-SB-1.5	~~44~~ 54	9/19/2024	1345		1							H				
TF-DP-12-SB-0.5	~~45~~ 55	9/19/2024	1405		1							H				
TF-DP-12-SB-1.5	~~46~~ 56	9/19/2024	1410		1							H				
PH-DP-6-SB-0.5	~~47~~ 57	9/19/2024	1500		1							X				
PH-DP-6-SB-1.5	~~48~~ 58	9/19/2024	1505		1							H				
PH-DP-7-SB-0.3	~~49~~ 59	9/19/2024	1635		1							X				
PH-DP-7-SB-1.3	~~50~~ 60	9/19/2024	1640		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Bub Myz	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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409307

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 7 of 8

[redacted] Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Zn	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
PH-DP-8-SB-0.4	AP ~~51~~ 61	9/19/2024	1450	Soil	1							X				
PH-DP-8-SB-1.3	~~52~~ 62	9/19/2024	1455		1							~~H~~		●		
PH-DP-9-SB-0.5	~~53~~ 63	9/19/2024	1645		1							H				
PH-DP-9-SB-1.3	~~54~~ 64	9/19/2024	1650		1							H				
TF-DP-3-SB-0.5-DUP	~~55~~ 65	9/19/2024	1540	Soil	1							H				
PH-DP-6-SB-0.5-DUP	~~56~~ 66	9/19/2024	1500		1							H				
TF-DP-6-SB-0.4 DM DUP	~~57~~ 67	9/19/2024	1350 DM		1							H				
VM-DP-6-SB-0.5-DUP	~~58~~ 68	9/19/2024	1210		1							X			A	
FO-DP-5-SB-0.5-DUP	~~59~~ 69	9/19/2024	1025		1							●				
SP-DP-6-SB-0.5-DUP	~~60~~ 70	9/19/2024	1010		1							X				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307

[redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 8 of 8

Report To Emily Hess

Company MFA

Address See page 1

City, State, ZIP —

Phone — Email —

SAMPLERS (signature)

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS

Project specific RLs? - Yes / [✓ No]

INVOICE TO

accounting @ maulfoster.com

TURNAROUND TIME

☒ Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Archive samples

☐ Other

Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Metals 6020B *	TCLP Pb			H = hold * As, Cd, Cr, Cu, Pb, Hg, Ni, Zn Notes
SP-DP-11-SB-05-DUP	AP 61 71	9-19-24	0935	Soil	1								H				

FMB 9/19/24

Samples received at 3 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	F. Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 409307 **CLIENT** Maul Foster **INITIALS/** AP **DATE:** 09/20/24

If custody seals are present on cooler, are they intact? ☒ NA ☐ YES ☐ NO

Cooler/Sample temperature 3 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☒ YES ☐ NO

How did samples arrive?
☒ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☒ YES ☐ NO **Initials/** AP **Date:** 09/20/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☒ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☒ YES ☐ NO

Were appropriate sample containers used? ☒ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☒ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☒ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's ☒ Yes ☐ No ____ ☐ Not on COC/label
Date Sampled ☒ Yes ☐ No ____ ☐ Not on COC/label
Time Sampled ☒ Yes ☐ No ____ ☐ Not on COC/label
\# of Containers ☒ Yes ☐ No ____
Relinquished ☒ Yes ☐ No ____
Requested analysis ☒ Yes ☐ On Hold ____

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☒ NA ☐ YES ☐ NO

Number of unused TO15 canisters ____ **Number of unused TO17 tubes** ____

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

November 6, 2024

Emily Hess, Project Manager
Maul Foster Alongi
2815 2nd Ave, Suite 540
Seattle, WA 98121

Dear Ms Hess:

Included are the additional results from the testing of material submitted on September 20, 2024 from the Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. There are 6 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
MFA1106R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2024 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
409307 -01	VM-DP-5-SB-0.5
409307 -02	VM-DP-5-SB-1.5
409307 -03	VM-DP-6-SB-0.5
409307 -04	VM-DP-6-SB-1.5
409307 -05	VM-DP-7-SB-0.4
409307 -06	VM-DP-7-SB-1.3
409307 -07	VM-DP-8-SB-0.5
409307 -08	VM-DP-8-SB-1.5
409307 -09	VM-DP-9-SB-0.5
409307 -10	VM-DP-9-SB-1.5
409307 -11	VM-DP-10-SB-0.5
409307 -12	VM-DP-10-SB-1.4
409307 -13	FO-DP-5-SB-0.5
409307 -14	FO-DP-5-SB-1.5
409307 -15	FO-DP-6-SB-0.5
409307 -16	FO-DP-6-SB-1.3
409307 -17	FO-DP-7-SB-0.3
409307 -18	FO-DP-7-SB-1.1
409307 -19	FO-DP-8-SB-0.3
409307 -20	FO-DP-8-SB-1.1
409307 -21	SP-DP-4-SB-0.5
409307 -22	SP-DP-4-SB-1.5
409307 -23	SP-DP-5-SB-0.4
409307 -24	SP-DP-5-SB-1.2
409307 -25	SP-DP-6-SB-0.5
409307 -26	SP-DP-6-SB-1.3
409307 -27	SP-DP-7-SB-0.4
409307 -28	SP-DP-7-SB-1.2
409307 -29	SP-DP-8-SB-0.5
409307 -30	SP-DP-8-SB-1.5
409307 -31	SP-DP-9-SB-0.5
409307 -32	SP-DP-9-SB-1.2
409307 -33	SP-DP-10-SB-0.5
409307 -34	SP-DP-10-SB-1.3
409307 -35	SP-DP-11-SB-0.5
409307 -36	SP-DP-11-SB-1.4
409307 -37	TF-DP-3-SB-0.5

CASE NARRATIVE (continued)

Laboratory ID	Maul Foster Alongi
409307 -38	TF-DP-3-SB-1.5
409307 -39	TF-DP-4-SB-0.4
409307 -40	TF-DP-4-SB-1.3
409307 -41	TF-DP-5-SB-0.3
409307 -42	TF-DP-5-SB-1.2
409307 -43	TF-DP-6-SB-0.4
409307 -44	TF-DP-6-SB-1.3
409307 -45	TF-DP-7-SB-0.4
409307 -46	TF-DP-7-SB-1.3
409307 -47	TF-DP-8-SB-0.4
409307 -48	TF-DP-8-SB-1.3
409307 -49	TF-DP-9-SB-0.3
409307 -50	TF-DP-9-SB-1.3
409307 -51	TF-DP-10-SB-0.3
409307 -52	TF-DP-10-SB-1.2
409307 -53	TF-DP-11-SB-0.5
409307 -54	TF-DP-11-SB-1.5
409307 -55	TF-DP-12-SB-0.5
409307 -56	TF-DP-12-SB-1.5
409307 -57	PH-DP-6-SB-0.5
409307 -58	PH-DP-6-SB-1.5
409307 -59	PH-DP-7-SB-0.3
409307 -60	PH-DP-7-SB-1.3
409307 -61	PH-DP-8-SB-0.4
409307 -62	PH-DP-8-SB-1.3
409307 -63	PH-DP-9-SB-0.5
409307 -64	PH-DP-9-SB-1.3
409307 -65	TF-DP-3-SB-0.5-DUP
409307 -66	PH-DP-6-SB-0.5-DUP
409307 -67	TF-DP-6-SB-0.4-DUP
409307 -68	VM-DP-6-SB-0.5-DUP
409307 -69	FO-DP-5-SB-0.5-DUP
409307 -70	SP-DP-6-SB-0.5-DUP
409307 -71	SP-DP-11-SB-0.5-DUP

All quality control requirements were acceptable.

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	FO-DP-8-SB-1.1	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	10/31/24	Lab ID:	409307-20
Date Analyzed:	11/01/24	Data File:	409307-20.083
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	1.3	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine
Date Extracted:	10/31/24	Lab ID:	I4-931 mb
Date Analyzed:	11/01/24	Data File:	I4-931 mb.081
Matrix:	Soil/Solid	Instrument:	ICPMS3
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<1	5.0

Date of Report: 11/06/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL/SOLID SAMPLES FOR TCLP METALS USING EPA METHODS 6020B AND 1311

Laboratory Code: 409307-20 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Lead	mg/L (ppm)	1.0	1.3	100 b	97 b	75-125	3 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Lead	mg/L (ppm)	1.0	98	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Page # 1 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brenden Murphy

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com
Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Pb	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-5-SB-0.5	01	9/19/2024	1235	Soil	1							X				● per EH
VM-DP-5-SB-1.5	02	9/19/2024	1240		1							H				9/30/24 ME
VM-DP-6-SB-0.5	03	9/19/2024	1210		1							X				
VM-DP-6-SB-1.5	04	9/19/2024	1215		1							~~H~~		●		
VM-DP-7-SB-0.4	05	9/19/2024	1150		1							X				
VM-DP-7-SB-1.3	06	9/19/2024	1155		1							H				
VM-DP-8-SB-0.5	07	9/19/2024	1245		1							H				
VM-DP-8-SB-1.5	08	9/19/2024	1250		1							H				
VM-DP-9-SB-0.5	09	9/19/2024	1225		1							H				
VM-DP-9-SB-1.5	10	9/19/2024	1230		1							H				

~~Samples received at~~ 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FBI	09/20/24	09:35

RB

FORMS\COC\COC.DOC

409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 2 of 8

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	~~PCBs EPA 8082~~ TCLP Pb	Total Metals 6020B**	As, Cd, Pb ~~Dissolved Metals 6020B**~~	As, Cd, Pb, Zn, Cu, Hg, Ni	Zn, Pb	H = Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-10-SB-0.5	11	9/19/2024	1140	Soil	1							H				B-per EH 10/31/24 ME
VM-DP-10-SB-1.4	12	9/19/2024	1145		1							H				
FO-DP-5-SB-0.5	13	9/19/2024	1025		1						A	X				
FO-DP-5-SB-1.5	14	9/19/2024	1030		1						A	~~H~~		●		
FO-DP-6-SB-0.5	15	9/19/2024	1055		1						A	X				
FO-DP-6-SB-1.3	16	9/19/2024	1100		1						A	~~H~~			●	
FO-DP-7-SB-0.3	17	9/19/2024	1110		1							H				
FO-DP-7-SB-1.1	18	9/19/2024	1115		1							H				
FO-DP-8-SB-0.3	19	9/19/2024	1040		1						A	~~H~~	●			
FO-DP-8-SB-1.1	20	9/19/2024	1045		1						B	H	Cd+Pb			

Samples received at 3 °C

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FORMS\COC\COC.DOC

409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3 [redacted]

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brden Mphy

PROJECT NAME
Roslyn No. 4 Mine

PO #
M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@maulfoster.com

Page # 3 of 8

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

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Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	TCLP Pb		H = Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-4-SB-0.5	21	9/19/2024	0850	Soil	1								X			
SP-DP-4-SB-1.5	22	9/19/2024	0855		1								H			
SP-DP-5-SB-0.4	23	9/19/2024	0915		1								X			
SP-DP-5-SB-1.2	24	9/19/2024	0920		1								H			
SP-DP-6-SB-0.5	25	9/19/2024	1010		1								X			
SP-DP-6-SB-1.3	26	9/19/2024	1015		1								H			
SP-DP-7-SB-0.4	27	9/19/2024	0920		1								X			
SP-DP-7-SB-1.2	28	9/19/2024	0925		1								H			
SP-DP-8-SB-0.5	29	9/19/2024	0905		1								H			
SP-DP-8-SB-1.5	30	9/19/2024	0910		1								H			

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brden Mphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307
[redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Page # 4 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) [redacted]

PROJECT NAME Roslyn No. 4 Mine
PO # M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com
Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

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☒ Standard Turnaround
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Dispose after 30 days
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						ANALYSES REQUESTED										
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SP-DP-9-SB-0.5	31	9/19/2024	0835	Soil	1							H				
SP-DP-9-SB-1.2	32	9/19/2024	0840		1							H				
SP-DP-10-SB-0.5	33	9/19/2024	1000		1							H				
SP-DP-10-SB-1.3	34	9/19/2024	1005		1							H				
SP-DP-11-SB-0.5	35	9/19/2024	0935		1							H				
SP-DP-11-SB 1.4	36	9/19/2024	0940		1							H				
TF-DP-3-SB-0.5	37	9/19/2024	1540		1							X				
TF-DP-3-SB-1.5	38	9/19/2024	1545		1							H				
TF-DP-4-SB-0.4	39	9/19/2024	1605		1							X				
TF-DP-4-SB-1.3	40	9/19/2024	1610		1							~~H~~		●		

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
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Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3 [redacted]

Page # 5 of 8

[redacted] Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brendan Murphy

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	As	TCLP Pb	H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-5-SB-0.3	~~31~~ 41 AP	9/19/2024	1320	Soil	1							X				
TF-DP-5-SB-1.2	~~32~~ 42	9/19/2024	1325		1							H				
TF-DP-6-SB-0.4	~~33~~ 43	9/19/2024	1350		1							X				
TF-DP-6-SB-1.3	~~34~~ 44	9/19/2024	1355		1							H				
TF-DP-7-SB-0.4	~~35~~ 45	9/19/2024	1420		1							H				
TF-DP-7-SB-1.3	~~36~~ 46	9/19/2024	1425		1							H				
TF-DP-8-SB-0.4	~~37~~ 47	9/19/2024	1550		1							~~H~~		●		
TF-DP-~~8~~-SB-1.3	~~38~~ 48	9/19/2024	1555		1							H				
TF-DP-9-SB-0.3	~~39~~ 49	9/19/2024	1615		1							~~H~~		●		
TF-DP-9-SB-1.3	~~40~~ 50	9/19/2024	1620		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brendan Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FDI	09/20/24	09:35

FORMS\COC\COC.DOC

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3 [redacted]

Page # 6 of 8

[redacted]
Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Bruh Myhg

PROJECT NAME
Roslyn No. 4 Mine

PO #
M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO
accounting@maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	TCLP Pb		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-10-SB-0.3	AP ~~41~~ 51	9/19/2024	1310	Soil	1							H				
TF-DP-10-SB-1.2	~~42~~ 52	9/19/2024	1315		1							H				
TF-DP-11-SB-0.5	~~43~~ 53	9/19/2024	1340		1							H				
TF-DP-11-SB-1.5	~~44~~ 54	9/19/2024	1345		1							H				
TF-DP-12-SB-0.5	~~45~~ 55	9/19/2024	1405		1							H				
TF-DP-12-SB-1.5	~~46~~ 56	9/19/2024	1410		1							H				
PH-DP-6-SB-0.5	~~47~~ 57	9/19/2024	1500		1							X				
PH-DP-6-SB-1.5	~~48~~ 58	9/19/2024	1505		1							H				
PH-DP-7-SB-0.3	~~49~~ 59	9/19/2024	1635		1							X				
PH-DP-7-SB-1.3	~~50~~ 60	9/19/2024	1640		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Bruh Myhg	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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409307

SAMPLE CHAIN OF CUSTODY

[redacted] 09/20/24 M3

Page # 7 of 8

Report To [redacted] Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Bruhn Murphy

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

INVOICE TO
accounting@
maulfoster.com

Project Specific RLs - Yes / [✓ No]

TURNAROUND TIME
X Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										H=Hold
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Zn	TCLP Pb	Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
PH-DP-8-SB-0.4	AP ~~51~~ 61	9/19/2024	1450	Soil	1							X				
PH-DP-8-SB- 1.3	~~52~~ 62	9/19/2024	1455		1							~~H~~		●		
PH-DP-9-SB-0.5	~~53~~ 63	9/19/2024	1645		1							H				
PH-DP-9-SB- 1.3	~~54~~ 64	9/19/2024	1650		1							H				
TF-DP-3-SB-0.5-DUP	~~55~~ 65	9/19/2024	1540	Soil	1							H				
PH-DP-6-SB-0.5-DUP	~~56~~ 66	9/19/2024	1500		1							H				
TF-DP-6-SB-0.4 BM DUP	~~57~~ 67	9/19/2024	1350 BM		1							H				
VM-DP-6-SB-0.5-DUP	~~58~~ 68	9/19/2024	1210		1							X			A	
FO-DP-5-SB-0.5-DUP	~~59~~ 69	9/19/2024	1025		1							●				
SP-DP-6-SB-0.5-DUP	~~60~~ 70	9/19/2024	1010		1							X				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Bruhn Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Page # 8 of 8

Report To Emily Hess

Company MFA

Address See page 1

City, State, ZIP —

Phone — Email —

SAMPLERS (signature)

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS

Project specific RLs? - Yes / [✓ No]

INVOICE TO
accounting @ maulfoster.com

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Metals 6020B *	TCLP Pb			H=hold * Notes As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-11-SB05-DUP	AP 61 71	9-19-24	0935	Soil	1								H				

FMB 9/19/24

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	F. Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 409307 CLIENT Maul Foster INITIALS/ AP DATE: 09/20/24

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 3 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO Initials/ AP Date: 09/20/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's ☑ Yes ☐ No ☐ Not on COC/label
Date Sampled ☑ Yes ☐ No ☐ Not on COC/label
Time Sampled ☑ Yes ☐ No ☐ Not on COC/label
\# of Containers ☑ Yes ☐ No
Relinquished ☑ Yes ☐ No
Requested analysis ☑ Yes ☐ On Hold

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☑ NA ☐ YES ☐ NO

Number of unused TO15 canisters ______ **Number of unused TO17 tubes** ______

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

October 7, 2024

Emily Hess, Project Manager
Maul Foster Alongi
2815 2nd Ave, Suite 540
Seattle, WA 98121

Dear Ms Hess:

Included are the results from the testing of material submitted on September 20, 2024 from the Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. There are 54 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Fiona Bellows, Brenden MurphyMFA1007R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2024 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006, F&BI 409307 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
409307 -01	VM-DP-5-SB-0.5
409307 -02	VM-DP-5-SB-1.5
409307 -03	VM-DP-6-SB-0.5
409307 -04	VM-DP-6-SB-1.5
409307 -05	VM-DP-7-SB-0.4
409307 -06	VM-DP-7-SB-1.3
409307 -07	VM-DP-8-SB-0.5
409307 -08	VM-DP-8-SB-1.5
409307 -09	VM-DP-9-SB-0.5
409307 -10	VM-DP-9-SB-1.5
409307 -11	VM-DP-10-SB-0.5
409307 -12	VM-DP-10-SB-1.4
409307 -13	FO-DP-5-SB-0.5
409307 -14	FO-DP-5-SB-1.5
409307 -15	FO-DP-6-SB-0.5
409307 -16	FO-DP-6-SB-1.3
409307 -17	FO-DP-7-SB-0.3
409307 -18	FO-DP-7-SB-1.1
409307 -19	FO-DP-8-SB-0.3
409307 -20	FO-DP-8-SB-1.1
409307 -21	SP-DP-4-SB-0.5
409307 -22	SP-DP-4-SB-1.5
409307 -23	SP-DP-5-SB-0.4
409307 -24	SP-DP-5-SB-1.2
409307 -25	SP-DP-6-SB-0.5
409307 -26	SP-DP-6-SB-1.3
409307 -27	SP-DP-7-SB-0.4
409307 -28	SP-DP-7-SB-1.2
409307 -29	SP-DP-8-SB-0.5
409307 -30	SP-DP-8-SB-1.5
409307 -31	SP-DP-9-SB-0.5
409307 -32	SP-DP-9-SB-1.2
409307 -33	SP-DP-10-SB-0.5
409307 -34	SP-DP-10-SB-1.3
409307 -35	SP-DP-11-SB-0.5
409307 -36	SP-DP-11-SB-1.4
409307 -37	TF-DP-3-SB-0.5

CASE NARRATIVE (continued)

Laboratory ID	Maul Foster Alongi
409307 -38	TF-DP-3-SB-1.5
409307 -39	TF-DP-4-SB-0.4
409307 -40	TF-DP-4-SB-1.3
409307 -41	TF-DP-5-SB-0.3
409307 -42	TF-DP-5-SB-1.2
409307 -43	TF-DP-6-SB-0.4
409307 -44	TF-DP-6-SB-1.3
409307 -45	TF-DP-7-SB-0.4
409307 -46	TF-DP-7-SB-1.3
409307 -47	TF-DP-8-SB-0.4
409307 -48	TF-DP-8-SB-1.3
409307 -49	TF-DP-9-SB-0.3
409307 -50	TF-DP-9-SB-1.3
409307 -51	TF-DP-10-SB-0.3
409307 -52	TF-DP-10-SB-1.2
409307 -53	TF-DP-11-SB-0.5
409307 -54	TF-DP-11-SB-1.5
409307 -55	TF-DP-12-SB-0.5
409307 -56	TF-DP-12-SB-1.5
409307 -57	PH-DP-6-SB-0.5
409307 -58	PH-DP-6-SB-1.5
409307 -59	PH-DP-7-SB-0.3
409307 -60	PH-DP-7-SB-1.3
409307 -61	PH-DP-8-SB-0.4
409307 -62	PH-DP-8-SB-1.3
409307 -63	PH-DP-9-SB-0.5
409307 -64	PH-DP-9-SB-1.3
409307 -65	TF-DP-3-SB-0.5-DUP
409307 -66	PH-DP-6-SB-0.5-DUP
409307 -67	TF-DP-6-SB-0.4-DUP
409307 -68	VM-DP-6-SB-0.5-DUP
409307 -69	FO-DP-5-SB-0.5-DUP
409307 -70	SP-DP-6-SB-0.5-DUP
409307 -71	SP-DP-11-SB-0.5-DUP

All quality control requirements were acceptable.

Date of Report: 10/07/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307
Date Extracted: NA
Date Analyzed: 09/23/24 and 10/02/24

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR PERCENT MOISTURE USING ASTM D2216-98

Sample ID Laboratory ID	% Moisture
VM-DP-5-SB-0.5 409307-01	9
VM-DP-6-SB-0.5 409307-03	12
VM-DP-6-SB-1.5 409307-04	10
VM-DP-7-SB-0.4 409307-05	5
FO-DP-5-SB-0.5 409307-13	3
FO-DP-5-SB-1.5 409307-14	14
FO-DP-6-SB-0.5 409307-15	4
FO-DP-6-SB-1.3 409307-16	7
FO-DP-8-SB-0.3 409307-19	9
SP-DP-4-SB-0.5 409307-21	13
SP-DP-5-SB-0.4 409307-23	8
SP-DP-6-SB-0.5 409307-25	9

Date of Report: 10/07/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307
Date Extracted: NA
Date Analyzed: 09/23/24 and 10/02/24

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR PERCENT MOISTURE USING ASTM D2216-98

Sample ID Laboratory ID	% Moisture
SP-DP-7-SB-0.4 409307-27	8
TF-DP-3-SB-0.5 409307-37	5
TF-DP-4-SB-0.4 409307-39	6
TF-DP-4-SB-1.3 409307-40	7
TF-DP-5-SB-0.3 409307-41	5
TF-DP-6-SB-0.4 409307-43	9
TF-DP-8-SB-0.4 409307-47	7
TF-DP-9-SB-0.3 409307-49	6
PH-DP-6-SB-0.5 409307-57	2
PH-DP-7-SB-0.3 409307-59	6
PH-DP-8-SB-0.4 409307-61	1
PH-DP-8-SB-1.3 409307-62	10

Date of Report: 10/07/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307
Date Extracted: NA
Date Analyzed: 09/23/24 and 10/02/24

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR PERCENT MOISTURE USING ASTM D2216-98

Sample ID Laboratory ID	% Moisture
VM-DP-6-SB-0.5-DUP 409307-68	9
FO-DP-5-SB-0.5-DUP 409307-69	5
SP-DP-6-SB-0.5-DUP 409307-70	7

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-5-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-01
Date Analyzed:	09/23/24	Data File:	409307-01.136
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.8
Cadmium	<1
Chromium	13
Copper	28
Mercury	<1
Nickel	14
Zinc	100

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-5-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-01 x5
Date Analyzed:	09/23/24	Data File:	409307-01 x5.064
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	99

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-03
Date Analyzed:	09/23/24	Data File:	409307-03.139
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.0
Cadmium	<1
Chromium	13
Copper	38
Mercury	<1
Nickel	15
Zinc	130

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-03 x5
Date Analyzed:	09/25/24	Data File:	409307-03 x5.108
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	110

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-6-SB-1.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-04
Date Analyzed:	10/03/24	Data File:	409307-04.166
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	75

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-7-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-05
Date Analyzed:	09/23/24	Data File:	409307-05.140
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.3
Cadmium	<1
Chromium	8.7
Copper	47
Mercury	<1
Nickel	16
Zinc	34

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-7-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-05 x5
Date Analyzed:	09/26/24	Data File:	409307-05 x5.268
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	44

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-13
Date Analyzed:	09/23/24	Data File:	409307-13.141
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	23
Cadmium	4.3
Mercury	1.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-13 x5
Date Analyzed:	09/26/24	Data File:	409307-13 x5.238
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	40
Copper	240
Lead	2,600
Nickel	89
Zinc	1,600

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-1.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-14
Date Analyzed:	10/02/24	Data File:	409307-14.112
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	69
Cadmium	15
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-1.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-14 x10
Date Analyzed:	10/03/24	Data File:	409307-14 x10.168
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	420
Nickel	140
Zinc	7,800

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-1.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-14 x1000
Date Analyzed:	10/04/24	Data File:	409307-14 x1000.192
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	9,700

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-15
Date Analyzed:	09/23/24	Data File:	409307-15.142
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.8
Cadmium	<1
Chromium	13
Copper	55
Mercury	<1
Nickel	23
Zinc	180

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-15 x5
Date Analyzed:	09/25/24	Data File:	409307-15 x5.222
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	200

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-6-SB-1.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-16 x5
Date Analyzed:	10/03/24	Data File:	409307-16 x5.169
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	200
Zinc	150

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-8-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-19
Date Analyzed:	10/02/24	Data File:	409307-19.121
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	15
Cadmium	3.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-8-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-19 x10
Date Analyzed:	10/03/24	Data File:	409307-19 x10.170
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	1,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-4-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-21
Date Analyzed:	09/23/24	Data File:	409307-21.143
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.6
Cadmium	<1
Chromium	11
Copper	57
Lead	13
Mercury	<1
Nickel	28
Zinc	25

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-5-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-23
Date Analyzed:	09/23/24	Data File:	409307-23.144
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.7
Cadmium	1.0
Chromium	10
Copper	53
Mercury	<1
Nickel	23
Zinc	120

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-5-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-23 x5
Date Analyzed:	09/25/24	Data File:	409307-23 x5.223
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	85

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-25
Date Analyzed:	09/23/24	Data File:	409307-25.145
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.8
Cadmium	<1
Chromium	20
Copper	20
Mercury	<1
Nickel	23
Zinc	53

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-25 x5
Date Analyzed:	09/25/24	Data File:	409307-25 x5.224
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	28

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-7-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-27
Date Analyzed:	09/23/24	Data File:	409307-27.146
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.4
Cadmium	<1
Chromium	22
Copper	20
Lead	19
Mercury	<1
Nickel	18
Zinc	52

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-3-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-37
Date Analyzed:	09/23/24	Data File:	409307-37.147
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.5
Cadmium	<1
Chromium	17
Copper	28
Mercury	<1
Nickel	20
Zinc	57

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-3-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-37 x5
Date Analyzed:	09/25/24	Data File:	409307-37 x5.237
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	42

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-4-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-39
Date Analyzed:	09/23/24	Data File:	409307-39.148
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	22
Cadmium	<1
Chromium	18
Copper	51
Mercury	<1
Nickel	24
Zinc	90

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-4-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-39 x5
Date Analyzed:	09/26/24	Data File:	409307-39 x5.290
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	61

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-4-SB-1.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-40
Date Analyzed:	10/02/24	Data File:	409307-40.122
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	34

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-5-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-41
Date Analyzed:	09/23/24	Data File:	409307-41.151
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.9
Cadmium	<1
Chromium	10
Copper	37
Lead	26
Mercury	<1
Nickel	20
Zinc	42

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-6-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-43
Date Analyzed:	09/23/24	Data File:	409307-43.152
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.0
Cadmium	<1
Chromium	9.3
Copper	44
Lead	24
Mercury	<1
Nickel	17
Zinc	34

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-8-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-47
Date Analyzed:	10/02/24	Data File:	409307-47.123
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	TF-DP-9-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-49
Date Analyzed:	10/02/24	Data File:	409307-49.124
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	PH-DP-6-SB-0.5	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-57
Date Analyzed:	09/23/24	Data File:	409307-57.153
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.2
Cadmium	<1
Chromium	7.7
Copper	6.3
Lead	5.4
Mercury	<1
Nickel	7.7
Zinc	49

Analysis For Total Metals By EPA Method 6020B

Client ID:	PH-DP-7-SB-0.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-59
Date Analyzed:	09/23/24	Data File:	409307-59.154
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.8
Cadmium	<1
Chromium	10
Copper	49
Lead	13
Mercury	<1
Nickel	23
Zinc	23

Analysis For Total Metals By EPA Method 6020B

Client ID:	PH-DP-8-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-61
Date Analyzed:	09/23/24	Data File:	409307-61.155
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.0
Cadmium	<1
Chromium	7.7
Copper	30
Mercury	<1
Nickel	8.6
Zinc	190

Analysis For Total Metals By EPA Method 6020B

Client ID:	PH-DP-8-SB-0.4	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-61 x5
Date Analyzed:	09/26/24	Data File:	409307-61 x5.300
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	81

Analysis For Total Metals By EPA Method 6020B

Client ID:	PH-DP-8-SB-1.3	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-62
Date Analyzed:	10/02/24	Data File:	409307-62.127
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Zinc	16

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-6-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-68
Date Analyzed:	09/23/24	Data File:	409307-68.156
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.1
Cadmium	<1
Chromium	12
Copper	31
Mercury	<1
Nickel	13
Zinc	130

Analysis For Total Metals By EPA Method 6020B

Client ID:	VM-DP-6-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-68 x5
Date Analyzed:	09/26/24	Data File:	409307-68 x5.301
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	180

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-69
Date Analyzed:	10/02/24	Data File:	409307-69.128
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	31
Cadmium	5.6
Mercury	1.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-69 x5
Date Analyzed:	10/03/24	Data File:	409307-69 x5.175
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	39
Copper	220
Nickel	86
Zinc	1,800

Analysis For Total Metals By EPA Method 6020B

Client ID:	FO-DP-5-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	409307-69 x200
Date Analyzed:	10/04/24	Data File:	409307-69 x200.193
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	2,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-6-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-70
Date Analyzed:	09/23/24	Data File:	409307-70.157
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.4
Cadmium	<1
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	SP-DP-6-SB-0.5-DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	409307-70 x2
Date Analyzed:	09/26/24	Data File:	409307-70 x2.313
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	24
Copper	28
Lead	53
Nickel	26
Zinc	61

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	M1122.05.006, F&BI 409307
Date Extracted:	09/23/24	Lab ID:	I4-786 mb
Date Analyzed:	09/23/24	Data File:	I4-786 mb.059
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	M1122.05.006, F&BI 409307
Date Extracted:	10/02/24	Lab ID:	I4-825 mb
Date Analyzed:	10/02/24	Data File:	I4-825 mb.103
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Zinc	<5

Date of Report: 10/07/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 409307-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	73 vo	83	75-125	13
Cadmium	mg/kg (ppm)	10	<5	87	94	75-125	8
Chromium	mg/kg (ppm)	50	13.2	85 b	89 b	75-125	5 b
Copper	mg/kg (ppm)	50	29.4	79 b	87 b	75-125	10 b
Lead	mg/kg (ppm)	50	90.5	3 b	13 b	75-125	125 b
Mercury	mg/kg (ppm	5	<5	84	90	75-125	7
Nickel	mg/kg (ppm)	25	14.9	84 b	90 b	75-125	7 b
Zinc	mg/kg (ppm)	50	107	83 b	91 b	75-125	9 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	91	80-120
Cadmium	mg/kg (ppm)	10	90	80-120
Chromium	mg/kg (ppm)	50	101	80-120
Copper	mg/kg (ppm)	50	98	80-120
Lead	mg/kg (ppm)	50	96	80-120
Mercury	mg/kg (ppm)	5	97	80-120
Nickel	mg/kg (ppm)	25	99	80-120
Zinc	mg/kg (ppm)	50	96	80-120

Date of Report: 10/07/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409307

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 409307-04 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	2.57	83 b	84 b	75-125	1 b
Cadmium	mg/kg (ppm)	10	<1	90	87	75-125	3
Chromium	mg/kg (ppm)	50	15.8	78 b	62 b	75-125	23 b
Copper	mg/kg (ppm)	50	18.6	81 b	67 b	75-125	19 b
Lead	mg/kg (ppm)	50	57.2	86 b	60 b	75-125	36 b
Mercury	mg/kg (ppm	5	<1	96	89	75-125	8
Nickel	mg/kg (ppm)	25	14.0	73 b	69 b	75-125	6 b
Zinc	mg/kg (ppm)	50	61.4	86 b	64 b	75-125	29 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	97	80-120
Cadmium	mg/kg (ppm)	10	99	80-120
Chromium	mg/kg (ppm)	50	109	80-120
Copper	mg/kg (ppm)	50	103	80-120
Lead	mg/kg (ppm)	50	105	80-120
Mercury	mg/kg (ppm)	5	110	80-120
Nickel	mg/kg (ppm)	25	104	80-120
Zinc	mg/kg (ppm)	50	103	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

Page # 1 of 8

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brnh Mrphy

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Pb		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-5-SB-0.5	01	9/19/2024	1235	Soil	1							X				● per EH
VM-DP-5-SB-1.5	02	9/19/2024	1240		1							H				9/30/24 ME
VM-DP-6-SB-0.5	03	9/19/2024	1210		1							X				
VM-DP-6-SB-1.5	04	9/19/2024	1215		1							~~H~~		●		
VM-DP-7-SB-0.4	05	9/19/2024	1150		1							X				
VM-DP-7-SB-1.3	06	9/19/2024	1155		1							H				
VM-DP-8-SB-0.5	07	9/19/2024	1245		1							H				
VM-DP-8-SB-1.5	08	9/19/2024	1250		1							H				
VM-DP-9-SB-0.5	09	9/19/2024	1225		1							H				
VM-DP-9-SB-1.5	10	9/19/2024	1230		1							H				

Samples received at 3 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Brnh Mrphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

FORMS\COC\COC.DOC

409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 2 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brnd Mrphy

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com
Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	As, Cd, Pb ~~Dissolved Metals 6020B**~~	As, Cd Pb, Zn, Cu, Hg, Ni	Zn, Pb	H= Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
VM-DP-10-SB-0.5	11	9/19/2024	1140	Soil	1							H				
VM-DP-10-SB-1.4	12	9/19/2024	1145	|	1							H				
FO-DP-5-SB-0.5	13	9/19/2024	1025	|	1							X				
FO-DP-5-SB-1.5	14	9/19/2024	1030	|	1							~~H~~		●		
FO-DP-6-SB-0.5	15	9/19/2024	1055	|	1							X				
FO-DP-6-SB-1.3	16	9/19/2024	1100	|	1							~~H~~			●	
FO-DP-7-SB-0.3	17	9/19/2024	1110	|	1							H				
FO-DP-7-SB-1.1	18	9/19/2024	1115	|	1							H				
FO-DP-8-SB-0.3	19	9/19/2024	1040	|	1							~~H~~	●			
FO-DP-8-SB-1.1	20	9/19/2024	1045	|	1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Brnd Mrphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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409307

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

[redacted]

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

[redacted]

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

Page # 3 of 8

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	ANALYSES REQUESTED NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**			H = Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-4-SB-0.5	21	9/19/2024	0850	Soil	1								X			
SP-DP-4-SB-1.5	22	9/19/2024	0855		1								H			
SP-DP-5-SB-0.4	23	9/19/2024	0915		1								X			
SP-DP-5-SB-1.2	24	9/19/2024	0920		1								H			
SP-DP-6-SB-0.5	25	9/19/2024	1010		1								X			
SP-DP-6-SB-1.3	26	9/19/2024	1015		1								H			
SP-DP-7-SB-0.4	27	9/19/2024	0920		1								X			
SP-DP-7-SB-1.2	28	9/19/2024	0925		1								H			
SP-DP-8-SB-0.5	29	9/19/2024	0905		1								H			
SP-DP-8-SB-1.5	30	9/19/2024	0910		1								H			

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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[redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3

[redacted]

Page # 4 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
[✓ Standard Turnaround]
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	As		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-9-SB-0.5	31	9/19/2024	0835	Soil	1							H				
SP-DP-9-SB-1.2	32	9/19/2024	0840		1							H				
SP-DP-10-SB-0.5	33	9/19/2024	1000		1							H				
SP-DP-10-SB-1.3	34	9/19/2024	1005		1							H				
SP-DP-11-SB-0.5	35	9/19/2024	0935		1							H				
SP-DP-11-SB-1.4	36	9/19/2024	0940		1							H				
TF-DP-3-SB-0.5	37	9/19/2024	1540		1							X				
TF-DP-3-SB-1.5	38	9/19/2024	1545		1							H				
TF-DP-4-SB-0.4	39	9/19/2024	1605		1							X				
TF-DP-4-SB-1.3	40	9/19/2024	1610		1							~~H~~		●		

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

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409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 M3 [redacted]

Page # 5 of 8

Report To Emily Hess
Company Maul Foster Alongi
Address 330 E Mill Plain Boulevard, Suite 405
City, State, ZIP Vancouver, WA 98660
Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com
Project Specific RLs - Yes [✓ No]

INVOICE TO
accounting@maulfoster.com

TURNAROUND TIME
✓ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	As		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-5-SB-0.3	AP ~~31~~ 41	9/19/2024	1320	Soil	1							X				
TF-DP-5-SB-1.2	~~32~~ 42	9/19/2024	1325		1							H				
TF-DP-6-SB-0.4	~~33~~ 43	9/19/2024	1350		1							X				
TF-DP-6-SB-1.3	~~34~~ 44	9/19/2024	1355		1							H				
TF-DP-7-SB-0.4	~~35~~ 45	9/19/2024	1420		1							H				
TF-DP-7-SB-1.3	~~36~~ 46	9/19/2024	1425		1							H				
TF-DP-8-SB-0.4	~~37~~ 47	9/19/2024	1550		1							~~H~~		●		
TF-DP-8-SB-1.3	~~38~~ 48	9/19/2024	1555		1							H				
TF-DP-9-SB-0.3	~~39~~ 49	9/19/2024	1615		1							~~H~~		●		
TF-DP-9-SB-1.3	~~40~~ 50	9/19/2024	1620		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	MFA	9/19/24	17:30
Received by:	Fiona Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 6 of 8

Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Brenden Murphy

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
☑ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**			H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
TF-DP-10-SB-0.3	AP ~~41~~ 51	9/19/2024	1310	Soil	1							H				
TF-DP-10-SB-1.2	~~42~~ 52	9/19/2024	1315		1							H				
TF-DP-11-SB-0.5	~~43~~ 53	9/19/2024	1340		1							H				
TF-DP-11-SB-1.5	~~44~~ 54	9/19/2024	1345		1							H				
TF-DP-12-SB-0.5	~~45~~ 55	9/19/2024	1405		1							H				
TF-DP-12-SB-1.5	~~46~~ 56	9/19/2024	1410		1							H				
PH-DP-6-SB-0.5	~~47~~ 57	9/19/2024	1500		1							X				
PH-DP-6-SB-1.5	~~48~~ 58	9/19/2024	1505		1							H				
PH-DP-7-SB-0.3	~~49~~ 59	9/19/2024	1635		1							X				
PH-DP-7-SB-1.3	~~50~~ 60	9/19/2024	1640		1							H				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Brenden Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] M3

Page # 7 of 8

[redacted] Report To Emily Hess

Company Maul Foster Alongi

Address 330 E Mill Plain Boulevard, Suite 405

City, State, ZIP Vancouver, WA 98660

Phone 360 433 0244 Email ehess@maulfoster.com

SAMPLERS (*signature*) Bretn Murphy

PROJECT NAME
Roslyn No. 4 Mine

PO #
M1122.05.006

REMARKS
cc fbellows@maulfoster.com; bmurphy@maulfoster.com

Project Specific RLs - Yes / [✓ No]

INVOICE TO
accounting@
maulfoster.com

TURNAROUND TIME
☒ Standard Turnaround
RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B**	Dissolved Metals 6020B**	Zn		H=Hold Notes **As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
PH-DP-8-SB-0.4	AP ~~51~~ 61	9/19/2024	1450	Soil	1							X				
PH-DP-8-SB- 1.3	~~52~~ 62	9/19/2024	1455		1							~~H~~		●		
PH-DP-9-SB-0.5	~~53~~ 63	9/19/2024	1645		1							H				
PH-DP-9-SB- 1.3	~~54~~ 64	9/19/2024	1650		1							H				
TF-DP-3-SB-0.5-DUP	~~55~~ 65	9/19/2024	1540	Soil	1							H				
PH-DP-6-SB-0.5-DUP	~~56~~ 66	9/19/2024	1500		1							H				
TF-DP-6-SB-0.4 DM DUP	~~57~~ 67	9/19/2024	1350 DM		1							H				
VM-DP-6-SB-0.5-DUP	~~58~~ 68	9/19/2024	1210		1							X				
FO-DP-5-SB-0.5-DUP	~~59~~ 69	9/19/2024	1025		1							●				
SP-DP-6-SB-0.5-DUP	~~60~~ 70	9/19/2024	1010		1							X				

Samples received at 3 °C

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Bretn Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:		Fiona Bellows	MFA	9/19/24	1730
Relinquished by:		Fiona Bellows	MFA	9/20/24	0935
Received by:		Anh Phan	FBI	09/20/24	09:35

FORMS\COC\COC.DOC

409307

SAMPLE CHAIN OF COSTODY

09/20/24 M3

Page # 8 of 8

Report To Emily Hess
Company MFA
Address See page 1
City, State, ZIP —
Phone — Email —

SAMPLERS (*signature*) Brenden Murphy

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS

INVOICE TO
accounting @ maulfoster.com

Project specific RLs? - Yes / [✓ No]

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Metals 6020B *			H=hold Notes * As, Cd, Cr, Cu, Pb, Hg, Ni, Zn
SP-DP-11-SB05-DUP	AP 61 71	9-19-24	0935	Soil	1								H			

FMB 9/19/24

Samples received at 3 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Brenden Murphy	Brenden Murphy	MFA	9/19/24	17:30
Received by:	F. Bellows	MFA	9/19/24	1730
Relinquished by:	Fiona Bellows	MFA	9/20/24	0935
Received by:	Anh Phan	FBI	09/20/24	09:35

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 409307 CLIENT Maul Foster INITIALS/ AP DATE: 09/20/24

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 3 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO Initials/ AP Date: 09/20/24
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's ☑ Yes ☐ No ☐ Not on COC/label
Date Sampled ☑ Yes ☐ No ☐ Not on COC/label
Time Sampled ☑ Yes ☐ No ☐ Not on COC/label
\# of Containers ☑ Yes ☐ No
Relinquished ☑ Yes ☐ No
Requested analysis ☑ Yes ☐ On Hold

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☑ NA ☐ YES ☐ NO

Number of unused TO15 canisters _____ **Number of unused TO17 tubes** _____

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

October 1, 2024

Emily Hess, Project Manager
Maul Foster Alongi
330 E Mill Plain Blvd Ste 405
Vancouver, WA 98660

Dear Ms Hess:

Included are the results from the testing of material submitted on September 20, 2024 from the Roslyn No 4 Mine M1122.05.006, F&BI 409337 project. There are 29 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
MFA1001R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 20, 2024 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006, F&BI 409337 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
409337 -01	MW-01-GW-15.0
409337 -02	MW-01-GW-15.0 DUP
409337 -03	MW-02-GW-15.0
409337 -04	MW-03-GW-13.0

A 6020B total and dissolved internal standard associated with copper did not meet the acceptance criteria for sample MW-02-GW-15.0. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

Several metals in the total 6020B matrix spike and matrix spike duplicate did not meet the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

The dissolved metals qualified with f were filtered at the laboratory on 09/24/24.

All other quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/24/24	Lab ID:	409337-01
Date Analyzed:	09/24/24	Data File:	409337-01.212
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.9
Cadmium	<1
Chromium	1.6
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0 DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/25/24	Lab ID:	409337-02
Date Analyzed:	09/26/24	Data File:	409337-02.329
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.5
Cadmium	<1
Chromium	1.6
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/25/24	Lab ID:	409337-03
Date Analyzed:	09/26/24	Data File:	409337-03.330
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	35
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/24/24	Lab ID:	409337-03 x2
Date Analyzed:	09/27/24	Data File:	409337-03 x2.289
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<4
Zinc	<10

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-03-GW-13.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/25/24	Lab ID:	409337-04
Date Analyzed:	09/26/24	Data File:	409337-04.331
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	2.5
Copper	<5
Lead	2.5
Mercury	<1
Nickel	9.8
Zinc	8.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/24/24	Lab ID:	I4-795 mb
Date Analyzed:	09/24/24	Data File:	I4-795 mb.141
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/25/24	Lab ID:	I4-795 mb2
Date Analyzed:	09/25/24	Data File:	I4-795 mb2.148
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-01
Date Analyzed:	10/01/24	Data File:	409337-01.069
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-01
Date Analyzed:	09/30/24	Data File:	409337-01.158
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-01 x2
Date Analyzed:	10/01/24	Data File:	409337-01 x2.087
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<2
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0 DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-02
Date Analyzed:	10/01/24	Data File:	409337-02.070
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0 DUP	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-02
Date Analyzed:	09/30/24	Data File:	409337-02.161
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID: MW-01-GW-15.0 DUP
Date Received: 09/20/24
Date Extracted: 09/30/24
Date Analyzed: 10/01/24
Matrix: Water
Units: ug/L (ppb)

Client: Maul Foster Alongi
Project: Roslyn No 4 Mine
Lab ID: 409337-02 x2
Data File: 409337-02 x2.088
Instrument: ICPMS3
Operator: SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<2
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-03
Date Analyzed:	10/01/24	Data File:	409337-03.085
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-03
Date Analyzed:	09/30/24	Data File:	409337-03.162
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	38

Analysis For Dissolved Metals By EPA Method 200.8

Client ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-03 x5
Date Analyzed:	10/01/24	Data File:	409337-03 x5.084
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<5
Copper	<25
Nickel	<5
Zinc	<25

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-03-GW-13.0	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	409337-04
Date Analyzed:	10/01/24	Data File:	409337-04.086
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1 k
Cadmium	<1
Chromium	<1
Copper	<5
Lead	1.6
Mercury	<1
Nickel	8.3
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine
Date Extracted:	09/30/24	Lab ID:	I4-820 mb
Date Analyzed:	09/30/24	Data File:	I4-820 mb.154
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	409337-01
Date Analyzed:	09/30/24	Data File:	409337-01.055
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-01-GW-15.0 DUP f	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	409337-02
Date Analyzed:	09/30/24	Data File:	409337-02.056
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	409337-03
Date Analyzed:	09/30/24	Data File:	409337-03.057
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.5
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-02-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	409337-03 x2
Date Analyzed:	09/30/24	Data File:	409337-03 x2.059
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<4
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-03-GW-13.0 f	Client:	Maul Foster Alongi
Date Received:	09/20/24	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	409337-04
Date Analyzed:	09/30/24	Data File:	409337-04.058
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	9.6
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank f	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	09/26/24	Lab ID:	I4-804 mb
Date Analyzed:	09/30/24	Data File:	I4-804 mb.073
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Date of Report: 10/01/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409337

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 409337-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.54	100 b	99 b	75-125	1 b
Cadmium	ug/L (ppb)	5	<1	102	102	75-125	0
Chromium	ug/L (ppb)	20	<1	80	79	75-125	1
Copper	ug/L (ppb)	20	<5	73 vo	72 vo	75-125	1
Lead	ug/L (ppb)	10	<1	105	103	75-125	2
Mercury	ug/L (ppb)	5	<1	96	94	75-125	2
Nickel	ug/L (ppb)	20	<1	76	74 vo	75-125	3
Zinc	ug/L (ppb)	50	<5	74 vo	73 vo	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	102	80-120
Cadmium	ug/L (ppb)	5	104	80-120
Chromium	ug/L (ppb)	20	105	80-120
Copper	ug/L (ppb)	20	100	80-120
Lead	ug/L (ppb)	10	100	80-120
Mercury	ug/L (ppb)	5	94	80-120
Nickel	ug/L (ppb)	20	101	80-120
Zinc	ug/L (ppb)	50	96	80-120

Date of Report: 10/01/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409337

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 409337-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.86	104 b	105 b	75-125	1 b
Cadmium	ug/L (ppb)	5	<1	105	105	75-125	0
Chromium	ug/L (ppb)	20	1.56	73 vo	73 vo	75-125	0
Copper	ug/L (ppb)	20	<5	71 vo	70 vo	75-125	1
Lead	ug/L (ppb)	10	<1	101	100	75-125	1
Mercury	ug/L (ppb)	5	<1	100	99	75-125	1
Nickel	ug/L (ppb)	20	1.45	74 vo	73 vo	75-125	1
Zinc	ug/L (ppb)	50	<5	76	75	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	96	80-120
Cadmium	ug/L (ppb)	5	100	80-120
Chromium	ug/L (ppb)	20	99	80-120
Copper	ug/L (ppb)	20	100	80-120
Lead	ug/L (ppb)	10	97	80-120
Mercury	ug/L (ppb)	5	95	80-120
Nickel	ug/L (ppb)	20	101	80-120
Zinc	ug/L (ppb)	50	102	80-120

Date of Report: 10/01/24
Date Received: 09/20/24
Project: Roslyn No 4 Mine M1122.05.006, F&BI 409337

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: 409337-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<1	92	98	75-125	6
Cadmium	ug/L (ppb)	5	<1	89	96	75-125	8
Chromium	ug/L (ppb)	20	<1	85	88	75-125	3
Copper	ug/L (ppb)	20	<5	78	111	75-125	35 b
Lead	ug/L (ppb)	10	<1	98	103	75-125	5
Mercury	ug/L (ppb)	5	<1	95	105	75-125	10
Nickel	ug/L (ppb)	20	1.25	89	95	75-125	7
Zinc	ug/L (ppb)	50	<5	79	96	75-125	19

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	99	80-120
Cadmium	ug/L (ppb)	5	99	80-120
Chromium	ug/L (ppb)	20	101	80-120
Copper	ug/L (ppb)	20	100	80-120
Lead	ug/L (ppb)	10	101	80-120
Mercury	ug/L (ppb)	5	93	80-120
Nickel	ug/L (ppb)	20	91	80-120
Zinc	ug/L (ppb)	50	95	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the standard reporting limit. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

409337 [redacted]

SAMPLE CHAIN OF CUSTODY

09/20/24 [redacted] L3

Page # 1 of 1

Report To Emily Hess
Company MFA
Address 330 E Mill Plain Blvd Ste 405
City, State, ZIP Vancouver WA 98660
Phone 360-433-0244 Email ehess@maulfoster.com

SAMPLERS (signature) Brendn Murphy

PROJECT NAME Roslyn No. 4 Mine

PO # M1122.05.006

REMARKS please analyze both field filtered & lab filtered for dissolved

Project specific RLs? - Yes / [✓ No]

INVOICE TO accounting@maulfoster.com

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total metals 6020B	Diss metals 6020B	As, Cd, Cr, Cu, Pb, Hg, Ni, Zn		Notes
MW-01-GW-15.0	01 A-C	9/20/24	11:00	BM GW	3								X	X			Please lab filter un-preserved poly
MW-01-GW-15.0-DUP	02		11:00		3								X	X			
MW-02-GW-15.0	03		13:15		3								X	X			
MW-03-GW-13.0	04		14:00		3								X	X			

Samples received at 0 °C

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Brendn Murphy	Brenden Murphy	MFA	9/20/24	17:10
Received by:	Anh Phan	FBI	09/20/24	17:10
Relinquished by:				
Received by:				

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 409337 **CLIENT** Maul Foster **INITIALS/ DATE:** AP 09/20/24

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 0 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO **Initials/ Date:** 9/23 JB
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 0 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's ☑ Yes ☐ No ☐ Not on COC/label
Date Sampled ☑ Yes ☐ No ☐ Not on COC/label
Time Sampled ☑ Yes ☐ No ☐ Not on COC/label
\# of Containers ☑ Yes ☐ No
Relinquished ☑ Yes ☐ No
Requested analysis ☑ Yes ☐ On Hold

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☐ NA ☐ YES ☐ NO

Number of unused TO15 canisters** _____ **Number of unused TO17 tubes** _____
**Fill out Green manifolds billing sheet

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Elizabeth Webber-Bruya
Ann Webber-Bruya
Michael Erdahl
Vineta Mills
Eric Young

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

April 9, 2025

Emily Hess, Project Manager
Maul Foster Alongi
2815 2nd Ave, Suite 540
Seattle, WA 98121

Dear Ms Hess:

Included are the results from the testing of material submitted on April 2, 2025 from the Roslyn No 4 Mine M1122.05.006, F&BI 504027 project. There are 6 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
MFA0409R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 2, 2025 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
504027 -01	DRUM01-S-COMP

Selenium in the 6020B matrix spike and matrix spike duplicate did not meet the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Date of Report: 04/09/25
Date Received: 04/02/25
Project: Roslyn No 4 Mine M1122.05.006, F&BI 504027
Date Extracted: NA
Date Analyzed: 04/02/25

RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES FOR PERCENT MOISTURE USING ASTM D2216-98

Sample ID Laboratory ID	% Moisture
DRUM01-S-COMP 504027-01	13

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	DRUM01-S-COMP	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504027-01
Date Analyzed:	04/04/25	Data File:	504027-01.074
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.5
Barium	180
Cadmium	<1
Chromium	21
Lead	150
Mercury	<1
Selenium	<1
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	I5-278 mb
Date Analyzed:	04/02/25	Data File:	I5-278 mb.041
Matrix:	Soil	Instrument:	ICPMS3
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

Date of Report: 04/09/25
Date Received: 04/02/25
Project: Roslyn No 4 Mine M1122.05.006, F&BI 504027

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 504022-21 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	6.56	92 b	90 b	75-125	2 b
Barium	mg/kg (ppm)	50	56.0	92 b	102 b	75-125	10 b
Cadmium	mg/kg (ppm)	10	<1	95	92	75-125	3
Chromium	mg/kg (ppm)	50	16.4	83 b	76 b	75-125	9 b
Lead	mg/kg (ppm)	50	29.3	112 b	99 b	75-125	12 b
Mercury	mg/kg (ppm	5	<1	98	96	75-125	2
Selenium	mg/kg (ppm)	5	<1	74 vo	72 vo	75-125	3
Silver	mg/kg (ppm)	10	<1	91	87	75-125	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	99	80-120
Barium	mg/kg (ppm)	50	98	80-120
Cadmium	mg/kg (ppm)	10	95	80-120
Chromium	mg/kg (ppm)	50	98	80-120
Lead	mg/kg (ppm)	50	103	80-120
Mercury	mg/kg (ppm)	5	94	80-120
Selenium	mg/kg (ppm)	5	95	80-120
Silver	mg/kg (ppm)	10	93	80-120

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

504027

SAMPLE CHAIN OF CUSTODY

04/02/25

[redacted] 1 of 1 MI

[redacted]
Report To Emily Hess
Company MFA
Address 330 E Mill Plain Blvd Ste 405
City, State, ZIP Vancouver WA 98660
Phone 360-433-0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME	PO #
Roslyn No. 4 Mine	M1122.05.006

REMARKS	INVOICE TO
Project specific RLs? - Yes / [✓ No]	accounting@maulfoster.com

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	RCRA 8 Metals				Notes
DRUM01-S-COMP	01	4/1/25	1215	SO	1								X				

FMB 4/1/25

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Fiona Bellows	MFA	4/2/25	0705
Received by:	James Bruya	F&B	4/2/25	0705
Relinquished by:				
Received by:		Samples received at 0 °C		

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 504027 CLIENT MFA INITIALS/DATE: NP 4/2/25

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 0 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO Initials/Date: NP 4/2
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's ☑ Yes ☐ No ☐ Not on COC/label
Date Sampled ☑ Yes ☐ No ☐ Not on COC/label
Time Sampled ☑ Yes ☐ No ☐ Not on COC/label
# of Containers ☑ Yes ☐ No
Relinquished ☑ Yes ☐ No
Requested analysis ☑ Yes ☐ On Hold

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☐ NA ☐ YES ☐ NO

Number of unused TO15 canisters** ____ Number of unused TO17 tubes ____
**Fill out Green manifolds billing sheet

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Elizabeth Webber-Bruya
Ann Webber-Bruya
Michael Erdahl
Vineta Mills
Eric Young

5500 4th Ave South
Seattle, WA 98108-2419
(206) 285-8282
office@friedmanandbruya.com
www.friedmanandbruya.com

April 9, 2025

Emily Hess, Project Manager
Maul Foster Alongi
2815 2nd Ave, Suite 540
Seattle, WA 98121

Dear Ms Hess:

Included are the results from the testing of material submitted on April 2, 2025 from the Roslyn No 4 Mine M1122.05.006, F&BI 504028 project. There are 26 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Fiona Bellows
MFA0409R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on April 2, 2025 by Friedman & Bruya, Inc. from the Maul Foster Alongi Roslyn No 4 Mine M1122.05.006, F&BI 504028 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Maul Foster Alongi
504028 -01	MW-01-GW-15.0
504028 -02	MW-02-GW-15.0
504028 -03	MW-03-GW-11.5
504028 -04	MW-02-GW-15.0-DUP

A 6020B internal standard associated with copper did not meet the acceptance criteria for samples MW-02-GW-15.0 and MW-02-GW-15.0-DUP. The samples were diluted and reanalyzed with acceptable results. Both data sets were reported.

The 6020B dissolved metals samples were filtered in the field and at the laboratory. The laboratory filtered samples were qualified accordingly. Both data sets were reported.

All other quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-01
Date Analyzed:	04/02/25	Data File:	504028-01.222
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.3
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02
Date Analyzed:	04/02/25	Data File:	504028-02.223
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	54
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02 x4
Date Analyzed:	04/04/25	Data File:	504028-02 x4.066
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<4
Copper	<20
Nickel	<8
Zinc	<20

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-03-GW-11.5	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-03
Date Analyzed:	04/02/25	Data File:	504028-03.224
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.7
Cadmium	<1
Chromium	16
Copper	8.3
Lead	12
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-03-GW-11.5	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-03 x2
Date Analyzed:	04/03/25	Data File:	504028-03 x2.228
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Nickel	28
Zinc	30

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0-DUP	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-04
Date Analyzed:	04/02/25	Data File:	504028-04.225
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	55
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0-DUP	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-04 x4
Date Analyzed:	04/07/25	Data File:	504028-04 x4.158
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<4
Copper	<20
Nickel	<4
Zinc	<20

Analysis For Total Metals By EPA Method 6020B

Client Sample ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	I5-274 mb2
Date Analyzed:	04/02/25	Data File:	I5-274 mb2.048
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-01-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-01
Date Analyzed:	04/02/25	Data File:	504028-01.210
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02
Date Analyzed:	04/02/25	Data File:	504028-02.211
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	50
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02 x2
Date Analyzed:	04/03/25	Data File:	504028-02 x2.215
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<4
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-03-GW-11.5	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-03
Date Analyzed:	04/02/25	Data File:	504028-03.212
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	22
Zinc	7.9

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0-DUP	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-04
Date Analyzed:	04/02/25	Data File:	504028-04.213
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	52
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0-DUP	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-04 x4
Date Analyzed:	04/08/25	Data File:	504028-04 x4.057
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<4
Copper	<20
Nickel	<4
Zinc	<20

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	Method Blank	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	I5-274 mb2
Date Analyzed:	04/02/25	Data File:	I5-274 mb2.048
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-01-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-01
Date Analyzed:	04/02/25	Data File:	504028-01.087
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.2
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02
Date Analyzed:	04/02/25	Data File:	504028-02.088
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	13
Cadmium	<1
Copper	<5 J
Lead	<1
Mercury	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0 f	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-02 x2
Date Analyzed:	04/03/25	Data File:	504028-02 x2.154
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Copper	<10
Nickel	<4
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-03-GW-11.5 f	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-03
Date Analyzed:	04/02/25	Data File:	504028-03.197
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	22
Zinc	7.5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	MW-02-GW-15.0-DUP f	Client:	Maul Foster Alongi
Date Received:	04/02/25	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	504028-04
Date Analyzed:	04/02/25	Data File:	504028-04.198
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	14
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client Sample ID:	Method Blank f	Client:	Maul Foster Alongi
Date Received:	Not Applicable	Project:	Roslyn No 4 Mine M1122.05.006
Date Extracted:	04/02/25	Lab ID:	I5-275 mb2
Date Analyzed:	04/02/25	Data File:	I5-275 mb2.044
Matrix:	Water	Instrument:	ICPMS3
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<2
Zinc	<5

Date of Report: 04/09/25
Date Received: 04/02/25
Project: Roslyn No 4 Mine M1122.05.006, F&BI 504028

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	94	97	80-120	3
Cadmium	ug/L (ppb)	5	96	98	80-120	2
Chromium	ug/L (ppb)	20	96	99	80-120	3
Copper	ug/L (ppb)	20	96	99	80-120	3
Lead	ug/L (ppb)	10	95	98	80-120	3
Mercury	ug/L (ppb)	5	97	99	80-120	2
Nickel	ug/L (ppb)	20	95	98	80-120	3
Zinc	ug/L (ppb)	50	98	99	80-120	1

Date of Report: 04/09/25
Date Received: 04/02/25
Project: Roslyn No 4 Mine M1122.05.006, F&BI 504028

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	94	97	80-120	3
Cadmium	ug/L (ppb)	5	96	98	80-120	2
Chromium	ug/L (ppb)	20	96	99	80-120	3
Copper	ug/L (ppb)	20	96	99	80-120	3
Lead	ug/L (ppb)	10	95	98	80-120	3
Mercury	ug/L (ppb)	5	97	99	80-120	2
Nickel	ug/L (ppb)	20	95	98	80-120	3
Zinc	ug/L (ppb)	50	98	99	80-120	1

Date of Report: 04/09/25
Date Received: 04/02/25
Project: Roslyn No 4 Mine M1122.05.006, F&BI 504028

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR DISSOLVED METALS USING EPA METHOD 6020B

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	99	96	80-120	3
Cadmium	ug/L (ppb)	5	101	100	80-120	1
Chromium	ug/L (ppb)	20	98	99	80-120	1
Copper	ug/L (ppb)	20	100	99	80-120	1
Lead	ug/L (ppb)	10	98	99	80-120	1
Mercury	ug/L (ppb)	5	100	101	80-120	1
Nickel	ug/L (ppb)	20	98	98	80-120	0
Zinc	ug/L (ppb)	50	102	98	80-120	4

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria, biased low; or, the calibration results for the analyte were outside of acceptance criteria, biased high, with a detection for the analyte in the sample. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported between the method detection limit and the lowest calibration point. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

k – The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

504028

[redacted]

SAMPLE CHAIN OF CUSTODY

04/02/25 [redacted] Page # 1 of 1 J3

Report To Emily Hess
Company MFA
Address 330 E Mill Plain Blvd Ste 405
City, State, ZIP Vancouver WA 98660
Phone 360-433-0244 Email ehess@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME: Roslyn No. 4 Mine
PO #: M1122.05.006

REMARKS: LAB FILTER unPRESERVED POLY @ RECEIPT.
Project specific RLs? - Yes [✓ No]

INVOICE TO: accounting@maulfoster.com

TURNAROUND TIME
☒ Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Archive samples
☐ Other
Default: Dispose after 30 days

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082	Total Metals 6020B ①	Diss. Metals 6020B ①			① As, Cd, Cr, Cu, Pb, Hg, Ni, Zn. Notes
MW-01-GW-15.0	01 A-C	4/1/25	1713	GW	3								X	X			Lab filter unpreserved
MW-02-GW-15.0	02		1248	GW	3								X	X			poly. Analyze both LF+FF.
MW-03-GW-11.5	03		1415	GW	3								X	X			
MW-02-GW-~~5.0~~-DUP 15.0 FMB 4/1/25	04		1248	GW	3								X	X			

FMB 4/1/25

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:		Fiona Bellows	MFA	4/2/25	0705
Received by:	James Bruya	James Bruya	F&B	04/02	705
Relinquished by:			Samples received at 0 °C		
Received by:					

Friedman & Bruya, Inc.
5500 4th Ave S.
Seattle WA 98108
(206) 285-8282
office@friedmanandbruya.com

SAMPLE CONDITION UPON RECEIPT CHECKLIST

PROJECT # 504028 **CLIENT** MFA **INITIALS/ DATE:** NP 4/2/25

If custody seals are present on cooler, are they intact? ☑ NA ☐ YES ☐ NO

Cooler/Sample temperature 6 °C
Thermometer ID: Fluke 96312917

Were samples received on ice/cold packs? ☑ YES ☐ NO

How did samples arrive?
☑ Over the Counter ☐ Picked up by F&BI ☐ FedEx/UPS/GSO

Is there a Chain-of-Custody* (COC)? ☑ YES ☐ NO **Initials/ Date:** NP 4/2
*or other representative documents, letters, and/or shipping memos

Number of days samples have been sitting prior to receipt at laboratory 1 days

Are the samples clearly identified? (explain "no" answer below) ☑ YES ☐ NO

Were all sample containers received intact (i.e. not broken, leaking etc.)? (explain "no" answer below) ☑ YES ☐ NO

Were appropriate sample containers used? ☑ YES ☐ NO ☐ Unknown

If custody seals are present on samples, are they intact? ☑ NA ☐ YES ☐ NO

Are samples requiring no headspace, headspace free? ☑ NA ☐ YES ☐ NO

Is the following information provided on the COC, and does it match the sample label?
(explain "no" answer below)

Sample ID's	☑ Yes	☐ No		☐ Not on COC/label
Date Sampled	☑ Yes	☐ No		☐ Not on COC/label
Time Sampled	☑ Yes	☐ No		☐ Not on COC/label
# of Containers	☑ Yes	☐ No		
Relinquished	☑ Yes	☐ No		
Requested analysis	☑ Yes	☐ On Hold		

Other comments (use a separate page if needed)

Air Samples: Were any additional canisters/tubes received? ☑ NA ☐ YES ☐ NO

Number of unused TO15 canisters** ________ **Number of unused TO17 tubes** ________
**Fill out Green manifolds billing sheet

Appendix F

Data Validation Memorandum

MAUL
FOSTER
ALONGI

Data Validation Memorandum

Project No. M1122.05.006 | October 3, 2024 | Forterra Roslyn LLC

Maul Foster & Alongi, Inc. (MFA), conducted an independent Stage 2A review of the quality of analytical results for groundwater, soil, and associated quality control samples collected on September 19 and 20, 2024, at the Roslyn No. 4 Mine in Roslyn, Washington.

Friedman & Bruya, Inc. (F&B), performed the analyses. MFA reviewed F&B report numbers 409307, 409307-additional, 409307-additional-2 and 409337. The analyses performed and the samples analyzed are listed in the following tables. Samples submitted on hold are also indicated below. Not all analyses were performed on all samples. Some analyses were taken off hold by the MFA project manager after sample receipt.

Analysis	Reference
Percent moisture	ASTM D2216-98
TCLP lead	EPA 6020B/1311
Total and dissolved metals	EPA 6020B

Notes
ASTM = ASTM International.
EPA = U.S. Environmental Protection Agency.
TCLP = toxicity characteristic leaching procedure.

Samples Analyzed			
Report 409307/409307-additional/409307-additional-2			
VM-DP-5-SB-0.5	FO-DP-8-SB-0.3	TF-DP-3-SB-0.5	TF-DP-12-SB-0.5 (hold)
VM-DP-5-SB-1.5 (hold)	FO-DP-8-SB-1.1	TF-DP-3-SB-1.5 (hold)	TF-DP-12-SB-1.5 (hold)
VM-DP-6-SB-0.5	SP-DP-4-SB-0.5	TF-DP-4-SB-0.4	PH-DP-6-SB-0.5
VM-DP-6-SB-1.5	SP-DP-4-SB-1.5 (hold)	TF-DP-4-SB-1.3	PH-DP-6-SB-1.5 (hold)
VM-DP-7-SB-0.4	SP-DP-5-SB-0.4	TF-DP-5-SB-0.3	PH-DP-7-SB-0.3
VM-DP-7-SB-1.3 (hold)	SP-DP-5-SB-1.2 (hold)	TF-DP-5-SB-1.2 (hold)	PH-DP-7-SB-1.3 (hold)
VM-DP-8-SB-0.5 (hold)	SP-DP-6-SB-0.5	TF-DP-6-SB-0.4	PH-DP-8-SB-0.4
VM-DP-8-SB-1.5 (hold)	SP-DP-6-SB-1.3 (hold)	TF-DP-6-SB-1.3 (hold)	PH-DP-8-SB-1.3
VM-DP-9-SB-0.5 (hold)	SP-DP-7-SB-0.4	TF-DP-7-SB-0.4 (hold)	PH-DP-9-SB-0.5 (hold)
VM-DP-9-SB-1.5 (hold)	SP-DP-7-SB-1.2 (hold)	TF-DP-7-SB-1.3 (hold)	PH-DP-9-SB-1.3 (hold)
VM-DP-10-SB-0.5 (hold)	SP-DP-8-SB-0.5 (hold)	TF-DP-8-SB-0.4	TF-DP-3-SB-0.5-DUP (hold)
VM-DP-10-SB-1.4 (hold)	SP-DP-8-SB-1.5 (hold)	TF-DP-8-SB-1.3 (hold)	PH-DP-6-SB-0.5-DUP (hold)
FO-DP-5-SB-0.5	SP-DP-9-SB-0.5 (hold)	TF-DP-9-SB-0.3	TF-DP-6-SB-0.4-DUP (hold)
FO-DP-5-SB-1.5	SP-DP-9-SB-1.2 (hold)	TF-DP-9-SB-1.3 (hold)	VM-DP-6-SB-0.5-DUP
FO-DP-6-SB-0.5	SP-DP-10-SB-0.5 (hold)	TF-DP-10-SB-0.3 (hold)	FO-DP-5-SB-0.5-DUP
FO-DP-6-SB-1.3	SP-DP-10-SB-1.3 (hold)	TF-DP-10-SB-1.2 (hold)	SP-DP-6-SB-0.5-DUP
FO-DP-7-SB-0.3 (hold)	SP-DP-11-SB-0.5 (hold)	TF-DP-11-SB-0.5 (hold)	SP-DP-11-SB-0.5-DUP (hold)
FO-DP-7-SB-1.1 (hold)	SP-DP-11-SB-1.4 (hold)	TF-DP-11-SB-1.5 (hold)	--
Report 409337			
MW-01-GW-15.0	MW-01-GW-15.0-DUP	MW-02-GW-15.0	MW-03-GW-13.0

Data Validation Procedures

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) guidelines for data review (EPA 2020) and appropriate laboratory- and method-specific guidelines (EPA 1986, F&B 2022).

ASTM D2216-98 percent moisture results reported by the laboratory for dry-weight correction were reviewed for completeness but were not included in Stage 2A data validation.

Based on the data quality assurance/quality control review described herein, the data, with the appropriate final data qualifiers assigned, are considered acceptable for their intended use. Final data qualifiers represent qualifiers originating from the laboratory and accepted by the reviewer, and data qualifiers assigned by the reviewer during validation.

Final data qualifiers:

- J = result is estimated.
- J- = result is estimated, but the result may be biased low.
- U = result is non-detect at the method reporting limit (MRL).
- UJ = result is non-detect with an estimated MRL.

General Qualifications

F&B flagged the initial total copper result from MW-02-GW-15.0, the initial field-filtered dissolved copper results from MW-01-GW-15.0, MW-01-GW-15.0-DUP, and MW-02-GW-15.0, and the initial laboratory-filtered dissolved copper result from MW01-GW-15.0 DUP due to internal standards outside of the control limits. The respective copper results were reanalyzed and both the initial and reanalysis results were reported. The result of record is the reanalysis copper results without internal standard issues.

Report	Sample	Analyte	Primary Analysis (ug/L)	Secondary Analysis (ug/L)	Result of Record (ug/L)
409337	MW-02-GW-15.0	Total copper	5 U	10 U	10 U
	MW-01-GW-15.0[(a)]	Dissolved copper	5 U	10 U	10 U
	MW-01-GW-15.0-DUP[(a)]		5 U	10 U	10 U
	MW-02-GW-15.0 [(a)]		5 U	25 U	25 U
	MW-02-GW-15.0[(b)]		5 U	10 U	10 U

Notes
U = result is non-detect at the method reporting limit.
ug/L = micrograms per liter.
[(a)]Field-filtered fraction.
[(b)]Laboratory-filtered fraction.

Sample Conditions

Sample Custody

Sample custody was appropriately documented on the chain-of-custody forms accompanying the reports.

Holding Times

Extractions and analyses were performed within the recommended holding times.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

Sample Filtration

Field samples for dissolved EPA Method 6020B analysis were field-filtered with a 0.45-micron filter during sample collection.

In addition to the field-filtered fractions, MFA also submitted unpreserved and unfiltered fractions of MW-01-GW-15.0, MW-01-GW-15.0-DUP, MW-02-GW-15.0, and MW-03-GW-13.0 samples with sample delivery group 409337, which were filtered and preserved at the laboratory upon sample receipt. At MFA's request, F&B reported both the field- and laboratory-filtered EPA Method 6020B dissolved metals results for these samples. F&B appropriately flagged the laboratory-filtered results with "f." Both filtered and unfiltered fractions were submitted due to high turbidity in the groundwater during sampling. Qualification of laboratory-filtered sample results was required since samples were filtered and preserved four days upon sample receipt, as shown in the following table.

Report	Sample	Analysis	Original Result (ug/L)	Qualified Result (ug/L)
409337	MW-01-GW-15.0(a)	EPA 6020B	Non-detect	UJ
	MW-01-GW-15.0-DUP(a)			
	MW-02-GW-15.0(a)		Detect	J
	MW-03-GW-13.0(a)			

Notes
J = result is estimated.
UJ = result is non-detect with an estimated reporting limit.
ug/L = micrograms per liter.
(a)Laboratory-filtered fraction.

Reporting Limits

The laboratory evaluated results to MRLs. Samples that required dilutions because of high analyte concentrations, matrix interferences, and/or dilutions necessary for preparation and/or analysis were reported with raised MRLs.

Blank Results

Method Blanks

Laboratory method blanks are used to evaluate whether laboratory contamination was introduced during sample preparation and analysis. Laboratory method blank analyses were performed at the required frequencies, in accordance with laboratory- and method-specific requirements.

All laboratory method blank results were non-detect to MRLs.

Equipment Rinsate Blanks

Equipment rinsate blanks are used to evaluate the adequacy of the field equipment decontamination process when decontaminated sampling equipment is used to collect samples.

These blanks were not required for this sampling event, as all samples were collected using dedicated or single-use equipment.

Filter Blanks

Field filter blanks are used to evaluate whether contamination was introduced during field filtering procedures.

Field filter blanks were not submitted for analysis. The reviewer could not evaluate whether metals contamination was introduced during field filtering procedures.

Laboratory Control Sample and Laboratory Control Sample Duplicate Results

Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results are used to evaluate laboratory precision and accuracy. LCSDs were not reported for any methods and laboratory precision was evaluated using matrix spike (MS) and matrix spike duplicate (MSD) results. The LCSs analyzed at the required frequency, in accordance with laboratory- and method-specific requirements.

Laboratory Duplicate Results

Laboratory duplicate results are used to evaluate laboratory precision and sample homogeneity

F&B did not report laboratory duplicate results for any methods. Laboratory precision was evaluated using MS and MSD results.

Matrix Spike and Matrix Spike Duplicate Results

MS and MSD results are used to evaluate laboratory precision, accuracy, and the effect of the sample matrix on sample preparation and target analyte recovery. All MS and MSD samples were prepared and analyzed at the required frequency, in accordance with laboratory- and method-specific requirements.

When MS and MSD were prepared with samples from unrelated projects, the MS and/or MSD percent recovery and/or RPD control limit exceedances did not require qualification because these sample matrices were not representative of project sample matrices.

Directional bias qualifiers (i.e., J- and J+) are only assigned by the reviewer when there is overwhelming influence in one direction.

According to report 409307, the EPA Method 6020B MS prepared with sample VM-DP-5-SB-0.5 had a total arsenic result below the lower percent recovery acceptance limit of 75 percent, at 73 percent. The MSD result and the RPD between the MS and MSD were acceptable; thus, qualification was not necessary. Additionally, the MS and MSD had lead results below the lower percent recovery acceptance limit of 75 percent, at 3 percent and 13 percent, respectively, and the RPD between the MS and MSD exceeded the 20 percent limit, at 125 percent. The associated lead result was qualified by the reviewer, as shown in the following table.

Report	Sample	Analyte	Original Result (mg/kg)	Qualified Result (mg/kg)
409307	VM-DP-5-SB-0.5	Lead	99	99 J

Notes
J = result is estimated.
mg/kg = milligrams per kilogram.

According to report 409307, the EPA Method 6020B MS and MSD prepared with sample VM-DP-6-SB-1.5 had chromium, copper, nickel, and zinc recoveries outside acceptance criteria. These analytes were not reported for sample VM-DP-6-SB-1.5 and thus did not require qualification. Additionally, the MSD lead result was below the lower percent recovery acceptance limit of 75 percent, and the RPD between the MS and MSD exceeded the 20 percent criteria, at 36 percent. The lead result was qualified by the reviewer, as shown in the following table.

Report	Sample	Analyte	Original Result (mg/kg)	Qualified Result (mg/kg)
409307	VM-DP-6-SB-1.5	Lead	75	75 J

Notes
J = result is estimated.
mg/kg = milligrams per kilogram.

According to report 409337, the EPA Method 6020B MS and MSD prepared with the field-filtered fraction of sample MW-01-GW-15.0 had dissolved copper, dissolved nickel, and dissolved zinc results below the lower percent recovery acceptance limit of 75 percent, ranging from 72 percent to 74 percent, respectively. The reviewer qualified the associated sample and field duplicate results with UJ, as shown in the following table.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
409337	MW-01-GW-15.0[a]	Dissolved copper	10 U	10 UJ[b]
		Dissolved nickel	2 U	2 UJ
		Dissolved zinc	10 U	10 UJ
	MW-01-GW-15.0-DUP[a]	Dissolved copper	10 U	10 UJ[b]
		Dissolved nickel	2 U	2 UJ
		Dissolved zinc	10 U	10 UJ

Notes
U = result is non-detect at the method reporting limit.
ug/L = micrograms per liter.
UJ = result is non-detect with an estimated method reporting limit.
[a] Field-filtered fraction.
[b] Result of record.

According to report 409337, the EPA Method 6020B MS and MSD prepared with sample MW-01-GW-15.0 had total chromium, total copper, and total nickel results below the lower percent recovery acceptance limit of 75 percent, ranging from 70 percent to 74 percent, respectively. The reviewer qualified associated non-detect sample and field duplicate results with UJ, and associated detected results with J-, as shown in the following table.

Report	Sample	Analyte	Original Result (ug/L)	Qualified Result (ug/L)
409337	MW-01-GW-15.0	Total chromium	1.6	1.6 J-
		Total copper	5 U	5 UJ
		Total nickel	2 U	2 UJ
		Total zinc	5 U	5 UJ
	MW-01-GW-15.0-DUP	Total chromium	1.6	1.6 J-
		Total copper	5 U	5 UJ
		Total nickel	2 U	2 UJ
		Total zinc	5 U	5 UJ

Notes
J- = result is estimated, but the result may be biased low.
U = result is non-detect at the method reporting limit.
ug/L = micrograms per liter.
UJ = result is non-detect with an estimated method reporting limit.

According to report 409337, the EPA Method 6020B MS and MSD prepared with sample MW-01-GW-15.0 had a dissolved copper RPD above the 20 percent limit, at 35 percent. Both MS and MSD results were within percent recovery acceptance limits. The associated dissolved copper result was non-detect; thus, qualifications were not necessary.

All remaining MS and MSD results were within acceptance limits for percent recovery and RPD.

Continuing Calibration Verification Results

Continuing calibration verification (CCV) results are used to evaluate instrument sensitivity, precision, and accuracy throughout the analytical sequence.

CCV results are not required for Stage 2A validation, however, the reviewer evaluated results flagged by the laboratory for associated CCV exceedances.

According to report 409337, the field-filtered dissolved arsenic result for sample MW-03-GW-13.0 was flagged by the laboratory due to an associated CCV result above the acceptance limit. The associated sample result was non-detect; thus, qualification was not necessary.

Field Duplicate Results

Field duplicate results are used to evaluate field precision and sample homogeneity. The following field duplicate and parent sample pairs were submitted for analysis:

Report	Parent Sample	Field Duplicate Sample
409307	VM-DP-6-SB-0.5	VM-DP-6-SB-0.5-DUP
	FO-DP-5-SB-0.5	FO-DP-5-SB-0.5-DUP
	SP-DP-6-SB-0.5	SP-DP-6-SB-0.5-DUP
409337	MW-01-GW-15.0	MW-01-GW-15.0-DUP

MFA uses acceptance criteria of 100 percent RPD for results that are less than five times the MRL or 50 percent RPD for results that are greater than five times the MRL. RPD was not evaluated when both results in the sample pair were non-detect.

Field duplicate results that exceeded the acceptance criteria were qualified by the reviewer, as shown in the following table.

Report	Sample	Analyte	RPD (%)	Original Result (mg/kg)	Qualified Result (mg/kg)
409307	SP-DP-6-SB-0.5	Lead	62	28	28 J
	SP-DP-6-SB-0.5-DUP			53	53 J

Notes
J = result is estimated.
mg/kg = milligrams per kilogram.
RPD = relative percent difference

All remaining field duplicate results met the RPD acceptance criteria.

Data Package

The data package was reviewed for transcription errors, omissions, and anomalies. None were found.

References

EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).

EPA. 2020. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

F&B. 2022. *Quality Assurance Manual.* Rev. 18. Friedman & Bruya, Inc.: Seattle, WA. December 9.

Data Validation Memorandum

Project No. M1122.05.006 | April 14, 2025 | Forterra Roslyn LLC

Maul Foster & Alongi, Inc. (MFA), conducted an independent Stage 2A review of the quality of analytical results for groundwater and associated quality control samples collected on April 1, 2025 at the Roslyn No. 4 Mine in Roslyn, Washington.

Friedman & Bruya, Inc. (F&B), performed the analyses. MFA reviewed F&B report number 504028. The analyses performed and the samples analyzed are listed in the following tables.

Analysis	Reference
Total and dissolved metals[a]	EPA 6020B

Notes
EPA = U.S. Environmental Protection Agency.
[a]The dissolved fractions of these samples were both field filtered and laboratory filtered.

Samples Analyzed
Report 504028
MW-01-GW-15.0
MW-02-GW-15.0
MW-03-GW-11.5
MW-02-GW-15.0-DUP

Data Validation Procedures

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) guidelines for data review (EPA 2020) and appropriate laboratory- and method-specific guidelines (EPA 1986, F&B 2024).

Based on the data quality assurance/quality control review described herein, the data, with the appropriate final data qualifiers assigned, are considered acceptable for their intended use. Final data qualifiers represent qualifiers originating from the laboratory and accepted by the reviewer, and data qualifiers assigned by the reviewer during validation.

Final data qualifiers:

- U = result is non-detect at the method reporting limit (MRL).

General Qualifications

F&B flagged the initial total copper results from MW-02-GW-15.0 and MW-02-GW-15.0-DUP, the initial field-filtered dissolved copper results from MW-02-GW-15.0, MW-02-GW-15.0-DUP, and the initial laboratory-filtered dissolved copper result from MW02-GW-15.0 due to internal standards outside of the control limits. The respective copper results were reanalyzed and both the initial and reanalysis results were reported. The result of record is the reanalysis copper results without internal standard issues.

Report	Sample	Analyte	Primary Analysis (ug/L)	Secondary Analysis (ug/L)	Result of Record (ug/L)
504028	MW-02-GW-15.0	Total copper	5 U	20 U	20 U
	MW-02-GW-15.0-DUP		5 U	20 U	20 U
	MW-02-GW-15.0(a)	Dissolved copper	5 U	10 U	10 U
	MW-02-GW-15.0-DUP(a)		5 U	20 U	20 U
	MW-02-GW-15.0(b)		5 U	10 U	10 U

Notes
U = result is non-detect at the method reporting limit.
ug/L = micrograms per liter.
(a)Field-filtered fraction.
(b)Laboratory-filtered fraction.

Sample Conditions

Sample Custody

Sample custody was appropriately documented on the chain-of-custody form accompanying the report.

Holding Times

Extractions and analyses were performed within the recommended holding times.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

Reporting Limits

The laboratory evaluated results to MRLs. Samples that required dilutions because of high analyte concentrations, matrix interferences, and/or dilutions necessary for preparation and/or analysis were reported with raised MRLs.

The reviewer confirmed that when samples were diluted for analysis or when a higher sample volume was used for the extraction, F&B provided the preparation or dilution factor after the laboratory sample identification number.

Blank Results

Method Blanks

Laboratory method blanks are used to evaluate whether laboratory contamination was introduced during sample preparation and analysis. Laboratory method blank analyses were performed at the required frequencies, in accordance with laboratory- and method-specific requirements.

All laboratory method blank results were non-detect to MRLs.

Equipment Rinsate Blanks

Equipment rinsate blanks are used to evaluate the adequacy of the field equipment decontamination process when decontaminated sampling equipment is used to collect samples.

These blanks were not required for this sampling event, as all samples were collected using dedicated or single-use equipment.

Filter Blanks

Field filter blanks are used to evaluate whether contamination was introduced during field filtering procedures.

Field filter blanks were not submitted for analysis. The reviewer could not evaluate whether metals contamination was introduced during field filtering procedures.

Laboratory Control Sample and Laboratory Control Sample Duplicate Results

Laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) results are used to evaluate laboratory precision and accuracy. All LCS and LCSD were prepared and analyzed at the required frequency, in accordance with laboratory- and method-specific requirements.

All LCS and LCSD results were within acceptance limits for percent recovery and relative percent difference (RPD).

Laboratory Duplicate Results

Laboratory duplicate results are used to evaluate laboratory precision and sample homogeneity.

F&B did not report laboratory duplicate results for any methods. Laboratory precision was evaluated using LCS and LCSD results.

Matrix Spike and Matrix Spike Duplicate Results

Matrix spike (MS) and matrix spike duplicate (MSD) results are used to evaluate laboratory precision, accuracy, and the effect of the sample matrix on sample preparation and target analyte recovery.

F&B did not report MS and MSD results for any methods. Laboratory precision was evaluated using LCS and LCSD results.

Field Duplicate Results

Field duplicate results are used to evaluate field precision and sample homogeneity. The following field duplicate and parent sample pair was submitted for analysis:

Report	Parent Sample	Field Duplicate Sample
504028	MW-02-GW-15.0	MW-02-GW-15.0-DUP

MFA uses acceptance criteria of 100 percent RPD for results that are less than five times the MRL or 50 percent RPD for results that are greater than five times the MRL. RPD was not evaluated when both results in the sample pair were non-detect.

All field duplicate results met the RPD acceptance criteria.

Data Package

The data package was reviewed for transcription errors, omissions, and anomalies. None were found.

References

EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).

EPA. 2020. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

F&B. 2024. Quality Assurance Manual. Rev. 19. Friedman & Bruya, Inc.: Seattle, WA. October 9.

Appendix G

Site-Specific Terrestrial Ecological Evaluation

MAUL
FOSTER
ALONGI

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Terrestrial-ecological-evaluation.

Step 1: IDENTIFY HAZARDOUS WASTE SITE

Please identify below the hazardous waste site for which you are documenting an evaluation.

Facility/Site Name: Roslyn No. 4 Mine

Facility/Site Address: 205 E Dakota Avenue, Roslyn, Washington

Facility/Site No: 66921

VCP Project No.: CE0558

Step 2: IDENTIFY EVALUATOR

Please identify below the person who conducted the evaluation and their contact information.

Name: Phil Wiescher, PhD

Title: Principal Environmental Scientist

Organization: Maul Foster & Alongi, Inc.

Mailing address: 1329 N State Street, Suite 301

City: Bellingham

State: WA

Zip code: 98225

Phone: (360) 594-6267

Fax:

E-mail: pwiescher@maulfoster.com

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 2**.*

☒ No or Unknown *If you answered **"NO" or "UNKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☐ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☐ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

± "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

\# "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☒ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☒ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☐ No *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

☒ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

☐ No issues were identified during the problem formulation step.

☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*

☒ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

☒ Literature surveys.

☐ Soil bioassays.

☒ Wildlife exposure model.

☐ Biomarkers.

☒ Site-specific field studies.

☒ Weight of evidence.

☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

☐ Confirmed there was no problem.

☒ Confirmed there was a problem and established site-specific cleanup levels.

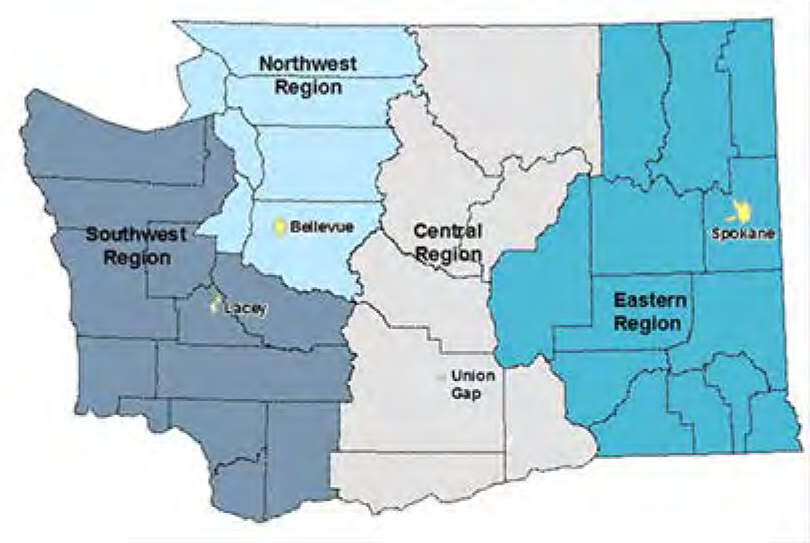
5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.



Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 1250 West Alder St. Union Gap, WA 98903-0009
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295

If you need this publication in an alternate format, please call the Toxics Cleanup Program at 360-407-7170. People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call 877-833-6341.

Site-Specific Terrestrial Ecological Evaluation

Roslyn No. 4 Mine
205 E Dakota Avenue, Roslyn, Washington

Maul Foster & Alongi, Inc. (MFA), has prepared this site-specific terrestrial ecological evaluation (TEE) for the Roslyn No. 4 Mine located at 205 E Dakota Avenue in Roslyn, Washington (the Property) (see Figures 1 and 2). The Property is currently vacant but was formerly occupied by a variety of operations, including a coal mine (referred to as the No. 4 Mine); a foundry that remained active through the mid-1970s; a powerhouse with large transformers; and a small building foundation that was reportedly used as a pad by the townspeople of Roslyn to change oil and conduct vehicle maintenance. The coal mine was active from the 1880s until about 1909 when it was shut down following an explosion. This site-specific TEE was prepared following the procedures outlined in Washington Administrative Code (WAC) 173-340-7490 and 173-340-7493.

The Property does not meet TEE exclusionary criteria (WAC 173-340-7491) and does not qualify for a simplified TEE due to the presence of natural areas and many acres of undeveloped land on or adjacent to the Property (WAC 173-340-7492). A site-specific TEE may be conducted at any site (WAC 173-340-7493).

The TEE process is required at all Model Toxics Control Act (MTCA) sites where there has been a release or threatened release of a hazardous substance that may pose a threat to human health or the environment. The TEE procedure is structured with the intent of protecting terrestrial wildlife at industrial and commercial sites and protecting terrestrial plants, soil biota, and terrestrial wildlife at other sites, as provided under WAC 173-340-7490(3)(b). The purpose of a TEE is to present information to evaluate the ecological protectiveness of current and future conditions at the Property (see WAC 173-340-7490(1)(b)).

The TEE includes problem formulation, initial data screening, and a site-specific weight of evidence (WOE) approach based on a balance of laboratory data and analysis, literature review, and biological field survey, recognizing that each component has particular strengths and weaknesses (WAC 173-340-7493(3)(f)). More specifically, the following evaluations were conducted consistent with the Ecology Terrestrial Ecological Evaluation guidance document (Ecology 2017b):

- Data screening using ecological indicator concentrations (EIC) screening levels to preliminarily identify chemicals for further evaluation.
- A literature review of peer-reviewed ecological screening levels for further assessment of risk potential. Studies regarding potential adverse effects for chemicals of interest were reviewed to determine site-specific EICs. Data analysis consistent with Washington State Department of Ecology (Ecology) methodology was conducted.

- A field survey of plants and soil biota was conducted by a biologist to: (1) assess density, condition, and characteristics of plants; and (2) evaluate density and condition of soil biota. Wildlife observations were made as part of the survey.
- An area-wide depth-weighted receptor adjustment (DWRA) evaluation was conducted to further evaluate anticipated receptor exposure.

The lines of evidence in combination were used to 1) determine the potential for adverse effects to ecological receptors at the Property and 2) inform proposed ecological cleanup levels for the Property.

Problem Formulation

One of the early steps in an ecological evaluation is problem formulation (EPA 1997). Problem formulation involves identifying chemicals of ecological concern (CECs), describing pathways by which ecological receptors may contact CECs in soil, and identifying current or potential future terrestrial ecological receptors that may contact soil (WAC 173-340-7493(2)). The conceptual site model for the Property is described in the supplemental investigation report to which this TEE is an appendix. Other aspects of problem formulation are described below.

Property Setting and Exposure Pathways

The Property consists of one 30.4-acre parcel and is currently vacant and undeveloped. In general, the Property is comprised of low vegetation, trees, and open grass. Dirt and gravel roads, and remnant foundations of former structures are present throughout the Property. Historically, the Property was used for a variety of mining and industrial operations. Plans for the Property include redevelopment for attainable housing and community benefit; some natural areas will be retained or enhanced as part of the redevelopment.

Multiple features of interest are located on the Property, including the former foundry, former powerhouse, slag pile, tailings pile, former transformers, vehicle maintenance, and wetland areas. The groundcover at the Property consists of ruderal vegetation (e.g., reed canary grass, tansy, perennial sweet pea, etc.) and wetland areas. The more densely vegetated wetland areas of the Property primarily consist of red osier dogwood, snowberry, cottonwood trees, willow trees, and red alder.

The Property is situated in the southeast portion of the City of Roslyn and is zoned as light industrial with a development overlay (City of Roslyn 2010). The planned future use of the Property is redevelopment for attainable housing and community benefit. This site-specific TEE evaluates whether existing or future conditions are protective of terrestrial plants, wildlife, and soil biota (WAC 173-340-7490(3)(b)).

Endangered and threatened, candidate, and proposed species listed under the Endangered Species Act (ESA) that potentially occur on the Property or in the vicinity were queried from state and federal agencies to identify potential terrestrial species and habitats of interest in the vicinity of the Property (see Attachment A). The following information was used in the development of this TEE:

- Washington Department of Fish and Wildlife Priority Habitats and Species mapping application (WDFW 2024)
- U.S. Fish and Wildlife Service Species List, retrieved from the ECOS-IPaC system (FWS 2024)

The search results identified the following ESA-listed species as potentially present:

- Elk (*Cervus canadensis*)
- Gray wolf (*Canis lupus*)
- North American wolverine (*Gulo gulo luscus*)
- Mt. Rainier white-tailed ptarmigan (*Lagopus leucura rainierensis*)
- Northern spotted oil (*Strix occidentalis caurina*)
- Yellow-billed cuckoo (*Coccyzus americanus*)
- Bull trout (*Salvelinus confluentus*)
- Monarch butterfly (*Danaus Plexippus*)

The species were not observed during site visits. Critical habitat for these species was not identified on the Property. No other priority habitats were identified on the Property.

The exposure routes assessed for this TEE include uptake by plants and soil biota, and ingestion of soil and ingestion of chemicals in plant material or prey by terrestrial wildlife. Terrestrial wildlife is defined to include mammalian herbivores (as represented by the shrew [*Sorex*]); mammalian and avian predators (represented by the vole [*Microtus*] and the American robin [*Turdus migratorius*], respectively) (MTCA Table 749-4).

Exposure Points

The standard point of compliance for screening levels developed under the TEE process is from the ground surface to a depth of 15 feet below ground surface (bgs). Note that when used in conjunction with institutional controls to prevent excavation of deeper soils, a conditional point of compliance may be set to a depth of 6 feet. This is assumed to be the depth to which the biologically active zone extends. For purposes of the TEE described herein, all soil samples collected between 0 and 15 feet bgs were included in the evaluation (WAC 173-340-7490 (4)(b)).

Chemicals of Ecological Concern

According to WAC 173-340-7493(2)(a)(i), chemicals detected in soil may be eliminated from further consideration as chemicals of ecological concern (CECs) if the maximum concentration or the upper 95 percent upper confidence limit (UCL) soil concentration found at the Property does not exceed EICs. MTCA also provides that chemicals below natural background concentrations should not be selected as CECs.

Additional factors are evaluated when determining for which chemicals ecological cleanup levels will ultimately be developed. Chemicals can be eliminated from further consideration on a site-specific basis, using the following evaluation factors outlined in WAC 173-340-703:

- The toxicological characteristics of the substance that influence its ability to adversely affect human health or the environment relative to the concentration of the substance at the Property, including consideration of essential nutrient requirements
- The chemical and physical characteristics of the substance that govern its tendency to persist in the environment
- The chemical and physical characteristics of the hazardous substance that govern its tendency to move into and through environmental media
- The natural background concentrations of the substance

- The thoroughness of testing for the substance at the Property
- The frequency with which the substance has been detected at the Property
- Degradation by-products of the substance

WAC 173-340-7493(2)(a)(i) further specifies that Ecology default EICs should be used cautiously and are not cleanup levels, and that concentrations that exceed EICs do not necessarily require remediation.

Ecological Screening

Screening levels for ecological receptors were obtained from MTCA Table 749-3, natural background concentrations for the Yakima Basin (Ecology 1994), and more recent peer-reviewed criteria, such as U.S. Environmental Protection Agency (EPA) ecological soil screening levels (Eco-SSL) (see Table 1). Consistent with Ecology's recommendation for site-specific TEEs, if EICs were not provided from MTCA Table 749-3 or a natural background value was not identified, additional databases were reviewed to obtain ecological screening level values. The following databases were reviewed for selection of additional ecological screening level values (see Table 1):

1. Los Alamos National Laboratory ECORISK Database Release 4.1 (LANL 2017).
2. EPA Ecological Soil Screening Level Guidance and Documents (EPA 2003).
3. The Risk Assessment Information System (RAIS), Ecological Benchmark Tool for Chemicals (ORNL 2024).
4. If no criteria were found using the above sources or other materials reviewed, then the compendium of practical quantitation limits (PQLs) for the lower Duwamish Waterway were used for initial screening comparison[1] (Ecology 2020).

Selection of Ecological Indicator Concentrations

The lowest applicable EIC was selected for site-specific screening of soil data as identified in Table 1. The screening levels and literature review considered for development of site-specific EICs are described below:

- **Arsenic.** The lowest available EIC for arsenic is the plant EIC of 10 mg/kg. For arsenic, the EIC was upward adjusted to 20 mg/kg, as this is consistent with Ecology determined regional background for the state that the MTCA Method A cleanup level for human health is based on. Based on this, the lowest applicable EIC is 20 mg/kg.
- **Cadmium.** The lowest available EIC for cadmium is the plant EIC of 4 mg/kg. This value is based on limited study (Efroymson et al. 1997a) and the more recently developed EPA screening level of 32 mg/kg for soil biota is applied. Consistent with WAC 173-340-7493(4) an alternative EIC based on anticipated adverse effects can be proposed for identifying a soil concentration. The use of the EPA Eco-SSL is considered appropriate because they are demonstrated to be protective of the conservative end of the exposure and effects species distribution (EPA 2005a). Based on this, the lowest applicable EIC for cadmium is 14 mg/kg, which is based on protection of wildlife.

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[1] PQLs are not based on ecological effects; however, these were incorporated for purposes of initial screening evaluation. It is assumed that, if PQLs were not exceeded, then unacceptable ecological impacts would not occur.

- **Chromium.** The lowest available EIC for chromium is the plant and soil biota EIC, both of which are 42 mg/kg. Based on this, the lowest applicable EIC for cadmium is 42 mg/kg.
- **Copper.** The lowest available EIC for copper is the soil biota EIC of 50 mg/kg. This value is based on limited study (Efroymson et al. 1997b) and the more recently developed EPA screening level of 80 mg/kg for soil biota is applied (EPA 2006). Based on this, the lowest applicable EIC for copper is 80 mg/kg.
- **Lead.** The lowest available EIC for lead is the plant EIC of 50 mg/kg. This value is based on a limited study (Efroymson 1997a) and the more recently developed EPA screening level of 120 mg/kg for plants is applied (EPA 2005b). Based on this, the lowest applicable EIC for lead is 118 mg/kg, which is based on protection of wildlife.
- **Mercury.** The lowest available EIC is the soil biota EIC of 0.1 mg/kg. Based on this, the lowest applicable EIC for mercury is 0.1 mg/kg.
- **Nickel.** The lowest available EIC is the plant EIC of 30 mg/kg. The Ecology-determined natural background for the Yakima Basin is 46 mg/kg and is considered appropriate because it reflects potential background conditions at the site (Ecology 1994). Based on this, the lowest applicable EIC for nickel is 46 mg/kg.
- **Zinc.** The lowest available EIC is the plant EIC of 86 mg/kg. This value is based on limited study (Efroymson 1997a) and the more recently developed EPA screening level of 160 mg/kg for plants is applied (EPA 2007). Based on this, the lowest applicable EIC for zinc is 160 mg/kg.
- **Diesel- and oil-range hydrocarbons.** The lowest available EIC is the soil biota EIC of 200 mg/kg. The more recently developed Ecology screening level of 260 mg/kg for soil biota is applied (Ecology 2017c). Based on this, the lowest applicable EIC for diesel-range hydrocarbons is 260 mg/kg.

Screening Results

All soil data collected on the Property were compiled and an initial ecological screening evaluation was performed to identify locations where chemicals in soil were detected at concentrations greater than the lowest applicable EICs (see Tables 2 and 3). Based on the initial screening, chemicals of potential ecological concern (CPECs) for further evaluation were identified based on one or more exceedances of the EIC.

A 95 percent UCL was calculated based on the ProUCL program and consistent with Ecology calculation guidelines (see Table 4) (Ecology 2017a). Consistent with WAC 173-340-7493(2)(a)(i), chemicals detected in soil may be eliminated from further consideration if the 95 percent UCL soil concentration does not exceed the EIC[2]. The CPECs identified based on screening are further described below. See Tables 2 and 3 for individual screening results. Table 4 provides 95 percent UCL results, and UCL outputs are provided in Attachment B[3]. 95 percent UCLs were calculated for all chemicals that exceeded EICs at one or more locations as further described below:

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[2] In some cases, Ecology has indicated that chemicals with natural background-based EICs must meet the three-part rule. The three-part rule states that for demonstrating cleanup compliance, a 95 percent UCL must not exceed the cleanup level; samples shall not exceed two times the cleanup level; and less than ten percent of samples shall exceed the cleanup level, unless otherwise approved by Ecology.

[3] It is noted that in some cases the identified 95 percent UCLs using Ecology methodology differ from those recommended by the EPA ProUCL software.

- **Arsenic.** Arsenic was detected above the EIC of 20 mg/kg. The resulting 95 percent UCL for soil is 20.6 mg/kg which is above the EIC of 20 mg/kg. Arsenic is considered a CPEC for further evaluation.
- **Cadmium.** Cadmium was detected above the EIC of 14 mg/kg. The 95 percent UCL is 1.35 mg/kg, which is below the EIC of 14 mg/kg; therefore, cadmium should not present an ecological risk.
- **Chromium.** Chromium was detected above the EIC of 42 mg/kg. The resulting 95 percent UCL for soil is 88.3 mg/kg which is above the EIC of 42 mg/kg. Chromium is considered a CPEC for further evaluation.
- **Copper.** Copper was detected above the EIC of 80 mg/kg. The resulting 95 percent UCL for soil is 148 mg/kg, above the EIC of 80 mg/kg. Copper is considered a CPEC for further evaluation.
- **Lead.** Lead was detected above the EIC of 118 mg/kg. The resulting 95 percent UCL for soil is 656 mg/kg, which is above the EIC of 118 mg/kg. Lead is considered a CPEC for further evaluation.
- **Mercury.** Mercury was detected above the EIC of 0.1 mg/kg. The resulting 95 percent UCL for soil is 1.80 mg/kg, above the EIC of 0.1 mg/kg. Mercury is considered a CPEC for further evaluation.
- **Nickel.** Nickel was detected above the EIC of 46 mg/kg. The 95 percent UCL for soil is 90.6 mg/kg, above the EIC of 46 mg/kg. Nickel is considered a CPEC for further evaluation.
- **Zinc.** Zinc was detected above the EIC of 160 mg/kg. The 95 percent UCL for soil is 638 mg/kg, above the EIC of 160 mg/kg. Zinc is considered a CPEC for further evaluation.
- **Diesel- and oil-range hydrocarbons.** Diesel-range hydrocarbons were detected above the EIC of 260 mg/kg. The 95 percent UCL is 641 mg/kg which is above the EIC of 260 mg/kg. Diesel- and oil-range hydrocarbons are considered a CPEC for further evaluation.

Based on the above analysis, the following are considered CPECs for further evaluation at the Property:

- Arsenic
- Chromium
- Copper
- Lead
- Mercury
- Nickel
- Zinc
- Diesel- and oil-range hydrocarbons

Field Survey

A biological field study was conducted to: (1) assess density, condition, and characteristics of plants; (2) evaluate soil biota density and condition; and 3) make wildlife observations. The field study was conducted on September 17, 2024. Weather conditions were partly sunny with temperatures around 60 degrees Fahrenheit.

Four 100-foot vegetation transects were established on the Property. Three transect targeted areas known to be most impacted by elevated chemical concentrations, including one in the vehicle maintenance area and two in the foundry and slag pile area. One background transect was located in an area with no known impacts (see Figure 3). In addition, three small test pits (up to approximately 2 feet bgs) were dug along the length of each transect. The objectives were as follows:

- Conduct a 100-foot vegetation line transect, identifying species at 10-foot intervals and making visual observation of plants for signs of stress.
- Visually observe soil biota presence/depth for each test pit location. Soil was hand sifted for approximately 15 minutes at each location, and soil species observed were identified. Three test pit locations along each transect were identified, at approximately 10, 50, and 100 feet.
- Measure plant rooting depth for each test pit location. Locations included the dominant species observed throughout the Property (low vegetation, reed canary grass, red osier dogwood, snowberry, tansy, perennial sweet pea).
- Record wildlife observations at each transect area and in the vicinity.

Photographs are provided in Attachment C; results and observations are discussed below relative to feature of interest locations (see Figures 2 and 3).

Soil Biota Presence and Depth

Foundry and Slag Pile A

- FSA-1: Dark brown, dry, sandy silty soil. No soil biota observed.
- FSA-5: Dark brown, dry, sandy silty soil. A small fly (*Diptera*), an unidentified small insect, and an earthworm (*Eisenia spp.*) were observed.
- FSA-10: Brown, dry, compacted, sandy silty soil. Four earthworms (*Eisenia spp.*), an ant colony (*Formicidae*), two arachnids, and an unidentified jumping insect were observed.

Foundry and Slag Pile B

- FSB-1: Dark brown, dry, sandy soil. Coal fragments, pieces of bricks, and rubble debris observed in the soil. One earthworm (*Eisenia spp.*) was observed.
- FSB-5: Dark brown, dry, sandy soil. Coal fragments and debris observed in the soil. An ant colony (*Formicidae*) and insect larvae were observed. A bee (*Apidae*) and a butterfly (*Lepidoptera*) were observed nearby.
- FSB-10: Brown, dry, compacted, sandy silty soil. Two pill bugs (*Armadillidium*), an unidentified small insect, and an arachnid were observed.

Vehicle Maintenance

- VM-1: Brown, dry, sandy soil with gravel and some coal debris. A small unidentified jumping insect was observed. Grasshoppers (*Caelifera*) were observed on the ground surface nearby.
- VM-5: Brown, dry, sandy soil with gravel and brick debris. An unidentified small jumping insect was observed.
- VM-10: Brown, dry, sandy soil with gravel. Several small flies (*Diptera*) and a small insect molt were observed.

Background

- BG-1: Brown, dry, sandy soil. Ants (*Formicidae*) and insect larva were observed.

- BG-5: Brown, dry, sandy soil with gravel. Insect larva, arachnids, and an earwig (*Dermaptera*) were observed.
- BG-10: Brown, dry, sandy soil with large cobbles. A pill bug (*Armadillidium*) and a small beetle (*Coleoptera*) were observed.

Based on these observations, soil biota were present at most test pit locations at depths up to approximately six inches. Soil conditions varied between the transect areas and test pit locations; however, the presence of soil biota did not appear to change significantly based on soil conditions. For example, the Foundry and Slag Pile B transect area was observed to have elevated metals concentrations and poor soil quality. Test pits FSB-1 and FSB-5 both contained coal fragments, brick, or rubble debris in the soil; however, an earthworm (*Eisenia spp.*), an ant colony (*Formicidae*), and insect larvae were observed at the test pit locations.

Overall, soil biota presence and density did not vary significantly between the background transect area and transect areas with elevated metal concentrations. Dry end of summer soil conditions and heat throughout the day (temperatures ranging from 60 to 70 degrees Fahrenheit) may have reduced the presence of soil biota in the shallow surface soil throughout the Property.

Plant Rooting Depth

Plant rooting depths were measured for each test pit location within the transect areas and are summarized below:

Foundry and Slag Pile A

- FSA-1: Reed canary grass, snowberry bush, and low vegetation were present and rooting depths of approximately up to 3 inches (0.2 feet) were observed.
- FSA-5: Reed canary grass, red osier dogwood, and snowberry bush were present and rooting depths of approximately up to 3 inches (0.2 feet) were observed.
- FSA-10: Reed canary grass, perennial sweet pea, and red osier dogwood were present and rooting depths of approximately up to 3 inches (0.2 feet) were observed.

Foundry and Slag Pile B

- FSB-1: Reed canary grass, perennial sweet pea, and tansy were present and rooting depths of approximately up to 6 inches (0.5 feet) were observed.
- FSB-5: Tansy, reed canary grass, and red osier dogwood were present and rooting depths of approximately up to 6 inches (0.5 feet) were observed.
- FSB-10: Reed canary grass and perennial sweet pea were present and rooting depths of approximately up to 6 inches (0.5 feet) were observed.

Vehicle Maintenance

- VM-1: Reed canary grass unidentified wildflowers were present and rooting depths of approximately 2 inches (0.2 feet) were observed.
- VM-5: Reed canary grass and snowberry were present and rooting depths of approximately 2 inches (0.2 feet) were observed.
- VM-10: Reed canary grass and unidentified wildflowers were present and rooting depths of approximately 2 inches (0.2 feet) were observed.

Background

- BG-1: Reed canary grass and tansy were present and rooting depths of approximately 3 to 6 inches (0.2 to 0.5 feet) were observed.
- BG-5: Reed canary grass and tansy were present and rooting depths of approximately up to 3 inches (0.2 feet) were observed.
- BG-10: Tansy, reed canary grass, and snowberry were present and rooting depths of approximately up to 3 inches (0.2 feet) were observed.

Based on these observations, the rooting depths for widespread dominant species at the Property are typically up to 0.5 foot for larger weeds and reed canary grass, and approximately up to 0.2 feet for grasses and smaller weeds. Typical rooting depths for trees observed at the Property are approximately 2 to 5 feet.

Plant Density and Condition

A 100-foot vegetation line transects were placed near selected features of interest. Species generally observed were similar for all four transect areas and included: reed canary grass (*Phalaris arundinacea*), common small weeds, tansy (*Tanacetum vulgare*), snowberry (*Symphoricarpos*), perennial sweet pea (*Lathyrus latifolius*), red-osier dogwood (*Cornus sericea*), and willow trees (*Salix*). Species were identified at 10-foot intervals as documented in Attachment C.

No evidence of excess contaminant uptake to plants, such as chlorosis, wilting, browning, mortality, or reduced growth, was observed at any of the transect areas. In some cases, certain weeds were brown; however, this is the typical state during later summer months and was observed in the impacted areas as well as the background transect and surrounding areas.

In addition, the transect areas showed vegetation establishment including second growth willow trees (*Salix*), red alders (*Alnus rubra*), cottonwood trees (*Populus*), fruiting apple trees (*Malus pumila*), and ponderosa pine (*Pinus ponderosa*), with little bare ground.

Wildlife Observations

As part of the survey activities, wildlife observations were made over the course of the field survey at all transect areas and throughout the Property. Deer (*Odocoileus*) scat, elk (*Cervus canadensis*) scat, and bear (*Ursus*) scat were observed throughout the Property. In addition, multiple deer were observed near the slag pile area. Several songbirds were observed. Based on frequent scat observations and reports from neighbors, wildlife are commonly present. No observations of wildlife impairment were observed during the field survey activities.

Field Survey Summary

Based on the biological field survey, soil biota presence and density did not vary between the background transect area and transect areas with elevated soil concentrations. No evidence of excess contaminant uptake to plants, such as chlorosis, wilting, browning, mortality, or reduced growth, was observed at any of the transect areas. In addition, the transect areas showed vegetation establishment including second growth trees of various species. Indications of wildlife activity were observed at all transect areas and throughout the Property. No observations of wildlife avoidance or impairment were observed.

Depth-Weighted Receptor Adjustment Evaluation

Consistent with the draft terrestrial ecological evaluation guidance (Ecology 2017b), a DWRA was performed to provide more realistic estimates for receptor exposure and can be used to support cleanup design making. A DWRA evaluation was conducted to further evaluate potential for soil biota (earthworm) and plant exposure and as an additional line of evidence to support the weight of evaluation process for the TEE. The areawide DWRA evaluation was conducted for CPECs at the Property.

The following general DWRA equation was used:

$$C_{ea} = \left(C_{c(1)} \times P_{r(1)}\right) + \left(C_{c(i)} \times P_{r(i)}\right)$$

Where:

C_{ea} = Exposure-adjusted contaminant concentration

$C_{c(1)}$ = Soil contaminant concentration at sample depth 1 (e.g., 0 to 12 inches)

$C_{c(i)}$ = Soil contaminant concentration at sample depth (i)

$P_{r(1)}$ = Proportion of receptors found at sample depth 1 (e.g., 0 to 6 inches)

$P_{r(i)}$ = Proportion of receptors found at sample depth (i)

The following sampling depth increments were evaluated for areawide evaluations:

- 0 to 12 inches bgs (including duff layer)
- 12 to 24 inches bgs
- 24 to 36 inches bgs

At each sampling depth increment, the following DWRA proportion values were used when associated chemical data were available.

Adjustment of 0.85 for sample depth 0 to 12 inches

The organic matter that provides the food base for the earthworm community is important in determining their distribution and abundance, and soil organic matter content can sometimes be a good predictor of earthworm abundance. For example, a highly significant correlation between earthworm density and soil organic content over a range of sites in Georgia, including a wide variety of soil and vegetation types and management histories was reported (Curry 1998). Therefore, it is assumed that the increased organic matter found at shallower depths (0 to 6 inches) would be the second most abundant vertical horizon for soil biota (0.33 or 33 percent). The relatively higher adjustment value for this interval corresponds with the field survey at the Property showing that soil biota and plant rooting were generally observed to be present at these depths.

Soil development is rarely uniform, and processes such as erosion and deposition can influence the vertical distribution of biological activity across landscapes. Sampling strategies where a constant depth is collected may not accurately reflect site-specific exposures of environmental contamination to the soil biota. A horizon may not accurately represent contaminant exposure to soil biota, resulting in inaccurate risk estimates. Results suggest that samples should be collected to a depth of approximately 25 to 30 centimeters as opposed to shallower depths (EPA 2015). Therefore, much of the receptor exposure to contamination is expected to be at a sample depth of 6 to 12 inches (0.55 or 55 percent).

The combined adjustment value for this interval (0.85 or 85 percent) corresponds with the field survey at the Property showing that soil biota and plant rooting were generally observed to be present at depths up to 12 inches.

Adjustment of 0.1 for 12 to 24 inches and 0.05 for 24 up to 36 inches

The main source of the organic matter on which earthworms feed is litter from aboveground plant parts in most ecosystems, although dead roots and rhizodeposition can also be important sources (Curry 1998). Therefore, as depth increases, receptor exposure should decrease, so at 12 to 24 inches (0.1 or 10 percent) and at 24 to 36 inches (0.05 or 5 percent) is assumed. The relatively lower adjustment values for these intervals correspond with the field survey at the Property showing that soil biota and plant rooting were generally observed to be present at depths up to 12 inches.

Areawide DWRA Evaluations

An areawide DWRA evaluation was conducted by combining all of the CPEC data collected at the Property and grouping concentrations based on the depth interval in which they were collected (i.e., 0 to 12 inches, 12 to 24 inches, 24 inches to 36 inches). Data from samples collected from depth ranges that exceeded the specified depth intervals (e.g., a sample collected from 0 to 4 feet) were excluded from the DWRA evaluation. In order to accommodate for an inconsistent number of samples between depth intervals, the average concentration from that depth interval was calculated and multiplied by the exposure adjustment value for that depth interval. This resulted in an exposure adjusted concentration for each depth interval that could be summed together to give an areawide DWRA. The following is the procedure for lead (see Table 5):

1. Soil samples collected on the Property between 0 and 12 inches and analyzed were compiled.
2. Based on the data, the average concentration of each chemical between 0 and 12 inches is calculated. The exposure adjustment value for 0 and 12 inches is 0.85 is multiplied by the concentration(s) to derive the adjusted concentration(s) for the sample depth (0 to 12 inches).
3. Repeat steps 1 and 2 for samples collected at other depth increments on the Property (12 to 24 inches and 24 to 36 inches), using the appropriate exposure adjustment values.
4. Sum the adjusted average sample depth concentrations.

The resulting areawide DWRA for CPECs and corresponding EICs are as follows (see Table 5):

- Arsenic: The DWRA of 13.0 mg/kg is less than the EIC of 20 mg/kg.
- Chromium: The DWRA of 43.7 mg/kg is similar to the EIC of 42 mg/kg.
- Copper: The DWRA of 83.0 mg/kg is similar to the EIC of 80 mg/kg.
- Lead: The DWRA of 248 mg/kg is less than approximately two times greater than the EIC of 118 mg/kg.
- Mercury: 0.75 mg/kg greater than the EIC of 0.1 mg/kg.
- Nickel: 55.8 mg/kg is similar to the EIC of 46 mg/kg.
- Zinc: 295 mg/kg is less than two times greater than the EIC of 160 mg/kg.
- Diesel-range hydrocarbons: The DWRA of 94.7 mg/kg is less than the EIC of 260 mg/kg.

- Oil-range hydrocarbons: The DWRA of 261 mg/kg is similar to the EIC of 260 mg/kg

DWRA Evaluation Summary

An area-wide DWRA incorporating all data obtained was calculated for CPECs to evaluate another line of evidence for the site-specific TEE. The calculated DWRA concentrations are below or up to two times greater than their respective EICs. During field investigations on the Property, no evidence of excess contaminant uptake to plants—such as chlorosis, wilting, browning, mortality, or reduced growth—was observed. In addition, no reduction or significant differences in soil biota were observed at the Property based on the biological field survey. Based on these observations and the DWRA concentrations, no significant adverse effects to plant and soil biota receptors are anticipated.

Arsenic, Copper, Mercury, and Nickel Evaluation

The 95 percent UCLs for arsenic, coppery, mercury, and nickel in soil exceed their respective EICs (see Table 4 and Attachment B). A WOE evaluation was conducted to further assess potential for adverse impacts to plants and soil biota. Based on the biological field study and DWRA results, no significant anticipated exposure to plants and soil biota is expected for these metals as summarized above.

To account for potential wildlife exposure, a comparison to criteria for protection of wildlife receptors was conducted. The 95 percent UCLs for arsenic (20.6 mg/kg), copper (148 mg/kg), mercury (1.80 mg/kg), and nickel (90.6 mg/kg) were compared to EICs protective of wildlife receptors. The 95 percent UCLs are below the EICs protective of wildlife receptors for arsenic (132 mg/kg), copper (217 mg/kg), mercury (5.5 mg/kg), and nickel (980 mg/kg) (see Tables 1 and 4). Based on this comparison, adverse effects to wildlife receptors at the Property from these metals are not anticipated.

Based on the WOE evaluations for arsenic, copper, mercury, and nickel, no adverse effects to ecological receptors at the Property are anticipated.

Diesel- and Oil-Range Hydrocarbon Evaluation

The 95 percent UCL for diesel- and oil-range hydrocarbons summed (641 mg/kg) exceed the default EIC of 260 mg/kg (see Table 4 and Attachment B). A WOE evaluation was conducted to further assess potential for adverse impacts to plants and soil biota. Based on the biological field study and DWRA results, no significant anticipated exposure to plants and soil biota is expected as summarized above, when comparing diesel-range and oil-range DWRA concentrations to EICs separately.

The default EIC notes that diesel- and oil-range hydrocarbons should be summed for comparison to the EIC. Therefore, a literature survey was also conducted to inform diesel- and oil-range petroleum EICs for further evaluation of exposure concentrations protective of plants and soil biota. EICs for diesel- and oil-range hydrocarbons were obtained from Ecology implementation memorandum No. 19 (Ecology 2017c) (see Table 1). The memorandum states that the proposed EICs for diesel-range hydrocarbons is based a sum of diesel fuel and heavy oils. The proposed values in the memorandum are based on a toxicity study of gasoline, diesel, and heavy oil in soils on plants and soil biota, conducted by Ecology (Ecology 2016). Based on the study results published by Ecology, significantly different concentration ranges associated with bioassay survival results were observed for diesel fuel versus heavy oil (see Table 8 of Ecology 2016). For diesel fuel, the lowest concentration associated with adverse results in the bioassay tests is 260 mg/kg for soil biota, and 270 mg/kg for plants. For heavy oil, the concentrations associated with adverse results are much higher: 1,600 mg/kg for plants and 3,800 mg/kg for soil biota (see Table 8 of Ecology 2016). The results of the toxicity testing indicate there are differences in effects levels based on the fraction of hydrocarbons (i.e., diesel fuel versus heavy oil).

To assess potential risk to soil and plant biota at the Property, diesel fuel and heavy oil were therefore assessed individually. A 95 percent UCL was calculated for diesel-range hydrocarbons and oil-range hydrocarbons separately (see Appendix B). The 95 percent UCLs were compared to the lowest concentration associated with results for survival for diesel- and oil-range hydrocarbons, based on Ecology's study (see Table 8 of Ecology 2016). For diesel-range hydrocarbons, the 95 percent UCL (104 mg/kg) is well below the effects concentration of 260 mg/kg, protective of soil biota and plants. For oil-range hydrocarbons, the 95 percent UCL (430 mg/kg) is well below the effects concentration of 1,600 mg/kg, protective of plants and soil biota (see Appendix B). These results show that the 95 percent UCLs of diesel- and oil-range hydrocarbons are lower than effects ranges reported in Ecology's toxicity results (Ecology 2016). Heavy oil is the more prevalent hydrocarbon fraction present at the Property (C28—C40 hydrocarbon range), which indicates lower potential risk to plants and soil biota since the effect levels of heavy oil compared to lighter diesel fuel (C10—C28 hydrocarbon range) are much higher (see Table 8) (Ecology 2016).

In addition, the DWRA values for diesel-range hydrocarbons (94.7 mg/kg) and oil-range hydrocarbons (261 mg/kg) are well below the Ecology reported effects ranges. This further supports that impacts to soil biota and plants at the Property are not anticipated. The 95 percent UCL is also well below the EIC protective of wildlife receptors for diesel- and oil-range hydrocarbons (6,000 mg/kg) (see Tables 1 and 4). Based on this comparison, adverse effects from diesel- and oil-range hydrocarbons to wildlife receptors are not anticipated at the Property.

Based on the WOE evaluations for diesel- and oil-range hydrocarbons, no adverse effects to ecological receptors at the Property are anticipated.

Chromium Evaluation

The 95 percent UCL for chromium in soil at the Property is 88.3 mg/kg (see Table 4 and Attachment B) exceeds the EIC of 42 mg/kg. A WOE evaluation was conducted to further assess potential for adverse impacts to plants and soil biota. Based on the biological field study and DWRA results, no significant anticipated exposure to plants and soil biota is expected for these metals as summarized above.

To account for potential wildlife exposure, a literature survey was conducted to inform a site-specific wildlife exposure model for further evaluation of wildlife.

Wildlife Exposure Model

MTCA Table 749-4 presents the wildlife exposure model to be used for site-specific evaluations, with default parameters noted in Table 749-5. The following equations are applied to evaluate risk to three receptors (shrew [*Sorex*], robin [*Turdus migratorius*], and vole [*Microtus*]) that act as surrogate receptors for mammalian predators, avian predators, and mammalian herbivores, respectively:

(1) Mammalian predator:

$$SC_{MP} = (T_{Shrew})/[(FIR_{Shrew,DW} \text{ x } P_{SB(Shrew)} \text{ x } BAF_{Worm}) + (SIR_{Shrew,DW} \text{ x } RGAF_{Soil,Shrew})]$$

(2) Avian predator:

$$SC_{AP} = (T_{Robin})/[(FIR_{Robin,DW} \text{ x } P_{SB(Robin)} \text{ x } BAF_{Worm}) + (SIR_{Robin,DW} \text{ x } RGAF_{Soil,Robin})]$$

(3) Mammalian herbivore:

$$SC_{MH} = (T_{Vole})/[(FIR_{Vole,DW} \times P_{Plant,Vole} \times K_{Plant}) + (SIR_{Vole,DW} \times RGAF_{Soil,Vole})]$$

Variable	Meaning
SC	Soil concentrations protective of EICs
T	Toxicity reference value
FIR	Food ingestion rate
P	Proportion of contaminated food in diet
BAF	Earthworm bioaccumulation factor
SIR	Soil ingestion rate
RGAF	Gut adsorption factor for a hazardous substance in soil, expressed relative to the gut adsorption factor for the hazardous substance in food
K_{Plant}	Plant uptake coefficient

Units and default values are presented in MTCA Table 749-4. As specified in MTCA Table 749-4, the lowest of the three SC values calculated is to be used as the EIC for a site-specific evaluation.

MTCA (WAC 173-340, Sections 7490 to 7494) uses K_{Plant} in the wildlife exposure model to estimate the concentration of a hazardous substance expected to be present in plants, given a measured concentration in the soil. Toxicity reference values (TRVs) represent the lowest observed adverse effect level (LOAEL)-based values derived from empirical toxicity studies and are measured in mg/kg per day. The site-specific wildlife exposure model presented here varies K_{Plant} and the avian TRV to calculate EICs (i.e., SCs) consistent with WAC 173-340-7493(4). All other parameters are MTCA defaults.

Plant uptake coefficient: In general, chemicals that migrate from subsurface soil into aboveground plant structures (e.g., leaves) first dissolve from soil into soil pore water and are then taken up by roots (McKone and Maddalena 2007). They can be transported from roots to leaves in the dissolved phase through either transpiration or translocation. Plant uptake of chemicals from soil is determined by numerous factors such as the species of plant, soil type, pH in soil, organic carbon content of soil, temperature, and nutrient levels.

K_{Plant} for aboveground plant parts is typically defined as the ratio of the chemical concentration in the plant over the concentration in soil (expressed as dry weight). The default K_{Plant} value applied for chromium in the wildlife model is 1.01 and is based on plant uptake of molybdenum (molybdenum was used as a surrogate for other metals and is considered a very conservative number for other metals). Plant uptake of molybdenum was higher than uptake of any other metals reported by the EPA (EPA 1992). To account for chromium in soil, a K_{Plant} value based on empirical studies on chromium uptake is applied. Specifically, a maximum value of 0.48 (dry weight basis) has been reported based on 28 co-located soil and plant observations, as summarized in the Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants (see Table D-1 of ORNL 1998). The corresponding 90th percentile is 0.084 and represents a reasonable maximum value. However, the maximum value is anticipated to account for uncertainty related to soil properties, such as pH, clay content, and organic matter, which can all affect the uptake from soil to plants. In addition, the proposed value is an order of magnitude greater (i.e., significantly more conservative) than the plant uptake factor for chromium (0.041) applied by EPA in its wildlife model (EPA 2005c).

Avian TRV: The chromium TRV reported in MTCA for avian receptors is 5 mg/kg per day (LOAEL based on juvenile survival in black ducks). As reported in Toxicological Benchmarks for Wildlife, this TRV is based on just one unpublished study by Haseltine (Haseltine et al. 1985; Sample et al. 1996).

Therefore, to supplement the single TRV identified in MTCA Table 749-5, a review was conducted to determine whether additional appropriate LOAEL-based TRVs could be identified. EPA has more recently conducted comprehensive review of available studies to inform avian TRVs (EPA 2005c). More specifically, the EPA conducted a literature search and identified 704 papers with possible toxicity data for chromium for either avian or mammalian species. Of these papers, 13 contained data for avian test species that met EPA data quality review and, of those, three additional LOAEL TRVs were identified for the reproduction and growth endpoints.[4] In addition, the Los Alamos National Laboratory ECORISK database was queried to determine the LOAEL identified for use for avian receptors (LANL 2017). Therefore, five LOAEL TRV values for chromium were identified as follows:

- 5 mg/kg per day, based on black duck (MTCA Table 749-5; Sample et al. 1996; Haseltine et al. 1985)
- 26.6 mg/kg per day, based on the Los Alamos National Laboratory LOAEL TRV
- 75.4 mg/kg per day, based on chicken (Gallus domesticus) (Meluzzi et al. 1996)
- 9.91 mg/kg per day, based on chicken (G. domesticus) (Motozono et al. 1998)
- 28.7 mg/kg per day, based on chicken (G. domesticus) (Nielsen et al. 1980)

According to WAC 173-340-7493(4), a literature-based TRV may be LOAEL-based and should represent a lower-end LOAEL, such as a 10th percentile value. The 10th percentile of the four TRVs noted above is 7 mg/kg per day and is applied for use in the wildlife exposure model for avian receptors. The LOAEL is anticipated to be sufficiently protective, as it is based on a lower bound estimate of peer-reviewed and validated LOAELs. Default TRVs for mammals were not evaluated.

Wildlife EICs were calculated for all receptors, based on the MTCA default values and the proposed K_{Plant} (0.48) (for the mammalian herbivore) and avian TRV (7 mg/kg per day) (for the avian predator). The resulting EICs are based on three significant figures:

(1) Mammalian predator:

SC_{MP} = 310 mg/kg

(2) Avian predator:

SC_{AP} = 95 mg/kg

(3) Mammalian herbivore:

SC_{MH} = 190 mg/kg

If these EICs are applied, then the resulting lowest wildlife EIC anticipated to be sufficiently protective of all wildlife receptors is 95 mg/kg. It is noted that multiple MTCA default parameters (e.g., ingestion proportions or rates) used in calculations are protective of the conservative end of the species exposure distribution. For example, the proportion of contaminated food (soil biota) for avian receptors is assumed to be 52 percent, which represents an upper range, and TRVs are based on LOAELs. Given the conservatism inherent in the EIC model, calculated EICs are assumed to be sufficiently conservative.

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[4] Four studies in total were identified with LOAELs, including the Haseltine study that provides the basis for the default MTCA TRV. The EPA reports a slightly different TRV for the study, based on differing assumptions of black duck body weights and/or food consumption rates than was assumed in the MTCA TRV (EPA 2005c).

The calculated 95 percent UCL for soil on the Property (88.3 mg/kg) is below the lowest calculated wildlife EIC of 95 mg/kg. Additionally, the wildlife model is inherently conservative for assessing potential exposure risk. Therefore, based on this assessment, adverse effects to wildlife receptors from chromium are not anticipated.

In summary, based on the WOE evaluations for chromium (i.e., plant and soil biota survey, DWRA assessment, and literature review), no adverse effects to ecological receptors at the Property are anticipated.

Ecological Cleanup Level Development

Based on field study and evaluations completed, no significant adverse effects to plant and soil biota receptors are anticipated at the Property. Of the CPECs identified, lead and zinc exceed EICs protective of wildlife. These metals are also co-located with other contaminants discussed. Ecological cleanup levels for cleanup planning are therefore proposed for these two metals.

WAC 173-340-7493(2)(a)(i) specifies that EICs are not cleanup levels and EIC exceedances do not necessarily require remediation. For zinc, the wildlife based EIC of 360 mg/kg is the proposed ecological cleanup level. For lead, the wildlife EIC of 118 mg/kg is upward adjusted to a 250 mg/kg ecological cleanup level. The proposed ecological cleanup levels are supported by the following:

- The lead cleanup level is 2 times lower than the soil biota EIC of 500 mg/kg and is therefore protective of the soil biota pathway.
- Based on the field vegetation survey results, potential impacts to vegetation were not observed despite concentrations well above 250 mg/kg being present. The proposed cleanup level is less than three times higher than the default (highly conservative) plant-based EIC of 120 mg/kg. Therefore, 250 mg/kg is considered protective of the plant pathway.
- As described in Sample et al. (1996), the parameters used for wildlife exposure modelling which inform the wildlife EIC of 118 mg/kg are inherently conservative and include uncertainty factors. These default EICs are therefore generally not characteristic of realistic wildlife population exposure or reflective of population toxicant susceptibility and these protective assumptions may be inappropriate for determining cleanup goals. The Los Alamos National Laboratory EcoRisk database (2017) was queried to determine a recommended cleanup goal assuming the Property area of 30 acres, for comparison with the proposed cleanup level (LANL 2019). The resulting value is 570 mg/kg (for protection of plants) and the lowest corresponding values protective of birds and mammals (herbivorous, omnivorous and prey diets) is 290 mg/kg. Given these lines of evidence, 290 mg/kg is considered sufficiently protective; however, 250 mg/kg is protective of human health and incorporates an additional factor of safety.

The 250 mg/kg ecological cleanup level is consistent with the MTCA Method A cleanup level protective of human health.

Areas of the Property with CPEC concentrations are largely collocated with concentrations above the cleanup levels of 360 mg/kg (for zinc) and 250 mg/kg (for lead).

Summary And Conclusions

The following chemicals were further evaluated based on exceedances of applicable EICs in the initial screening evaluation:

- **Arsenic**. No ecological risk is anticipated based on arsenic WOE evaluation. The MTCA Method A CUL for human health is also considered to be protective of ecological receptors.

- **Cadmium**. The 95 percent UCL for cadmium does not exceed the EIC. No ecological risk due to cadmium is anticipated.
- **Chromium**. No ecological risk is anticipated based on chromium WOE evaluation.
- **Copper**. No ecological risk is anticipated based on copper WOE evaluation.
- **Lead**. An ecological cleanup level of 250 mg/kg protective of ecological receptors will be carried forward for cleanup planning.
- **Mercury**. No ecological risk is anticipated based on mercury WOE evaluation.
- **Nickel**. No ecological risk is anticipated based on nickel WOE evaluation.
- **Zinc**. An ecological cleanup level of 360 mg/kg protective of ecological receptors will be carried forward for cleanup planning.
- **Diesel- and oil-range hydrocarbons**. No ecological risk is anticipated based on diesel- and oil-range hydrocarbons WOE evaluation.

Therefore, cleanup planning will incorporate ecological-based cleanup levels for lead and zinc. Areas on the Property that exceed for the lead and zinc cleanup levels include the foundry and nearby slag pile, and one location in the vehicle maintenance area. Exceedances will be addressed as part of final cleanup actions at the Property.

Attachments

References

Limitations

Figures

Tables

A—Priority Habitats and Species Report

B—ProUCL Outputs

C—Field Photographs

References

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Limitations

The services undertaken in completing this technical memorandum were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This technical memorandum is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this technical memorandum apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this technical memorandum.

Figures

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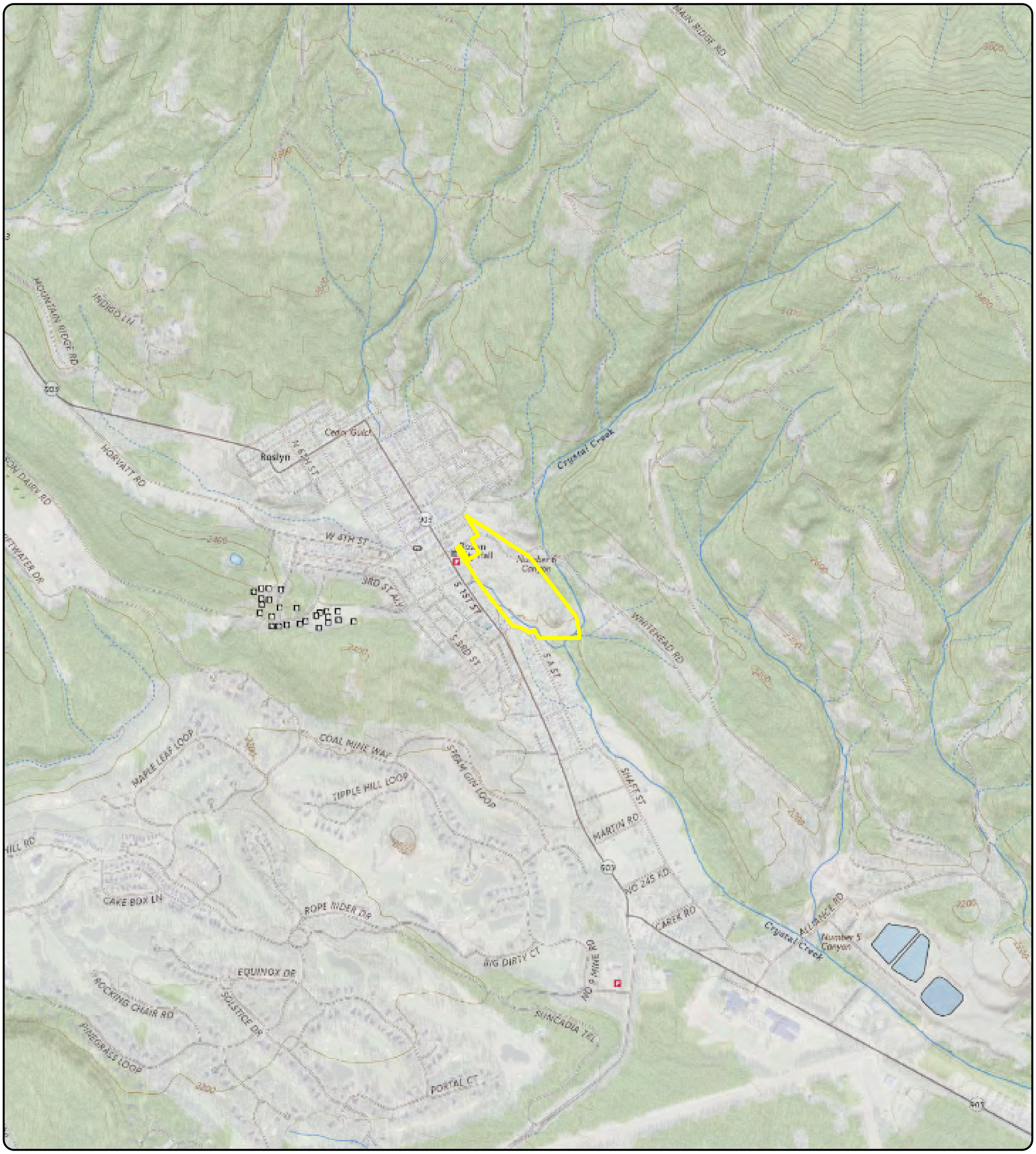
Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 1-1 Property Location

Print Date: 10/10/2024

Reviewed By: ehess

Produced By: bmurphy

Project: M1122.05.006



Notes
U.S. Geological Survey 7.5-minute topographic quadrangle (2020): Cle Elum.
Township 20 north, range 15 east, section 17.

Data Source
Property boundary obtained from Kittitas County.

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Legend

🟨 Property Boundary

Figure 1
Property Location

Roslyn No. 4 Mine
205 E Dakota Ave
Roslyn, WA

0 2,000
Feet

Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\Fig 2-1 Property Features of Interest

Figure 2
Property Features of Interest

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

▭	Property Boundary
▭	Feature of Interest
▨	Wetland
⬚	Wetland Buffer
▸—	Perennial Stream
▸- -	Intermittent Stream

Notes

Property features are approximate.

0 200
Feet

Data Sources

Aerial photograph obtained from the U.S. National Agriculture Imagery Program; tax lot data obtained from Kittitas County; wetland extent, wetland buffer, and select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance. Hydrography data obtained from USGS National Hydrography Dataset.

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Path: X:\1122.05\006\Pro\M1122_05_006_001.aprx\TEE Fig 3 Transect Locations

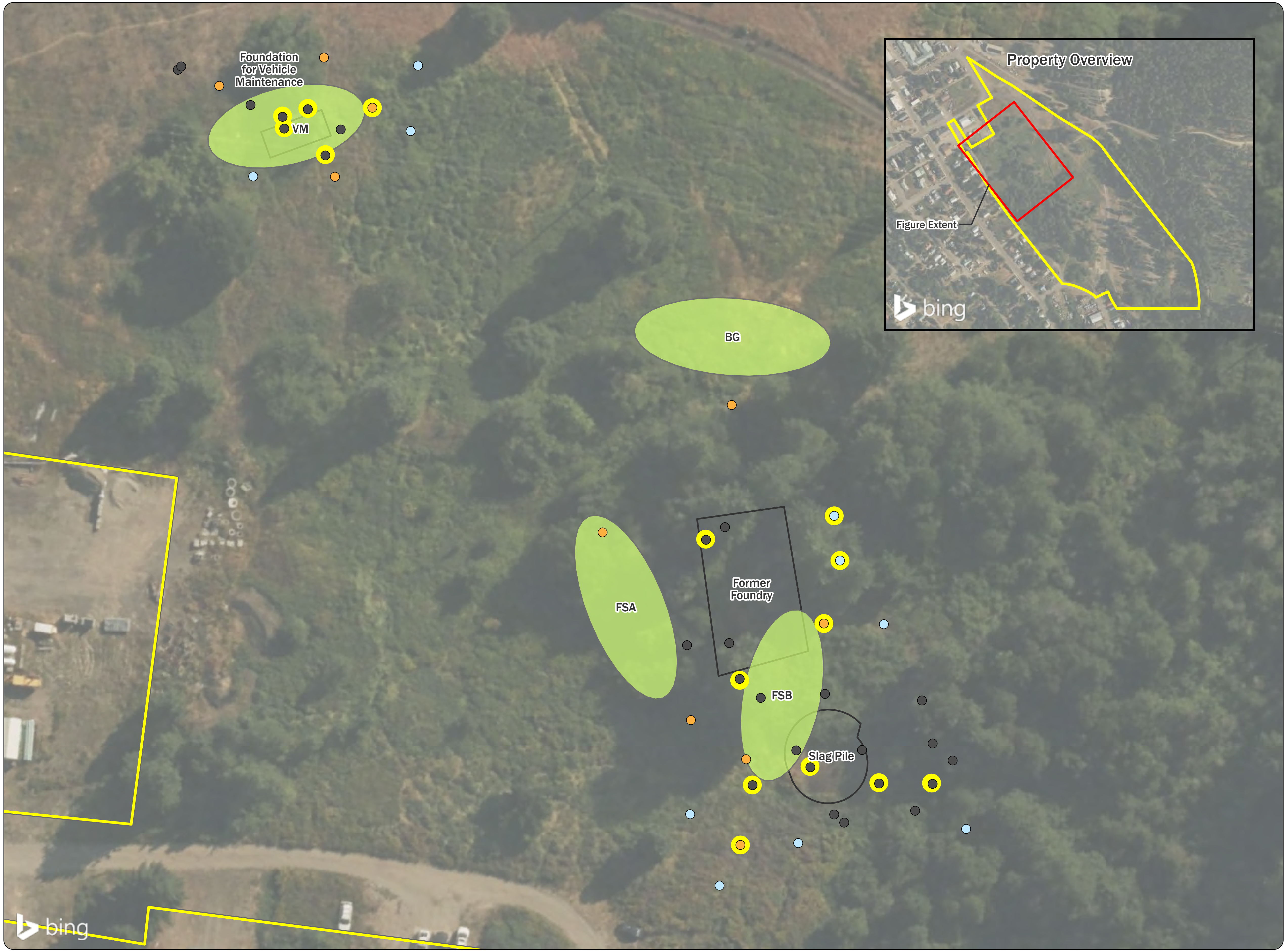

Figure 3
Terrestrial Ecological Evaluation Transects

Roslyn No. 4 Mine
205 E Dakota Avenue
Roslyn, Washington

Legend

☐ Property Boundary
☐ Feature of Interest
🟩 Transect Area
● Soil Sample (2024)
● Soil Sample (2023)
● Soil Sample (2004-2020)
● MTCA Method A: Metals Exceedance

Notes
Boring locations from 2023 and 2024 were recorded on a handheld GPS with sub-meter accuracy.
Sample locations from 2004-2020 and property features obtained by others are approximate.
Transect areas are approximate and are based on endpoints recorded on a handheld GPS.
GPS = global positioning system.
MTCA = Model Toxics Control Act.

0 40
Feet

Data Sources
Aerial photograph obtained from Bing; tax lot data obtained from Kittitas County. Select features obtained from Goldsmith Engineering topographic survey, dated March 18, 2022. Other features obtained from Hart Crowser Phase I ESA (2004) and from MFA site reconnaissance.

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Tables

Table 1
Ecological Screening Level Development
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Analyte	Yakima Basin Natural Background Value(1)	EICs(a)			Other Sources of EICs		Preliminary Lowest EIC
		Plants	Soil Biota	Wildlife	Lowest Available from other Sources(b)(2)(3)(4)(5)	Source	
Metals (mg/kg)							
Arsenic	20(c)	10	60	132	--	--	20
Cadmium	1	32(d)(6)	20	14	--	--	14
Chromium	38	42	42	67	--	--	42
Copper	27	100	80(d)(6)	217	--	--	80
Lead	11	120(d)(6)	500	118	--	--	118
Mercury	0.05	0.3	0.1	5.5	--	--	0.1
Nickel	46	30	200	980	--	--	46
Zinc	79	160(d)(6)	200	360	--	--	160
TPH (mg/kg)							
Gasoline-range hydrocarbons	NV	120(e)(7)	120(e)(7)	5,000	--	--	120
Diesel-range hydrocarbons	NV	1,600(e)(7)	260(e)(7)	6,000	--	--	260
Oil-range hydrocarbons	NV	1,600(e)(7)	260(e)(7)	6,000	--	--	260
Diesel+Oil	NV	1,600(e)(7)	260(e)(7)	6,000	--	--	260
PCBs (mg/kg)							
Total PCB Aroclors	NV	40	NV	0.65	--	--	0.65
VOCs (mg/kg)							
1,1,1,2-Tetrachloroethane	NV	NV	NV	NV	225	EPA, Region 5, RCRA ESLs	225
1,1,1-Trichloroethane	NV	NV	NV	NV	260	ESL Spreadsheet, Minimum ESL value	260
1,1,2,2-Tetrachloroethane	NV	NV	NV	NV	0.127	EPA, Region 5, RCRA ESLs	0.127
1,1,2-Trichloroethane	NV	NV	NV	NV	28.6	EPA, Region 5, RCRA ESLs	28.6
1,1-Dichloroethane	NV	NV	NV	NV	210	ESL Spreadsheet, Minimum ESL value	210
1,1-Dichloroethene	NV	NV	NV	NV	11	ESL Spreadsheet, Minimum ESL value	11
1,1-Dichloropropene	NV	NV	NV	NV	0.0015	PQL	0.0015
1,2,3-Trichlorobenzene	NV	NV	20	NV	--	--	20
1,2,3-Trichloropropane	NV	NV	NV	NV	3.36	EPA, Region 5, RCRA ESLs	3.36
1,2,4-Trichlorobenzene	NV	NV	20	NV	--	--	20
1,2,4-Trimethylbenzene	NV	NV	NV	NV	0.09	RAIS Ecological Benchmark	0.09
1,2-Dibromo-3-chloropropane	NV	NV	NV	NV	0.0352	EPA, Region 5, RCRA ESLs	0.0352
1,2-Dibromoethane	NV	NV	NV	NV	1.23	EPA, Region 5, RCRA ESLs	1.23
1,2-Dichlorobenzene	NV	NV	NV	NV	0.92	ESL Spreadsheet, Minimum ESL value	0.92
1,2-Dichloroethane	NV	NV	NV	NV	0.85	ESL Spreadsheet, Minimum ESL value	0.85
1,2-Dichloropropane	NV	NV	700	NV	--	--	700
1,3,5-Trimethylbenzene	NV	NV	NV	NV	0.16	RAIS Ecological Benchmark	0.16
1,3-Dichlorobenzene	NV	NV	NV	NV	0.74	ESL Spreadsheet, Minimum ESL value	0.74
1,3-Dichloropropane	NV	NV	NV	NV	0.0015	PQL	0.0015
1,4-Dichlorobenzene	NV	NV	20	NV	--	--	20
2,2-Dichloropropane	NV	NV	NV	NV	0.003	PQL	0.003

Table 1
Ecological Screening Level Development
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Analyte	Yakima Basin Natural Background Value(1)	EICs(a)			Other Sources of EICs		Preliminary Lowest EIC
		Plants	Soil Biota	Wildlife	Lowest Available from other Sources(b)(2)(3)(4)(5)	Source	
2-Chlorotoluene	NV	NV	NV	NV	0.001	PQL	0.001
4-Chlorotoluene	NV	NV	NV	NV	0.001	PQL	0.001
4-Isopropyltoluene	NV	NV	NV	NV	0.001	PQL	0.001
Benzene	NV	NV	NV	NV	24	ESL Spreadsheet, Minimum ESL value	24
Bromobenzene	NV	NV	NV	NV	0.003	PQL	0.003
Bromodichloromethane	NV	NV	NV	NV	0.54	EPA, Region 5, RCRA ESLs	0.54
Bromoform	NV	NV	NV	NV	15.9	EPA, Region 5, RCRA ESLs	15.9
Bromomethane	NV	NV	NV	NV	0.002	RAIS Ecological Benchmark	0.002
Carbon tetrachloride	NV	NV	NV	NV	2.98	EPA, Region 5, RCRA ESLs	2.98
Chlorobenzene	NV	NV	40	NV	--	--	40
Chloroethane	NV	NV	NV	NV	0.0015	PQL	0.0015
Chloroform	NV	NV	NV	NV	8	ESL Spreadsheet, Minimum ESL value	8
Chloromethane	NV	NV	NV	NV	10.4	RAIS Ecological Benchmark	10.4
cis-1,2-Dichloroethene	NV	NV	NV	NV	24	ESL Spreadsheet, Minimum ESL value	24
cis-1,3-Dichloropropene	NV	NV	NV	NV	0.398	EPA, Region 5, RCRA ESLs	0.398
Dibromochloromethane	NV	NV	NV	NV	2.05	EPA, Region 5, RCRA ESLs	2.05
Dibromomethane	NV	NV	NV	NV	65	RAIS Ecological Benchmark	65
Dichlorodifluoromethane (Freon 12)	NV	NV	NV	NV	39.5	EPA, Region 5, RCRA ESLs	39.5
Ethylbenzene	NV	NV	NV	NV	5.16	EPA, Region 5, RCRA ESLs	5.16
Hexachlorobutadiene	NV	NV	NV	NV	0.0398	EPA, Region 5, RCRA ESLs	0.0398
Isopropylbenzene	NV	NV	NV	NV	0.001	PQL	0.001
Methylene chloride	NV	NV	NV	NV	2.6	ESL Spreadsheet, Minimum ESL value	2.6
Naphthalene	NV	NV	NV	NV	0.0994	EPA, Region 5, RCRA ESLs	0.0994
n-Butylbenzene	NV	NV	NV	NV	0.001	PQL	0.001
n-Propylbenzene	NV	NV	NV	NV	0.001	PQL	0.001
sec-Butylbenzene	NV	NV	NV	NV	0.001	PQL	0.001
Styrene	NV	300	NV	NV	--	--	300
tert-Butylbenzene	NV	NV	NV	NV	0.001	PQL	0.001
Tetrachloroethene	NV	NV	NV	NV	0.18	ESL Spreadsheet, Minimum ESL value	0.18
Toluene	NV	200	NV	NV	--	--	200
trans-1,2-dichloroethene	NV	NV	NV	NV	24	ESL Spreadsheet, Minimum ESL value	24
trans-1,3-Dichloropropene	NV	NV	NV	NV	0.398	EPA, Region 5, RCRA ESLs	0.398
Trichloroethene	NV	NV	NV	NV	42	ESL Spreadsheet, Minimum ESL value	42
Trichlorofluoromethane (Freon 11)	NV	NV	NV	NV	52	ESL Spreadsheet, Minimum ESL value	52
Vinyl chloride	NV	NV	NV	NV	0.12	ESL Spreadsheet, Minimum ESL value	0.12
Xylenes, Total	NV	NV	NV	NV	1.4	ESL Spreadsheet, Minimum ESL value	1.4
PAHs (mg/kg)							
Acenaphthene	NV	20	29	100	--	--	20
Acenaphthylene	NV	NV	29	100	--	--	29

Table 1
Ecological Screening Level Development
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Analyte	Yakima Basin Natural Background Value(1)	EICs(a)			Other Sources of EICs		Preliminary Lowest EIC
		Plants	Soil Biota	Wildlife	Lowest Available from other Sources(b)(2)(3)(4)(5)	Source	
Anthracene	NV	NV	NV	NV	1480	EPA, Region 5, RCRA ESLs	1480
Benzo(a)anthracene	NV	NV	18	1.1	--	--	1.1
Benzo(a)pyrene	NV	NV	18	12	--	--	12
Benzo(b)fluoranthene	NV	NV	18	1.1	--	--	1.1
Benzo(ghi)perylene	NV	NV	18	1.1	--	--	1.1
Benzo(j+k)fluoranthene	NV	NV	18	1.1	--	--	1.1
Chrysene	NV	NV	18	1.1	--	--	1.1
Dibenzo(a,h)anthracene	NV	NV	18	1.1	--	--	1.1
Fluoranthene	NV	NV	18	1.1	--	--	1.1
Fluorene	NV	NV	30	100	--	--	30
Indeno(1,2,3-cd)pyrene	NV	NV	18	1.1	--	--	1.1
Naphthalene	NV	NV	29	100	--	--	29
Phenanthrene	NV	NV	29	100	--	--	29
Pyrene	NV	NV	18	1.1	--	--	1.1

Table 1
Ecological Screening Level Development
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Notes

-- = not applicable.

Ecology = Washington State Department of Ecology.

Eco-SLL = ecological soil screening level.

EIC = ecological indicator concentration.

ESL = environmental screening level.

EPA = U.S. Environmental Protection Agency.

mg/kg = milligrams per kilogram.

MTCA = Model Toxics Control Act.

NV = no value.

PAH = polycyclic aromatic hydrocarbon.

PCB = polychlorinated biphenyl.

pg/g = picograms per gram.

PQL = practical quantitation limit.

RAIS = risk assessment information system.

RCRA = Resource Conservation and Recovery Act.

SVOC = semivolatile organic compound.

TPH = total petroleum hydrocarbons.

VOC = volatile organic compound.

WAC = Washington Administrative Code.

(a)EICs were obtained from MTCA Table 749-3 of WAC 173-340-900. Consistent with WAC 173-340-7493(4), an alternative EIC based on anticipated adverse effects can be proposed for identifying a soil concentration.

(b)The lowest available screening level selected from other sources was obtained using the following hierarchy if a site-specific background value or EIC were not available: (1) ESL Spreadsheet, Minimum ESL value; (2) EPA Region 5, RCRA ESLs; (3) RAIS Ecological Benchmark; (4) PQL.

(c)Arsenic was adjusted to 20 mg/kg, equivalent with MTCA Method A CUL for arsenic from MTCA Table 745-1 of WAC 173-340-900, which is based-on the Ecology-determined regional background for soil.

(d)Adjusted to EPA Eco-SSLs, obtained from EPA's soil screening documents.

(e)Adjusted based on Ecology implementation memorandum No. 19.

References

(1)Ecology. 1994. *Natural Background Soil Metals Concentrations in Washington State.* Publication 94-115. Washington State Department of Ecology. October.

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(3)EPA. 2003. Guidance for Developing Ecological Soil Screening Levels. OSWER Directive 9285.7-55. U.S. Environmental Protection Agency: Washington D.C. November. Revised February 2005.

(4)ORNL. 2024. “The Risk Assessment Information System. Ecological Benchmark Tool for Chemicals”. Oak Ridge National Laboratory. Accessed November 18, 2024. https://rais.ornl.gov/tools/eco_search.php.

(5)Ecology. 2020. “Preliminary Cleanup Levels for Lower Duwamish Waterway”. Washington State Department of Ecology. August. https://apps.ecology.wa.gov/cleanupsearch/site/1643.

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Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Metals (mg/kg)								
				Arsenic	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Zinc
			Preliminary EIC:$^{(a)}$	20	14	42	NV	80	118	0.1	46	160
Former Foundry												
HB3	HB3-S1	06/14/2004	0.4-0.5	7.6	1.1	8.9	--	170	620	0.5 U	160	180
TP3	TP3-S1	07/27/2006	0-2	3.7	1 U	11	--	1 U	84	1.2	18	53
TP4	TP4-S1	07/27/2006	0-2	2 U	1 U	7.6	--	3.9	13	0.5 U	21	48
TP5	TP5-S1	07/27/2006	0-2	2 U	1 U	5.3	--	1 U	7.9	0.5 U	7.8	93
HC-SB-8	HC-SB-8-S1	08/09/2007	0-4	6 U	0.3 U	21.1	--	46.1 J	8	0.05 U	31	58 J
	HC-SB-8-S2	08/09/2007	4-8	20 U	0.6 U	56	--	34.1 J	8	0.06	46	81 J
HC-SS-11	HC-SS-11	08/10/2007	0-0.5	20	0.5 U	35	--	81.2	149	0.07 J	503	239
HC-SS-12	HC-SS-12	08/10/2007	0-0.5	40	0.5 U	33	--	88.2	130	0.06 J	601	324
FO-DP-1	FO-DP-1-SB-1.0	04/11/2023	1.0	2.56	1 U	16.5	--	11.1	6.95	1 U	17.2	59.4
FO-DP-2	FO-DP-2-SB-0.5	04/11/2023	0.5	1.82	1 U	16	--	10	11.4	1 U	14.6	56.7
FO-DP-3	FO-DP-3-SB-0.5	04/11/2023	0.5	15.4	5.45	33.8	--	165	988	1 U	36.8	1,720
	FO-DP-3-SB-2.5	04/11/2023	2.5	--	1 U	--	--	--	72.1	--	--	--
FO-DP-4	FO-DP-4-SB-0.5	04/11/2023	0.5	2.48	1 U	22.9	--	12.1	6.86	1 U	19	67.5
FO-DP-5	FO-DP-5-SB-0.5	09/19/2024	0.5	23	4.3	40	--	240	2,600	1.8	89	1,600
	FO-DP-5-SB-0.5-DUP	09/19/2024	0.5	31	5.6	39	--	220	2,000	1.4	86	1,800
	FO-DP-5-SB-1.5	09/19/2024	1.5	69	15	--	--	420	9,700	1 U	140	7,800
FO-DP-6	FO-DP-6-SB-0.5	09/19/2024	0.5	6.8	1 U	13	--	55	200	1 U	23	180
	FO-DP-6-SB-1.3	09/19/2024	1.3	--	--	--	--	--	200	--	--	150
FO-DP-8	FO-DP-8-SB-0.3	09/19/2024	0.3	15	3.0	--	--	--	1,000	--	--	--
	FO-DP-8-SB-1.1	09/19/2024	1.1	--	5.1	--	--	--	2,400	--	--	--
Former Powerhouse												
TP13	TP13-S1	07/28/2006	0-2	9.2	1 U	8	--	1 U	68	4	20	31
TP14	TP14-S1	07/28/2006	0-2	2 U	1 U	5.9	--	1 U	5.6	0.5 U	5.8	11
HC-SB-5	HC-SB-5-S1	08/09/2007	0-4	10	0.6 U	23	--	76.1 J	11	0.04	42	62 J
	HC-SB-5-S2	08/09/2007	4-8	6 U	0.2 U	28.2	--	17.6 J	4	0.05 U	25	79 J
HC-SS-1	HC-SS-1	08/10/2007	0-0.5	58	1.8	33.7	--	123	57	0.83 J	55	252
HC-SS-2	HC-SS-2	08/10/2007	0-0.5	9	0.4	18.9	--	42.1	28	0.06 J	21	95
HC-SS-3	HC-SS-3	08/10/2007	0-0.5	26	0.8	26.5	--	85.6	68	0.16 J	33	147
PH-DP-1	PH-DP-1-SB-1.5	04/12/2023	1.5	4.96	1 U	6.71	--	57.2	13.2	1 U	20.1	10.5
PH-DP-2	PH-DP-2-SB-0.5	04/12/2023	0.5	16.3	1 U	10.3	--	20.9	10.5	1 U	15.3	113
PH-DP-3	PH-DP-3-SB-0.8	04/12/2023	0.8	4.26	1 U	10.8	--	27.2	119	1 U	8.95	62.3
PH-DP-4	PH-DP-4-SB-0.5	04/12/2023	0.5	46.5 J	1.36	20.2	--	75.2 J	33.7 J	1 U	36.2 J	173 J
	PH-DP-4-SB-2.5	04/12/2023	2.5	7.6	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Metals (mg/kg)								
				Arsenic	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Zinc
			Preliminary EIC:[(a)]	20	14	42	NV	80	118	0.1	46	160
Former Powerhouse (cont.)												
PH-DP-5	PH-DP-5-SB-0.8	04/12/2023	0.8	4.96	1 U	17.4	--	29.5	21.1	1 U	16.2	62.2
	PH-DP-5-SB-0.8-DUP	04/12/2023	0.8	4.51	1 U	15.2	--	26.4	15.7	1 U	15.3	59.5
PH-DP-6	PH-DP-6-SB-0.5	09/19/2024	0.5	2.2	1 U	7.7	--	6.3	5.4	1 U	7.7	49
PH-DP-7	PH-DP-7-SB-0.3	09/19/2024	0.3	8.8	1 U	10	--	49	13	1 U	23	23
PH-DP-8	PH-DP-8-SB-0.4	09/19/2024	0.4	4.0	1 U	7.7	--	30	81	1 U	8.6	190
	PH-DP-8-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	16
Slag Pile												
HB5	HB5-S1	06/14/2004	0.3-0.5	2 U	1 U	12	--	59	32	0.5 U	0.5 U	2.2
Slag Pile	Slag Pile	06/14/2004	0-0.5	2 U	1 U	5.2	--	18	36	0.5 U	0.5 U	2.8
TP1	TP1-S1	07/27/2006	0-2	4.8	1.2	45	--	1 U	290	5.2	88	19
TP2	TP2-S1	07/27/2006	0-2	6.9	1 U	100	--	1 U	200	4.9	140	58
HC-SB-7	HC-SB-7-S1	08/09/2007	0-4	10 U	0.5 U	52	--	32 J	9	0.04 U	35	87 J
	HC-SB-7-S2	08/09/2007	4-8	20 U	0.6 U	52	--	36.5 J	8	0.06	37	74 J
HC-SS-7	HC-SS-7	08/10/2007	0-0.5	10 U	0.5 U	36	--	49.5	62	0.05 J	41	229
HC-SS-8	HC-SS-8	08/10/2007	0-0.5	10 U	0.7	36	--	54.3	101	0.08 J	53	277
HC-SS-9	HC-SS-9	08/10/2007	0-0.5	10 U	0.5 U	39	--	48.6	54	0.05 J	39	90
HC-SS-10	HC-SS-10	08/10/2007	0-0.5	10 U	0.5 U	38	--	35.5	27	0.05 J	34	81
TP-104	TP-104, S-1	07/15/2020	1.5	22	4.1	530	--	430	100	0.26 U	200	130
	TP-104, S-2	07/15/2020	3	10 U	2.1	570	1 U	190	74	0.26 U	92	77
TP-105	TP-105, S-1	07/15/2020	1.5	24	6.7	600	1.1 U	700	45	0.26 U	300	56
	TP-105, S-2	07/15/2020	3	17	3	310	--	230	130	0.26 U	280	100
TP-106	TP-106, S-1	07/15/2020	1.5	11 U	1.5	53	--	62	34	0.28 U	66	59
	TP-106, S-2	07/15/2020	3	11 U	1.4	56	1.1 U	46	31	0.26 U	83	52
SP-DP-1	SP-DP-1-SB-0.5	04/11/2023	0.5	4.85	1 U	24	--	25.1	14.7	1 U	20.5	51.1
SP-DP-2	SP-DP-2-SB-0.5	04/11/2023	0.5	3.95	1 U	39.5	--	17.5	14.6	1 U	64.6	45.4
	SP-DP-2-SB-0.5-DUP	04/11/2023	0.5	4.41	1 U	41	0.613 U	22.6	41.7	1 U	60.6	56.2
SP-DP-3	SP-DP-3-SB-0.5	04/11/2023	0.5	9.78	2.66	19.2	--	80.2	91.3 J	1 U	31.7	242
	SP-DP-3-SB-0.5-DUP	04/11/2023	0.5	--	2.32	--	--	--	--	--	--	--
	SP-DP-3-SB-2.5	04/11/2023	2.5	--	1 U	--	--	--	--	--	--	--
SP-DP-4	SP-DP-4-SB-0.5	09/19/2024	0.5	4.6	1 U	11	--	57	13	1 U	28	25
SP-DP-5	SP-DP-5-SB-0.4	09/19/2024	0.4	7.7	1.0	10	--	53	85	1 U	23	120

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Metals (mg/kg)								
				Arsenic	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Zinc
Preliminary EIC:[a]				20	14	42	NV	80	118	0.1	46	160
Slag Pile (cont.)												
SP-DP-6	SP-DP-6-SB-0.5	09/19/2024	0.5	3.8	1 U	20	--	20	28 J	1 U	23	53
	SP-DP-6-SB-0.5-DUP	09/19/2024	0.5	4.4	1 U	24	--	28	53 J	1 U	26	61
SP-DP-7	SP-DP-7-SB-0.4	09/19/2024	0.4	4.4	1 U	22	--	20	19	1 U	18	52
Tailings Pile												
TP-96	TP-96	07/15/2020	3	11 U	0.82	37	1.1 U	37	8.1	0.27 U	37	73
TP-97	TP-97	07/15/2020	3	11 U	0.78	38	--	36	7.8	0.27 U	38	68
TP-98	TP-98	07/15/2020	3	11 U	0.64	23	--	28	7.9	0.26 U	21	51
TP-99	TP-99	07/15/2020	3	11 U	0.54 U	9.7	--	22	5.4	0.27 U	13	36
TP-100	TP-100	07/15/2020	3	15	0.58	28	1.1 U	30	12	0.27 U	30	55
TP-101	TP-101	07/15/2020	3	12	0.53 U	20	--	25	5.3 U	0.27 U	21	43
TP-102	TP-102	07/15/2020	3	11 U	0.63	29	--	34	8.8	0.27 U	32	68
TP-103	TP-103	07/15/2020	3	11 U	0.68	36	1.1 U	37	9.8	0.27 U	37	69
Former Transformers												
HB6	HB6-S1	06/14/2004	0.5-1	--	--	--	--	--	--	--	--	--
HB8	HB8-S1	06/14/2004	0.5-1	2 U	1 U	12	--	160	30	0.5 U	0.5 U	3.3
TP11	TP11-S1	07/28/2006	0-2	2 U	1 U	11	--	1 U	7.3	0.5 U	8.9	80
TP12	TP12-S1	07/28/2006	0-2	2.1	2	6.1	--	1 U	50	8	7.5	35
HC-SS-4	HC-SS-4	08/10/2007	0-0.5	5 U	0.2 U	16.6	--	10.9	15	0.19 J	16	36.4
HC-SS-5	HC-SS-5	08/10/2007	0-0.5	6	0.5	23.8	--	169	61	3.04 J	39	122
HC-SS-6	HC-SS-6	08/10/2007	0-0.5	8	0.4	20.9	--	49.1	65	0.32 J	27	114
TF-DP-1	TF-DP-1-SB-1.0	04/12/2023	1	38.1	3.54	17.6	--	138	24.3	1 U	30.7	108
	TF-DP-1-SB-3.0	04/12/2023	3	1 U	1 U	--	--	--	--	--	--	--
TF-DP-2	TF-DP-2-SB-0.5	04/12/2023	0.5	24.7	1.87	23.8	--	69.7	50.8	1 U	31.8	141
	TF-DP-2-SB-2.5	04/12/2023	2.5	6.16	--	--	--	--	--	--	--	--
TF-DP-3	TF-DP-3-SB-0.5	09/19/2024	0.5	7.5	1 U	17	--	28	42	1 U	20	57
TF-DP-4	TF-DP-4-SB-0.4	09/19/2024	0.4	22	1 U	18	--	51	61	1 U	24	90
	TF-DP-4-SB-1.3	09/19/2024	1.3	34	--	--	--	--	--	--	--	--
TF-DP-5	TF-DP-5-SB-0.3	09/19/2024	0.3	7.9	1 U	10	--	37	26	1 U	20	42
TF-DP-6	TF-DP-6-SB-0.4	09/19/2024	0.4	5.0	1 U	9.3	--	44	24	1 U	17	34
TF-DP-8	TF-DP-8-SB-0.4	09/19/2024	0.4	5.4	--	--	--	--	--	--	--	--
TF-DP-9	TF-DP-9-SB-0.3	09/19/2024	0.3	7.1	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	Metals (mg/kg)								
				Arsenic	Cadmium	Chromium	Chromium (Hexavalent)	Copper	Lead	Mercury	Nickel	Zinc
			Preliminary EIC:[a]	20	14	42	NV	80	118	0.1	46	160
Vehicle Maintenance												
HB1	HB1-S1	06/14/2004	0-0.5	11	2.7	4.4	--	50	250	0.5 U	21	25
TP10	TP10-S1	07/28/2006	0-2	2 U	1 U	9.3	--	1 U	130	0.5 U	12	12
TP8	TP8-S1[b]	07/28/2006	0-3	150	8.6	5.1	--	1 U	110	0.54	14	7.8
TP9	TP9-S1	07/28/2006	0-2	4.1	1 U	2.9	--	1 U	24	0.5 U	6.4	5.1
HC-SB-6	HC-SB-6-S1	08/09/2007	0-4	5	0.2 U	11.9	--	41.1 J	27	0.1	15	20 J
	HC-SB-6-S2	08/09/2007	4-8	6 U	0.2 U	37.4	--	20.6 J	5	0.05 U	25	61 J
HC-SS-13	HC-SS-13	08/10/2007	0-0.5	10	0.6	22.8	--	81.3 J	83	0.09	44	164 J
HC-SS-14	HC-SS-14	08/10/2007	0-0.5	10	0.7	34.8	--	106 J	152	22.9	52	210 J
HC-SS-15	HC-SS-15	08/10/2007	0-0.5	90	5.8	46	--	184 J	153	0.13	77	392 J
VM-DP-1	VM-DP-1-SB-0.5	04/12/2023	0.5	14.6	1 U	12.1	--	53.8	67.9	1 U	19.2	105
VM-DP-2	VM-DP-2-SB-0.5	04/12/2023	0.5	9.08	1 U	13.7	--	60.1	81	1 U	24.5	108
VM-DP-3	VM-DP-3-SB-0.5	04/12/2023	0.5	25.9	5.33	39.8	--	106	301	1 U	25	4,110
	VM-DP-3-SB-2.5	04/12/2023	2.5	3.5	1 U	--	--	--	6.49	--	--	--
VM-DP-4	VM-DP-4-SB-0.5	04/11/2023	0.5	9.52	1 U	14.2	--	63	28.7	1 U	26.4	67.7
VM-DP-5	VM-DP-5-SB-0.5	09/19/2024	0.5	3.8	1 U	13	--	28	99 J	1 U	14	100
VM-DP-6	VM-DP-6-SB-0.5	09/19/2024	0.5	5.0	1 U	13	--	38	110	1 U	15	130
	VM-DP-6-SB-0.5-DUP	09/19/2024	0.5	4.1	1 U	12	--	31	180	1 U	13	130
	VM-DP-6-SB-1.5	09/19/2024	1.5	--	--	--	--	--	75 J	--	--	--
VM-DP-7	VM-DP-7-SB-0.4	09/19/2024	0.4	8.3	1 U	8.7	--	47	44	1 U	16	34
Wetland												
HC-WS-1	HC-WS-1	08/10/2007	0-0.5	8 U	0.6	19.4 J	--	56.7	47	0.19	32 J	161
HC-WS-2	HC-WS-2	08/10/2007	0-0.5	30	0.8	46 J	--	118	33	0.05	92 J	87
HC-WS-3	HC-WS-3	08/10/2007	0-0.5	7	0.2 U	26	--	60.3 J	15	0.19	42	49 J
WL-DP-1	WL-DP-1-SB-0.5	04/12/2023	0.5	4.61	1 U	30.2	--	27.4	11.9	1 U	25.2	65.2
	WL-DP-1-SB-0.5-DUP	04/12/2023	0.5	5.73	1 U	31.7	--	28.1	13.2	1 U	25.6	69.5
WL-DP-2	WL-DP-2-SB-0.3	04/12/2023	0.3	3.82	1 U	23.3	--	23.4	10.7	1 U	20.2	73.2
WL-DP-3	WL-DP-3-SB-0.5	04/12/2023	0.5	3.69	1 U	19.2	--	14	5.57	1 U	26.2	49
WL-DP-4	WL-DP-4-SB-0.5	04/12/2023	0.5	6.47	1 U	12.5	--	92.2	15.7	1 U	26.4	36.3

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	TPH (mg/kg)						PCB Aroclors (mg/kg)						
				Gasoline-range hydrocarbons	Mineral spirit-range hydrocarbons	Kerosene-range hydrocarbons	Diesel-range hydrocarbons	Oil-range hydrocarbons[c]	Diesel+Oil[d]	Aroclor 1016/1242 coelution	Aroclor 1221	Aroclor 1232	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs[e]
Preliminary EIC:[a]				120	120[f]	260[g]	260	260	260	NV	NV	NV	NV	NV	NV	0.65
Former Foundry																
HB3	HB3-S1	06/14/2004	0.4-0.5	--	--	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP3	TP3-S1	07/27/2006	0-2	--	--	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP4	TP4-S1	07/27/2006	0-2	--	--	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP5	TP5-S1	07/27/2006	0-2	--	--	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
HC-SB-8	HC-SB-8-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-8-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-11	HC-SS-11	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-12	HC-SS-12	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-1	FO-DP-1-SB-1.0	04/11/2023	1.0	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-2	FO-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-3	FO-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-4	FO-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-5	FO-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-5-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-5-SB-1.5	09/19/2024	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-6	FO-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-6-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-8	FO-DP-8-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-8-SB-1.1	09/19/2024	1.1	--	--	--	--	--	--	--	--	--	--	--	--	--
Former Powerhouse																
TP13	TP13-S1	07/28/2006	0-2	--	--	20 U	20 U	2,100	2,100	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TP14	TP14-S1	07/28/2006	0-2	--	--	20 U	20 U	210	230	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HC-SB-5	HC-SB-5-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-5-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-1	HC-SS-1	08/10/2007	0-0.5	--	--	--	190	320	510	--	--	--	--	--	--	--
HC-SS-2	HC-SS-2	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-3	HC-SS-3	08/10/2007	0-0.5	--	--	--	240	380	620	--	--	--	--	--	--	--
PH-DP-1	PH-DP-1-SB-1.5	04/12/2023	1.5	--	--	--	140	250 U	270	--	--	--	--	--	--	--
PH-DP-2	PH-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	50 U	250 U	250 U	--	--	--	--	--	--	--
PH-DP-3	PH-DP-3-SB-0.8	04/12/2023	0.8	--	--	--	90	980	1,100	--	--	--	--	--	--	--
PH-DP-4	PH-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	210	250 U	340	--	--	--	--	--	--	--
	PH-DP-4-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	TPH (mg/kg)						PCB Aroclors (mg/kg)						
				Gasoline-range hydrocarbons	Mineral spirit-range hydrocarbons	Kerosene-range hydrocarbons	Diesel-range hydrocarbons	Oil-range hydrocarbons[c]	Diesel+Oil[d]	Aroclor 1016/1242 coelution	Aroclor 1221	Aroclor 1232	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs[e]
Preliminary EIC:[a]				120	120[f]	260[g]	260	260	260	NV	NV	NV	NV	NV	NV	0.65
Former Powerhouse (cont.)																
PH-DP-5	PH-DP-5-SB-0.8	04/12/2023	0.8	--	--	--	50 U	610	640	--	--	--	--	--	--	--
	PH-DP-5-SB-0.8-DUP	04/12/2023	0.8	--	--	--	130	1,100	1,200	--	--	--	--	--	--	--
PH-DP-6	PH-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-7	PH-DP-7-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-8	PH-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
	PH-DP-8-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--
Slag Pile																
HB5	HB5-S1	06/14/2004	0.3-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Slag Pile	Slag Pile	06/14/2004	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
TP1	TP1-S1	07/27/2006	0-2	--	--	--	--	--	--	--	--	--	--	--	--	--
TP2	TP2-S1	07/27/2006	0-2	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SB-7	HC-SB-7-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-7-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-7	HC-SS-7	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-8	HC-SS-8	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-9	HC-SS-9	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-10	HC-SS-10	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
TP-104	TP-104, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	TP-104, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TP-105	TP-105, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	TP-105, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TP-106	TP-106, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	TP-106, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-1	SP-DP-1-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-2	SP-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-2-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-3	SP-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-3-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-4	SP-DP-4-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-5	SP-DP-5-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	TPH (mg/kg)						PCB Aroclors (mg/kg)						
				Gasoline-range hydrocarbons	Mineral spirit-range hydrocarbons	Kerosene-range hydrocarbons	Diesel-range hydrocarbons	Oil-range hydrocarbons[c]	Diesel+Oil[d]	Aroclor 1016/1242 coelution	Aroclor 1221	Aroclor 1232	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs[e]
			Preliminary EIC:[a]	120	120[f]	260[g]	260	260	260	NV	NV	NV	NV	NV	NV	0.65
Slag Pile (cont.)																
SP-DP-6	SP-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-7	SP-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
Tailings Pile																
TP-96	TP-96	07/15/2020	3	--	--	--	27 U	69	83	--	--	--	--	--	--	--
TP-97	TP-97	07/15/2020	3	--	--	--	29	69	98	--	--	--	--	--	--	--
TP-98	TP-98	07/15/2020	3	--	--	--	110	250	360	--	--	--	--	--	--	--
TP-99	TP-99	07/15/2020	3	--	--	--	370	860	1,200	--	--	--	--	--	--	--
TP-100	TP-100	07/15/2020	3	--	--	--	140	380	520	--	--	--	--	--	--	--
TP-101	TP-101	07/15/2020	3	--	--	--	42	110	150	--	--	--	--	--	--	--
TP-102	TP-102	07/15/2020	3	--	--	--	95	270	370	--	--	--	--	--	--	--
TP-103	TP-103	07/15/2020	3	--	--	--	65	170	240	--	--	--	--	--	--	--
Former Transformers																
HB6	HB6-S1	06/14/2004	0.5-1	--	--	20 U	20 U	50 U	50 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HB8	HB8-S1	06/14/2004	0.5-1	--	--	20 U	20 U	50 U	50 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TP11	TP11-S1	07/28/2006	0-2	--	--	20 U	20 U	50 U	50 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
TP12	TP12-S1	07/28/2006	0-2	--	--	20 U	20 U	50 U	50 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
HC-SS-4	HC-SS-4	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-5	HC-SS-5	08/10/2007	0-0.5	--	--	--	180	410	590	--	--	--	--	--	--	--
HC-SS-6	HC-SS-6	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-1	TF-DP-1-SB-1.0	04/12/2023	1	--	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-1-SB-3.0	04/12/2023	3	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-2	TF-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-2-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-3	TF-DP-3-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-4	TF-DP-4-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-4-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-5	TF-DP-5-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-6	TF-DP-6-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-8	TF-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-9	TF-DP-9-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	TPH (mg/kg)						PCB Aroclors (mg/kg)						
				Gasoline-range hydrocarbons	Mineral spirit-range hydrocarbons	Kerosene-range hydrocarbons	Diesel-range hydrocarbons	Oil-range hydrocarbons[c]	Diesel+Oil[d]	Aroclor 1016/1242 coelution	Aroclor 1221	Aroclor 1232	Aroclor 1248	Aroclor 1254	Aroclor 1260	Total PCBs[e]
			Preliminary EIC:[a]	120	120[f]	260[g]	260	260	260	NV	NV	NV	NV	NV	NV	0.65
Vehicle Maintenance																
HB1	HB1-S1	06/14/2004	0-0.5	--	--	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP10	TP10-S1	07/28/2006	0-2	5 U	5 U	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP8	TP8-S1[b]	07/28/2006	0-3	5 U	5 U	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
TP9	TP9-S1	07/28/2006	0-2	5 U	5 U	20 U	20 U	50 U	50 U	--	--	--	--	--	--	--
HC-SB-6	HC-SB-6-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-6-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-13	HC-SS-13	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-14	HC-SS-14	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-15	HC-SS-15	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-1	VM-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-2	VM-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-3	VM-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-3-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-4	VM-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-5	VM-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-6	VM-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-6-SB-1.5	09/19/2024	1.5	--	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-7	VM-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--
Wetland																
HC-WS-1	HC-WS-1	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-WS-2	HC-WS-2	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
HC-WS-3	HC-WS-3	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-1	WL-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
	WL-DP-1-SB-0.5-DUP	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-2	WL-DP-2-SB-0.3	04/12/2023	0.3	--	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-3	WL-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-4	WL-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (mg/kg)											
				Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene
			Preliminary EIC:$^{(a)}$	20	29	1,480	1.1	12	1.1	1.1	1.1	1.1	1.1	1.1	30
Former Foundry															
HB3	HB3-S1	06/14/2004	0.4-0.5	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TP3	TP3-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP4	TP4-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP5	TP5-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-8	HC-SB-8-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-8-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-11	HC-SS-11	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-12	HC-SS-12	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-1	FO-DP-1-SB-1.0	04/11/2023	1.0	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-2	FO-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-3	FO-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-4	FO-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-5	FO-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-5-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-5-SB-1.5	09/19/2024	1.5	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-6	FO-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-6-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--
FO-DP-8	FO-DP-8-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--
	FO-DP-8-SB-1.1	09/19/2024	1.1	--	--	--	--	--	--	--	--	--	--	--	--
Former Powerhouse															
TP13	TP13-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP14	TP14-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-5	HC-SB-5-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-5-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-1	HC-SS-1	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-2	HC-SS-2	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-3	HC-SS-3	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-1	PH-DP-1-SB-1.5	04/12/2023	1.5	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-2	PH-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-3	PH-DP-3-SB-0.8	04/12/2023	0.8	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-4	PH-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	PH-DP-4-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (mg/kg)											
				Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene
Preliminary EIC:$^{(a)}$				20	29	1,480	1.1	12	1.1	1.1	1.1	1.1	1.1	1.1	30
Former Powerhouse (cont.)															
PH-DP-5	PH-DP-5-SB-0.8	04/12/2023	0.8	--	--	--	--	--	--	--	--	--	--	--	--
	PH-DP-5-SB-0.8-DUP	04/12/2023	0.8	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-6	PH-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-7	PH-DP-7-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--
PH-DP-8	PH-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
	PH-DP-8-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--
Slag Pile															
HB5	HB5-S1	06/14/2004	0.3-0.5	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Slag Pile	Slag Pile	06/14/2004	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
TP1	TP1-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP2	TP2-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-7	HC-SB-7-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-7-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-7	HC-SS-7	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-8	HC-SS-8	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-9	HC-SS-9	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-10	HC-SS-10	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
TP-104	TP-104, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--
	TP-104, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-105	TP-105, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--
	TP-105, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-106	TP-106, S-1	07/15/2020	1.5	--	--	--	--	--	--	--	--	--	--	--	--
	TP-106, S-2	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-1	SP-DP-1-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-2	SP-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-2-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-3	SP-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-3-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-4	SP-DP-4-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-5	SP-DP-5-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (mg/kg)											
				Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene
			Preliminary EIC:$^{(a)}$	20	29	1,480	1.1	12	1.1	1.1	1.1	1.1	1.1	1.1	30
Slag Pile (cont.)															
SP-DP-6	SP-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	SP-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
SP-DP-7	SP-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
Tailings Pile															
TP-96	TP-96	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-97	TP-97	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-98	TP-98	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-99	TP-99	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-100	TP-100	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-101	TP-101	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-102	TP-102	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
TP-103	TP-103	07/15/2020	3	--	--	--	--	--	--	--	--	--	--	--	--
Former Transformers															
HB6	HB6-S1	06/14/2004	0.5-1	--	--	--	--	--	--	--	--	--	--	--	--
HB8	HB8-S1	06/14/2004	0.5-1	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TP11	TP11-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP12	TP12-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.07	0.05 U	0.05 U	0.05 U	0.05 U	0.06	0.05 U	0.11	0.05 U
HC-SS-4	HC-SS-4	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-5	HC-SS-5	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-6	HC-SS-6	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-1	TF-DP-1-SB-1.0	04/12/2023	1	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-1-SB-3.0	04/12/2023	3	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-2	TF-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-2-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-3	TF-DP-3-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-4	TF-DP-4-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
	TF-DP-4-SB-1.3	09/19/2024	1.3	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-5	TF-DP-5-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-6	TF-DP-6-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-8	TF-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
TF-DP-9	TF-DP-9-SB-0.3	09/19/2024	0.3	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (mg/kg)											
				Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)-anthracene	Benzo(a)-pyrene	Benzo(b)-fluoranthene	Benzo(ghi)-perylene	Benzo(k)-fluoranthene	Chrysene	Dibenzo(a,h)-anthracene	Fluoranthene	Fluorene
Preliminary EIC:[a]				20	29	1,480	1.1	12	1.1	1.1	1.1	1.1	1.1	1.1	30
Vehicle Maintenance															
HB1	HB1-S1	06/14/2004	0-0.5	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
TP10	TP10-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP8	TP8-S1[b]	07/28/2006	0-3	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
TP9	TP9-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-6	HC-SB-6-S1	08/09/2007	0-4	--	--	--	--	--	--	--	--	--	--	--	--
	HC-SB-6-S2	08/09/2007	4-8	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-13	HC-SS-13	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-14	HC-SS-14	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-SS-15	HC-SS-15	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-1	VM-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-2	VM-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-3	VM-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-3-SB-2.5	04/12/2023	2.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-4	VM-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-5	VM-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-6	VM-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	VM-DP-6-SB-1.5	09/19/2024	1.5	--	--	--	--	--	--	--	--	--	--	--	--
VM-DP-7	VM-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--	--	--	--	--	--	--	--	--
Wetland															
HC-WS-1	HC-WS-1	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-WS-2	HC-WS-2	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
HC-WS-3	HC-WS-3	08/10/2007	0-0.5	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-1	WL-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
	WL-DP-1-SB-0.5-DUP	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-2	WL-DP-2-SB-0.3	04/12/2023	0.3	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-3	WL-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--
WL-DP-4	WL-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	--	--	--	--	--	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (cont.) (mg/kg)			
				Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Preliminary EIC:[(a)]	1.1	0.0994	29	1.1
Former Foundry							
HB3	HB3-S1	06/14/2004	0.4-0.5	0.1 U	0.1 U	0.1 U	0.1 U
TP3	TP3-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP4	TP4-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP5	TP5-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-8	HC-SB-8-S1	08/09/2007	0-4	--	--	--	--
	HC-SB-8-S2	08/09/2007	4-8	--	--	--	--
HC-SS-11	HC-SS-11	08/10/2007	0-0.5	--	--	--	--
HC-SS-12	HC-SS-12	08/10/2007	0-0.5	--	--	--	--
FO-DP-1	FO-DP-1-SB-1.0	04/11/2023	1.0	--	--	--	--
FO-DP-2	FO-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--
FO-DP-3	FO-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--
	FO-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--
FO-DP-4	FO-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--
FO-DP-5	FO-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--
	FO-DP-5-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--
	FO-DP-5-SB-1.5	09/19/2024	1.5	--	--	--	--
FO-DP-6	FO-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--
	FO-DP-6-SB-1.3	09/19/2024	1.3	--	--	--	--
FO-DP-8	FO-DP-8-SB-0.3	09/19/2024	0.3	--	--	--	--
	FO-DP-8-SB-1.1	09/19/2024	1.1	--	--	--	--
Former Powerhouse							
TP13	TP13-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP14	TP14-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-5	HC-SB-5-S1	08/09/2007	0-4	--	--	--	--
	HC-SB-5-S2	08/09/2007	4-8	--	--	--	--
HC-SS-1	HC-SS-1	08/10/2007	0-0.5	--	--	--	--
HC-SS-2	HC-SS-2	08/10/2007	0-0.5	--	--	--	--
HC-SS-3	HC-SS-3	08/10/2007	0-0.5	--	--	--	--
PH-DP-1	PH-DP-1-SB-1.5	04/12/2023	1.5	--	--	--	--
PH-DP-2	PH-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--
PH-DP-3	PH-DP-3-SB-0.8	04/12/2023	0.8	--	--	--	--
PH-DP-4	PH-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	--
	PH-DP-4-SB-2.5	04/12/2023	2.5	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (cont.) (mg/kg)			
				Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
Preliminary EIC:[a]				1.1	0.0994	29	1.1
Former Powerhouse (cont.)							
PH-DP-5	PH-DP-5-SB-0.8	04/12/2023	0.8	--	--	--	--
	PH-DP-5-SB-0.8-DUP	04/12/2023	0.8	--	--	--	--
PH-DP-6	PH-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--
PH-DP-7	PH-DP-7-SB-0.3	09/19/2024	0.3	--	--	--	--
PH-DP-8	PH-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--
	PH-DP-8-SB-1.3	09/19/2024	1.3	--	--	--	--
Slag Pile							
HB5	HB5-S1	06/14/2004	0.3-0.5	0.1 U	0.1 U	0.1 U	0.1 U
Slag Pile	Slag Pile	06/14/2004	0-0.5	--	--	--	--
TP1	TP1-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP2	TP2-S1	07/27/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-7	HC-SB-7-S1	08/09/2007	0-4	--	--	--	--
	HC-SB-7-S2	08/09/2007	4-8	--	--	--	--
HC-SS-7	HC-SS-7	08/10/2007	0-0.5	--	--	--	--
HC-SS-8	HC-SS-8	08/10/2007	0-0.5	--	--	--	--
HC-SS-9	HC-SS-9	08/10/2007	0-0.5	--	--	--	--
HC-SS-10	HC-SS-10	08/10/2007	0-0.5	--	--	--	--
TP-104	TP-104, S-1	07/15/2020	1.5	--	--	--	--
	TP-104, S-2	07/15/2020	3	--	--	--	--
TP-105	TP-105, S-1	07/15/2020	1.5	--	--	--	--
	TP-105, S-2	07/15/2020	3	--	--	--	--
TP-106	TP-106, S-1	07/15/2020	1.5	--	--	--	--
	TP-106, S-2	07/15/2020	3	--	--	--	--
SP-DP-1	SP-DP-1-SB-0.5	04/11/2023	0.5	--	--	--	--
SP-DP-2	SP-DP-2-SB-0.5	04/11/2023	0.5	--	--	--	--
	SP-DP-2-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--
SP-DP-3	SP-DP-3-SB-0.5	04/11/2023	0.5	--	--	--	--
	SP-DP-3-SB-0.5-DUP	04/11/2023	0.5	--	--	--	--
	SP-DP-3-SB-2.5	04/11/2023	2.5	--	--	--	--
SP-DP-4	SP-DP-4-SB-0.5	09/19/2024	0.5	--	--	--	--
SP-DP-5	SP-DP-5-SB-0.4	09/19/2024	0.4	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (cont.) (mg/kg)			
				Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Preliminary EIC:[(a)]	1.1	0.0994	29	1.1
Slag Pile (cont.)							
SP-DP-6	SP-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--
	SP-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--
SP-DP-7	SP-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--
Tailings Pile							
TP-96	TP-96	07/15/2020	3	--	--	--	--
TP-97	TP-97	07/15/2020	3	--	--	--	--
TP-98	TP-98	07/15/2020	3	--	--	--	--
TP-99	TP-99	07/15/2020	3	--	--	--	--
TP-100	TP-100	07/15/2020	3	--	--	--	--
TP-101	TP-101	07/15/2020	3	--	--	--	--
TP-102	TP-102	07/15/2020	3	--	--	--	--
TP-103	TP-103	07/15/2020	3	--	--	--	--
Former Transformers							
HB6	HB6-S1	06/14/2004	0.5-1	--	--	--	--
HB8	HB8-S1	06/14/2004	0.5-1	0.1 U	0.1 U	0.1 U	0.1 U
TP11	TP11-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP12	TP12-S1	07/28/2006	0-2	0.05 U	0.05 U	0.09	0.13
HC-SS-4	HC-SS-4	08/10/2007	0-0.5	--	--	--	--
HC-SS-5	HC-SS-5	08/10/2007	0-0.5	--	--	--	--
HC-SS-6	HC-SS-6	08/10/2007	0-0.5	--	--	--	--
TF-DP-1	TF-DP-1-SB-1.0	04/12/2023	1	--	--	--	--
	TF-DP-1-SB-3.0	04/12/2023	3	--	--	--	--
TF-DP-2	TF-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--
	TF-DP-2-SB-2.5	04/12/2023	2.5	--	--	--	--
TF-DP-3	TF-DP-3-SB-0.5	09/19/2024	0.5	--	--	--	--
TF-DP-4	TF-DP-4-SB-0.4	09/19/2024	0.4	--	--	--	--
	TF-DP-4-SB-1.3	09/19/2024	1.3	--	--	--	--
TF-DP-5	TF-DP-5-SB-0.3	09/19/2024	0.3	--	--	--	--
TF-DP-6	TF-DP-6-SB-0.4	09/19/2024	0.4	--	--	--	--
TF-DP-8	TF-DP-8-SB-0.4	09/19/2024	0.4	--	--	--	--
TF-DP-9	TF-DP-9-SB-0.3	09/19/2024	0.3	--	--	--	--

Table 2
Initial Ecological Screening
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Location	Sample Name	Collection Date	Collection Depth (ft bgs)	PAHs (cont.) (mg/kg)			
				Indeno(1,2,3-cd)pyrene	Naphthalene	Phenanthrene	Pyrene
			Preliminary EIC:(a)	1.1	0.0994	29	1.1
Vehicle Maintenance							
HB1	HB1-S1	06/14/2004	0-0.5	0.1 U	0.1 U	0.1 U	0.1 U
TP10	TP10-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
TP8	TP8-S1(b)	07/28/2006	0-3	0.05 U	0.05 U	0.05 U	0.05 U
TP9	TP9-S1	07/28/2006	0-2	0.05 U	0.05 U	0.05 U	0.05 U
HC-SB-6	HC-SB-6-S1	08/09/2007	0-4	--	--	--	--
	HC-SB-6-S2	08/09/2007	4-8	--	--	--	--
HC-SS-13	HC-SS-13	08/10/2007	0-0.5	--	--	--	--
HC-SS-14	HC-SS-14	08/10/2007	0-0.5	--	--	--	--
HC-SS-15	HC-SS-15	08/10/2007	0-0.5	--	--	--	--
VM-DP-1	VM-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--
VM-DP-2	VM-DP-2-SB-0.5	04/12/2023	0.5	--	--	--	--
VM-DP-3	VM-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--
	VM-DP-3-SB-2.5	04/12/2023	2.5	--	--	--	--
VM-DP-4	VM-DP-4-SB-0.5	04/11/2023	0.5	--	--	--	--
VM-DP-5	VM-DP-5-SB-0.5	09/19/2024	0.5	--	--	--	--
VM-DP-6	VM-DP-6-SB-0.5	09/19/2024	0.5	--	--	--	--
	VM-DP-6-SB-0.5-DUP	09/19/2024	0.5	--	--	--	--
	VM-DP-6-SB-1.5	09/19/2024	1.5	--	--	--	--
VM-DP-7	VM-DP-7-SB-0.4	09/19/2024	0.4	--	--	--	--
Wetland							
HC-WS-1	HC-WS-1	08/10/2007	0-0.5	--	--	--	--
HC-WS-2	HC-WS-2	08/10/2007	0-0.5	--	--	--	--
HC-WS-3	HC-WS-3	08/10/2007	0-0.5	--	--	--	--
WL-DP-1	WL-DP-1-SB-0.5	04/12/2023	0.5	--	--	--	--
	WL-DP-1-SB-0.5-DUP	04/12/2023	0.5	--	--	--	--
WL-DP-2	WL-DP-2-SB-0.3	04/12/2023	0.3	--	--	--	--
WL-DP-3	WL-DP-3-SB-0.5	04/12/2023	0.5	--	--	--	--
WL-DP-4	WL-DP-4-SB-0.5	04/12/2023	0.5	--	--	--	--

Table 4
95 percent UCLs in Soil for CPECs
Roslyn No. 4 Mine Site, Roslyn, Washington
Forterra Roslyn, LLC

	Applicable EIC	Soil 95 percent UCL
Metals (mg/kg)		
Arsenic	20	20.6
Cadmium	14	1.35
Chromium	42	88.3
Copper	80	148
Lead	118	656
Mercury	0.1	1.80
Nickel	46	90.6
Zinc	160	638
TPH (mg/kg)		
Diesel- and oil-range hydrocarbons	260	641

Notes

bgs = below ground surface.

CPECs = chemicals of potential ecological concern.

EIC = ecological indicator concentration.

mg/kg = milligrams per kilogram.

NC = not calculated.

UCL = upper confidence limit.

Table 5
Areawide Depth Weighted Receptor Adjustment Evaluation
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Sample Depth (ft bgs)	Arsenic			Chromium		
	Average Arsenic Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Arsenic Concentration (mg/kg)	Average Chromium Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Chromium Concentration (mg/kg)
0 - 1	12.0	0.85	10.2	21.2	0.85	18.0
1 - 2	25.0	0.1	2.5	204.0	0.1	20.4
2 - 3	7.0	0.05	0.4	105.2	0.05	5.3
Areawide Depth Weighted Receptor Adjustment Concentration		**Arsenic:**	13.0		**Chromium:**	43.7

Table 5

Areawide Depth Weighted Receptor Adjustment Evaluation

Roslyn No. 4 Mine, Roslyn, Washington

Forterra Roslyn LLC

Sample Depth (ft bgs)	Copper			Lead		
	Average Copper Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Copper Concentration (mg/kg)	Average Lead Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Lead Concentration (mg/kg)
0 - 1	63.2	0.85	53.8	141.7	0.85	120.5
1 - 2	259.8	0.1	26.0	1,259.8	0.1	126.0
2 - 3	65.0	0.05	3.3	28.9	0.05	1.4
Areawide Depth Weighted Receptor Adjustment Concentration	**Copper:**		83.0	**Lead:**		248

Table 5
Areawide Depth Weighted Receptor Adjustment Evaluation
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Sample Depth (ft bgs)	Mercury			Nickel		
	Average Mercury Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Mercury Concentration (mg/kg)	Average Nickel Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Nickel Concentration (mg/kg)
0 - 1	0.83	0.85	0.71	48.9	0.85	41.6
1 - 2	0.34	0.1	0.03	110.6	0.1	11.1
2 - 3	0.13	0.05	0.01	62.2	0.05	3.1
Areawide Depth Weighted Receptor Adjustment Concentration		**Mercury:**	0.75		**Nickel:**	55.8

Table 5
Areawide Depth Weighted Receptor Adjustment Evaluation
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Sample Depth (ft bgs)	Zinc			Diesel-Range Hydrocarbons		
	Average Zinc Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Zinc Concentration (mg/kg)	Average Diesel Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Diesel Concentration (mg/kg)
0 - 1	233.1	0.85	198.1	88.5	0.85	75.3
1 - 2	932.1	0.1	93.2	140.0	0.1	14.0
2 - 3	62.9	0.05	3.1	108.1	0.05	5.4
Areawide Depth Weighted Receptor Adjustment Concentration		**Zinc:**	295		**Diesel-Range Hydrocarbons:**	94.7

Table 5
Areawide Depth Weighted Receptor Adjustment Evaluation
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Sample Depth (ft bgs)	Oil-Range Hydrocarbons		
	Average Heavy Oil Concentration (mg/kg)	Proportion of Receptor Found at Depth	Adjusted Heavy Oil Concentration (mg/kg)
0 - 1	276.7	0.85	235.2
1 - 2	125.0	0.1	12.5
2 - 3	272.3	0.05	13.6
Areawide Depth Weighted Receptor Adjustment Concentration	**Oil-Range Hydrocarbons:**		261

Table 5
Areawide Depth Weighted Receptor Adjustment Evaluation
Roslyn No. 4 Mine, Roslyn, Washington
Forterra Roslyn LLC

Notes

One half of the method detection limit were used for non-detects.

DWRA = depth-weighted receptor adjustment.

ft bgs = feet below ground surface.

mg/kg = milligrams per kilogram.

Attachment A

Priority Habitats and Species Report

MAUL
FOSTER
ALONGI

IPaC

U.S. Fish & Wildlife Service

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Kittitas County, Washington

Local office

Washington Fish And Wildlife Office

☎ (360) 753-9440
📠 (360) 753-9405

510 Desmond Drive Se, Suite 102
Lacey, WA 98503-1263

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Gray Wolf *Canis lupus* There is **final** critical habitat for this species. https://ecos.fws.gov/ecp/species/4488	Endangered
North American Wolverine *Gulo gulo luscus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5123	Threatened

Birds

NAME	STATUS
Mt. Rainier White-tailed Ptarmigan *Lagopus leucura rainierensis* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9234	Threatened
Northern Spotted Owl *Strix occidentalis caurina* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1123	Threatened
Yellow-billed Cuckoo *Coccyzus americanus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

Fishes

NAME	STATUS

Bull Trout *Salvelinus confluentus* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8212	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

You are still required to determine if your project(s) may have effects on all above listed species.

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Bald and Golden Eagle information is not available at this time

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Migratory bird information is not available at this time

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

FRESHWATER FORESTED/SHRUB WETLAND
    PFOC

RIVERINE
    R4SBC
    R5UBH

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

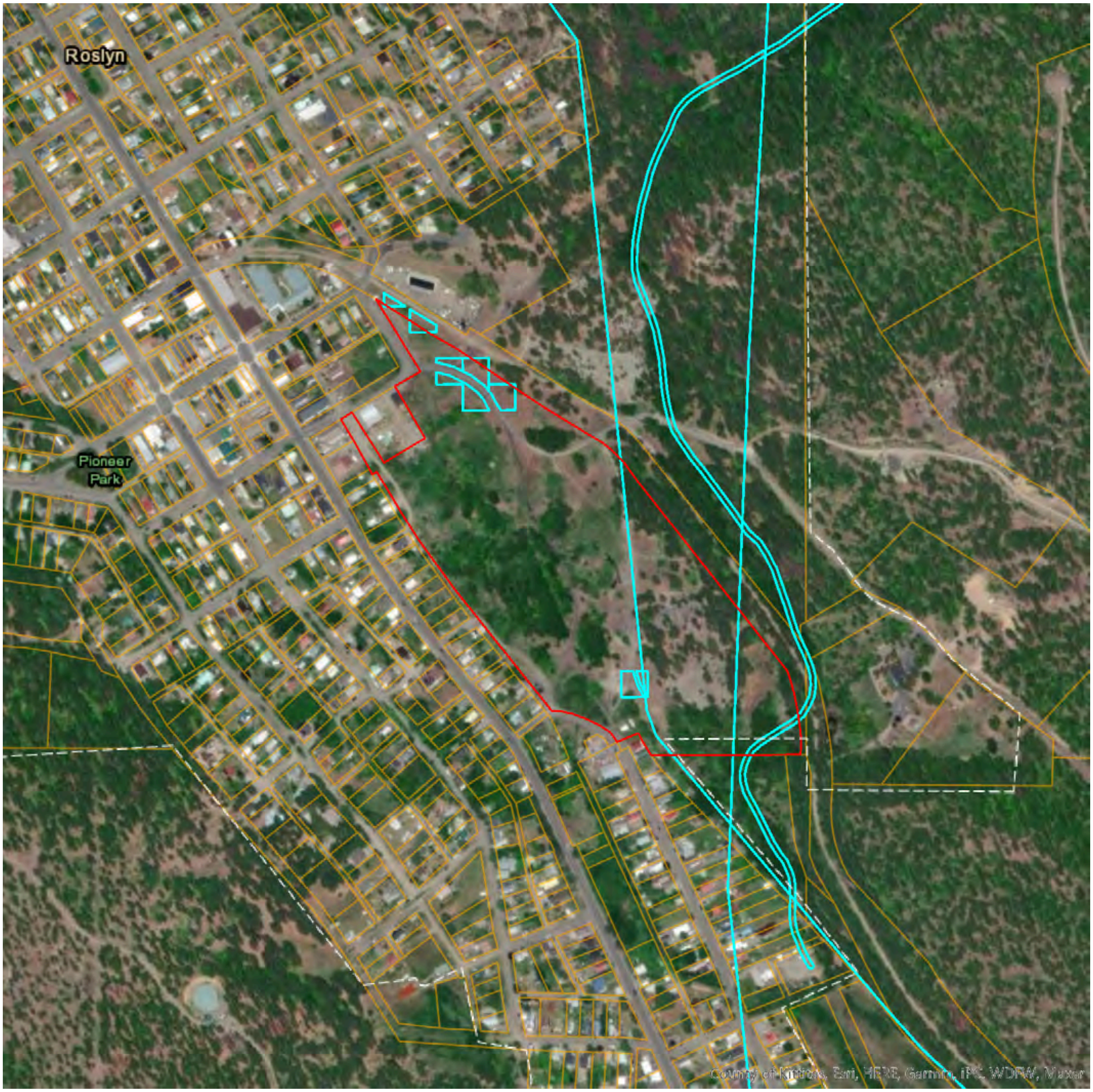
Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Priority Habitats and Species on the Web



Report Date: 10/29/2024, Parcel ID: 20-15-17042-0032

PHS Species/Habitats Overview:

Occurence Name	Federal Status	State Status	Sensitive Location
Elk	N/A	N/A	No
Biodiversity Areas And Corridor	N/A	N/A	No
Freshwater Forested/Shrub Wetland	N/A	N/A	No
Shrubsteppe	N/A	N/A	No
Northern Spotted Owl	Threatened	Endangered	Yes

PHS Species/Habitats Details:

Elk	
Scientific Name	*Cervus elaphus*
Priority Area	Regular Concentration
Site Name	DOMERIE FLATS ELK WINTER CONCENTRATION AREA
Accuracy	1/4 mile (Quarter Section)
Notes	ELK WINTER CONCENTRATION AREA, 100 PLUS ANIMALS USE AREA ALONG CLE ELUM RIVER BELOW CLE ELUM LAKE DAM. ANIMALS RANGE ON BOTH SIDES OF RIVER, CROSS BULLFROG RD AND USE CEMETARY & SCHOOL ATHLETIC FIELDS
Source Record	901287
Source Dataset	PHSREGION
Source Name	ROGERS, STEVE
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00614
Geometry Type	Polygons

Biodiversity Areas And Corridor	
Priority Area	Terrestrial Habitat
Site Name	BULLFROG FLATS CORRIDOR
Notes	Movement corridor for wildlife north to south between heavily developed areas.Also movement corridor for Beaver and Mule Deer from Washington WildlifeHabitat Connectivity analysis
Source Record	920517
Source Dataset	PHSREGION
Source Name	SCOTT DOWNES
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00023
Geometry Type	Polygons

Freshwater Forested/Shrub Wetland	
Priority Area	Aquatic Habitat
Site Name	N/A
Accuracy	NA
Notes	Wetland System: Freshwater Forested/Shrub Wetland - NWI Code: PFOC
Source Dataset	NWIWetlands
Source Name	Not Given
Source Entity	US Fish and Wildlife Service
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS Listed Occurrence
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
ManagementRecommendations	http://www.ecy.wa.gov/programs/sea/wetlands/bas/index.html
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Presumptive Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920870
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Presumptive Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920870
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Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Presumptive Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920870
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Presumptive Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920870
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Shrubsteppe	
Priority Area	Habitat Feature
Site Name	Kittitas County Shrubsteppe
Accuracy	NA
Notes	General location of Shrubsteppe. Confirm or refute with site-scale info. WDFW recommends using site-scale info to inform site-scale land use decisions. Expect that on-the-ground conditions (e.g., boundaries) will vary from the map.
Source Record	920871
Source Name	Keith Folkerts, WDFW
Source Entity	WA Dept. of Fish and Wildlife
Federal Status	N/A
State Status	N/A
PHS Listing Status	PHS LISTED OCCURRENCE
Sensitive	N
SGCN	N
Display Resolution	AS MAPPED
Geometry Type	Polygons

Northern Spotted Owl	
Scientific Name	*Strix occidentalis*
Notes	This polygon mask represents one or more records of the above species or habitat occurrence. Contact PHS Data Release at phsproducts@dfw.wa.gov for obtaining information about masked sensitive species and habitats.
Federal Status	Threatened
State Status	Endangered
PHS Listing Status	PHS Listed Occurrence
Sensitive	Y
SGCN	Y
Display Resolution	TOWNSHIP
ManagementRecommendations	http://wdfw.wa.gov/publications/pub.php?id=00026

DISCLAIMER. This report includes information that the Washington Department of Fish and Wildlife (WDFW) maintains in a central computer database. It is not an attempt to provide you with an official agency response as to the impacts of your project on fish and wildlife. This information only documents the location of fish and wildlife resources to the best of our knowledge. It is not a complete inventory and it is important to note that fish and wildlife resources may occur in areas not currently known to WDFW biologists, or in areas for which comprehensive surveys have not been conducted. Site specific surveys are frequently necesssary to rule out the presence of priority resources. Locations of fish and wildlife resources are subject to variation caused by disturbance, changes in season and weather, and other factors. WDFW does not recommend using reports more than six months old.

Attachment B

ProUCL Outputs

MAUL
FOSTER
ALONGI

```
                              UCL Statistics for Data Sets with Non-Detects

          User Selected Options
      Date/Time of Computation    ProUCL 5.2 11/26/2024 12:31:55 PM
                     From File    Tee_input.xls
                Full Precision    OFF
        Confidence Coefficient    95%
  Number of Bootstrap Operations  2000

Arsenic

                                        General Statistics
               Total Number of Observations   104          Number of Distinct Observations    69
                                                            Number of Missing Observations     7
                        Number of Detects      74                  Number of Non-Detects      30
               Number of Distinct Detects      67         Number of Distinct Non-Detects      8
                          Minimum Detect       1.82                  Minimum Non-Detect       1
                          Maximum Detect      150                    Maximum Non-Detect      20
                        Variance Detects      497.9                 Percent Non-Detects      28.85%
                            Mean Detects       15.59                        SD Detects       22.31
                          Median Detects        7.8                         CV Detects        1.431
                        Skewness Detects        3.912                 Kurtosis Detects       19.11
                    Mean of Logged Detects      2.236             SD of Logged Detects        0.926

                                    Normal GOF Test on Detects Only
               Shapiro Wilk Test Statistic      0.575       Normal GOF Test on Detected Observations Only
                 1% Shapiro Wilk P Value        0           Detected Data Not Normal at 1% Significance Level
                 Lilliefors Test Statistic      0.269                      Lilliefors GOF Test
              1% Lilliefors Critical Value      0.119       Detected Data Not Normal at 1% Significance Level
                            Detected Data Not Normal at 1% Significance Level

         Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs
                                 KM Mean       12.16               KM Standard Error of Mean      1.931
                                 90KM SD       19.51                     95% KM (BCA) UCL     16.15
                          95% KM (t) UCL       15.36       95% KM (Percentile Bootstrap) UCL     15.62
                          95% KM (z) UCL       15.33                95% KM Bootstrap t UCL     17.33
                    90% KM Chebyshev UCL       17.95                 95% KM Chebyshev UCL     20.57
                  97.5% KM Chebyshev UCL       24.22                 99% KM Chebyshev UCL     31.37

                             Gamma GOF Tests on Detected Observations Only
                       A-D Test Statistic       3.33                 Anderson-Darling GOF Test
                     5% A-D Critical Value      0.778    Detected Data Not Gamma Distributed at 5% Significance Level
                       K-S Test Statistic       0.205                 Kolmogorov-Smirnov GOF
                     5% K-S Critical Value      0.107    Detected Data Not Gamma Distributed at 5% Significance Level
                       Detected Data Not Gamma Distributed at 5% Significance Level

                                 Gamma Statistics on Detected Data Only
                             k hat (MLE)        1.116           k star (bias corrected MLE)      1.079
                         Theta hat (MLE)       13.97        Theta star (bias corrected MLE)     14.44
                            nu hat (MLE)      165.1                 nu star (bias corrected)    159.8
                          Mean (detects)       15.59

                               Gamma ROS Statistics using Imputed Non-Detects
            GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
     GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
                    For such situations, GROS method may yield incorrect values of UCLs and BTVs
                                 This is especially true when the sample size is small.
        For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates
                                 Minimum        0.01                                  Mean     11.62
                                 Maximum      150                                   Median      5.788
                                      SD       19.9                                     CV      1.713
                             k hat (MLE)        0.388           k star (bias corrected MLE)      0.383
                         Theta hat (MLE)       29.96        Theta star (bias corrected MLE)     30.34
                            nu hat (MLE)       80.64                nu star (bias corrected)     79.65
         Adjusted Level of Significance (β)     0.0477
       Approximate Chi Square Value (79.65, α)  60.08      Adjusted Chi Square Value (79.65, β)     59.85
```

95% Gamma Approximate UCL	15.4	95% Gamma Adjusted UCL	15.46

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	12.16	SD (KM)	19.51
Variance (KM)	380.7	SE of Mean (KM)	1.931
k hat (KM)	0.388	k star (KM)	0.384
nu hat (KM)	80.77	nu star (KM)	79.78
theta hat (KM)	31.31	theta star (KM)	31.7
80% gamma percentile (KM)	19.52	90% gamma percentile (KM)	34.59
95% gamma percentile (KM)	51.25	99% gamma percentile (KM)	93.33

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (79.78, α)	60.2	Adjusted Chi Square Value (79.78, β)	59.96
95% KM Approximate Gamma UCL	16.11	95% KM Adjusted Gamma UCL	16.18

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.948	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.00992	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.133	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0943	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	12.13	Mean in Log Scale	1.88
SD in Original Scale	19.61	SD in Log Scale	1.044
95% t UCL (assumes normality of ROS data)	15.32	95% Percentile Bootstrap UCL	15.5
95% BCA Bootstrap UCL	15.99	95% Bootstrap t UCL	16.86
95% H-UCL (Log ROS)	14.26		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.887	KM Geo Mean	6.601
KM SD (logged)	1.034	95% Critical H Value (KM-Log)	2.239
KM Standard Error of Mean (logged)	0.111	95% H-UCL (KM -Log)	14.16
KM SD (logged)	1.034	95% Critical H Value (KM-Log)	2.239
KM Standard Error of Mean (logged)	0.111		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	12.23	Mean in Log Scale	1.906
SD in Original Scale	19.57	SD in Log Scale	1.037
95% t UCL (Assumes normality)	15.41	95% H-Stat UCL	14.48

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	15.36

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Cadmium

General Statistics

Total Number of Observations	102	Number of Distinct Observations	38
		Number of Missing Observations	9
Number of Detects	39	Number of Non-Detects	63
Number of Distinct Detects	34	Number of Distinct Non-Detects	7
Minimum Detect	0.4	Minimum Non-Detect	0.2

Maximum Detect	15	Maximum Non-Detect	1
Variance Detects	8.372	Percent Non-Detects	61.76%
Mean Detects	2.583	SD Detects	2.893
Median Detects	1.4	CV Detects	1.12
Skewness Detects	2.504	Kurtosis Detects	8.148
Mean of Logged Detects	0.484	SD of Logged Detects	0.952

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.723	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.917	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.225	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.163	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	1.221	KM Standard Error of Mean	0.21
90KM SD	2.073	95% KM (BCA) UCL	1.583
95% KM (t) UCL	1.569	95% KM (Percentile Bootstrap) UCL	1.576
95% KM (z) UCL	1.566	95% KM Bootstrap t UCL	1.719
90% KM Chebyshev UCL	1.85	95% KM Chebyshev UCL	2.134
97.5% KM Chebyshev UCL	2.53	99% KM Chebyshev UCL	3.306

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.228	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.773	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.154	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.145	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.216	k star (bias corrected MLE)	1.139
Theta hat (MLE)	2.125	Theta star (bias corrected MLE)	2.267
nu hat (MLE)	94.81	nu star (bias corrected)	88.85
Mean (detects)	2.583		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.067
Maximum	15	Median	0.01
SD	2.156	CV	2.021
k hat (MLE)	0.299	k star (bias corrected MLE)	0.297
Theta hat (MLE)	3.566	Theta star (bias corrected MLE)	3.594
nu hat (MLE)	61.01	nu star (bias corrected)	60.55
Adjusted Level of Significance (β)	0.0476		
Approximate Chi Square Value (60.55, α)	43.65	Adjusted Chi Square Value (60.55, β)	43.45
95% Gamma Approximate UCL	1.479	95% Gamma Adjusted UCL	1.486

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.221	SD (KM)	2.073
Variance (KM)	4.296	SE of Mean (KM)	0.21
k hat (KM)	0.347	k star (KM)	0.343
nu hat (KM)	70.77	nu star (KM)	70.02
theta hat (KM)	3.519	theta star (KM)	3.557
80% gamma percentile (KM)	1.926	90% gamma percentile (KM)	3.536
95% gamma percentile (KM)	5.343	99% gamma percentile (KM)	9.966

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (70.02, α)	51.76	Adjusted Chi Square Value (70.02, β)	51.54
95% KM Approximate Gamma UCL	1.652	95% KM Adjusted Gamma UCL	1.659

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.94	**Shapiro Wilk GOF Test**

10% Shapiro Wilk Critical Value	0.948	Detected Data Not Lognormal at 10% Significance Level	
Lilliefors Test Statistic	0.148	**Lilliefors GOF Test**	
10% Lilliefors Critical Value	0.129	Detected Data Not Lognormal at 10% Significance Level	

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.194	Mean in Log Scale	-0.74
SD in Original Scale	2.1	SD in Log Scale	1.353
95% t UCL (assumes normality of ROS data)	1.54	95% Percentile Bootstrap UCL	1.556
95% BCA Bootstrap UCL	1.621	95% Bootstrap t UCL	1.643
95% H-UCL (Log ROS)	1.68		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.512	KM Geo Mean	0.599
KM SD (logged)	1.067	95% Critical H Value (KM-Log)	2.267
KM Standard Error of Mean (logged)	0.128	95% H-UCL (KM -Log)	1.346
KM SD (logged)	1.067	95% Critical H Value (KM-Log)	2.267
KM Standard Error of Mean (logged)	0.128		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.248	Mean in Log Scale	-0.402
SD in Original Scale	2.067	SD in Log Scale	0.988
95% t UCL (Assumes normality)	1.588	95% H-Stat UCL	1.353

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.569

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Chromium

General Statistics

Total Number of Observations	95	Number of Distinct Observations	76
		Number of Missing Observations	16
Minimum	2.9	Mean	43.25
Maximum	600	Median	20.2
SD	100.8	Std. Error of Mean	10.34
Coefficient of Variation	2.331	Skewness	4.79

Normal GOF Test

Shapiro Wilk Test Statistic	0.335	**Shapiro Wilk GOF Test**	
1% Shapiro Wilk P Value	0	Data Not Normal at 1% Significance Level	
Lilliefors Test Statistic	0.397	**Lilliefors GOF Test**	
1% Lilliefors Critical Value	0.105	Data Not Normal at 1% Significance Level	

Data Not Normal at 1% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	60.43	95% Adjusted-CLT UCL (Chen-1995)	65.69
		95% Modified-t UCL (Johnson-1978)	61.28

Gamma GOF Test

A-D Test Statistic	8.78	**Anderson-Darling Gamma GOF Test**	

5% A-D Critical Value	0.791	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.242	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.0952	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.826	k star (bias corrected MLE)	0.807
Theta hat (MLE)	52.38	Theta star (bias corrected MLE)	53.62
nu hat (MLE)	156.9	nu star (bias corrected)	153.3
MLE Mean (bias corrected)	43.25	MLE Sd (bias corrected)	48.16
		Approximate Chi Square Value (0.05)	125.7
Adjusted Level of Significance	0.0475	Adjusted Chi Square Value	125.3

Assuming Gamma Distribution

95% Approximate Gamma UCL	52.76	95% Adjusted Gamma UCL	52.92

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.903	**Shapiro Wilk Lognormal GOF Test**
10% Shapiro Wilk P Value	4.6537E-8	Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**
10% Lilliefors Critical Value	0.0834	Data Not Lognormal at 10% Significance Level

Data Not Lognormal at 10% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.065	Mean of logged Data	3.051
Maximum of Logged Data	6.397	SD of logged Data	0.951

Assuming Lognormal Distribution

95% H-UCL	41.25	90% Chebyshev (MVUE) UCL	44.41
95% Chebyshev (MVUE) UCL	49.58	97.5% Chebyshev (MVUE) UCL	56.76
99% Chebyshev (MVUE) UCL	70.85		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Nonparametric Distribution Free UCLs

95% CLT UCL	60.26	95% BCA Bootstrap UCL	66.73
95% Standard Bootstrap UCL	59.92	95% Bootstrap-t UCL	72.14
95% Hall's Bootstrap UCL	58.54	95% Percentile Bootstrap UCL	61.75
90% Chebyshev(Mean, Sd) UCL	74.28	95% Chebyshev(Mean, Sd) UCL	88.33
97.5% Chebyshev(Mean, Sd) UCL	107.8	99% Chebyshev(Mean, Sd) UCL	146.2

Suggested UCL to Use

95% Student's-t UCL	60.43

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Copper

General Statistics

Total Number of Observations	96	Number of Distinct Observations	79
		Number of Missing Observations	15
Number of Detects	85	Number of Non-Detects	11
Number of Distinct Detects	78	Number of Distinct Non-Detects	1
Minimum Detect	3.9	Minimum Non-Detect	1
Maximum Detect	700	Maximum Non-Detect	1
Variance Detects	10243	Percent Non-Detects	11.46%
Mean Detects	76.58	SD Detects	101.2
Median Detects	48.6	CV Detects	1.322

Skewness Detects	3.931	Kurtosis Detects	19.14
Mean of Logged Detects	3.884	SD of Logged Detects	0.911

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.586	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.259	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.111	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	67.92	KM Standard Error of Mean	10.03
90KM SD	97.68	95% KM (BCA) UCL	85.25
95% KM (t) UCL	84.58	95% KM (Percentile Bootstrap) UCL	85.07
95% KM (z) UCL	84.41	95% KM Bootstrap t UCL	91.97
90% KM Chebyshev UCL	98	95% KM Chebyshev UCL	111.6
97.5% KM Chebyshev UCL	130.5	99% KM Chebyshev UCL	167.7

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.592	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.777	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.167	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0993	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.24	k star (bias corrected MLE)	1.204
Theta hat (MLE)	61.76	Theta star (bias corrected MLE)	63.6
nu hat (MLE)	210.8	nu star (bias corrected)	204.7
Mean (detects)	76.58		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	67.8
Maximum	700	Median	41.6
SD	98.28	CV	1.449
k hat (MLE)	0.488	k star (bias corrected MLE)	0.48
Theta hat (MLE)	138.9	Theta star (bias corrected MLE)	141.3
nu hat (MLE)	93.75	nu star (bias corrected)	92.16
Adjusted Level of Significance (β)	0.0475		
Approximate Chi Square Value (92.16, α)	71.02	Adjusted Chi Square Value (92.16, β)	70.74
95% Gamma Approximate UCL	87.98	95% Gamma Adjusted UCL	88.33

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	67.92	SD (KM)	97.68
Variance (KM)	9542	SE of Mean (KM)	10.03
k hat (KM)	0.483	k star (KM)	0.475
nu hat (KM)	92.81	nu star (KM)	91.25
theta hat (KM)	140.5	theta star (KM)	142.9
80% gamma percentile (KM)	111.3	90% gamma percentile (KM)	185.7
95% gamma percentile (KM)	265.7	99% gamma percentile (KM)	463.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (91.25, α)	70.22	Adjusted Chi Square Value (91.25, β)	69.94
95% KM Approximate Gamma UCL	88.25	95% KM Adjusted Gamma UCL	88.61

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.983	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	0.726	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0938	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0881	Detected Data Not Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	68.55	Mean in Log Scale	3.647
SD in Original Scale	97.78	SD in Log Scale	1.089
95% t UCL (assumes normality of ROS data)	85.13	95% Percentile Bootstrap UCL	85.46
95% BCA Bootstrap UCL	88.26	95% Bootstrap t UCL	92.38
95% H-UCL (Log ROS)	90.16		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.439	KM Geo Mean	31.15
KM SD (logged)	1.502	95% Critical H Value (KM-Log)	2.794
KM Standard Error of Mean (logged)	0.154	95% H-UCL (KM -Log)	148
KM SD (logged)	1.502	95% Critical H Value (KM-Log)	2.794
KM Standard Error of Mean (logged)	0.154		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	67.86	Mean in Log Scale	3.359
SD in Original Scale	98.24	SD in Log Scale	1.697
95% t UCL (Assumes normality)	84.51	95% H-Stat UCL	205.9

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	148

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Lead

General Statistics

Total Number of Observations	102	Number of Distinct Observations	86
		Number of Missing Observations	9
Number of Detects	101	Number of Non-Detects	1
Number of Distinct Detects	85	Number of Distinct Non-Detects	1
Minimum Detect	4	Minimum Non-Detect	5.3
Maximum Detect	9700	Maximum Non-Detect	5.3
Variance Detects	1032121	Percent Non-Detects	0.98%
Mean Detects	221.8	SD Detects	1016
Median Detects	34	CV Detects	4.58
Skewness Detects	8.476	Kurtosis Detects	77.77
Mean of Logged Detects	3.695	SD of Logged Detects	1.473

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.221	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.419	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.102	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	219.7	KM Standard Error of Mean	100.1
90KM SD	1006	95% KM (BCA) UCL	404.8
95% KM (t) UCL	385.9	95% KM (Percentile Bootstrap) UCL	404.6
95% KM (z) UCL	384.4	95% KM Bootstrap t UCL	786.3
90% KM Chebyshev UCL	520	95% KM Chebyshev UCL	656.1
97.5% KM Chebyshev UCL	844.9	99% KM Chebyshev UCL	1216

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	10.74	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.846	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.253	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0957	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.388	k star (bias corrected MLE)	0.383
Theta hat (MLE)	572.4	Theta star (bias corrected MLE)	579.8
nu hat (MLE)	78.28	nu star (bias corrected)	77.29
Mean (detects)	221.8		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	219.6
Maximum	9700	Median	33.85
SD	1011	CV	4.604
k hat (MLE)	0.374	k star (bias corrected MLE)	0.37
Theta hat (MLE)	587.2	Theta star (bias corrected MLE)	594.3
nu hat (MLE)	76.31	nu star (bias corrected)	75.4
Adjusted Level of Significance (β)	0.0476		
Approximate Chi Square Value (75.40, α)	56.4	Adjusted Chi Square Value (75.40, β)	56.16
95% Gamma Approximate UCL	293.6	95% Gamma Adjusted UCL	294.9

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	219.7	SD (KM)	1006
Variance (KM)	1012341	SE of Mean (KM)	100.1
k hat (KM)	0.0477	k star (KM)	0.0528
nu hat (KM)	9.725	nu star (KM)	10.77
theta hat (KM)	4608	theta star (KM)	4160
80% gamma percentile (KM)	35.91	90% gamma percentile (KM)	359.1
95% gamma percentile (KM)	1190	99% gamma percentile (KM)	4675

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (10.77, α)	4.43	Adjusted Chi Square Value (10.77, β)	4.372
95% KM Approximate Gamma UCL	534.2	95% KM Adjusted Gamma UCL	541.3

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.933	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	4.1448E-5	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.0753	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0809	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Approximate Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	219.7	Mean in Log Scale	3.663
SD in Original Scale	1011	SD in Log Scale	1.501
95% t UCL (assumes normality of ROS data)	385.9	95% Percentile Bootstrap UCL	408.6
95% BCA Bootstrap UCL	509.1	95% Bootstrap t UCL	751.6
95% H-UCL (Log ROS)	180.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.673	KM Geo Mean	39.39
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.686
KM Standard Error of Mean (logged)	0.147	95% H-UCL (KM -Log)	173.2
KM SD (logged)	1.474	95% Critical H Value (KM-Log)	2.686
KM Standard Error of Mean (logged)	0.147		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	219.7	Mean in Log Scale	3.668
SD in Original Scale	1011	SD in Log Scale	1.49
95% t UCL (Assumes normality)	385.9	95% H-Stat UCL	177.6

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 10% Significance Level

Suggested UCL to Use

KM H-UCL	173.2

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Mercury

General Statistics

Total Number of Observations	96	Number of Distinct Observations	26
		Number of Missing Observations	15
Number of Detects	29	Number of Non-Detects	67
Number of Distinct Detects	21	Number of Distinct Non-Detects	7
Minimum Detect	0.04	Minimum Non-Detect	0.04
Maximum Detect	22.9	Maximum Non-Detect	1
Variance Detects	20.31	Percent Non-Detects	69.79%
Mean Detects	1.869	SD Detects	4.507
Median Detects	0.16	CV Detects	2.411
Skewness Detects	3.981	Kurtosis Detects	17.84
Mean of Logged Detects	-1.226	SD of Logged Detects	1.882

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.462	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.898	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.342	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.189	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	0.634	KM Standard Error of Mean	0.267
90KM SD	2.568	95% KM (BCA) UCL	1.14
95% KM (t) UCL	1.078	95% KM (Percentile Bootstrap) UCL	1.109
95% KM (z) UCL	1.073	95% KM Bootstrap t UCL	1.739
90% KM Chebyshev UCL	1.435	95% KM Chebyshev UCL	1.798
97.5% KM Chebyshev UCL	2.302	99% KM Chebyshev UCL	3.291

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.661	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.842	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.284	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.175	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.361	k star (bias corrected MLE)	0.347
Theta hat (MLE)	5.173	Theta star (bias corrected MLE)	5.388
nu hat (MLE)	20.96	nu star (bias corrected)	20.12
Mean (detects)	1.869		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.725
Maximum	22.9	Median	0.01
SD	2.607	CV	3.597
k hat (MLE)	0.264	k star (bias corrected MLE)	0.263
Theta hat (MLE)	2.741	Theta star (bias corrected MLE)	2.755
nu hat (MLE)	50.78	nu star (bias corrected)	50.53
Adjusted Level of Significance (β)	0.0475		
Approximate Chi Square Value (50.53, α)	35.2	Adjusted Chi Square Value (50.53, β)	35.01
95% Gamma Approximate UCL	1.04	95% Gamma Adjusted UCL	1.046

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.634	SD (KM)	2.568
Variance (KM)	6.592	SE of Mean (KM)	0.267
k hat (KM)	0.061	k star (KM)	0.066
nu hat (KM)	11.7	nu star (KM)	12.67
theta hat (KM)	10.4	theta star (KM)	9.605
80% gamma percentile (KM)	0.197	90% gamma percentile (KM)	1.303
95% gamma percentile (KM)	3.617	99% gamma percentile (KM)	12.27

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (12.67, α)	5.672	Adjusted Chi Square Value (12.67, β)	5.601
95% KM Approximate Gamma UCL	1.416	95% KM Adjusted Gamma UCL	1.434

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.937	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.212	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.148	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.66	Mean in Log Scale	-2.391
SD in Original Scale	2.579	SD in Log Scale	1.785
95% t UCL (assumes normality of ROS data)	1.097	95% Percentile Bootstrap UCL	1.129
95% BCA Bootstrap UCL	1.305	95% Bootstrap t UCL	1.728
95% H-UCL (Log ROS)	0.8		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.181	KM Geo Mean	0.113
KM SD (logged)	1.316	95% Critical H Value (KM-Log)	2.582
KM Standard Error of Mean (logged)	0.168	95% H-UCL (KM -Log)	0.38
KM SD (logged)	1.316	95% Critical H Value (KM-Log)	2.582
KM Standard Error of Mean (logged)	0.168		

Note: KM UCLs may be biased low with this dataset. Other substitution method recommended

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.812	Mean in Log Scale	-1.254
SD in Original Scale	2.549	SD in Log Scale	1.233
95% t UCL (Assumes normality)	1.244	95% H-Stat UCL	0.836

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	1.078

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Nickel

General Statistics

Total Number of Observations	96	Number of Distinct Observations	71
		Number of Missing Observations	15
Number of Detects	93	Number of Non-Detects	3
Number of Distinct Detects	70	Number of Distinct Non-Detects	1
Minimum Detect	5.8	Minimum Non-Detect	0.5
Maximum Detect	601	Maximum Non-Detect	0.5
Variance Detects	8054	Percent Non-Detects	3.125%
Mean Detects	52.69	SD Detects	89.74
Median Detects	26.2	CV Detects	1.703
Skewness Detects	4.406	Kurtosis Detects	21.72
Mean of Logged Detects	3.422	SD of Logged Detects	0.892

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.467	**Normal GOF Test on Detected Observations Only**
1% Shapiro Wilk P Value	0	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.106	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	51.06	KM Standard Error of Mean	9.063
90KM SD	88.32	95% KM (BCA) UCL	67.88
95% KM (t) UCL	66.11	95% KM (Percentile Bootstrap) UCL	66.67
95% KM (z) UCL	65.97	95% KM Bootstrap t UCL	76.8
90% KM Chebyshev UCL	78.25	95% KM Chebyshev UCL	90.56
97.5% KM Chebyshev UCL	107.7	99% KM Chebyshev UCL	141.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	6.659	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.782	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.231	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.0954	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.057	k star (bias corrected MLE)	1.03
Theta hat (MLE)	49.83	Theta star (bias corrected MLE)	51.13
nu hat (MLE)	196.7	nu star (bias corrected)	191.7
Mean (detects)	52.69		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	51.04
Maximum	601	Median	25.2
SD	88.79	CV	1.74
k hat (MLE)	0.782	k star (bias corrected MLE)	0.764
Theta hat (MLE)	65.29	Theta star (bias corrected MLE)	66.79
nu hat (MLE)	150.1	nu star (bias corrected)	146.7
Adjusted Level of Significance (β)	0.0475		
Approximate Chi Square Value (146.74, α)	119.7	Adjusted Chi Square Value (146.74, β)	119.4
95% Gamma Approximate UCL	62.55	95% Gamma Adjusted UCL	62.75

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	51.06	SD (KM)	88.32

Variance (KM)	7800	SE of Mean (KM)	9.063
k hat (KM)	0.334	k star (KM)	0.331
nu hat (KM)	64.17	nu star (KM)	63.5
theta hat (KM)	152.8	theta star (KM)	154.4
80% gamma percentile (KM)	80.01	90% gamma percentile (KM)	148.7
95% gamma percentile (KM)	226.3	99% gamma percentile (KM)	425.5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (63.50, α)	46.17	Adjusted Chi Square Value (63.50, β)	45.94
95% KM Approximate Gamma UCL	70.23	95% KM Adjusted Gamma UCL	70.57

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Approximate Test Statistic	0.922	**Shapiro Wilk GOF Test**
10% Shapiro Wilk P Value	7.3853E-6	Detected Data Not Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.136	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.0843	Detected Data Not Lognormal at 10% Significance Level

Detected Data Not Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	51.16	Mean in Log Scale	3.355
SD in Original Scale	88.73	SD in Log Scale	0.955
95% t UCL (assumes normality of ROS data)	66.2	95% Percentile Bootstrap UCL	66.79
95% BCA Bootstrap UCL	70.16	95% Bootstrap t UCL	74.52
95% H-UCL (Log ROS)	56.13		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.293	KM Geo Mean	26.94
KM SD (logged)	1.129	95% Critical H Value (KM-Log)	2.381
KM Standard Error of Mean (logged)	0.116	95% H-UCL (KM -Log)	67.13
KM SD (logged)	1.129	95% Critical H Value (KM-Log)	2.381
KM Standard Error of Mean (logged)	0.116		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	51.05	Mean in Log Scale	3.272
SD in Original Scale	88.79	SD in Log Scale	1.215
95% t UCL (Assumes normality)	66.1	95% H-Stat UCL	75.1

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution

Suggested UCL to Use

95% KM (t) UCL	66.11

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Zinc

General Statistics

Total Number of Observations	98	Number of Distinct Observations	83
		Number of Missing Observations	13
Minimum	2.2	Mean	240.6
Maximum	7800	Median	67.85
SD	903.1	Std. Error of Mean	91.23
Coefficient of Variation	3.754	Skewness	7.082

Normal GOF Test

```
           Shapiro Wilk Test Statistic    0.247                   Shapiro Wilk GOF Test
          1% Shapiro Wilk P Value    0                   Data Not Normal at 1% Significance Level
            Lilliefors Test Statistic    0.424                     Lilliefors GOF Test
         1% Lilliefors Critical Value    0.104               Data Not Normal at 1% Significance Level
                              Data Not Normal at 1% Significance Level

                                   Assuming Normal Distribution
          95% Normal UCL                                       95% UCLs (Adjusted for Skewness)
                95% Student's-t UCL    392.1                    95% Adjusted-CLT UCL (Chen-1995)    460.4
                                                                95% Modified-t UCL (Johnson-1978)    403

                                          Gamma GOF Test
                   A-D Test Statistic    11.5                  Anderson-Darling Gamma GOF Test
                  5% A-D Critical Value    0.816        Data Not Gamma Distributed at 5% Significance Level
                   K-S Test Statistic    0.259                Kolmogorov-Smirnov Gamma GOF Test
                  5% K-S Critical Value    0.0955        Data Not Gamma Distributed at 5% Significance Level
                         Data Not Gamma Distributed at 5% Significance Level

                                         Gamma Statistics
                          k hat (MLE)    0.521                             k star (bias corrected MLE)    0.511
                      Theta hat (MLE)    462.1                          Theta star (bias corrected MLE)    470.3
                         nu hat (MLE)    102                                  nu star (bias corrected)    100.3
             MLE Mean (bias corrected)    240.6                                 MLE Sd (bias corrected)    336.4
                                                                   Approximate Chi Square Value (0.05)    78.15
          Adjusted Level of Significance    0.0476                               Adjusted Chi Square Value    77.86

                                   Assuming Gamma Distribution
            95% Approximate Gamma UCL    308.6                                 95% Adjusted Gamma UCL    309.8

                                        Lognormal GOF Test
           Shapiro Wilk Test Statistic    0.918                Shapiro Wilk Lognormal GOF Test
          10% Shapiro Wilk P Value  1.1981E-6         Data Not Lognormal at 10% Significance Level
            Lilliefors Test Statistic    0.14                   Lilliefors Lognormal GOF Test
         10% Lilliefors Critical Value    0.0821          Data Not Lognormal at 10% Significance Level
                            Data Not Lognormal at 10% Significance Level

                                       Lognormal Statistics
              Minimum of Logged Data    0.788                                       Mean of logged Data    4.271
              Maximum of Logged Data    8.962                                         SD of logged Data    1.249

                                  Assuming Lognormal Distribution
                          95% H-UCL    214.6                              90% Chebyshev (MVUE) UCL    228.9
            95% Chebyshev (MVUE) UCL    262.9                           97.5% Chebyshev (MVUE) UCL    310.1
            99% Chebyshev (MVUE) UCL    402.8

                           Nonparametric Distribution Free UCL Statistics
                             Data do not follow a Discernible Distribution

                                Nonparametric Distribution Free UCLs
                        95% CLT UCL    390.6                                    95% BCA Bootstrap UCL    520.8
             95% Standard Bootstrap UCL    391.5                                  95% Bootstrap-t UCL    887.1
               95% Hall's Bootstrap UCL    898.7                          95% Percentile Bootstrap UCL    405.7
           90% Chebyshev(Mean, Sd) UCL    514.3                         95% Chebyshev(Mean, Sd) UCL    638.2
         97.5% Chebyshev(Mean, Sd) UCL    810.3                         99% Chebyshev(Mean, Sd) UCL    1148

                                        Suggested UCL to Use
                95% Student's-t UCL    392.1

        The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
                            Please verify the data were collected from random locations.
                        If the data were collected using judgmental or other non-random methods,
                              then contact a statistician to correctly calculate UCLs.

      Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
        Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
    However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.
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DRO

General Statistics

Total Number of Observations	30	Number of Distinct Observations	16
		Number of Missing Observations	60
Number of Detects	14	Number of Non-Detects	16
Number of Distinct Detects	13	Number of Distinct Non-Detects	3
Minimum Detect	29	Minimum Non-Detect	20
Maximum Detect	370	Maximum Non-Detect	50
Variance Detects	8366	Percent Non-Detects	53.33%
Mean Detects	141.3	SD Detects	91.47
Median Detects	125	CV Detects	0.647
Skewness Detects	1.179	Kurtosis Detects	1.718
Mean of Logged Detects	4.746	SD of Logged Detects	0.696

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.917	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.825	Detected Data appear Normal at 1% Significance Level
Lilliefors Test Statistic	0.149	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.263	Detected Data appear Normal at 1% Significance Level

Detected Data appear Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	76.68	KM Standard Error of Mean	16.17
90KM SD	85.34	95% KM (BCA) UCL	106.6
95% KM (t) UCL	104.2	95% KM (Percentile Bootstrap) UCL	105.1
95% KM (z) UCL	103.3	95% KM Bootstrap t UCL	111.4
90% KM Chebyshev UCL	125.2	95% KM Chebyshev UCL	147.2
97.5% KM Chebyshev UCL	177.7	99% KM Chebyshev UCL	237.6

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.118	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0864	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.231	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	2.597	k star (bias corrected MLE)	2.088
Theta hat (MLE)	54.42	Theta star (bias corrected MLE)	67.68
nu hat (MLE)	72.71	nu star (bias corrected)	58.46
Mean (detects)	141.3		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	66.66
Maximum	370	Median	10.56
SD	93.83	CV	1.408
k hat (MLE)	0.187	k star (bias corrected MLE)	0.19
Theta hat (MLE)	357.2	Theta star (bias corrected MLE)	350.5
nu hat (MLE)	11.2	nu star (bias corrected)	11.41
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (11.41, α)	4.842	Adjusted Chi Square Value (11.41, β)	4.596
95% Gamma Approximate UCL	157.1	95% Gamma Adjusted UCL	165.5

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	76.68	SD (KM)	85.34
Variance (KM)	7283	SE of Mean (KM)	16.17
k hat (KM)	0.807	k star (KM)	0.749
nu hat (KM)	48.44	nu star (KM)	44.93
theta hat (KM)	94.98	theta star (KM)	102.4

80% gamma percentile (KM)	125.7	90% gamma percentile (KM)	189.4
95% gamma percentile (KM)	254.7	99% gamma percentile (KM)	409.7

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (44.93, α)	30.55	Adjusted Chi Square Value (44.93, β)	29.87
95% KM Approximate Gamma UCL	112.8	95% KM Adjusted Gamma UCL	115.3

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.982	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.895	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.208	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	76.25	Mean in Log Scale	3.704
SD in Original Scale	87.4	SD in Log Scale	1.19
95% t UCL (assumes normality of ROS data)	103.4	95% Percentile Bootstrap UCL	104.7
95% BCA Bootstrap UCL	107.5	95% Bootstrap t UCL	112.5
95% H-UCL (Log ROS)	150.6		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.815	KM Geo Mean	45.37
KM SD (logged)	0.985	95% Critical H Value (KM-Log)	2.459
KM Standard Error of Mean (logged)	0.187	95% H-UCL (KM -Log)	115.6
KM SD (logged)	0.985	95% Critical H Value (KM-Log)	2.459
KM Standard Error of Mean (logged)	0.187		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	71.9	Mean in Log Scale	3.484
SD in Original Scale	90.11	SD in Log Scale	1.3
95% t UCL (Assumes normality)	99.85	95% H-Stat UCL	151.7

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL	104.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ORO

General Statistics

Total Number of Observations	30	Number of Distinct Observations	14
		Number of Missing Observations	60
Number of Detects	15	Number of Non-Detects	15
Number of Distinct Detects	13	Number of Distinct Non-Detects	2
Minimum Detect	69	Minimum Non-Detect	50
Maximum Detect	2100	Maximum Non-Detect	250
Variance Detects	281932	Percent Non-Detects	50%
Mean Detects	495.5	SD Detects	531
Median Detects	320	CV Detects	1.072
Skewness Detects	2.221	Kurtosis Detects	5.674
Mean of Logged Detects	5.765	SD of Logged Detects	0.977

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.738	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.835	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.297	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.255	Detected Data Not Normal at 1% Significance Level

Detected Data Not Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	275	KM Standard Error of Mean	80.34
90KM SD	424.8	95% KM (BCA) UCL	412.7
95% KM (t) UCL	411.5	95% KM (Percentile Bootstrap) UCL	408.6
95% KM (z) UCL	407.1	95% KM Bootstrap t UCL	498
90% KM Chebyshev UCL	516	95% KM Chebyshev UCL	625.2
97.5% KM Chebyshev UCL	776.7	99% KM Chebyshev UCL	1074

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.403	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.196	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.227	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.277	k star (bias corrected MLE)	1.066
Theta hat (MLE)	388.1	Theta star (bias corrected MLE)	464.9
nu hat (MLE)	38.3	nu star (bias corrected)	31.98
Mean (detects)	495.5		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	247.8
Maximum	2100	Median	34.51
SD	446.8	CV	1.803
k hat (MLE)	0.155	k star (bias corrected MLE)	0.162
Theta hat (MLE)	1598	Theta star (bias corrected MLE)	1531
nu hat (MLE)	9.304	nu star (bias corrected)	9.707
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (9.71, α)	3.76	Adjusted Chi Square Value (9.71, β)	3.548
95% Gamma Approximate UCL	639.7	95% Gamma Adjusted UCL	677.9

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	275	SD (KM)	424.8
Variance (KM)	180458	SE of Mean (KM)	80.34
k hat (KM)	0.419	k star (KM)	0.399
nu hat (KM)	25.14	nu star (KM)	23.96
theta hat (KM)	656.2	theta star (KM)	688.6
80% gamma percentile (KM)	443.7	90% gamma percentile (KM)	777
95% gamma percentile (KM)	1143	99% gamma percentile (KM)	2064

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (23.96, α)	13.82	Adjusted Chi Square Value (23.96, β)	13.37
95% KM Approximate Gamma UCL	476.8	95% KM Adjusted Gamma UCL	492.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.901	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.202	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	264.2	Mean in Log Scale	4.482
SD in Original Scale	437.9	SD in Log Scale	1.589
95% t UCL (assumes normality of ROS data)	400	95% Percentile Bootstrap UCL	404.2
95% BCA Bootstrap UCL	441.9	95% Bootstrap t UCL	508.3
95% H-UCL (Log ROS)	826.4		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	4.863	KM Geo Mean	129.4
KM SD (logged)	1.134	95% Critical H Value (KM-Log)	2.65
KM Standard Error of Mean (logged)	0.216	95% H-UCL (KM -Log)	429.8
KM SD (logged)	1.134	95% Critical H Value (KM-Log)	2.65
KM Standard Error of Mean (logged)	0.216		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	270.3	Mean in Log Scale	4.653
SD in Original Scale	435.2	SD in Log Scale	1.398
95% t UCL (Assumes normality)	405.3	95% H-Stat UCL	610.3

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	492.7	95% GROS Adjusted Gamma UCL	677.9

The calculated UCLs are based on assumptions that the data were collected in a random and unbiased manner.
Please verify the data were collected from random locations.
If the data were collected using judgmental or other non-random methods,
then contact a statistician to correctly calculate UCLs.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

DRO+ORO

General Statistics

Total Number of Observations	30	Number of Distinct Observations	19
		Number of Missing Observations	60
Number of Detects	17	Number of Non-Detects	13
Number of Distinct Detects	17	Number of Distinct Non-Detects	2
Minimum Detect	83	Minimum Non-Detect	50
Maximum Detect	2100	Maximum Non-Detect	250
Variance Detects	264878	Percent Non-Detects	43.33%
Mean Detects	570.6	SD Detects	514.7
Median Detects	370	CV Detects	0.902
Skewness Detects	1.865	Kurtosis Detects	4
Mean of Logged Detects	6.001	SD of Logged Detects	0.878

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.81	**Shapiro Wilk GOF Test**
1% Shapiro Wilk Critical Value	0.851	Detected Data Not Normal at 1% Significance Level
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**
1% Lilliefors Critical Value	0.241	Detected Data appear Normal at 1% Significance Level

Detected Data appear Approximate Normal at 1% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

KM Mean	346.1	KM Standard Error of Mean	85.72
90KM SD	455.4	95% KM (BCA) UCL	491.4
95% KM (t) UCL	491.8	95% KM (Percentile Bootstrap) UCL	491.3
95% KM (z) UCL	487.1	95% KM Bootstrap t UCL	545
90% KM Chebyshev UCL	603.3	95% KM Chebyshev UCL	719.8
97.5% KM Chebyshev UCL	881.5	99% KM Chebyshev UCL	1199

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.231	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.123	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.213	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.594	k star (bias corrected MLE)	1.352
Theta hat (MLE)	357.9	Theta star (bias corrected MLE)	422
nu hat (MLE)	54.21	nu star (bias corrected)	45.98
Mean (detects)	570.6		

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	323.4
Maximum	2100	Median	124
SD	478.4	CV	1.479
k hat (MLE)	0.172	k star (bias corrected MLE)	0.177
Theta hat (MLE)	1878	Theta star (bias corrected MLE)	1825
nu hat (MLE)	10.33	nu star (bias corrected)	10.63
Adjusted Level of Significance (β)	0.041		
Approximate Chi Square Value (10.63, α)	4.34	Adjusted Chi Square Value (10.63, β)	4.11
95% Gamma Approximate UCL	792.1	95% Gamma Adjusted UCL	836.5

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	346.1	SD (KM)	455.4
Variance (KM)	207354	SE of Mean (KM)	85.72
k hat (KM)	0.578	k star (KM)	0.542
nu hat (KM)	34.66	nu star (KM)	32.53
theta hat (KM)	599.1	theta star (KM)	638.4
80% gamma percentile (KM)	569.9	90% gamma percentile (KM)	920.5
95% gamma percentile (KM)	1292	99% gamma percentile (KM)	2197

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (32.53, α)	20.49	Adjusted Chi Square Value (32.53, β)	19.94
95% KM Approximate Gamma UCL	549.4	95% KM Adjusted Gamma UCL	564.6

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**
10% Shapiro Wilk Critical Value	0.91	Detected Data appear Lognormal at 10% Significance Level
Lilliefors Test Statistic	0.084	**Lilliefors GOF Test**
10% Lilliefors Critical Value	0.19	Detected Data appear Lognormal at 10% Significance Level

Detected Data appear Lognormal at 10% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	345.7	Mean in Log Scale	5.028
SD in Original Scale	463.6	SD in Log Scale	1.382
95% t UCL (assumes normality of ROS data)	489.5	95% Percentile Bootstrap UCL	494.6
95% BCA Bootstrap UCL	527.8	95% Bootstrap t UCL	566.3
95% H-UCL (Log ROS)	854.6		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	5.107	KM Geo Mean	165.1
KM SD (logged)	1.213	95% Critical H Value (KM-Log)	2.756
KM Standard Error of Mean (logged)	0.229	95% H-UCL (KM -Log)	640.8
KM SD (logged)	1.213	95% Critical H Value (KM-Log)	2.756
KM Standard Error of Mean (logged)	0.229		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	337.5	Mean in Log Scale	4.849
SD in Original Scale	469	SD in Log Scale	1.518
95% t UCL (Assumes normality)	483	95% H-Stat UCL	992.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 1% Significance Level

Suggested UCL to Use

95% KM (t) UCL 491.8

When a data set follows an approximate distribution passing only one of the GOF tests,
it is suggested to use a UCL based upon a distribution passing both GOF tests in ProUCL

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Attachment C

Field Photographs

MAUL
FOSTER
ALONGI

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 1.

Description

Foundry Slag Pile A transect area, looking south from FSA-1.

Photo No. 2.

Description

Foundry Slag Pile A transect area, looking south toward FSA-10.

Photo No. 3.

Description

Plant survey at FSA-1. Wetland area with mature willow trees. Groundcover consists of reed canary grass, snowberry bush, and low vegetation. Deer trails observed nearby.

Photo No. 4.

Description

Plant survey at FSA-5. Groundcover consists of taller reed canary grass, snowberry bush, red osier dogwood and low vegetation. Mature willow trees nearby.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 5.

Description

Mature willow trees at FSA-5.

Photo No. 6.

Description

Soil at FSA-10. Grass and weed roots observed in upper 3 inches.

Photo No. 7.

Description

Soil at FSA-10. Brown, dry, compacted, sandy silty soil. Soil biota were observed, including worms, ants, and spiders. Representative earthworm pictured.

Photo No. 8.

Description

Minor debris and trash observed near FSA-6.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 9.

Description

Foundry Slag Pile B transect area, looking east from FSB-10.

Photo No. 10.

Description

Foundry Slag Pile B transect area, looking east toward FSB-1.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 11.

Description

Soil at FSB-1. Grass, perennial sweet pea, and tansy roots observed in upper 6 inches.

Photo No. 12.

Description

Soil at FSB-1. Dark brown, dry, sandy soil. Coal fragments, pieces of bricks, and rubble debris observed in the soil. Soil biota were observed, including an earthworm.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 13.

Description

Representative earthworm observed at FSB-1.

Photo No. 14.

Description

Plant survey at FSB-5. Groundcover consists of tansy, reed canary grass, and mature red osier dogwood. Mature willow and cottonwood trees nearby.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 15.

Description

Mature willow and cottonwood trees at FSB-5.

Photo No. 16.

Description

Deer scat observed near FSB-1.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 17.

Description

Vehicle Maintenance transect area, looking southwest from VM-1.

Photo No. 18.

Description

Vehicle Maintenance transect area, looking northwest toward VM-10.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 19.

Description

Soil at VM-5. Reed canary grass and snowberry roots were observed in upper 2 inches.

Photo No. 20.

Description

Soil at VM-5. Brown, dry, sandy soil with gravel and brick debris. Soil biota were observed, including an unidentified small jumping insect.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 21.

Description

Plant survey at VM-5. Groundcover consists of Reed canary grass and snowberry. Mature willow trees and red osier dogwood nearby.

Photo No. 22.

Description

Plant survey at VM-10. Groundcover consists of Reed canary grass, snowberry, and unidentified wildflowers. Mature willow trees and red osier dogwood nearby.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 23.

Description

Background transect area, looking northwest from BG-1.

Photo No. 24.

Description

Background transect area, looking southeast from BG-10.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 25.

Description

Soil at BG-1. Reed canary grass and tansy roots were observed in upper 3 to 6 inches.

Photo No. 26.

Description

Gray, dry, sandy soil at BG-1. Soil biota were observed, including ants and an unidentified insect larva. Representative insect larva pictured.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 27.

Description

Plant survey at BG-5. Groundcover consists of Tansy, reed canary grass, and snowberry. Mature ponderosa pine nearby.

Photo No. 28.

Description

Mature ponderosa pine near BG-5.

Photo No. 29.

Description

Plant survey at BG-10. Groundcover consists of Tansy, reed canary grass, red osier dogwood, and snowberry. Red alder observed nearby.

Photo No. 30.

Description

Soil at BG-10. Tansy, reed canary grass, and snowberry roots were observed in upper 3 inches.

Photo No. 31.

Description

Dry, sandy soil at BG-10. Soil biota were observed, including a pill bug and a small beetle.

Photo No. 32.

Description

Representative beetle observed at BG-10.

Photographs

Project Name: Roslyn No. 4 Mine Terrestrial Ecological Evaluation
Project Number: M1122.05.006
Location: Roslyn, Washington

Photo No. 33.

Description

Bear scat observed near BG-1.