Phase II Environmental Assessment Report for the Panhandle Smelting and Refining Company, Ponderay, ID

Final

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Prepared by:
Alta Science & Engineering, Inc.
988 S. Longmont Avenue, Suite 200
Boise, Idaho 83706
208-336-7080
alta-se.com

Alta
Science & Engineering, Inc.

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Acronyms and Abbreviations

ABCA	Analysis of Brownfields Cleanup Alternatives
Alta	Alta Science & Engineering, Inc.
APN	Assessor Parcel Number
As	Arsenic
ASTM	ASTM International
bgs	below ground surface
BNSF	Burlington Northern and Santa Fe
Ca	Calcium
Cd	Cadmium
Cl-	Chloride
COPC	chemicals of potential concern
DQO	data quality objective
DO	dissolved oxygen
DU	decision unit
ESA	Environmental Site Assessment
Hg	Mercury
IDEQ	Idaho Department of Environmental Quality
ISM	Incremental Sampling Method
ITRC	Interstate Technology and Regulatory Council
K	Potassium
MCL	maximum contaminant level
MEND	mine environmental neutral drainage
Mg	Magnesium
MS	matrix spike
MSD	matrix spike duplicate
Na	Sodium
ORP	oxygen reduction potential
Pace	Pace Analytical National
Pb	Lead
PSRC	Panhandle Smelting and Refining Company
QA	quality assurance
QC	quality control
QAO	quality assurance officer
QAPP	Quality Assurance Project Plan
REC	recognized environmental condition
RL	reporting limit
ROW	right-of-way
RSL	Regional Screening Level
SO_4	Sulfate
SPLP	synthetic precipitation leachate procedure

SVL	SVL Analytical
TerraGraphics	TerraGraphics Environmental Engineering, Inc.
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WSP	WSP USA Inc.
Zn	Zinc

Units

L	liter
mg/kg	milligram per kilogram
mg/L	milligram per liter
mm	millimeter
µm	micrometer

Executive Summary

In September 2019, the City of Ponderay entered into a Brownfields Multipurpose Cooperative Agreement with the U.S. Environmental Protection Agency (USEPA) to clean up the former Panhandle Smelting and Refining Company (PSRC) (the Site).

The PSRC was developed in 1904 as a lead (Pb)/silver smelter for local mines and operated sporadically until 1909. Not much evidence of previous activities remains at the Site today, except for a few remnants of the smelter operations, ore and waste piles, and a large slag dump that extends from the shoreline into Lake Pend Oreille (Figure 1).

Because of past smelting activities, the Site soils contains high levels of Pb and other metals that present potential impacts to human health (e.g., Site users) and the environment.

In preparation for cleanup of the PSRC, the City contracted with Alta Science & Engineering, Inc. (Alta) to address existing data gaps associated with 1) metals concentrations in beach sediments near the slag pile, 2) the potential for metals to leach and/or mobilize from slag material into Lake Pend Oreille, and 3) the geotechnical characteristics of soil in the footprint of a proposed onsite waste repository.

On March 1, 2023, Alta collected Site-specific information to fill existing data gaps identified from previous assessment review and inform the cleanup approach and design of the Site. This document summarizes field activities and analytical data collected and provides conclusions and recommendations for the Site.

Assessment activities included:

1) **Incremental Sampling Method (ISM)** sampling for beach sediments in the vicinity of the slag pile,

2) **Slag characterization sampling** to evaluate the leaching of metals from non-crushed and crushed slag material (Synthetic Precipitation Leachate Procedure [SPLP] tests and wall wash samples collected from the slag face), and

3) **Soil geotechnical characterization sampling** (particle size testing and Atterberg limits) in the footprint of the proposed onsite waste repository.

ISM samples were collected from the beach area surrounding the slag pile for analysis of Pb, cadmium (Cd), zinc (Zn), arsenic (As), and mercury (Hg) to delineate metals concentrations in this previously unsampled area of the Site.

Slag samples were collected from the surface or slope faces of the slag pile and subjected to SPLP analysis on crushed and non-crushed slag material to evaluate the slag leaching potential. The leachate was then analyzed for Pb, Cd, Zn, As, and Hg.

Wall wash samples were collected from the slag face following procedures developed by the Mine Environmental Neutral Drainage (MEND) program and one (1) surface water sample was collected from lake water that was located outside of the project Site boundaries for use as the wall wash lixiviant. Wall wash samples were analyzed for pH, major ions (calcium [Ca], magnesium [Mg], potassium [K], sodium [Na], sulfate [SO_4], chloride [Cl-]), total alkalinity, and total and dissolved metals (Pb, Cd, Zn, As, and Hg) to evaluate the geochemical characteristics of the slag material. Surface water samples were analyzed for total and dissolved metals (Pb, Cd, Zn, As, and Hg) to establish baseline metals concentrations in surface water prior to wall washing.

Three test pits were excavated in the proposed onsite waste repository footprint to collect geotechnical samples and evaluate the degree of saturation and general conditions in the

shallow subsurface. An archaeological monitor was onsite during the assessment to identify and document any cultural artifacts unearthed during test pit excavation. Geotechnical samples were collected from the test pits for particle size determination (particle size testing) and Atterberg limits.

ISM sample results for metals were compared to USEPA's Resident Soil Table Regional Screening Levels (RSLs) (USEPA 2022) and U.S. Geological Survey (USGS) background values for Bonner County (USGS 2016). ISM sample results will be used to guide remedial actions at the Site.

During cleanup design, Slag SPLP, wall wash, and surface water sample results will be used to evaluate fate and mobility of metals from the slag material to surface water and geotechnical data will be used to evaluate the suitability of the ground surface for the waste repository foundation.

ISM Soil Sampling Results

Alta collected three (3) ISM samples (and one duplicate sample) from the beach area surrounding the slag pile. Arsenic was detected at concentrations that exceed the USEPA RSL for Resident Soil but did not exceed mean USGS background values for Bonner County. No other metals were detected at concentrations that exceed the USEPA RSLs or mean background values.

Table 1 summarizes the ISM results (expressed in milligrams per kilogram [mg/kg]). Figure 2 shows ISM sampling locations.

Slag SPLP Sampling Results

Alta collected three (3) slag pile samples from the surface or slope faces of the slag pile for SPLP analysis to evaluate the leaching behavior of slag material. Prior to analysis, each sample was split into two equal portions. One portion was crushed to pass through a 9.5-millimeter (mm) screen and the other portion was left uncrushed. SPLP leachate for both crushed and uncrushed samples was then analyzed for Pb, Cd, Zn, As, and Hg.

Arsenic, Pb, and Zn were detected in SPLP leachate from the three uncrushed slag samples while lead only was detected in SPLP leachate from the three crushed slag samples.

Table 2 summarizes SPLP metals results for crushed and uncrushed slag samples (expressed in milligrams per liter [mg/L]). Figure 2 shows slag sample locations.

Surface Water and Wall Wash Sampling Results

Alta collected one (1) surface water sample (and one duplicate sample) from lake water that was located outside of the project Site boundaries and was not in contact with the slag pile in order to establish baseline metals concentrations in surface water used as the lixiviant for the wall wash samples. Arsenic and Zn were the only metals detected above the reporting limits in surface water samples.

Alta collected three (3) wall wash samples from the slag face. Wall wash samples were collected following procedures developed by the Mine Environmental Neutral Drainage (MEND) program.

Metals concentrations in wall wash samples were compared to metals concentrations in the surface water sample. Except for Hg, all metals were detected in wall wash samples at concentrations at least an order of magnitude above those in the baseline surface water samples. Total and dissolved As concentrations in wall wash samples were 1 to 2 orders of magnitude greater than concentrations in the surface waters sample and total and dissolved Pb and Zn were several orders of magnitude greater than concentrations in surface water samples.

Table 3 summarizes the wall wash analytical results (expressed in mg/L). Figure 2 shows surface water and wall wash sampling locations.

Geotechnical Sampling Results

Alta collected five (5) samples from three test pits excavated by backhoe or excavator in the proposed onsite waste repository footprint, which encompasses RL1, RL2, RL3, RO1, RO2 and RO3 (Figure 2).

Geotechnical results will be used to develop design criteria for the waste repository and discussed in more detail in a subsequent technical memorandum.

Conclusions and Recommendations

Based on the available information and Site-specific data collected, Alta concludes the following:

- No metals were detected in ISM sediment samples at concentrations that exceed the USEPA RSLs and mean background values. Arsenic was not detected in any sediment sample; however, the reporting limit for As (3.00 mg/kg) exceeds the Resident Soil RSLs (0.68 mg/kg). Therefore, As may be present at the Site at concentrations greater than the RSL but below the mean background value of 5.68 mg/kg for Bonner County. Arsenic concentrations in ISM sediment samples are comparable to concentrations in composite soil samples collected near the slag pile in 2012.
- Slag characterization samples including Slag SPLP and wall wash samples suggest that metals have the potential to leach or mobilize from slag material to nearby surface water. Slag SPLP samples had detections of As, Pb, and Zn and wall wash samples had detections of total and dissolved As, Cd, Pb, and Zn in wall wash samples at concentrations orders of magnitude greater than surface water used for wall wash samples.

Alta recommends the following:

- Conduct additional surface water sampling in summer when the lake is in contact with the slag pile to further evaluate the potential for metals to leach/mobilize from slag material to Lake Pend Oreille.
- Use available slag characterization data (SPLP and wall wash sample results) to complete a geochemical evaluation of the slag material with recommendations on the potential need to contain or isolate the slag pile from storm and surface water.
- Include the 2023 ISM sediment results and existing Site characterization data from previous assessments to develop Site-specific cleanup criteria and evaluate and identify cleanup alternatives for the PSRC.

Section 1 Introduction

In September 2019, the City of Ponderay entered into a Brownfields Multipurpose Cooperative Agreement with the U.S. Environmental Protection Agency (USEPA) to clean up the former Panhandle Smelting and Refining Company (PSRC) (the Site). Because of past smelting activities, the Site soils contain high levels of lead (Pb) and other metals that present potential impacts to human health (e.g., Site users) and the environment.

In preparation for cleanup of the PSRC, the City contracted with Alta Science & Engineering, Inc. (Alta) to address existing data gaps associated with 1) metals concentrations in beach sediments near the slag pile, 2) the potential for metals to leach and/or mobilize from slag material into Lake Pend Oreille, and 3) the geotechnical characteristics of soil in the footprint of a proposed onsite waste repository.

1.1 Site History

The former PSRC is located in the City of Ponderay and sits along the shoreline of Lake Pend Oreille (Figure 1). The Burlington Northern Santa Fe (BNSF) right of way (ROW) borders the Site to the northwest with vacant forested land surrounds to the southwest and northeast and the lake serving as a boundary to the southeast. The Site consists of five (5) parcels totaling 18.13 acres and is generally located in the Southeast Quarter of Section 11, Township 57 North, Range 2 West, Boise Meridian, Bonner County, within the City of Ponderay, Idaho. The five individual parcel descriptions are:

- Bonner County, Idaho, Assessor Parcel Number (APN) RPP00000118252A, the area of this parcel is 11.2 acres.
- Bonner County, Idaho APN RPP00000117850A, the area of this parcel is 1.65 acres.
- Bonner County, Idaho APN RPP00000118150A, the area of this parcel is 1.04 acres.
- Bonner County, Idaho APN RPP00000118275A, the area of this parcel is 0.89 acres.
- Bonner County, Idaho APN RPP00000117800A, the area of this parcel is 3.35 acres.

The PSRC was developed in 1904 as a Pb/silver smelter for local mines and the first ingots were poured June 12, 1907. Production continued until legal action stopped the smelter in July 1907. After a retrofit with roasters and other equipment, the smelter started back up on October 20, 1908, and ran sporadically through March 1909. Salvage crews dismantled the plant and scrapped all salvageable materials in December 1922. Not much evidence of previous activities remains at the Site today, except for remnants of the smelter operations, ore and waste piles, and a large slag dump that extends out into the lake.

Because of past smelting activities, the soil in this area contains high levels of Pb and other metals. Mine wastes at the Site present potential human health impacts to Site users and potential environmental impacts to Lake Pend Oreille. Potential human health and potential impacts to the environment are associated with metals contamination of soils, unprocessed ore, and smelter slag (IDEQ 2009).

Section 2 Previous Site Assessment

Numerous site assessments have been completed for the PSRC. In July and August 2010, URS Corporation (URS) conducted a Phase I Environmental Site Assessment (ESA) of the PSRC (URS 2011) for Idaho Department of Environmental Quality (IDEQ). The Phase I ESA identified several recognized environmental conditions (RECs) in connection with the Site including: 1) a

portion of a BNSF (ROW), which has been operating for more than 100 years, with potential of having released hazardous substances and petroleum products, residual coal ash, and the railroad tie preservatives; 2) the former PSRC facility, which received and refined Pb and silver ores from local mines, and consists of the remnants of a furnace, three roasters, two smoke stacks, an assay and metal sample room, a few ore piles and a slag dump which is located on the Lake Pend Oreille shoreline; and 3) the Delco Dump, a dump area in the southwestern portion of the Site where a large number of discarded automotive generators and a few Pb-acid battery parts were found by the U.S. Army Corps of Engineers (USACE) in 1996.

IDEQ contracted with TerraGraphics Environmental Engineering, Inc. (TerraGraphics) to complete Phase II ESA soil and slag sampling in November 2011 (TerraGraphics 2012a). The Phase II ESA addressed select RECs and associated chemicals of potential concern (COPCs) identified in the Phase I ESA (URS 2011). Soil sampling conducted during the Phase II ESA was limited to areas where RECs had been identified, areas proposed for trail development, and areas frequently accessed by the public. At the time of the Phase II site assessment, IDEQ did not have an access agreement with the BNSF and Montana Rail Link, and as a result, no sampling was conducted on the BNSF ROW. Figure 2 shows the Phase II ESA sample units and approximate locations of historic Site structures.

The results from the Phase II ESA and the Risk Assessment (TerraGraphics 2012a) identified several COPCs: arsenic (As), cadmium (Cd), Pb, mercury (Hg), and zinc (Zn). The Phase II ESA determined that soil contamination was generally greatest at the PSRC in areas associated with ore stockpiling, processing, or smelting during smelter operations. The highest Pb and As concentrations (Pb: 77,100 milligrams per kilogram [mg/kg], As: 2,610 mg/kg) were observed at a depth of 1 to 6 inches in sample unit RO2, which consisted of three mounds that were the remnants of ore roasters. High Pb and As concentrations were also observed in sample units OR1, RL1, TR5, and LA3, which were all likely previously used as stockpile areas for ore. Lead and As concentrations were also elevated where the smelter blast furnace had been located (FU1, FU2) (TerraGraphics 2012a).

Test pit sample results indicated that Cd, Pb, Hg, and Zn concentrations were generally highest within the 0-to-6 inch and 6-to-12-inch horizons; concentrations below 12 inches were much lower. Arsenic concentrations did not show a consistent pattern with depth. Differences in As concentration profiles may be related to differences in soil or waste characteristics between sample units that affect As mobility within the soil (TerraGraphics 2012a).

Surface water, groundwater, seep water, and beach sediment sampling were not completed during the November 2011 Phase II field sampling event.

In April 2012, IDEQ contracted with Strata to sample five seeps emanating from the PSRC and vicinity. One seep that emerges below the Pend d'Oreille Bay Trail and the PSRC had a Cd concentration slightly above the Maximum Contaminant Level (MCL). An original/split sample pair was collected from this seep and Cd concentrations exceeded the MCL in the split sample only. The report noted that this could be explained by entrained sediment that settled at the bottom of the split sample (Strata 2012).

In December 2012, TerraGraphics characterized the waste piles and groundwater at the PSRC and summarized the results in a Site Investigation Report (TerraGraphics 2012b). This report provided: 1) geotechnical and environmental data to characterize slag, mine waste, and contaminated and native soils, 2) groundwater monitoring data, 3) topographic data, and 4) volume estimates of slag, ore, mine waste, and contaminated soils at the PSRC.

Groundwater samples were collected in 2012 from three monitoring wells (MW-1, MW-2, and MW-3) (Figure 2). MW-1 was the only well with a metal detection above the maximum contaminant level with a total Pb concentration of 0.0179 milligrams per liter (mg/L).

Following completion of the Phase II ESA and waste pile and groundwater investigations, IDEQ engaged TerraGraphics to develop an Analysis of Brownfield Cleanup Alternatives (ABCA) and Cleanup Workplan for the PSRC. The Draft ABCA and Cleanup Workplan (completed in 2013) provided a preferred alternative for the PSRC that includes: 1) the construction of an onsite waste repository to dispose of contaminated soils exceeding Site cleanup levels and onsite disposal criteria, 2) the encapsulation of the slag pile, a retaining wall system, and concrete deck and 3) the capping and/or fencing of soils that exceed Site cleanup levels and are not suitable for disposal in an onsite waste repository (TerraGraphics 2013).

In September 2019, the City of Ponderay entered into a Brownfields Multipurpose Cooperative Agreement with the USEPA for $840,000 total project funds for a five-year project period of October 1, 2019 to September 30, 2024. These funds will be used to conduct Phase I and Phase II ESAs, develop an area-wide plan, and clean up the former PSRC Site.

The purpose of the additional assessment performed in March 2023 was for Alta to conduct environmental assessment activities to address existing data gaps. Assessment activities included 1) Incremental Sampling Method (ISM) sampling for beach sediments in the vicinity of the slag pile, 2) slag characterization sampling to evaluate the leaching of metals from non-crushed and crushed slag material (Synthetic Precipitation Leachate Procedure [SPLP] tests and wall wash samples collected from the slag face), and 3) soil geotechnical characterization sampling (particle size testing and Atterberg limits).

This report describes Site assessment activities and field observations, summarizes analytical sample results, and provides conclusions and recommendations.

Section 3 Field Activities

The following sections describe the field sampling activities that occurred during Site assessment.

Appendix A includes sampling field sheets.

Appendix B includes photographs taken during the sampling activities.

Appendix C includes the complete laboratory data sheets and chain-of-custody documentation.

Appendix D includes the Site-specific QA/QC Memorandum.

Appendix E includes Geotechnical results (e.g., Particle size determination [particle size testing] and Atterberg limits) and test pit soil logs.

Appendix F includes the Archaeological Monitoring report.

3.1 Quality Assurance Project Plan Deviations

In general, sampling procedures followed the *Quality Assurance Project Plan [QAPP] for the Panhandle Smelting and Refining Company, Ponderay, Idaho* (Alta 2023) except for the following deviations:

- Alta's field crew did not collect ISM samples from the BNSF ROW because the cleanup footprint will not impact the ROW and BNSF did not grant access to the property.

- Alta submitted ISM and slag samples to SVL Analytical (SVL) for analysis instead of Pace National Laboratory (Pace) because Pace could not sieve the ISM samples nor crush the slag samples to the required fraction.
- Alta's field crew did not collect surface water samples from lake water in contact with the slag pile because the lake water level was too low.
- Surface water samples were not analyzed for pH, major ions (calcium [Ca], magnesium [Mg], potassium [K], sodium [Na], sulfate [SO_4], chloride [Cl-]), or total alkalinity.

3.2 Sediment Sampling

Alta conducted ISM sampling on sediments from the beach area surrounding the slag pile on March 1, 2023. The area between the lake (winter pool level) and previously sampled beach areas (BE1, BE2, and BE3) was divided into three decision units (DUs) (DU1, DU2, and DU3). Figure 2 shows the previously sampled beach areas and newly sampled DUs.

Alta determined subsample locations using the "random sampling in grid" approach described in Section 4.3.2 of ISM guidance (ITRC 2020). Each DU was divided into a grid pattern and subsamples were obtained from a random location within each grid cell.

Alta's field crew collected three (3) ISM samples (created from 30 subsamples within each DU). Field staff collected the ISM samples from the surface to a maximum depth of 6 inches below ground surface (bgs). Because the soil was frozen at all locations, field staff used a mine bar to break apart frozen soils at each subsample location and then used a stainless-steel trowel to scoop frozen soil chips into the sample container. The mine bar was decontaminated between each DU according to the decontamination procedure outlined in the QAPP Section 9.2 (Alta 2023). Field crews placed the soil from each DU into a 1-gallon Ziploc® bag and then double bagged the sample. At the time of sampling, the collected sediments were frozen, so samples were first thawed indoors and then homogenized by mixing the sediments thoroughly by hand while wearing single use, nitrile gloves.

Alta placed all ISM samples in a cooler kept in chilled conditions immediately after collection and held under chain-of-custody for shipment. ISM soil samples were sent to SVL for preparation following ITRC guidance and analysis for Total Metals (including Pb, Cd, Zn, As, and Hg) by USEPA Method 6020 and by Method 7471A for mercury (USEPA 2007 and 1994a, respectively). Samples were dried and sieved through a -80 (180 micrometer [µm]) mesh sieve at the laboratory prior to analysis.

3.3 Slag Characterization Sampling

3.3.1 Slag SPLP Sampling

Alta conducted slag sampling on March 1, 2023. The field staff collected slag samples from the slag face using a rock hammer to break small pieces from the consolidated slag surface into a plastic bag. Field personnel collected rock chips from a vertical channel adjacent to the wall wash area, approximately 1 foot to the left of the wall wash area for each location. The sampling tool was decontaminated between sampling locations according to the decontamination procedure outlined in the QAPP Section 9.2 (Alta 2023).

Alta collected three (3) samples from the surface of the slag pile (corresponding with each wall wash location) for SPLP analysis to evaluate the leaching behavior of slag material.

Alta placed all slag samples in a cooler kept in chilled conditions immediately after collection and held under chain-of-custody for shipment. Slag samples were sent to SVL for sample preparation prior to SPLP analysis by USEPA Method 1312 (USEPA 1994b). SVL split each

slag sample into two equal portions and then crushed one portion to pass through a 9.5 millimeter (mm) screen and left the other portion uncrushed. Both crushed and uncrushed samples were analyzed for Pb, Cd, Zn, As, and Hg by SPLP.

3.3.2 Wall Wash Sampling

Alta conducted wall wash and surface water sampling on March 1, 2023. Three (3) wall wash samples (plus one equipment blank) were collected from the slag face for analysis of pH, major ions (Ca, Mg, K, Na, SO_4, Cl-), total alkalinity, and total and dissolved metals (Pb, Cd, Zn, As, and Hg). Wall wash samples were completed using lake water collected outside of the Site boundaries and followed procedures developed by the Mine Environmental Neutral Drainage (MEND) program.

For each sample, field staff located a relatively flat surface of slag measuring no greater than 1 meter by 1 meter and installed flexible plastic sheeting along the bottom limb using silicone caulking to affix plastic sheeting to the rock face. The plastic sheeting was installed so that it could be held up such that all water caught on it was captured for sample collection. At least 1 liter (L) of lake water (collected at least 100 feet from the project Site) was poured over the slag surface and allowed to drain off to collect on the plastic sheeting and then transferred to laboratory-supplied sample bottles. The volume of water applied to the slag and the volume of water recovered was recorded. Samples for dissolved analytes were field filtered by collecting rinse water onto a single-use 0.45 µm Nalgene filter, using a hand vacuum-pump to process water through the filter, and then transferring the filtered sample into sample containers. Unfiltered samples for total analytes were transferred directly into a sample container.

The wall wash equipment blank was collected by rinsing a blank sheet of the wall wash plastic and caulk with the lake surface water in the same manner as the wall wash samples.

One (1) surface water sample (plus one duplicate, one field blank, and one rinsate blank) was collected from the lake from the same location that surface water was obtained for wall wash sampling. Surface water sample results are considered baseline and used for comparison to wall wash sample results.

Surface water samples were collected using the dip sampling method from the *Techniques of Water-Resources Investigations (TWRI), Book 9, Chapter A4, Collection of Water Samples* (USGS 2006).

Field staff used a decontaminated non-metallic grab sampler to collect the sample. During sample collection, field staff opened a hole in the ice and collected samples from the hole, taking care to avoid collecting particulates that could be re-suspended from the lake bottom. Samples were mixed in a churn splitter. Similar to wall wash samples, samples for dissolved analytes were field filtered by collecting rinse water in a single-use 0.45 µm Nalgene filter, using a hand vacuum-pump to process water through the filter, and then transferring the filtered sample into sample containers. Unfiltered samples for total analytes were transferred directly into a sample container.

Water quality parameters including specific conductance, temperature, pH, dissolved oxygen (DO), oxygen reduction potential (ORP), and turbidity were measured using a multi-parameter water quality probe immediately after the sample was collected. Water quality parameters for surface water samples are included in Appendix A.

Alta placed all surface water and wall wash samples in a cooler kept in chilled conditions immediately after collection and held under chain-of-custody for shipment. Wall wash samples were sent to Pace for analysis of pH by SM 4500-H+B (SMO 2018a), major ions (Ca, Mg, K and Na by USEPA 6020 [USEPA 2007] and SO_4 and Cl- by USEPA 300.0 [USEPA 1993]), total

alkalinity by SM 2320 B (SMO 2018b), and total and dissolved metals (Pb, Cd, Zn, As, and Hg) by USEPA Methods 6020 (USEPA 2007) and 7470 (USEPA 1994c). Surface water samples were submitted for analysis of total and dissolved metals (Pb, Cd, Zn, As, and Hg) by USEPA Methods 6020 (USEPA 2007) and 7470 (USEPA 1994c) and hardness by USEPA 130.1 (USEPA 1971).

3.4 Geotechnical Sampling

Alta conducted geotechnical sampling on March 1, 2023. The field technician collected one sample from a representative lithology of excavated soil from each test pit for geotechnical analyses.

At least one 5-gallon bucket was collected per geotechnical sample in order to meet the laboratory's sample volume requirements. Material greater than 4 inches in diameter was removed, to a practical extent, prior to placing the sample in the sample container. Due to soil composition, it was determined that one 5-gallon bucket per sample was sufficient in quantity to submit for analysis.

Alta collected five (5) samples from three test pits excavated by excavator in the footprint of the proposed onsite waste repository. Samples were collected from each vertical change in lithology. Following sample collection, remaining excavated soils were returned to the test pit. Figure 2 shows test pit locations.

Geotechnical samples were held under chain-of-custody for shipment to WSP's geotechnical laboratory for particle size determination (particle size testing) and Atterberg limits.

Sample photographs can be found in Appendix B.

Section 4 Data Quality Assurance Evaluation

Section 5.0 of the QAPP outlines the data quality objectives (DQOs) and criteria (Alta 2023). Alta's project Quality Assurance Officer (QAO) reviewed field documentation, results of field and laboratory Quality Assurance/Quality Control (QA/QC) samples, and data reported by the laboratory to ensure that the data had been recorded, transmitted, and processed correctly, and to determine that DQOs were met. Appendix C includes the Analytical Laboratory Results and Chain of Custody Documentation and Appendix D includes the Site-specific QA/QC Memorandum which provides a summary of the data validation and data quality assessment performed by Alta.

4.1 Data Accuracy and Precision

Based on this data quality review, Alta determines the laboratory and field data to be of acceptable quality except for the qualifications that are discussed below.

4.1.1 Accuracy

Alta's QAO qualified the following data based on accuracy results (laboratory control spike or matrix spike [MS]):

- Total and dissolved As, and total and dissolved Zn are qualified as estimated (J) in samples PSRC-SW-1 and PSRC-SW-1-FD due to the MS analysis not sourced from the Site.
- Dissolved Zn in sample PSRC-SW-1-RB is qualified as estimated (J) due to the MS analysis not sourced from the Site.

- All results in PSRC-SW-1, PSRC-SW-1-FD, PSRC-SW-1-FB, and PSRC-SW-1-RB that are below the method detection limit are qualified as estimated (UJ) due to the MS analysis not sourced from the Site.
- Total Zn in sample PSRC-SL-1 (sieved) will be qualified as estimated with a low bias (J-) based on a low MS/MS Duplicate (MSD) %R.

4.1.2 Precision

Alta's QAO will qualify the following data based on precision results (MSD or field duplicate):

- Total and dissolved As, and total and dissolved Zn are qualified as estimated (J) in samples PSRC-SW-1 and PSRC-SW-1-FD due to the MSD analysis not sourced from the Site.
- Dissolved Zn in sample PSRC-SW-1-RB is qualified as estimated (J) due to the MSD analysis not sourced from the Site.
- All results in PSRC-SW-1, PSRC-SW-1-FD, PSRC-SW-1-FB, and PSRC-SW-1-RB that are below the method detection limit are qualified as estimated (UJ) due to the MSD analysis not sourced from the Site.

4.2 Data Sensitivity

Method blanks, field blanks, rinsate blanks, silica sand blanks, and equipment blanks were collected to assess sample collection and decontamination methods in the field and laboratory. The following data is qualified based on detections in a blank sample:

- Total As in samples PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1 will be reported at the reporting limit (RL) and qualified as not detected (U) based on a detection in the method blank.
- Total As in samples PSRC-SL-1 (sieved), PSRC-SL-2 (sieved), and PSRC-SL-3 (sieved) will be reported at the RL and qualified as not detected (U) based on a method blank detection.
- Total Zn in samples PSRC-SL-2 (sieved) and PSRC-SL-3 (sieved) will be reported at the RL and qualified as not detected (U) based on a method blank detection.
- Total lead in samples PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1 will be reported at the processed silica blank result (26.5 mg/kg) and qualified as estimated with a high bias (J+).
- Total and dissolved Zn in sample PSRC-WW-EB will be reported at the RL and qualified as not detected (U) based on a detection in the method blank.
- Hardness as CaCO3, Cl-, SO_4, Ca, Mg, K, Na, and dissolved As will be qualified as estimated (J) in sample PSRC-WW-1 based on the equipment blank analysis.
- Hardness as CaCO3, Cl-, SO_4, Ca, Mg, K, and Na will be qualified as estimated (J) in sample PSRC-WW-2 based on the equipment blank analysis.
- Hardness as CaCO3, Cl-, SO_4, Ca, Mg, K, Na, and dissolved As will be qualified as estimated (J) in sample PSRC-WW-3 based on the equipment blank analysis.
- Total and dissolved Zn in samples PSRC-SW-1 and PSRC-SW-1-FD will be reported at the RL and qualified as not detected (U) based on a detection in the method blank.

It should be noted that one or more sample and/or QC results were flagged "B," "E," "T8," and "V" by the laboratory to indicate QC parameters that did not meet the laboratory or method QC criteria. These flags are qualitative and do not necessarily indicate that data validation qualifier

should be assigned. Except for "J" flags, laboratory-assigned qualifiers are for informational purposes only. Data validation qualifiers, if assigned, supersede the laboratory-assigned flags.

4.3 Data Usability

The Alta QAO did not reject any data; therefore, according to the QAPP (Alta 2023), the completeness for this sampling event is calculated at 100%, which meets the DQO of 90%.

Section 5 Results

This section summarizes the ISM sediment, slag, wall wash and surface water, and geotechnical sample results.

5.1 Sediment Sample Results

ISM sample results were compared to USEPA's Resident Soil Regional Screening Levels (RSLs) (USEPA 2022a) and U.S. Geological Survey (USGS) background values for Bonner County (USGS 2016). No metals were detected at concentrations that exceed the USEPA RSLs and mean background values.

Arsenic was not detected in any ISM samples. However, the reporting limit for As (3.00 mg/kg) exceeds the Resident Soil RSLs (0.68 mg/kg); therefore, As may be present at the Site at concentrations greater than the RSL but below the mean background value of 5.68 mg/kg.

Table 1 summarizes the ISM results (expressed in mg/kg). Figure 2 shows ISM sampling locations.

5.2 Slag Characterization Results

Slag characterization samples include Slag SPLP and wall wash samples. The analytical results for these samples will be used to characterize the environmental behavior of the slag to inform the Site cleanup approach during cleanup design. Specifically, the geochemical analysis results (pH, major ions and metals) for wall wash samples and SPLP results will be used to evaluate the leaching potential of slag material. A geochemical evaluation will be completed in a subsequent technical memorandum that further summarizes SPLP and wall wash sample results and provides recommendations on the possible containment or isolation of the slag pile from surface water.

5.2.1 Slag SPLP Sample Results

Alta collected three (3) slag pile samples from the surface or slope faces of the slag pile for SPLP analysis to evaluate the leaching behavior of slag material. Prior to analysis, each sample was split into two equal portions. One portion was crushed to pass through a 9.5 mm screen and the other portion was left uncrushed. SPLP leachate for both crushed and uncrushed samples was then analyzed for Pb, Cd, Zn, As, and Hg.

Arsenic, Pb and Zn were detected in SPLP leachate from the three uncrushed slag samples while Pb only was detected in SPLP leachate from the three crushed slag samples.

Table 2 summarizes SPLP metals results for crushed and uncrushed slag samples (expressed in mg/L). Figure 2 shows slag sample locations.

5.2.2 Surface Water and Wall Wash Sample Results

Alta collected one (1) surface water sample (and one duplicate sample) from lake water that was not in contact with the slag pile to use as the lixiviant for the wall wash samples.

No constituents of concern were detected above the IDAPA Water Quality Standards (IDAPA 58.01.02) in the groundwater sample collected from the lake.

Alta collected three (3) wall wash samples from the slag face. Wall wash samples were collected following procedures developed by the MEND program.

Metals concentrations in wall wash samples were compared to metals concentrations in the surface water sample. With the exception of Hg, all metals were detected in wall wash samples at concentrations at least an order of magnitude above those in the baseline surface water samples. Total and dissolved As concentrations in wall wash samples were 1 to 2 orders of magnitude greater than concentrations in the surface waters sample and total and dissolved Pb and Zn were several orders of magnitude greater than concentrations in surface water samples.

Table 3 summarizes the wall wash analytical results (expressed in mg/L). Figure 2 shows surface water and wall wash sampling locations.

5.3 Geotechnical Test Pit Sample Results

Geotechnical results will be used to develop design criteria for the onsite waste repository and discussed in more detail in a subsequent technical memorandum. Appendix E includes geotechnical results (e.g., particle size determination [particle size testing] and Atterberg limits) and test pit soil logs. Appendix F includes the archaeological monitoring report. A brief description of observations for each geotechnical test pit is provided below.

Test pit 1 (TP-1) was advanced to a total depth of 6 feet bgs. The top 0-1 feet contained heavy root and organic material with charcoal and red brick from former structures onsite. At 1-2 feet, tan to yellowish brown clay silt with very fine sands were encountered. From 2-4 feet, there was a higher percentage of sand (~80%), underlain by tan buff to light gray silty clays from 4-6 feet. From 1-6 feet are thinly bedded glaciofluvial/lacustrine deposits.

Test pit 2 (TP-2) was advanced to a total depth of 6 feet bgs. The top 0-0.5 feet contained heavy root and organic material with red brick. A concrete footing with steel I-beam support was encountered within the first foot of excavation, so the excavation was moved to the northeast to avoid it. From 0.5-2 feet, light gray silty sands with brownish red mottling were encountered. Soil from 0.5-2 feet appeared to be heavily disturbed by historical building activities. From 2-6 feet, tan-buff light gray silty clays were encountered. From 2-6 feet are thinly bedded glaciofluvial/lacustrine deposits.

Test pit 3 (TP-3) was advanced to a total depth of 6 feet bgs. The top 0-1 feet contained dark brown sandy silt with heavy root and organic material. From 1-6 feet, yellow-brown to light gray clay silts and sands were encountered with a sandy lens from 4-4.5 feet. From 1-6 feet are thinly bedded glaciofluvial/lacustrine deposits.

5.4 Discussion

ISM sample results indicate that sediments within the sampled DUs do not contain Cd, Hg, Pb, or Zn at concentrations above the USEPA Resident Soil RSL. However, As, which was not detected above the reporting limit of 3.00 mg/kg, could be present in sediments at concentrations above the RSL and below mean background values. Sediment sampling conducted in 2012 along the beach nearest the slag pile and shoreline (BE1, BE2, and BE3

shown in Figure 2) indicated As in sediments at concentrations above the USEPA Resident Soil RSL and below mean background (range from 2.81 to 6.43 mg/kg) and Pb in sediments at concentrations below the USEPA Resident Soil RSL (ranging from 37.8 to 350 mg/kg). In both 2012 and 2023, beach sediment samples that were visibly impacted by eroding slag were sieved to less than 180 µm which may have removed larger slag particles prior to laboratory analysis.

Slag SPLP and wall wash sample results suggest that As, Pb, and Zn have the potential to leach from slag material to nearby surface water. In addition, the presence of total and dissolved As, Cd, Pb, and Zn in wall wash samples at concentrations 1 to several orders of magnitude greater than surface water used for wall wash samples indicates that metals may have the potential to mobilize from the slag pile to nearby surface water. These results will be used to inform the Site cleanup approach during cleanup design. A geochemical evaluation will be completed in a subsequent technical memorandum that further summarizes SPLP and wall wash sample results and provides recommendations on the potential need to contain or isolate the slag pile from storm and surface water.

Particle size determination and Atterberg limits results (presented in Appendix E) for soils in the footprint of a proposed onsite waste repository will be used to develop design criteria for the repository and will be discussed in more detail in a subsequent technical memorandum.

Section 6 Conclusions and Recommendations

6.1 Conclusions

Based on the available information and Site-specific data collected, Alta concludes the following:

- No metals were detected in ISM sediment samples at concentrations that exceed the USEPA RSLs and mean background values. Arsenic was not detected in any sediment sample; however, the reporting limit for As (3.00 mg/kg) exceeds the Resident Soil RSLs (0.68 mg/kg). Therefore, As may be present at the Site at concentrations greater than the RSL but below the mean background value of 5.68 mg/kg for Bonner County. Arsenic concentrations in ISM sediment samples are comparable to concentrations in composite soil samples collected near the slag pile in 2012.
- Slag characterization samples including Slag SPLP and wall wash samples suggest that metals have the potential to leach or mobilize from slag material to nearby surface water. Slag SPLP samples had detections of As, Pb, and Zn and wall wash samples had detections of total and dissolved As, Cd, Pb, and Zn in wall wash samples at concentrations orders of magnitude greater than surface water used for wall wash samples.

6.2 Recommendations

Alta recommends the following:

- Conduct additional surface water sampling in summer when the lake is in contact with the slag pile to further evaluate the potential for metals to leach/mobilize from slag material to the Lake Pend Oreille.

- Use available slag characterization data (SPLP and wall wash sample results) to complete a geochemical evaluation of the slag material with recommendations on the potential need to contain or isolate the slag pile from storm and surface water.
- Include the 2023 ISM sediment results and existing Site characterization data from previous assessments to develop Site-specific cleanup criteria and evaluate and identify cleanup alternatives for the PSRC.

Section 7 Clean and Green Reporting

In accordance with the Green Remediation Objectives outlined in USEPA Region 10 Clean and Green Policy, Alta implemented several sustainable technologies and practices to minimize the overall environmental footprint on this project, including the following:

- Reduced use of paper products, project correspondence, plans, and reports were conveyed via electronic transmittal.
- Coordinated Site visits with additional work in the project/Site vicinity, further reducing fuel consumption and greenhouse gas emissions.

Section 8 References and Resources Used

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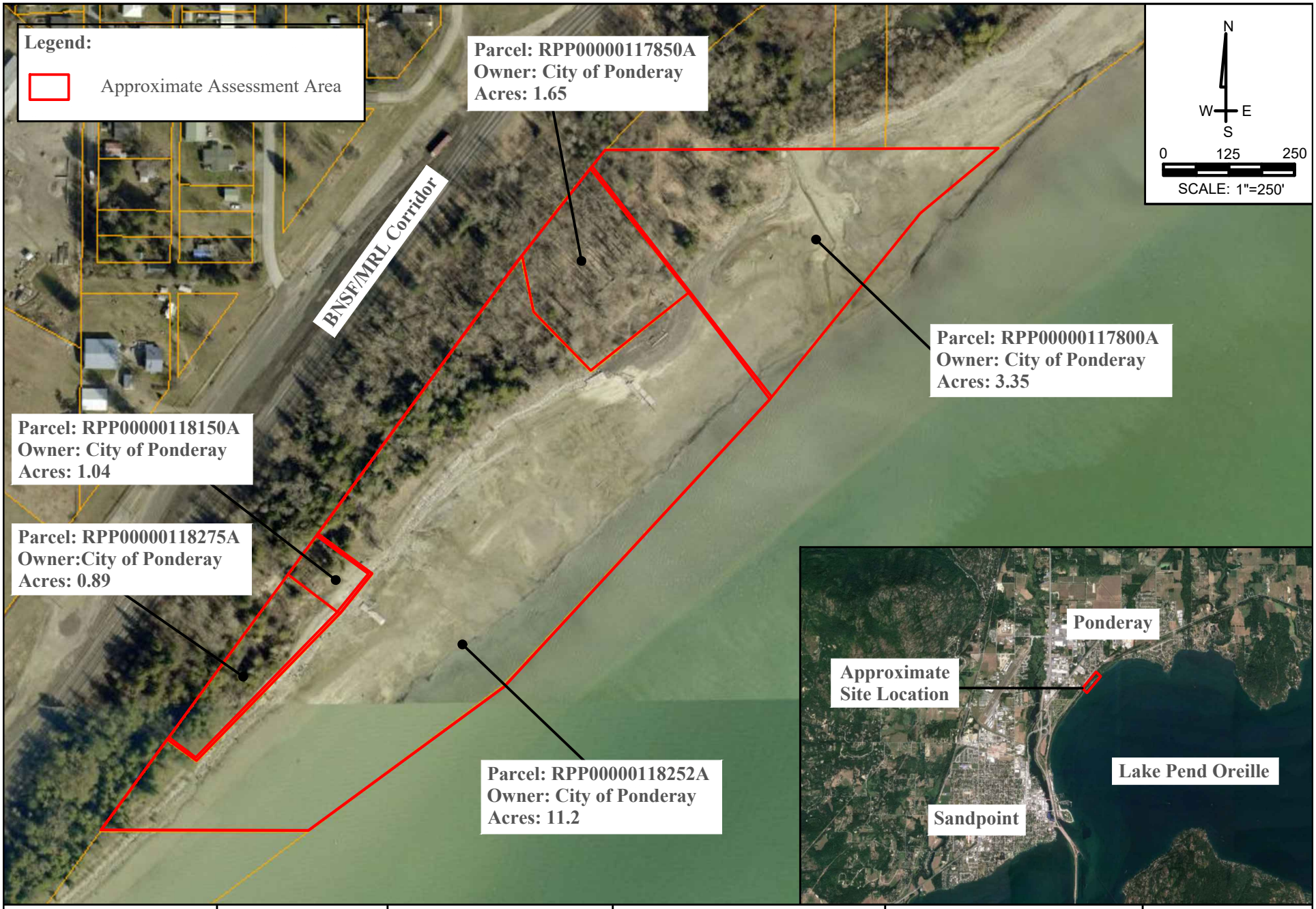
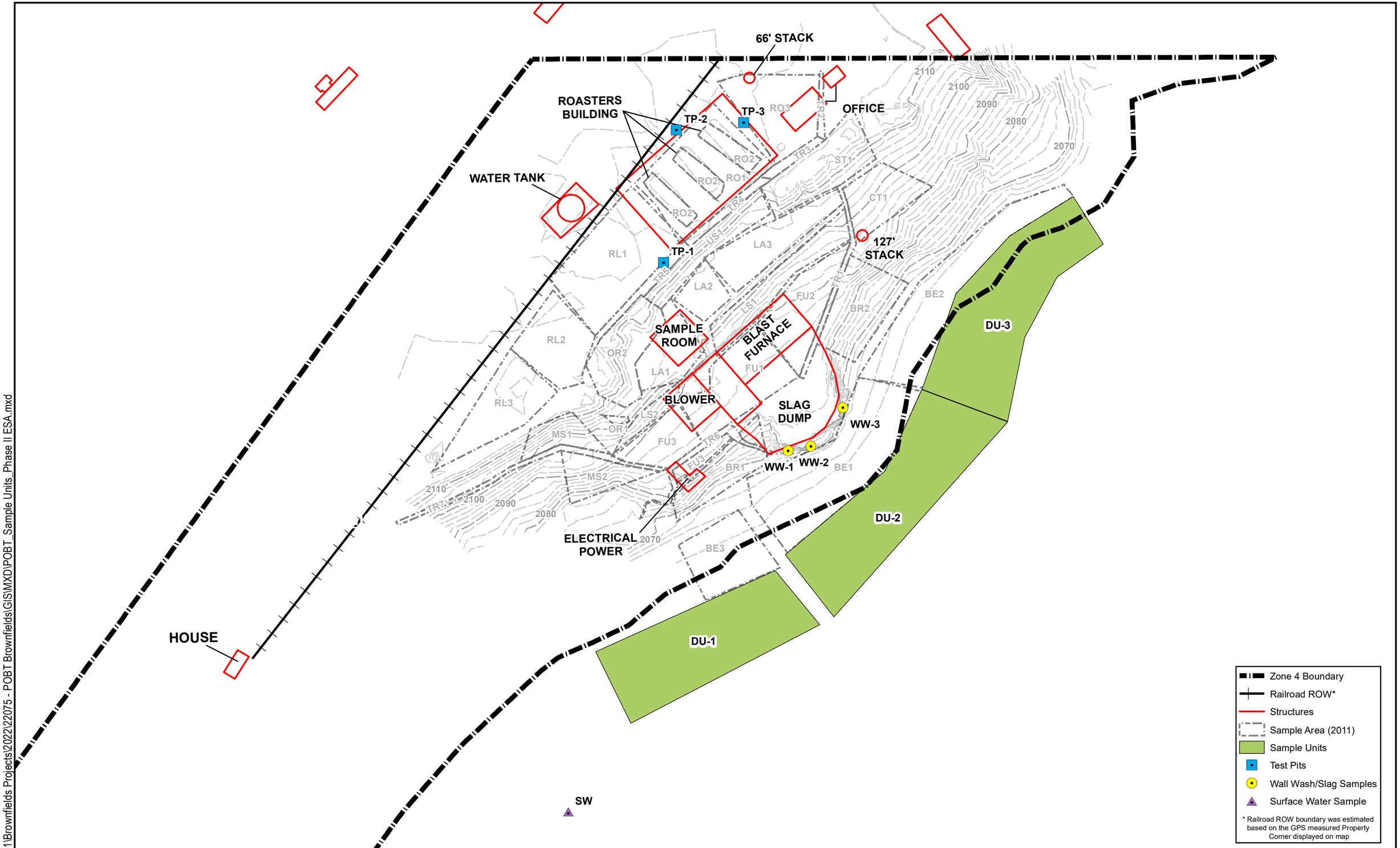


Alta Science & Engineering, Inc.

PRINT DATE: October 14, 2022	PROJECTION: UTM NAD 83, Zone 11N	PROJECT NAME: City of Ponderay Brownfields Project Ponderay, ID	FIGURE 1 Site Location with Regional Map	This map was produced using information obtained from several different sources that have not been independently verified. These sources have also not provided information on the precision and accuracy of the data. Information on this map is not a substitute for survey data.
PROJECT NUMBER: 22075	PROJECT MANAGER: D. Forseth			
	CARTOGRAPHER: M. Studer			



\\boise\BoiseData1\Brownfields Projects\2022\22075 - POBT Brownfields\GIS\MXD\POBT_Sample Units_Phase II ESA.mxd

Alta Science & Engineering, Inc.

File: GIS/POBT_Proposed Sample Units.mxd	Requestor: City of Ponderay
Print Date: November 17, 2022	Project Manager: Derek Forseth
Project Number: 22075	Cartographer: A. Hanna/B. Rollins/S.Morosky

Project Name: City of Ponderay Brownfields Project Ponderay, ID

Figure 2
Decision Units and Sampling Locations

This map was produced using information obtained from several different sources that have not been independently verified. These sources have also not provided information on the precision and accuracy of the data. Information on this map is not a substitute for survey data.

1 inch = 83 feet

0 80 160 Feet

N

Table 1. ISM Sample Results

Sample ID	Date	Unit	Arsenic	Cadmium	Mercury	Lead	Zinc
PSRC-DU1-ISM-0-0.5'-1							
Result	3/1/2023	mg/kg	3.00 U	0.145	ND	26.5 J+	47.3
RL		mg/kg	3.00	0.100	0.0330	0.160	8.00
MDL		mg/kg	0.118	0.0720	0.0110	0.104	6.40
PSRC-DU1-ISM-0-0.5'-2							
Result	3/1/2023	mg/kg	3.00 U	0.139	ND	26.5 J+	43.4
RL		mg/kg	3.00	0.100	0.0330	0.160	8.00
MDL		mg/kg	0.118	0.0720	0.0110	0.104	6.40
PSRC-DU1-ISM-0-0.5'-3 ††							
Result	3/1/2023	mg/kg	3.00 U	0.157	ND	26.5 J+	38.5
RL		mg/kg	3.00	0.100	0.0330	0.160	8.00
MDL		mg/kg	0.118	0.0720	0.0110	0.104	6.40
PSRC-DU2-ISM-0-0.5'-1							
Result	3/1/2023	mg/kg	3.00 U	0.135	ND	26.5 J+	48.7
RL		mg/kg	3.00	0.100	0.0330	0.160	8.00
MDL		mg/kg	0.118	0.0720	0.0110	0.104	6.40
PSRC-DU3-ISM-0-0.5'-1							
Result	3/1/2023	mg/kg	3.00 U	0.136	0.015 J	26.5 J+	62.8
RL		mg/kg	3.00	0.100	0.0330	0.160	8.00
MDL		mg/kg	0.118	0.0720	0.0110	0.104	6.40
Bonner County Background Levels[1]	**Mean**		5.68	-	0.0780	30.8	72.3
	Minimum		1.11	-	0.0200	24.1	35.7
	Maximum		27.6	-	0.129	82.8	180.4
USEPA RSL Resident Soil			0.68	7.10	11.0	400	23,000

Notes:

Analytical tests for arsenic, cadmium, lead and zinc used USEPA Method 6020B. Mercury used USEPA Method 7470A.

Analytical tests for calcium, potassium, magnesium, and sodium used USEPA Method 6010B.

Analytical tests for pH used USEPA Method 9040C.

Analytical tests for sulfate used USEPA Method 9056A.

[1]USGS 2016. https://mrdata.usgs.gov/geochem/county.php?place=f16017&el=As&rf=northwestern

†† The higher of the laboratory replicate sample is shown

USEPA Regional Screening Level (RSL) Resident Soil (November 2022)

mg/kg = milligram per kilogram

A shaded cell indicates a reporting limit (RL) that is higher than the RSL.

ND = not detected above the method detection limit

U = as a result of internal data validation, these results are reported at the RL and qualified as not detected.

J+ = as a result of internal data validation, these results are reported at the blank result and estimated with a high bias.

Table 2. Slag SPLP Sample Results

Sample ID	Date	pH	Unit	Arsenic	Cadmium	Mercury	Lead	Zinc
PSRC-SL-1								
Result	3/1/2023	9.31	mg/L extract	0.00495	0.000076 J	ND	0.0640	0.0409
RL			mg/L extract	0.00300	0.000200	0.000200	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200
PSRC-SL-2								
Result	3/1/2023	9.51	mg/L extract	0.0295	ND	ND	0.0217	0.0260
RL			mg/L extract	0.00300	0.00020	0.00020	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200
PSRC-SL-3								
Result	3/1/2023	9.42	mg/L extract	0.00624	ND	ND	0.0276	0.0222
RL			mg/L extract	0.00300	0.00020	0.00020	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200
PSRC-SL-1 (Sieved)								
Result	3/1/2023	8.99	mg/L extract	0.00300 U	ND	ND	0.00522	0.0132 J-
RL			mg/L extract	0.00300	0.00020	0.00020	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200
PSRC-SL-2 (Sieved)								
Result	3/1/2023	9.27	mg/L extract	0.00300 U	ND	ND	0.00404	0.00500 U
RL			mg/L extract	0.00300	0.00020	0.00020	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200
PSRC-SL-3 (Sieved)								
Result	3/1/2023	9.23	mg/L extract	0.00300 U	ND	ND	0.0186	0.00500 U
RL			mg/L extract	0.00300	0.00020	0.00020	0.00100	0.00500
MDL			mg/L extract	0.000210	0.0000630	0.0000930	0.000140	0.00200

Notes:

Analytical tests for arsenic, cadmium, lead and zinc used USEPA Method 6020B. Mercury used USEPA Method 7470A.

Analytical test for pH used USEPA Method 1312.

mg/L = milligram per liter

ND = not detected above the method detection limit (MDL)

U = as a result of internal data validation, these results are reported at the RL and qualified as not detected.

J - = result is an estimate with low bias

J = result is an estimate

Table 3. Surface Water and Wall Wash Sample Results

Sample ID	Date	Unit	Arsenic (Total)	Arsenic (Dissolved)	Cadmium (Total)	Cadmium (Dissolved)	Lead (Total)	Lead (Dissolved)	Zinc (Total)	Zinc (Dissolved)	Mercury (Total)	Mercury (Dissolved)	Calcium	Potassium	Magnesium	Sodium	Sulfate	Chloride	Total Alkalinity	Hardness	pH
PSRC-SW-1 ††																					
Result	3/1/2023	mg/L	0.000857 J	0.000676 J	ND UJ	ND UJ	ND UJ	ND UJ	0.0250 U	0.0250 U	ND UJ	ND UJ	-	-	-	-	-	-	-	250	-
Reporting Limit		mg/L	0.00200	0.00200	0.00100	0.00100	0.00200	0.00200	0.0250	0.0250	0.000200	0.000200	-	-	-	-	-	-	-	60.0	-
Method Detection Limit		mg/L	0.000180	0.000180	0.000150	0.000150	0.000849	0.000849	0.00302	0.00302	0.000100	0.000100	-	-	-	-	-	-	-	30.0	-
PSRC-WW-1																					
Result	3/1/2023	mg/L	0.0362	0.00136 J	0.00138	ND	5.20	0.0405	3.84	0.110	ND	ND	98.6 J	4.20 J	18.9 J	7.84 J	29.9 J	**22.3** J	**223**	247 J	8.52
Reporting Limit		mg/L	0.00200	0.00200	0.00100	0.00100	0.00200	0.00200	0.0250	0.0250	0.000200	0.000200	1.00	2.00	1.00	3.00	5.00	0.379	20.0	150	-
Method Detection Limit		mg/L	0.000180	0.000180	0.000150	0.000150	0.000849	0.000849	0.00302	0.00302	0.000100	0.000100	0.0793	0.261	0.0853	0.504	0.594	1.00	8.45	75.0	-
PSRC-WW-2																					
Result	3/1/2023	mg/L	0.0257	0.0265	0.000815 J	0.000799 J	3.72	3.54	2.56	2.55	ND	ND	87.6 J	1.96 J	18.2 J	8.03 J	15.5 J	**24.5** J	**213**	254 J	8.41
Reporting Limit		mg/L	0.00200	0.00200	0.00100	0.00100	0.00200	0.00200	0.0250	0.0250	0.000200	0.000200	1.00	2.00	1.00	3.00	5.00	0.379	20.0	150	-
Method Detection Limit		mg/L	0.000180	0.000180	0.000150	0.000150	0.000849	0.000849	0.00302	0.00302	0.000100	0.000100	0.0793	0.261	0.0853	0.504	0.594	1.00	8.45	75.0	-
PSRC-WW-3																					
Result	3/1/2023	mg/L	0.00827	0.00144 J	0.000725 J	ND	2.09	0.105	0.962	0.0774	ND	ND	94.5 J	5.86 J	21.3 J	8.38 J	36.1 J	**25.1** J	**238**	286 J	8.35
Reporting Limit		mg/L	0.0020	0.0020	0.0010	0.00100	0.00200	0.00200	0.0250	0.0250	0.000200	0.000200	1.00	2.00	1.00	3.00	5.00	0.379	20.0	150	-
Method Detection Limit		mg/L	0.000180	0.000180	0.000150	0.000150	0.000849	0.000849	0.00302	0.00302	0.000100	0.000100	0.0793	0.261	0.0853	0.504	0.594	1.00	8.45	75.0	-

Notes:
Analytical tests for arsenic, cadmium, lead and zinc used USEPA Method 6020B. Mercury used USEPA Method 7470A.
Analytical tests for calcium, potassium, magnesium, and sodium used USEPA Method 6010B.
Analytical tests for pH used USEPA Method 9040C.
Analytical tests for sulfate used USEPA Method 9056A.
Analytical tests for alkalinity used SM 2320B.
†† The higher of the duplicate sample is shown
mg/L = milligram per Liter
- = not available
ND = not detected above the method detection limit
J = concentration is an estimate
UJ = concentration is an estimate
U = as a result of internal data validation, these results are reported at the RL and qualified as not detected.

Appendix A
Field Sheets

3/1/23 PSRC Ponderay SAH/LB
22075-30-30

YSI ProDSS calibration temp.
pH: 4.00/7.00/10.00
ORP:
SC:
DO:

Safety tailgate at trailhead 0830

Sites Sampled

PSRC-SW-1	MS/D	off-site lake sample	1028
PSRC-SW-1-FB	field blank		1113
PSRC-DU1-1SM-0-0.5'-1	30-pt. random in grid		1218
PSRC-DU1-1SM-0-0.5'-2	replicate of DU1		
PSRC-DU1-1SM-0-0.5'-3	replicate of DU1		
Note: replicates are systematically offset from original			
PSRC-DU2-1SM-0-0.5'-1	30 pt. random in grid		1446
PSRC-DU3-1SM-0-0.5'-1	30 pt. random in grid		1520
PSRC-WW-1	wall wash (west)		1613
PSRC-SL-1	slag at wall wash 1		1635
PSRC-WW-2	wall wash (center)		1645
PSRC-SL-2	slag at wall wash 2		1650
PSRC-WW-3	wall wash (east)		1700
PSRC-SL-3	slag at wall wash 3		1705
PSRC-WW-EB	wall wash equipment blank		1720
↳ on plastic sheeting and caulk			
PSRC-SW-1-RB	on churn splitter		1848

SAH

3/1/23 PSRC Ponderay SAH/LB
22075-30-30

end of day meter check Temp. 18.6°C
pH: 4.13/7.16/10.11
ORP: 233.1 mV
SC: 1,133 µS/cm
DO: 100.1 %

PSRC-SW-1-FD duplicate 1028

SAH

SAH

Sample List:

Wall Wash Samples:

PSRC -WW-1 – wall rinsed with lake water

PSRC -WW-2 – wall rinsed with lake water

PSRC -WW-3 – wall rinsed with lake water

PSRC -WW-EB - Taken by rinsing a blank sheet of the wall wash plastic + caulk with lake water

Slag Samples:

PSRC-SL-1 - Slag collected 1ft to the left of PSRC-WW-1

PSRC-SL-2 - Slag collected 1ft to the left of PSRC-WW-2

PSRC-SL-3 - Slag collected 1ft to the left of PSRC-WW-3

Surface Water Samples:

PSRC -SW-1 – sample of lake water

PSRC -SW-1-FD – duplicate sampled of lake water

PSRC-SW-1-FB – field blank collected with DI water

PSRC-SW-1-RB – rinsate blank collected with DI water from Churn Splitter after decon

Field Notes:

Lots of ice on lake ~4 inches

Had to break hole in ice to take lake water

1028 Sample time for lake water (initial) into churn splitter

YSI Readings in lake

Wall wash area- approx. 3.5 ft wide by 2 feet tall

Took slag samples approx. 1 ft to the left of wall wash locations

1613 WW-1 (leftmost) Lots of dirt washed into bottles, 6 liters applied, 2 liters recovered,

Water draining into fractures, not getting a lot of recovery

1635 Slag 1 collected

1645 WW-2 (middle) lots of dirt to bottles, 8 liters applied, 2 liters recovered,

Water draining into fractures, and not all being collected- observed drainage from below catchment plastic

1650 Slag 2 collected

1700 WW-3 (rightmost) less dirt into bottles, slag more grey here, 4 liters applied, 2.6 liters recovered

1705 Slag 3 collected

1720 WW-EB – collected by caulking down the middle of a plastic sheet, folding over, and running DI water over the plastic and caulk into the bottles

Alta Science & Engineering, Inc.

SURFACE WATER SAMPLING RECORD

Project: PSRC Ponderay	Station Name: PSRC-SW-1
Project Number: 22075-30-30	Sample Number: PSRC-SW-1
Location: Slag Pile/Lake	Weather: partly cloudy, cold
Date: 3/1/2023 Time: 10:28	Samplers: SAH, LO

WATER QUALITY PARAMETERS

Equipment: YSI Pro DSS

pH	Temp. (°C)	S.C. (µS/cm)	D.O. (mg/l)	D.O. (% Sat)	ORP (mV)	Turbidity (NTU)
7.46	1.4	385.3	12.98	98.6	290.0	0.00

SAMPLES

Analytes	Total Metals (TM)	Dissolved Metals (DM)
Sample ID	PSRC-SW-1	PSRC-SW-1
Time	10:28	10:28
Preservative	HNO_3	HNO_3
Filtered?	No	Yes
Container	250 mL poly	250 mL poly

Analytes	TM	DM
Sample ID	PSRC-SW-1-FD	PSRC-SW-1-FD
Time	10:28	10:28
Preservative	HNO_3	HNO_3
Filtered?	No	Yes
Container	250 mL poly	250 mL poly

QC SAMPLES

Analytes	TM	DM
Sample ID	PSRC-SW-1-FB	PSRC-SW-1-FB
Time	11:13	11:13
Preservative	HNO_3	HNO_3
Filtered?	No	Yes
Container	250 mL poly	250 mL poly

Analytes	TM	DM
Sample ID	PSRC-SW-1-RB	PSRC-SW-1-RB
Time	18:48	18:48
Preservative	HNO_3	HNO_3
Filtered?	No	Yes
Container	250 mL poly	250 mL poly

FLOW MEASUREMENTS: None/Not Applicable.

NOTES/DEVIATIONS/OBSERVATIONS:

1. Rinsate blank taken on churn splitter.

De-Ionized Water: Pace Laboratory (no date).

Expendable Supplies Used: 3 Nalgene bottles.

Appendix B
Photographs

Photo 1

TP-2 facing northeast

Photo 2

TP-2 bricks in top 0.5’ of test pit

Photo 3

TP-2 concrete footing in top 0.5’ of test pit

Photo 4

TP-2 moved test pit NE to avoid concrete footing

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 5

TP-2 spoils pile 0-2.5’

Photo 6

TP-2 facing east wall 0-2.5’

Photo 7

TP-2 facing west wall 0-4’

Photo 8

TP-2 facing west wall 0-6’

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 9

TP-2 spoils pit 2.5'-6'

Photo 10

TP-2 soils

Photo 11

TP-2 facing northeast

Photo 12

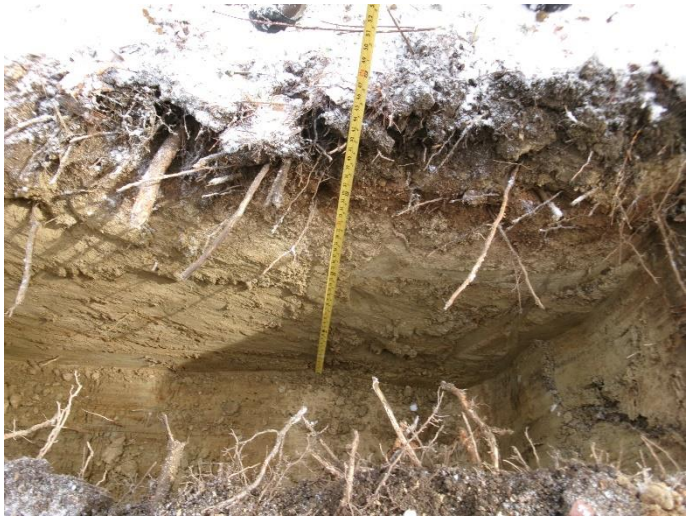
TP-2 soils

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 13

TP-2 backfilled facing northeast

Photo 14



TP-3 facing north wall 0-4’

Photo 15

TP-3 facing north wall 0-6’

Photo 16

TP-3 spoils pile 1’-6’

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 17

TP-3 soils

Photo 18

TP-3 soils

Photo 19

TP-3 spoils pile

Photo 20

TP-3 backfilling facing north

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 21

TP-1 location staked just east of MW-1 facing west

Photo 22

Existing Monitoring Well MW-1

Photo 23

Excavating TP-1 facing east

Photo 24

TP-1 north wall 0-5'

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 25

TP-1 north wall 0-6’

Photo 26

TP-1 north wall 0-6’

Photo 27

TP-1 spoils pile

Photo 28

TP-1 spoils pile

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 29

TP-1 soils

Photo 30

TP-1 spoils pile. 2-4' material on far right

Photo 31

TP-1 backfilling facing southeast

Photo 32

TP-1 backfilled facing northwest

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Photo 33

Surface water sample location

Photo 34

ISM Sampling

Photo 35

Wall Wash Sample

Photo 36

Wall Wash Sample

Alta Science & Engineering, Inc.	PRINT DATE: March 27, 2023	PROJECT MANAGER: Sarah Weppner	PROJECT NAME: City of Ponderay – Ponderay Brownfields Cleanup – Ponderay, ID	APPENDIX A, PHOTO LOG **Test Pit Photos**
	PROJECT NUMBER: 22075-30	CREATED BY: Tom Jenkins		

Appendix C
Analytical Laboratory Results and Chain of Custody Documentation

ANALYTICAL REPORT

March 20, 2023

Alta Science & Engineering, Inc

Sample Delivery Group:	L1592379
Samples Received:	03/07/2023
Project Number:	22075-30-30
Description:	Panhandle Smelting and Refining Company
Site:	PSRC PONDERAY
Report To:	Shelley Hicks 988 South Longmont Ave., Suite 200 Boise, ID 83706

Entire Report Reviewed By:

Kelly Mercer
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.

Pace Analytical National
12065 Lebanon Rd Mount Juliet, TN 37122 615-758-5858 800-767-5859 www.pacenational.com

TABLE OF CONTENTS

PSRC-SW-1 L1592379-01 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 10:28 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	2	03/09/23 12:31	03/09/23 21:42	CAT	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 18:37	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 17:50	AKB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018851	1	03/08/23 12:33	03/08/23 17:11	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018857	1	03/08/23 17:24	03/08/23 19:43	SJM	Mt. Juliet, TN

PSRC-SW-1-FB L1592379-02 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 11:13 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	1	03/09/23 12:31	03/09/23 21:28	CAT	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 18:59	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 17:56	AKB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018851	1	03/08/23 12:33	03/08/23 17:24	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018857	1	03/08/23 17:24	03/08/23 20:19	SJM	Mt. Juliet, TN

PSRC-SW-1-FD L1592379-03 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 10:28 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	2	03/09/23 12:31	03/09/23 21:29	CAT	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:01	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:02	AKB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018851	1	03/08/23 12:33	03/08/23 17:28	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018857	1	03/08/23 17:24	03/08/23 20:22	SJM	Mt. Juliet, TN

PSRC-WW-1 L1592379-04 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 16:13 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	5	03/09/23 12:31	03/09/23 21:30	CAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2018889	1	03/08/23 12:27	03/08/23 12:27	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2019104	1	03/08/23 18:45	03/08/23 18:45	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2020189	1	03/09/23 16:35	03/09/23 16:35	LBR	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:03	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:04	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG2018852	1	03/08/23 08:22	03/08/23 12:36	ABL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022319	1	03/13/23 15:43	03/14/23 13:26	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022331	1	03/14/23 07:28	03/14/23 12:06	JPD	Mt. Juliet, TN

PSRC-WW-2 L1592379-05 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 16:45 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	5	03/09/23 12:31	03/09/23 21:31	CAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2018889	1	03/08/23 12:32	03/08/23 12:32	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2019104	1	03/08/23 18:45	03/08/23 18:45	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2020189	1	03/09/23 21:22	03/09/23 21:22	LBR	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:06	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:08	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG2018852	1	03/08/23 08:22	03/08/23 12:38	ABL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022319	1	03/13/23 15:43	03/14/23 13:29	JPD	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

PSRC-WW-2 L1592379-05 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 16:45 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 6020	WG2022331	1	03/14/23 07:28	03/14/23 12:19	JPD	Mt. Juliet, TN

PSRC-WW-3 L1592379-06 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 17:00 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	5	03/09/23 12:31	03/09/23 21:32	CAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2018889	1	03/08/23 12:38	03/08/23 12:38	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2019104	1	03/08/23 18:45	03/08/23 18:45	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2020189	1	03/09/23 21:35	03/09/23 21:35	LBR	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:08	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:10	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG2018852	1	03/08/23 08:22	03/08/23 12:41	ABL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022319	1	03/13/23 15:43	03/14/23 13:32	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022331	1	03/14/23 07:28	03/14/23 12:22	JPD	Mt. Juliet, TN

PSRC-WW-EB L1592379-07 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 17:20 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	5	03/09/23 12:31	03/09/23 21:33	CAT	Mt. Juliet, TN
Wet Chemistry by Method 2320 B-2011	WG2018889	1	03/08/23 12:43	03/08/23 12:43	ARD	Mt. Juliet, TN
Wet Chemistry by Method 9040C	WG2019104	1	03/08/23 18:45	03/08/23 18:45	KAD	Mt. Juliet, TN
Wet Chemistry by Method 9056A	WG2020189	1	03/09/23 21:47	03/09/23 21:47	LBR	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:10	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:12	AKB	Mt. Juliet, TN
Metals (ICP) by Method 6010B	WG2018852	1	03/08/23 08:22	03/08/23 12:44	ABL	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022319	1	03/13/23 15:43	03/14/23 13:36	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2022331	1	03/14/23 07:28	03/14/23 12:26	JPD	Mt. Juliet, TN

PSRC-SW-1-RB L1592379-08 GW

Collected by: Shelley Hicks | Collected date/time: 03/01/23 18:48 | Received date/time: 03/07/23 08:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 130.1	WG2017850	1	03/09/23 12:31	03/09/23 21:36	CAT	Mt. Juliet, TN
Mercury by Method 7470A	WG2018685	1	03/08/23 13:16	03/08/23 19:12	AKB	Mt. Juliet, TN
Mercury by Method 7470A	WG2018757	1	03/08/23 13:06	03/08/23 18:14	AKB	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018851	1	03/08/23 12:33	03/08/23 17:51	JPD	Mt. Juliet, TN
Metals (ICPMS) by Method 6020	WG2018857	1	03/08/23 17:24	03/08/23 20:39	SJM	Mt. Juliet, TN

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Kelly Mercer
Project Manager

Sample Delivery Group (SDG) Narrative

No extra volume received to perform Matrix Spike samples.

Lab Sample ID	Project Sample ID	Method
L1592379-01	PSRC-SW-1	130.1

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	250		30.0	60.0	2	03/09/2023 21:42	WG2017850

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 18:37	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 17:50	WG2018757

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000857	J	0.000180	0.00200	1	03/08/2023 19:43	WG2018857
Arsenic,Dissolved	0.000676	J	0.000180	0.00200	1	03/08/2023 17:11	WG2018851
Cadmium	U		0.000150	0.00100	1	03/08/2023 19:43	WG2018857
Cadmium,Dissolved	U		0.000150	0.00100	1	03/08/2023 17:11	WG2018851
Lead	U		0.000849	0.00200	1	03/08/2023 19:43	WG2018857
Lead,Dissolved	U		0.000849	0.00200	1	03/08/2023 17:11	WG2018851
Zinc	0.00767	J	0.00302	0.0250	1	03/08/2023 19:43	WG2018857
Zinc,Dissolved	0.00554	J	0.00302	0.0250	1	03/08/2023 17:11	WG2018851

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	U		15.0	30.0	1	03/09/2023 21:28	WG2017850

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 18:59	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 17:56	WG2018757

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	U		0.000180	0.00200	1	03/08/2023 20:19	WG2018857
Arsenic,Dissolved	U		0.000180	0.00200	1	03/08/2023 17:24	WG2018851
Cadmium	U		0.000150	0.00100	1	03/08/2023 20:19	WG2018857
Cadmium,Dissolved	U		0.000150	0.00100	1	03/08/2023 17:24	WG2018851
Lead	U		0.000849	0.00200	1	03/08/2023 20:19	WG2018857
Lead,Dissolved	U		0.000849	0.00200	1	03/08/2023 17:24	WG2018851
Zinc	U		0.00302	0.0250	1	03/08/2023 20:19	WG2018857
Zinc,Dissolved	U		0.00302	0.0250	1	03/08/2023 17:24	WG2018851

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	244		30.0	60.0	2	03/09/2023 21:29	WG2017850

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:01	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:02	WG2018757

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000795	J	0.000180	0.00200	1	03/08/2023 20:22	WG2018857
Arsenic,Dissolved	0.000658	J	0.000180	0.00200	1	03/08/2023 17:28	WG2018851
Cadmium	U		0.000150	0.00100	1	03/08/2023 20:22	WG2018857
Cadmium,Dissolved	U		0.000150	0.00100	1	03/08/2023 17:28	WG2018851
Lead	U		0.000849	0.00200	1	03/08/2023 20:22	WG2018857
Lead,Dissolved	U		0.000849	0.00200	1	03/08/2023 17:28	WG2018851
Zinc	0.00663	J	0.00302	0.0250	1	03/08/2023 20:22	WG2018857
Zinc,Dissolved	0.00520	J	0.00302	0.0250	1	03/08/2023 17:28	WG2018851

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	247		75.0	150	5	03/09/2023 21:30	WG2017850

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	223		8.45	20.0	1	03/08/2023 12:27	WG2018889

Sample Narrative:

L1592379-04 WG2018889: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.52	T8	1	03/08/2023 18:45	WG2019104

Sample Narrative:

L1592379-04 WG2019104: 8.52 at 18.5C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	22.3		0.379	1.00	1	03/09/2023 16:35	WG2020189
Sulfate	29.9		0.594	5.00	1	03/09/2023 16:35	WG2020189

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:03	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:04	WG2018757

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Calcium	98.6		0.0793	1.00	1	03/08/2023 12:36	WG2018852
Magnesium	18.9		0.0853	1.00	1	03/08/2023 12:36	WG2018852
Potassium	4.20		0.261	2.00	1	03/08/2023 12:36	WG2018852
Sodium	7.84		0.504	3.00	1	03/08/2023 12:36	WG2018852

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0362		0.000180	0.00200	1	03/14/2023 13:26	WG2022319
Arsenic,Dissolved	0.00136	J	0.000180	0.00200	1	03/14/2023 12:06	WG2022331
Cadmium	0.00138		0.000150	0.00100	1	03/14/2023 13:26	WG2022319
Cadmium,Dissolved	U		0.000150	0.00100	1	03/14/2023 12:06	WG2022331
Lead	5.20		0.000849	0.00200	1	03/14/2023 13:26	WG2022319
Lead,Dissolved	0.0405		0.000849	0.00200	1	03/14/2023 12:06	WG2022331
Zinc	3.84		0.00302	0.0250	1	03/14/2023 13:26	WG2022319
Zinc,Dissolved	0.110		0.00302	0.0250	1	03/14/2023 12:06	WG2022331

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	254		75.0	150	5	03/09/2023 21:31	WG2017850

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	213		8.45	20.0	1	03/08/2023 12:32	WG2018889

Sample Narrative:

L1592379-05 WG2018889: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.41	T8	1	03/08/2023 18:45	WG2019104

Sample Narrative:

L1592379-05 WG2019104: 8.41 at 18.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	24.5		0.379	1.00	1	03/09/2023 21:22	WG2020189
Sulfate	15.5		0.594	5.00	1	03/09/2023 21:22	WG2020189

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:06	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:08	WG2018757

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Calcium	87.6		0.0793	1.00	1	03/08/2023 12:38	WG2018852
Magnesium	18.2		0.0853	1.00	1	03/08/2023 12:38	WG2018852
Potassium	1.96	J	0.261	2.00	1	03/08/2023 12:38	WG2018852
Sodium	8.03		0.504	3.00	1	03/08/2023 12:38	WG2018852

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.0257		0.000180	0.00200	1	03/14/2023 13:29	WG2022319
Arsenic,Dissolved	0.0265		0.000180	0.00200	1	03/14/2023 12:19	WG2022331
Cadmium	0.000815	J	0.000150	0.00100	1	03/14/2023 13:29	WG2022319
Cadmium,Dissolved	0.000799	J	0.000150	0.00100	1	03/14/2023 12:19	WG2022331
Lead	3.72		0.000849	0.00200	1	03/14/2023 13:29	WG2022319
Lead,Dissolved	3.54		0.000849	0.00200	1	03/14/2023 12:19	WG2022331
Zinc	2.56		0.00302	0.0250	1	03/14/2023 13:29	WG2022319
Zinc,Dissolved	2.55		0.00302	0.0250	1	03/14/2023 12:19	WG2022331

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	286		75.0	150	5	03/09/2023 21:32	WG2017850

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	238		8.45	20.0	1	03/08/2023 12:38	WG2018889

Sample Narrative:

L1592379-06 WG2018889: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.35	T8	1	03/08/2023 18:45	WG2019104

Sample Narrative:

L1592379-06 WG2019104: 8.35 at 18.5C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	25.1		0.379	1.00	1	03/09/2023 21:35	WG2020189
Sulfate	36.1		0.594	5.00	1	03/09/2023 21:35	WG2020189

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:08	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:10	WG2018757

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Calcium	94.5		0.0793	1.00	1	03/08/2023 12:41	WG2018852
Magnesium	21.3		0.0853	1.00	1	03/08/2023 12:41	WG2018852
Potassium	5.86		0.261	2.00	1	03/08/2023 12:41	WG2018852
Sodium	8.38		0.504	3.00	1	03/08/2023 12:41	WG2018852

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.00827		0.000180	0.00200	1	03/14/2023 13:32	WG2022319
Arsenic,Dissolved	0.00144	J	0.000180	0.00200	1	03/14/2023 12:22	WG2022331
Cadmium	0.000725	J	0.000150	0.00100	1	03/14/2023 13:32	WG2022319
Cadmium,Dissolved	U		0.000150	0.00100	1	03/14/2023 12:22	WG2022331
Lead	2.09		0.000849	0.00200	1	03/14/2023 13:32	WG2022319
Lead,Dissolved	0.105		0.000849	0.00200	1	03/14/2023 12:22	WG2022331
Zinc	0.962		0.00302	0.0250	1	03/14/2023 13:32	WG2022319
Zinc,Dissolved	0.0774		0.00302	0.0250	1	03/14/2023 12:22	WG2022331

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	226		75.0	150	5	03/09/2023 21:33	WG2017850

Wet Chemistry by Method 2320 B-2011

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Alkalinity	222		8.45	20.0	1	03/08/2023 12:43	WG2018889

Sample Narrative:

L1592379-07 WG2018889: Endpoint pH 4.5 Headspace

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
pH	8.27	T8	1	03/08/2023 18:45	WG2019104

Sample Narrative:

L1592379-07 WG2019104: 8.27 at 18.3C

Wet Chemistry by Method 9056A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Chloride	25.2		0.379	1.00	1	03/09/2023 21:47	WG2020189
Sulfate	12.0		0.594	5.00	1	03/09/2023 21:47	WG2020189

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:10	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:12	WG2018757

Metals (ICP) by Method 6010B

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Calcium	76.1		0.0793	1.00	1	03/08/2023 12:44	WG2018852
Magnesium	18.0		0.0853	1.00	1	03/08/2023 12:44	WG2018852
Potassium	1.27	J	0.261	2.00	1	03/08/2023 12:44	WG2018852
Sodium	8.11		0.504	3.00	1	03/08/2023 12:44	WG2018852

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.000696	J	0.000180	0.00200	1	03/14/2023 13:36	WG2022319
Arsenic,Dissolved	0.000626	J	0.000180	0.00200	1	03/14/2023 12:26	WG2022331
Cadmium	U		0.000150	0.00100	1	03/14/2023 13:36	WG2022319
Cadmium,Dissolved	U		0.000150	0.00100	1	03/14/2023 12:26	WG2022331
Lead	0.00332	B	0.000849	0.00200	1	03/14/2023 13:36	WG2022319
Lead,Dissolved	0.00220	B	0.000849	0.00200	1	03/14/2023 12:26	WG2022331
Zinc	0.00854	B J	0.00302	0.0250	1	03/14/2023 13:36	WG2022319
Zinc,Dissolved	0.00646	B J	0.00302	0.0250	1	03/14/2023 12:26	WG2022331

Wet Chemistry by Method 130.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Hardness (colorimetric) as CaCO3	U		15.0	30.0	1	03/09/2023 21:36	WG2017850

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	U		0.000100	0.000200	1	03/08/2023 19:12	WG2018685
Mercury,Dissolved	U		0.000100	0.000200	1	03/08/2023 18:14	WG2018757

Metals (ICPMS) by Method 6020

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	U		0.000180	0.00200	1	03/08/2023 20:39	WG2018857
Arsenic,Dissolved	U		0.000180	0.00200	1	03/08/2023 17:51	WG2018851
Cadmium	U		0.000150	0.00100	1	03/08/2023 20:39	WG2018857
Cadmium,Dissolved	U		0.000150	0.00100	1	03/08/2023 17:51	WG2018851
Lead	U		0.000849	0.00200	1	03/08/2023 20:39	WG2018857
Lead,Dissolved	U		0.000849	0.00200	1	03/08/2023 17:51	WG2018851
Zinc	U		0.00302	0.0250	1	03/08/2023 20:39	WG2018857
Zinc,Dissolved	0.00373	J	0.00302	0.0250	1	03/08/2023 17:51	WG2018851

Method Blank (MB)

(MB) R3899402-1 03/09/23 21:13

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hardness (colorimetric) as CaCO3	U		15.0	30.0

L1592197-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1592197-01 03/09/23 21:22 • (DUP) R3899402-3 03/09/23 21:25

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	119	124	1	4.12		20

L1592909-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1592909-01 03/09/23 21:40 • (DUP) R3899402-6 03/09/23 21:41

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Hardness (colorimetric) as CaCO3	189	189	2	0.211		20

Laboratory Control Sample (LCS)

(LCS) R3899402-2 03/09/23 21:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Hardness (colorimetric) as CaCO3	100	95.7	95.7	85.0-115	

L1592197-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592197-01 03/09/23 21:22 • (MS) R3899402-4 03/09/23 21:26 • (MSD) R3899402-5 03/09/23 21:26

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Hardness (colorimetric) as CaCO3	100	119	207	210	88.0	91.0	1	80.0-120	E	E	1.44	20

L1592909-01 Original Sample (OS) • Matrix Spike (MS)

(OS) L1592909-01 03/09/23 21:40 • (MS) R3899402-7 03/09/23 21:42

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Hardness (colorimetric) as CaCO3	100	189	298	109	2	80.0-120	

Method Blank (MB)

(MB) R3898700-1 03/08/23 10:28

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Alkalinity	U		8.45	20.0

Sample Narrative:

BLANK: Endpoint pH 4.5

L1592140-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1592140-01 03/08/23 11:58 • (DUP) R3898700-3 03/08/23 12:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	327	334	1	2.17		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

L1592379-07 Original Sample (OS) • Duplicate (DUP)

(OS) L1592379-07 03/08/23 12:43 • (DUP) R3898700-4 03/08/23 12:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Alkalinity	222	219	1	1.21		20

Sample Narrative:

OS: Endpoint pH 4.5 Headspace

DUP: Endpoint pH 4.5

Laboratory Control Sample (LCS)

(LCS) R3898700-2 03/08/23 10:33

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Alkalinity	100	103	103	90.0-110	

Sample Narrative:

LCS: Endpoint pH 4.5

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

L1592352-14 Original Sample (OS) • Duplicate (DUP)

(OS) L1592352-14 03/08/23 18:45 • (DUP) R3898824-2 03/08/23 18:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	8.74	8.70	1	0.459		1

Sample Narrative:

OS: 8.74 at 19.4C

DUP: 8.7 at 19C

L1592441-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1592441-01 03/08/23 18:45 • (DUP) R3898824-3 03/08/23 18:45

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
pH	7.93	7.95	1	0.252		1

Sample Narrative:

OS: 7.93 at 19.3C

DUP: 7.95 at 18.8C

Laboratory Control Sample (LCS)

(LCS) R3898824-1 03/08/23 18:45

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
pH	10.0	10.0	100	99.0-101	

Sample Narrative:

LCS: 10.01 at 20.1C

Method Blank (MB)

(MB) R3899598-1 03/09/23 12:29

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Chloride	U		0.379	1.00
Sulfate	U		0.594	5.00

L1592379-04 Original Sample (OS) • Duplicate (DUP)

(OS) L1592379-04 03/09/23 16:35 • (DUP) R3899598-3 03/09/23 16:48

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	22.3	22.2	1	0.456		15
Sulfate	29.9	29.9	1	0.0698		15

L1592398-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1592398-02 03/09/23 22:24 • (DUP) R3899598-6 03/09/23 23:02

Analyte	Original Result mg/l	DUP Result mg/l	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Chloride	U	U	1	0.000		15
Sulfate	U	U	1	0.000		15

Laboratory Control Sample (LCS)

(LCS) R3899598-2 03/09/23 12:42

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Chloride	40.0	40.1	100	80.0-120	
Sulfate	40.0	40.3	101	80.0-120	

L1592379-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-04 03/09/23 16:35 • (MS) R3899598-4 03/09/23 17:00 • (MSD) R3899598-5 03/09/23 17:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Chloride	50.0	22.3	68.6	68.6	92.5	92.5	1	80.0-120			0.0198	15
Sulfate	50.0	29.9	75.6	75.6	91.3	91.4	1	80.0-120			0.0968	15

L1592398-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1592398-02 03/09/23 22:24 • (MS) R3899598-7 03/09/23 23:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Chloride	50.0	U	50.6	101	1	80.0-120	
Sulfate	50.0	U	50.4	101	1	80.0-120	

Method Blank (MB)

(MB) R3898828-1 03/08/23 18:33

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3898828-2 03/08/23 18:35

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury	0.00300	0.00294	98.0	80.0-120	

L1592379-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-01 03/08/23 18:37 • (MS) R3898828-3 03/08/23 18:39 • (MSD) R3898828-4 03/08/23 18:41

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	U	0.00306	0.00301	102	100	1	75.0-125			1.65	20

Method Blank (MB)

(MB) R3898825-1 03/08/23 17:46

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.000100	0.000200

Laboratory Control Sample (LCS)

(LCS) R3898825-2 03/08/23 17:48

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Mercury,Dissolved	0.00300	0.00306	102	80.0-120	

L1592379-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-01 03/08/23 17:50 • (MS) R3898825-3 03/08/23 17:52 • (MSD) R3898825-4 03/08/23 17:54

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	U	0.00307	0.00289	102	96.4	1	75.0-125			6.13	20

Method Blank (MB)

(MB) R3898720-1 03/08/23 11:44

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Calcium	U		0.0793	1.00
Magnesium	U		0.0853	1.00
Potassium	U		0.261	2.00
Sodium	U		0.504	3.00

Laboratory Control Sample (LCS)

(LCS) R3898720-2 03/08/23 11:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Calcium	10.0	10.1	101	80.0-120	
Magnesium	10.0	10.1	101	80.0-120	
Potassium	10.0	9.64	96.4	80.0-120	
Sodium	10.0	10.1	101	80.0-120	

L1592140-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592140-01 03/08/23 11:50 • (MS) R3898720-4 03/08/23 11:55 • (MSD) R3898720-5 03/08/23 11:58

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Calcium	10.0	63.6	72.0	73.3	83.8	97.3	1	75.0-125			1.85	20
Magnesium	10.0	39.0	48.0	48.8	89.4	97.7	1	75.0-125			1.71	20
Potassium	10.0	2.07	11.4	11.8	93.4	97.1	1	75.0-125			3.22	20
Sodium	10.0	1.11	10.9	11.2	98.3	101	1	75.0-125			2.64	20

Method Blank (MB)

(MB) R3898811-1 03/08/23 17:04

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000180	0.00200
Cadmium,Dissolved	U		0.000150	0.00100
Lead,Dissolved	U		0.000849	0.00200
Zinc,Dissolved	U		0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R3898811-2 03/08/23 17:08

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	0.0500	0.0489	97.8	80.0-120	
Cadmium,Dissolved	0.0500	0.0542	108	80.0-120	
Lead,Dissolved	0.0500	0.0530	106	80.0-120	
Zinc,Dissolved	0.0500	0.0501	100	80.0-120	

L1592379-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-01 03/08/23 17:11 • (MS) R3898811-4 03/08/23 17:18 • (MSD) R3898811-5 03/08/23 17:21

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.000676	0.0492	0.0491	97.1	96.9	1	75.0-125			0.202	20
Cadmium,Dissolved	0.0500	U	0.0535	0.0542	107	108	1	75.0-125			1.35	20
Lead,Dissolved	0.0500	U	0.0516	0.0503	103	101	1	75.0-125			2.57	20
Zinc,Dissolved	0.0500	0.00554	0.0530	0.0560	95.0	101	1	75.0-125			5.46	20

Method Blank (MB)

(MB) R3898947-1 03/08/23 19:36

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000180	0.00200
Cadmium	U		0.000150	0.00100
Lead	U		0.000849	0.00200
Zinc	U		0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R3898947-2 03/08/23 19:39

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0482	96.4	80.0-120	
Cadmium	0.0500	0.0526	105	80.0-120	
Lead	0.0500	0.0564	113	80.0-120	
Zinc	0.0500	0.0489	97.9	80.0-120	

L1592379-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-01 03/08/23 19:43 • (MS) R3898947-4 03/08/23 19:49 • (MSD) R3898947-5 03/08/23 19:53

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.000857	0.0499	0.0490	98.0	96.2	1	75.0-125			1.82	20
Cadmium	0.0500	U	0.0537	0.0530	107	106	1	75.0-125			1.38	20
Lead	0.0500	U	0.0505	0.0500	101	100	1	75.0-125			1.01	20
Zinc	0.0500	0.00767	0.0556	0.0543	95.8	93.3	1	75.0-125			2.36	20

Method Blank (MB)

(MB) R3900927-6 03/14/23 14:25

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.000180	0.00200
Cadmium	U		0.000150	0.00100
Lead	0.00175	J	0.000849	0.00200
Zinc	0.0148	J	0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R3900927-2 03/14/23 13:10

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic	0.0500	0.0510	102	80.0-120	
Cadmium	0.0500	0.0529	106	80.0-120	
Lead	0.0500	0.0526	105	80.0-120	
Zinc	0.0500	0.0528	106	80.0-120	

L1592916-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592916-02 03/14/23 13:13 • (MS) R3900927-4 03/14/23 13:19 • (MSD) R3900927-5 03/14/23 13:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	0.0500	0.00251	0.0533	0.0532	102	101	1	75.0-125			0.161	20
Cadmium	0.0500	0.000974	0.0539	0.0546	106	107	1	75.0-125			1.39	20
Lead	0.0500	0.220	0.280	0.284	120	128	1	75.0-125		V	1.48	20
Zinc	0.0500	0.256	0.301	0.302	89.0	90.6	1	75.0-125			0.263	20

Method Blank (MB)

(MB) R3900793-1 03/14/23 11:59

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.000180	0.00200
Cadmium,Dissolved	U		0.000150	0.00100
Lead,Dissolved	0.00191	J	0.000849	0.00200
Zinc,Dissolved	0.00310	J	0.00302	0.0250

Laboratory Control Sample (LCS)

(LCS) R3900793-2 03/14/23 12:03

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Arsenic,Dissolved	0.0500	0.0494	98.8	80.0-120	
Cadmium,Dissolved	0.0500	0.0520	104	80.0-120	
Lead,Dissolved	0.0500	0.0543	109	80.0-120	
Zinc,Dissolved	0.0500	0.0537	107	80.0-120	

L1592379-04 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1592379-04 03/14/23 12:06 • (MS) R3900793-4 03/14/23 12:13 • (MSD) R3900793-5 03/14/23 12:16

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	0.0500	0.00136	0.0499	0.0509	97.1	99.2	1	75.0-125			2.00	20
Cadmium,Dissolved	0.0500	U	0.0517	0.0520	103	104	1	75.0-125			0.444	20
Lead,Dissolved	0.0500	0.0405	0.0900	0.0943	99.0	108	1	75.0-125			4.67	20
Zinc,Dissolved	0.0500	0.110	0.155	0.154	90.8	89.5	1	75.0-125			0.428	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
B	The same analyte is found in the associated blank.
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
T8	Sample(s) received past/too close to holding time expiration.
V	The sample concentration is too high to evaluate accurate spike recoveries.

Pace Analytical National 12065 Lebanon Rd Mount Juliet, TN 37122

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN000032021-1
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	TN00003
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO000356
Kentucky [1 6]	KY90010	South Carolina	84004002
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana	LA018	Texas	T104704245-20-18
Maine	TN00003	Texas [5]	LAB0152
Maryland	324	Utah	TN000032021-11
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	110033
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	998093910
Montana	CERT0086	Wyoming	A2LA
A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
Alta Science & Engineering, Inc
988 South Longmont Ave., Suite 200
Boise, ID 83706

Billing Information:
Accounting
220 East 5th Street, Suite 325
Moscow, ID 83843

Pres Chk

Report to: **Shelley Hicks**

Email To: sarah.weppner@alta-se.com;shelley.hicks@alta-se.com

Project Description: **Panhandle Smelting and Refining Company**

City/State Collected: Sandpoint, Idaho

Please Circle: (PT) MT CT ET

Phone: **208-336-7080**

Client Project # 22075-30-30

Lab Project # ALTASCIBID-PONDERAY

Collected by (print): Shelley Hicks

Site/Facility ID # PSRC Ponderay

P.O. # 22075-30-30

Collected by (signature): Shelley Hicks

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Alkalinity 1L-HDPE NoPres	Anions (Ca,K,Mg,Na) 250mlHDPE-HNO3	Chloride,Sulfate,pH 250mlHDPE-NoPres	Diss Pb,Cd,Zn,As,Hg 250mlHDPE-HNO3 (Field Filtered)	Pb,Cd,Zn,As,Hg, Hard 250mlHDPE-HNO3						Remarks	Sample # (lab only)
PSRC-SW-1	grab	~~GW~~ OT	—	3/1/23	1028	2				1	1						MS/D	-01
PSRC-SW-1-FB	grab	~~GW~~ OT	—	3/1/23	1113	2				1	1							-02
PSRC-SW-1-FD	grab	~~GW~~ OT	—	3/1/23	1028	2				1	1							-03
PSRC-WW-1	grab	~~GW~~ OT	—	3/1/23	1613	5	1	1	1	1	1							-04
PSRC-WW-2	grab	~~GW~~ OT	—	3/1/23	1645	5	1	1	1	1	1							-05
PSRC-WW-3	grab	~~GW~~ OT	—	3/1/23	1700	5	1	1	1	1	1							-06
PSRC-WW-EB	grab	~~GW~~ OT	—	3/1/23	1720	5	1	1	1	1	1							-07
PSRC-SW-1-RB	grab	~~GW~~ OT	—	3/1/23	1848	2				1	1							-08
		GW																
		GW																

Chain of Custody Page 1 of 1

Pace
PEOPLE ADVANCING SCIENCE

MT JULIET, TN
12065 Lebanon Rd Mount Juliet, TN 37122
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # L592379
1091

Acctnum: ALTASCIBID
Template: T224437
Prelogin: P979909
PM: 841 - Kelly Mercer
PB: ct 2/10/23

Shipped Via: FedEX Ground

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other SW (surface water)

Remarks:

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: Y N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No (HCl) / MeoH TBR	If preservation required by Login: Date/Time
Shelley Hicks	3/6/23	0700			
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 0.4 °C Bottles Received: 28	
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 3/7/23 Time: 0800	Hold: Condition: NCF / OK

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received	Notes
PSRC-SL-1 (As Received)	X3C0131-01	Slag	01-Mar-23 00:00	LB	09-Mar-2023	
PSRC-SL-2 (As Received)	X3C0131-02	Slag	01-Mar-23 00:00	LB	09-Mar-2023	
PSRC-SL-3 (As Received)	X3C0131-03	Slag	01-Mar-23 00:00	LB	09-Mar-2023	
PSRC-SL-1 (Sieved)	X3C0131-04	Slag	01-Mar-23 00:00	LB	09-Mar-2023	
PSRC-SL-2 (Sieved)	X3C0131-05	Slag	01-Mar-23 00:00	LB	09-Mar-2023	
PSRC-SL-3 (Sieved)	X3C0131-06	Slag	01-Mar-23 00:00	LB	09-Mar-2023	

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Case Narrative: X3C0131

The state of origin only accredits for drinking water analyses.

Prior to sieving the sample(s) were prepped using a crush/roll process to <3/8", as requested.

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
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Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-1 (As Received)**
SVL Sample ID: **X3C0131-01 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	9.31	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.00495	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:18	
EPA 6020B	**Cadmium**	0.000076	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:18	J
EPA 6020B	**Lead**	0.0640	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:18	
EPA 6020B	**Zinc**	0.0409	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:18	
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:16	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
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Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-2 (As Received)**
SVL Sample ID: **X3C0131-02 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	9.51	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.0295	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:20	
EPA 6020B	Cadmium	< 0.000063	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:20	U
EPA 6020B	**Lead**	0.0217	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:20	
EPA 6020B	**Zinc**	0.0260	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:20	
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:19	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
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Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-3 (As Received)**
SVL Sample ID: **X3C0131-03 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	9.42	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.00624	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:22	
EPA 6020B	Cadmium	< 0.000063	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:22	U
EPA 6020B	**Lead**	0.0276	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:22	
EPA 6020B	**Zinc**	0.0222	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:22	
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:21	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-1 (Sieved)**
SVL Sample ID: **X3C0131-04 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	8.99	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.00178	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:24	J
EPA 6020B	Cadmium	< 0.000063	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:24	U
EPA 6020B	**Lead**	0.00522	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:24	
EPA 6020B	**Zinc**	0.0132	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:24	M2
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:23	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-2 (Sieved)**
SVL Sample ID: **X3C0131-05 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	9.27	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.00290	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:32	J
EPA 6020B	Cadmium	< 0.000063	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:32	U
EPA 6020B	**Lead**	0.00404	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:32	
EPA 6020B	**Zinc**	0.0026	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:32	J
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:25	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Client Sample ID: **PSRC-SL-3 (Sieved)**
SVL Sample ID: **X3C0131-06 (Slag)**

Sampled: 01-Mar-23 00:00
Received: 09-Mar-23
Sampled By: LB

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
SPLP Extraction Parameters										
SW-846 1312	**Extract pH**	9.23	pH Units				X311177	JDS	03/23/23 14:03	
SPLP Leachates (Metals) Extracted: 03/23/23 14:03										
EPA 6020B	**Arsenic**	0.00185	mg/L Extract	0.00300	0.00021		X312178	DWJ	03/30/23 10:43	J
EPA 6020B	Cadmium	< 0.000063	mg/L Extract	0.000200	0.000063		X312178	DWJ	03/30/23 10:43	U
EPA 6020B	**Lead**	0.0186	mg/L Extract	0.00100	0.00014		X312178	DWJ	03/30/23 10:43	
EPA 6020B	**Zinc**	0.0034	mg/L Extract	0.0050	0.0020		X312178	DWJ	03/30/23 10:43	J
EPA 7470A	Mercury	< 0.000093	mg/L Extract	0.000200	0.000093		X312189	RCA	03/27/23 13:27	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

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1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Quality Control - EXTRACTION BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
SPLP Leachates (Metals) Extracted: 03/23/23 14:03 Batch: X311177								
EPA 6020B	Arsenic	mg/L Extract	0.00040	0.00021	0.00300	X312178	30-Mar-23	J
EPA 6020B	Cadmium	mg/L Extract	<0.000063	0.000063	0.000200	X312178	30-Mar-23	U
EPA 6020B	Lead	mg/L Extract	0.00014	0.00014	0.00100	X312178	30-Mar-23	J
EPA 6020B	Zinc	mg/L Extract	0.0035	0.0020	0.0050	X312178	30-Mar-23	J

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
SPLP Leachates (Metals)									
EPA 6020B	Arsenic	mg/L Extract	0.0226	0.0250	90.5	80 - 120	X312178	30-Mar-23	
EPA 6020B	Cadmium	mg/L Extract	0.0226	0.0250	90.2	80 - 120	X312178	30-Mar-23	
EPA 6020B	Lead	mg/L Extract	0.0268	0.0250	107	80 - 120	X312178	30-Mar-23	
EPA 6020B	Zinc	mg/L Extract	0.0253	0.0250	101	80 - 120	X312178	30-Mar-23	
EPA 7470A	Mercury	mg/L Extract	0.00232	0.00200	116	80 - 120	X312189	27-Mar-23	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch and Source ID	Analyzed	Notes
SPLP Leachates (Metals)										
EPA 6020B	Arsenic	mg/L Extract	0.0251	0.00178	0.0250	93.2	75 - 125	X312178 - X3C0131-04	30-Mar-23	
EPA 6020B	Cadmium	mg/L Extract	0.0238	<0.000063	0.0250	95.2	75 - 125	X312178 - X3C0131-04	30-Mar-23	
EPA 6020B	Lead	mg/L Extract	0.0330	0.00522	0.0250	111	75 - 125	X312178 - X3C0131-04	30-Mar-23	
EPA 6020B	Zinc	mg/L Extract	0.0245	0.0132	0.0250	45.4	75 - 125	X312178 - X3C0131-04	30-Mar-23	M2
EPA 7470A	Mercury	mg/L Extract	0.00216	<0.000093	0.00200	108	70 - 130	X312189 - X3C0131-04	27-Mar-23	

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	% Recovery	Batch and Source ID	Notes
SPLP Leachates (Metals)										
EPA 6020B	Arsenic	mg/L Extract	0.0241	0.0251	0.0250	3.9	20	89.3	X312178 - X3C0131-04	
EPA 6020B	Cadmium	mg/L Extract	0.0231	0.0238	0.0250	2.8	20	92.6	X312178 - X3C0131-04	
EPA 6020B	Lead	mg/L Extract	0.0319	0.0330	0.0250	3.4	20	107	X312178 - X3C0131-04	
EPA 6020B	Zinc	mg/L Extract	0.0239	0.0245	0.0250	2.5	20	43.0	X312178 - X3C0131-04	M2
EPA 7470A	Mercury	mg/L Extract	0.00219	0.00216	0.00200	1.3	20	109	X312189 - X3C0131-04	

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Qualitiy Control - SERIAL DILUTION Data

Method	Analyte	Sample Result	Serial Dilution Result	RPD	Q	QC Limits	Batch and Source ID	Notes
SPLP Leachates (Metals)								
EPA 6020B	Arsenic	0.0251	0.0266	5.8		20	X312178 - MS1	
EPA 6020B	Cadmium	0.0238	0.0256	7.2		20	X312178 - MS1	
EPA 6020B	Lead	0.0330	0.0333	0.9		20	X312178 - MS1	
EPA 6020B	Zinc	0.0245	0.0258	5.3		20	X312178 - MS1	

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Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

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1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0131**
Reported: 17-Apr-23 11:41

Notes and Definitions

J	The reported value is less than the Reporting Limit (MRL, CRDL) but greater than or equal to the MDL. Results closer to the MDL have increased relative uncertainty.
M2	Matrix spike recovery was low, but the LCS recovery was acceptable.
U	Less than MDL.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
0.30R>S	% recovery not applicable; spike level is less than 30% of the sample concentration
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

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1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Sampled By	Date Received	Notes
PSRC-DU1-ISM-0-0.5'-1	X3C0135-01	Soil	01-Mar-23 12:18	SH	09-Mar-2023	
PSRC-DU1-ISM-0-0.5'-2	X3C0135-02	Soil	01-Mar-23 12:18	SH	09-Mar-2023	
PSRC-DU1-ISM-0-0.5'-3	X3C0135-03	Soil	01-Mar-23 12:18	SH	09-Mar-2023	
PSRC-DU1-ISM-0-0.5'-3 (Dup1)	X3C0135-04	Soil	01-Mar-23 12:18	SH	09-Mar-2023	
PSRC-DU1-ISM-0-0.5'-3 (Dup2)	X3C0135-05	Soil	01-Mar-23 12:18	SH	09-Mar-2023	
PSRC-DU2-ISM-0-0.5'-1	X3C0135-06	Soil	01-Mar-23 14:46	SH	09-Mar-2023	
PSRC-DU3-ISM-0-0.5'-1	X3C0135-07	Soil	01-Mar-23 15:20	SH	09-Mar-2023	
Unprocessed Blank	X3C0135-08	Soil	09-Mar-23 00:00	SH	09-Mar-2023	
Processed Blank	X3C0135-09	Soil	09-Mar-23 00:00	SH	09-Mar-2023	

Solid samples are analyzed on an as-received, wet-weight basis, unless otherwise requested.

Case Narrative: X3C0135

The state of origin only accredits for drinking water analyses.

After extensive investigation, including sample inspection and reanalysis, it was determined that there was a mishap with the original digestion/analysis of samples X3C0135-08 and -09. this report has been reissued with the newest results for metals on those samples.

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU1-ISM-0-0.5'-1**
SVL Sample ID: **X3C0135-01 (Soil)**

Sampled: 01-Mar-23 12:18
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.73	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:17	D1,J
EPA 6020B	**Cadmium**	0.145	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:29	D1
EPA 6020B	**Lead**	10.8	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:29	D1
EPA 6020B	**Zinc**	47.3	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:17	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:28	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU1-ISM-0-0.5'-2**
SVL Sample ID: **X3C0135-02 (Soil)**

Sampled: 01-Mar-23 12:18
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.25	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:27	D1,J
EPA 6020B	**Cadmium**	0.139	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:39	D1
EPA 6020B	**Lead**	10.9	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:39	D1
EPA 6020B	**Zinc**	43.4	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:27	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:30	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU1-ISM-0-0.5'-3**
SVL Sample ID: **X3C0135-03 (Soil)**

Sampled: 01-Mar-23 12:18
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.31	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:30	D1,J
EPA 6020B	**Cadmium**	0.140	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:41	D1
EPA 6020B	**Lead**	9.93	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:41	D1
EPA 6020B	**Zinc**	38.5	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:30	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:32	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU1-ISM-0-0.5'-3 (Dup1)**
SVL Sample ID: **X3C0135-04 (Soil)**

Sampled: 01-Mar-23 12:18
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.26	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:32	D1,J
EPA 6020B	**Cadmium**	0.157	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:43	D1
EPA 6020B	**Lead**	9.38	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:43	D1
EPA 6020B	**Zinc**	36.1	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:32	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:34	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU1-ISM-0-0.5'-3 (Dup2)**
SVL Sample ID: **X3C0135-05 (Soil)**

Sampled: 01-Mar-23 12:18
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.18	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:34	D1,J
EPA 6020B	**Cadmium**	0.132	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:46	D1
EPA 6020B	**Lead**	9.14	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:46	D1
EPA 6020B	**Zinc**	36.3	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:34	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:36	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU2-ISM-0-0.5'-1**
SVL Sample ID: **X3C0135-06 (Soil)**

Sampled: 01-Mar-23 14:46
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	1.99	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:37	D1,J
EPA 6020B	**Cadmium**	0.135	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:53	D1
EPA 6020B	**Lead**	13.8	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:53	D1
EPA 6020B	**Zinc**	48.7	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:37	D1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:38	U

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **PSRC-DU3-ISM-0-0.5'-1**
SVL Sample ID: **X3C0135-07 (Soil)**

Sampled: 01-Mar-23 15:20
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	2.88	mg/kg	3.00	0.118	20	X312062	DWJ	03/24/23 15:39	D1,J
EPA 6020B	**Cadmium**	0.136	mg/kg	0.100	0.072	2	X312062	DWJ	03/24/23 14:56	D1
EPA 6020B	**Lead**	18.0	mg/kg	0.160	0.104	2	X312062	DWJ	03/24/23 14:56	D1
EPA 6020B	**Zinc**	62.8	mg/kg	8.00	6.40	20	X312062	DWJ	03/24/23 15:39	D1
EPA 7471A	**Mercury**	0.015	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:45	J

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Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

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1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **Unprocessed Blank**
SVL Sample ID: **X3C0135-08 (Soil)**

Sampled: 09-Mar-23 00:00
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	0.108	mg/kg	0.300	0.0118	2	X312062	SMU	05/15/23 15:17	N1,J
EPA 6020B	Cadmium	< 0.072	mg/kg	0.100	0.072	2	X312062	SMU	05/15/23 15:17	N1,U
EPA 6020B	**Lead**	0.396	mg/kg	0.160	0.104	2	X312062	SMU	05/15/23 15:17	N1
EPA 6020B	**Zinc**	1.70	mg/kg	1.00	0.64	2	X312062	SMU	05/15/23 15:17	N1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:47	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

Alta Science and Engineering - Kellogg
1220 Big Creek Rd, Suite A
Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Client Sample ID: **Processed Blank**
SVL Sample ID: **X3C0135-09 (Soil)**

Sampled: 09-Mar-23 00:00
Received: 09-Mar-23
Sampled By: SH

Method	Analyte	Result	Units	RL	MDL	Dilution	Batch	Analyst	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	**Arsenic**	0.165	mg/kg	0.300	0.0118	2	X312062	SMU	05/15/23 15:19	N1,J
EPA 6020B	Cadmium	< 0.072	mg/kg	0.100	0.072	2	X312062	SMU	05/15/23 15:19	N1,U
EPA 6020B	**Lead**	26.5	mg/kg	1.60	1.04	20	X312062	SMU	05/15/23 15:54	D2,N1
EPA 6020B	**Zinc**	2.33	mg/kg	1.00	0.64	2	X312062	SMU	05/15/23 15:19	N1
EPA 7471A	Mercury	< 0.011	mg/kg	0.033	0.011		X312136	RCA	03/23/23 14:49	U

This data has been reviewed for accuracy and has been authorized for release by the Laboratory Director or designee.

Dave Tryon
Project Manager

One Government Gulch - PO Box 929
Kellogg, ID 83837-0929
(208) 784-1258
www.svl.net

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Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Quality Control - BLANK Data

Method	Analyte	Units	Result	MDL	MRL	Batch ID	Analyzed	Notes
Metals by EPA 6000/7000 Series								
EPA 6020B	Arsenic	mg/kg	0.0274	0.0118	0.300	X312062	24-Mar-23	D1,J
EPA 6020B	Cadmium	mg/kg	<0.072	0.072	0.100	X312062	24-Mar-23	D1,U
EPA 6020B	Lead	mg/kg	<0.104	0.104	0.160	X312062	24-Mar-23	D1,U
EPA 6020B	Zinc	mg/kg	<0.64	0.64	1.00	X312062	24-Mar-23	D1,U
EPA 7471A	Mercury	mg/kg	<0.011	0.011	0.033	X312136	23-Mar-23	U

Quality Control - LABORATORY CONTROL SAMPLE Data

Method	Analyte	Units	LCS Result	LCS True	% Rec.	Acceptance Limits	Batch ID	Analyzed	Notes
Metals by EPA 6000/7000 Series									
EPA 6020B	Arsenic	mg/kg	2.63	2.50	105	80 - 120	X312062	24-Mar-23	D1
EPA 6020B	Cadmium	mg/kg	2.45	2.50	98.2	80 - 120	X312062	24-Mar-23	D1
EPA 6020B	Lead	mg/kg	2.47	2.50	98.8	80 - 120	X312062	24-Mar-23	D1
EPA 6020B	Zinc	mg/kg	2.45	2.50	97.8	80 - 120	X312062	24-Mar-23	D1
EPA 7471A	Mercury	mg/kg	0.341	0.333	102	80 - 120	X312136	23-Mar-23	

Quality Control - DUPLICATE Data

Method	Analyte	Units	Duplicate Result	Sample Result	RPD	RPD Limit	Batch and Source ID	Analyzed	Notes
Metals by EPA 6000/7000 Series									
EPA 6020B	Arsenic	mg/kg	0.176	0.179	<RL	20	X312062 - X3C0135-09	15-May-23	J
EPA 6020B	Cadmium	mg/kg	<0.072	<0.072	UDL	20	X312062 - X3C0135-09	15-May-23	U
EPA 6020B	Lead	mg/kg	42.1	<1.04	UDL	20	X312062 - X3C0135-09	15-May-23	D2
EPA 6020B	Zinc	mg/kg	1.80	<0.64	UDL	20	X312062 - X3C0135-09	15-May-23	

Quality Control - MATRIX SPIKE Data

Method	Analyte	Units	Spike Result	Sample Result (R)	Spike Level (S)	% Rec.	Acceptance Limits	Batch and Source ID	Analyzed	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	Arsenic	mg/kg	5.45	2.73	2.50	109	75 - 125	X312062 - X3C0135-01	24-Mar-23	D1
EPA 6020B	Cadmium	mg/kg	2.65	0.145	2.50	100	75 - 125	X312062 - X3C0135-01	24-Mar-23	D1
EPA 6020B	Lead	mg/kg	13.4	10.8	2.50	103	75 - 125	X312062 - X3C0135-01	24-Mar-23	D1
EPA 6020B	Zinc	mg/kg	53.6	47.3	2.50	0.30R>S	75 - 125	X312062 - X3C0135-01	24-Mar-23	M4
EPA 7471A	Mercury	mg/kg	0.353	<0.011	0.333	106	75 - 125	X312136 - X3C0135-02	23-Mar-23	

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Work Order: **X3C0135**
Reported: 25-May-23 12:43

Quality Control - MATRIX SPIKE DUPLICATE Data

Method	Analyte	Units	MSD Result	Spike Result	Spike Level	RPD	RPD Limit	% Recovery	Batch and Source ID	Notes
Metals by EPA 6000/7000 Series										
EPA 6020B	Arsenic	mg/kg	5.14	5.45	2.50	5.8	20	96.6	X312062 - X3C0135-01	D1
EPA 6020B	Arsenic	mg/kg	5.20	5.45	2.50	4.6	20	99.1	X312062 - X3C0135-01	
EPA 6020B	Cadmium	mg/kg	2.64	2.65	2.50	0.5	20	99.8	X312062 - X3C0135-01	D1
EPA 6020B	Lead	mg/kg	14.7	13.4	2.50	9.5	20	0.30R>S	X312062 - X3C0135-01	D1,M4
EPA 6020B	Zinc	mg/kg	50.6	53.6	2.50	5.8	20	0.30R>S	X312062 - X3C0135-01	D1,M4
EPA 7471A	Mercury	mg/kg	0.351	0.353	0.333	0.8	20	105	X312136 - X3C0135-02	

Qualitiy Control - SERIAL DILUTION Data

Method	Analyte	Sample Result	Serial Dilution Result	RPD	Q	QC Limits	Batch and Source ID	Notes
Metals by EPA 6000/7000 Series								
EPA 6020B	Cadmium	2.65	2.72	2.7		20	X312062 - MS1	
EPA 6020B	Lead	13.4	14.1	5.6		20	X312062 - MS1	D1,M4
EPA 6020B	Zinc	53.6	52.0	3.0		20	X312062 - MS1	D1,M4

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Kellogg, ID 83837

Work Order: **X3C0135**
Reported: 25-May-23 12:43

Notes and Definitions

D1	Sample required dilution due to matrix.
D2	Sample required dilution due to high concentration of target analyte.
J	The reported value is less than the Reporting Limit (MRL, CRDL) but greater than or equal to the MDL. Results closer to the MDL have increased relative uncertainty.
M4	The analysis of the spiked sample required a dilution such that the spike recovery calculation does not provide useful information. The LCS recovery was acceptable.
N1	See case narrative.
U	Less than MDL.
LCS	Laboratory Control Sample (Blank Spike)
RPD	Relative Percent Difference
UDL	A result is less than the detection limit
0.30R>S	% recovery not applicable; spike level is less than 30% of the sample concentration
<RL	A result is less than the reporting limit
MRL	Method Reporting Limit
MDL	Method Detection Limit
N/A	Not Applicable

SLAG

SVL ANALYTICAL

CHAIN OF CUSTODY RECORD

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Page 1 of 1

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TEMP on Receipt:

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other slag

Report to Company: Alta Science + Engineering, Inc.
Contact: Shelley Hicks
Address: 1220 Big Creek Rd., Ste. A
Kellogg, ID 83837
Phone Number: 208-786-1206
FAX Number:
E-mail: shelley.hicks@alta-se.com

Invoice Sent To: Alta
Contact: Accounting
Address: 220 East Fifth St., Ste. 325
Moscow, ID 83843
Phone Number: 208-882-7858
~~FAX Number~~: e-mail: accounting@alta-se.com
PO#: 22075-30-30

Project Name: Ponderay Brownfields Cleanup
Sampler's Signature: Shelley Hicks

Indicate State of sample origination: ID **USACE?** ☐ Yes ☒ No

	Sample ID	Collection			Misc.		Preservative(s)							Analyses Required										Rush Instructions (Days)	Comments
	Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!	Date	Time	Collected by: (Init.)	Matrix Type (From Table 1)	No. of Containers	Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	split sample	SPLP (Pb, Cd, Zn, As, Hg)										
1	PSRC-SL-1	3/1/23	1635	LB	7	1	1							X	X										Split and pulverize ½ of sample.
2	PSRC-SL-2	3/1/23	1650	LB	7	1	1							X	X										
3	PSRC-SL-3	3/1/23	1705	LB	7	1	1							X	X										
4																									
5																									
6																									
7																									
8																									
9																									
10																									

Relinquished by: Shelley Hicks	Date: 3/1/23	Time: 1335	Received by: Melissa Gil	Date: 3/9/23	Time: 1335
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

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ISM

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TEMP on Receipt: —

Table 1. -- Matrix Type
1 = Surface Water, 2 = Ground Water
3 = Soil/Sediment, 4 = Rinsate, 5 = Oil
6 = Waste, 7 = Other_____

Report to Company: Alta Science + Engineering, Inc.
Contact: Shelley Hicks
Address: 1220 Big Creek Rd., Ste. A
Kellogg, ID 83837
Phone Number: 208-786-1206
FAX Number:
E-mail: shelley.hicks@alta-se.com

Invoice Sent To: Alta
Contact: Accounting
Address: 220 East Fifth St., Ste. 325
Moscow, ID 83843
Phone Number: 208-882-7858
~~FAX Number:~~ e-mail: accounting@alta-se.com
PO#: 22075-30-30

Project Name: Ponderay Brownfields Cleanup
Sampler's Signature: Shelley Hicks

Indicate State of sample origination: ID **USACE?** ☐ Yes ☒ No

	Sample ID	Collection			Misc.		Preservative(s)							Analyses Required										Rush Instructions (Days)	Comments
	Please take care to distinguish between: 1 and I, 2 and Z, 5 and S, Ø and O. Thanks!	Date	Time	Collected by: (Init.)	Matrix Type (From Table 1)	No. of Containers	Unpreserved	HNO_3 Filtered	HNO_3 Unfiltered	HCl	H_2SO_4	NaOH	Other (Specify)	dry and sieve -80 mesh	ISM prep	Total Metals (As, Cd, Pb, Zn, Hg)									
1	PSRC-DU1-ISM-0-0.5'-1	3/1/23	1218	SH	3	1	1							X	X	X									Air dry and sieve -80 mesh. ISM prep by ITRC guidance. (30-point composites). Analyze for metals: USEPA 6020: As, Cd, Pb, Zn USEPA 7471A: Hg • analyze (1) silica sand blank - unprocessed • analyze (1) silica sand blank - processed
2	PSRC-DU1-ISM-0-0.5'-2	3/1/23	1218	SH	3	1	1							X	X	X									
3	PSRC-DU1-ISM-0-0.5'-3	3/1/23	1218	SH	3	1	1							X	X	X									lab prep triplicate on this sample
4	PSRC-DU2-ISM-0-0.5'-1	3/1/23	1446	SH	3	1	1							X	X	X									
5	PSRC-DU3-ISM-0-0.5'-1	3/1/23	1520	SH	3	1	1							X	X	X									
6																									
7																									
8																									
9																									
10																									

Relinquished by: Shelley Hicks	Date: 3/9/23	Time: 1335	Received by: Melissa Cox	Date: 3/9/23	Time: 1335
Relinquished by:	Date:	Time:	Received by:	Date:	Time:

* Sample Reject: ☐ Return ☐ Dispose ☐ Store (30 Days)

White: LAB COPY Yellow: CUSTOMER COPY

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Appendix D
QA/QC Memorandum

Alta Science & Engineering, Inc.

alta-se.com

988 South Longmont Avenue, Suite 200
Boise, Idaho 83706
Ph: (208) 336-7080; Fax: (208) 908-4980

INTERNAL MEMORANDUM

To: Derek Forseth, Project Manager
Sarah Weppner, Quality Assurance Officer

From: Rachel Gibeault, Data Validator

Date: April 20, 2023

Contract No./Title: PSA Dated 7/8/2022

Alta Project No.: 22075

Subject: **QA/QC Review of the March 2023 Sampling Events at the Panhandle Smelting and Refining Company Site**

1 Introduction

This memorandum provides a summary of the data validation and data quality assessment performed on the sample results for the water (lake water, wall wash, and slag Synthetic Precipitation Leachate Procedure [SPLP] extraction) sampling effort, and the soil (sediment Incremental Sampling Methodology [ISM]) sampling effort that occurred on March 1, 2023 at the Panhandle Smelting and Refining Company (PSRC) Site located on the northern shoreline of Lake Pend Oreille, Ponderay, Idaho. Alta Science & Engineering, Inc.'s (Alta's) quality assurance/quality control (QA/QC) review followed guidelines set forth in the following documents:

- *Site Assessment Quality Assurance Project Plan [QAPP] for the Panhandle Smelting and Refining Company, Ponderay, Idaho* (Alta 2023)
- *National Functional Guidelines for Inorganic Superfund Methods Data Review* (USEPA 2020)
- *Incremental Sampling Methodology (ISM) Update ISM-2* (ITRC 2020)
- *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (USEPA 2009)
- *USEPA Guidance on Environmental Data Verification and Data Validation* (USEPA 2002)

This memorandum discusses the data validation and quality assessment performed for the Sample Delivery Group (SDG) or Work Orders listed in Table 1. Data qualifiers used in this review are defined by the U.S. Environmental Protection Agency (USEPA 2020).

Table 1. Sample Delivery Group Data Validation

Laboratory	SDG / Work Order	Analysis	Matrix	Data Validation Level (USEPA 2009)	Review Conducted by
SVL	X3C0135	total metals [a]	Soil	Stage 2A	Alta data validator
	X3C0131	SPLP metals [b], pH [c]	Slag SPLP extract		
Pace	L1592379	total and dissolved metals [a], pH [c], alkalinity [d], cations [e], anions [f], hardness [g]	Surface / wall wash water		

Footnotes:
[a] total and dissolved metal target analytes: arsenic, cadmium, lead, and zinc analyzed using USEPA Method 6020B (USEPA 2014); with mercury in soil using USEPA Method 7471A (USEPA 1994a) and in surface water analyzed using USEPA Method 7470A (USEPA 1994b).
[b] Synthetic Precipitation Leachate Procedure (SPLP) sieved and as-received metals target analytes: arsenic, cadmium, lead, and zinc analyzed using USEPA Method 6020B (USEPA 2014); with mercury analyzed using USEPA Method 7471A (USEPA 1994a).
[c] pH analyzed using USEPA Method 9040C (USEPA 2004).
[d] alkalinity analyzed using Standard Method (SM) 2320 B-2011.
[e] cation target analytes: calcium, potassium, magnesium, and sodium analyzed using USEPA Method 6010B (USEPA 1996).
[f] anion target analytes: chloride and sulfate analyzed using USEPA Method 9056A (USEPA 2007).
[g] hardness analyzed using USEPA Method 130.1 (USEPA 1971).
Pace = Pace National Analytical Laboratory, Inc. in Mt. Juliet, Tennessee.
SVL = SVL Analytical, Inc. in Kellogg, Idaho.

2 Data Validation and Quality Assessment Summary of Soil Results

Alta's Stage 2A validation of the analytical data and review of the field data are summarized in Table 2. Procedures/checks that require further discussion are explained below the table, as necessary.

Table 2. Data Quality Review Summary for Soil

Data Validation Procedure of Check	Acceptable Frequency? [a]	Acceptable Performance? [b]	Data Qualified?	Discussion Item Number
Sample condition upon receipt at laboratory	--	Y	N	
Preservation	--	Y	N	
Laboratory followed specified analytical methods and shows analysis dates	--	Y	N	
Holding times	--	Y	N	

Table 2. Data Quality Review Summary for Soil

Data Validation Procedure of Check	Acceptable Frequency? [a]	Acceptable Performance? [b]	Data Qualified?	Discussion Item Number
Requested target analyte results are reported with lab qualifiers and units	--	Y	N	
Requested reporting limits are present	--	N	N	1
Method Blanks	Y	N	Y	2
Surrogate Recoveries/Deuterated Monitoring Compounds Recoveries	-	-	-	
Matrix Spikes (MS)	Y	N	N	3
Laboratory Control Samples (LCS)	Y	Y	N	
Matrix Spike Duplicates (MSD)	Y	Y	N	
Trip Blank	-	-	-	
Field Duplicates	-	-	-	
Field Replicates (ISM) (Table 3)	Y	Y	N	4
Laboratory Replicate (ISM) (Table 3)	Y	Y	N	5
Processed/Unprocessed Silica Blanks (Table 4)	Y	N	Y	6

[a] Frequencies as defined in the QAPP (Alta 2023).
[b] As defined in the QAPP (Alta 2023) or based on professional judgment of the data validator.
-- = not applicable

Discussion Item

1. **Requested reporting limits are present:** Most reporting limits (RLs) were reported as requested in the QAPP (Alta 2023) except for soil samples: PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1, which were raised by factors of 2 and 20, depending on the sample and analyte due to dilution. As a result, the RL for arsenic (3.00 milligrams per kilogram [mg/kg]) exceeds its screening level (0.68 mg/kg) in these samples. However, all samples have arsenic detections above the method detection limit (MDL; 0.118 mg/kg) and qualified by the laboratory as estimated (J). Further qualifications are necessary based on other data quality indicators (see Discussion Item #2).
2. **Method Blanks:** Most method blanks did not have any concentrations detected above the MDL for the constituents of concern (COCs) as listed in Table 1, except for total arsenic, which had a detected concentration of 0.0274 J mg/kg, which is greater than the MDL and less than the RL. Total arsenic in samples PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1 was

detected between the MDL and the RL and qualified as estimated (J) by the laboratory. However, according to the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), due to detection in the method blank of arsenic below the RL, all detections of arsenic in ISM samples that are less than the RL will be reported at the RL and qualified as U. However, arsenic may be present at the site above the screening level (0.68 mg/kg).

3. **Matrix Spikes (MS):** Most percent recoveries for MS soil samples are within laboratory and QAPP (Alta 2023) limits with the following exceptions:
    a. Lead: the sample concentration is greater than four times the spike amount and accurate spike recoveries cannot be evaluated. The laboratory control sample (LCS) percent recovery (%R) is within acceptable limits. No qualification is necessary.
    b. Zinc: the sample concentration is greater than four times the spike amount and accurate spike recoveries cannot be evaluated. The LCS %R is within acceptable limits. No qualification is necessary.
4. **Field Replicates:** The percent Relative Standard Deviations (RSDs), or coefficients of variation (CVs), are generally considered reasonable for field conditions for the decision units (DUs) where replicate samples were collected (Table 3). No data were qualified based on field replicate results as all RSDs were below the ITRC ISM (ITRC 2020) recommendation of less than or equal to 30%.
5. **Laboratory Replicate:** Laboratory replicates (also known as subsampling replicates) were recommended in the QAPP (Alta 2023) to assess the precision of ISM subsampling processes and ensure that the subsample selected for analysis is representative of the entire field sample collected for processing. These replicates should then be carried through the rest of the analytical process. The RSDs are all below the ITRC ISM (ITRC 2020) recommendation of less than or equal to 30% (Table 3). No data are qualified.

Table 3. ISM Metals Soil Field and Laboratory Replicate Analysis

Sample ID	Unit	Arsenic	Cadmium	Lead	Zinc	Mercury
Field Replicate						
PSRC-DU1-ISM-0-0.5'-1	mg/kg	3.00 U	0.145	10.8	47.3	0.011 U
PSRC-DU1-ISM-0-0.5'-2	mg/kg	3.00 U	0.139	10.9	43.4	0.011 U
PSRC-DU1-ISM-0-0.5'-3	mg/kg	3.00 U	0.14	9.93	38.5	0.011 U
Mean	mg/kg	-	0.141	10.54	43.1	-
Standard Deviation	mg/kg	-	0.003	0.4	3.6	-
Relative Standard Deviation	mg/kg	-	2%	4%	8%	-
Laboratory Replicate						
PSRC-DU1-ISM-0-0.5'-3	mg/kg	3.00 U	0.140	9.93	38.5	0.011 U
PSRC-DU1-ISM-0-0.5'-3 (Dup1)	mg/kg	3.00 U	0.157	9.38	36.1	0.011 U
PSRC-DU1-ISM-0-0.5'-3 (Dup2)	mg/kg	3.00 U	0.132	9.14	36.3	0.011 U
Mean	mg/kg	-	0.143	9.48	37.0	-
Standard Deviation	mg/kg	-	0.010	0.3	1.1	-
Relative Standard Deviation	mg/kg	-	7%	3%	3%	-

Relative standard deviation = (Standard Deviation/Mean Concentration)*100
U = concentration is not detected above the reporting limit (for arsenic) or method detection limit (for mercury) shown
All samples collected on March 1, 2023.

6. **Processed/Unprocessed Silica Blank:** For ISM preparation blanks, both a processed and an unprocessed silica sand blank were collected as required in the QAPP (Alta 2023). Most COCs were below MDLs except for the following COCs (Table 4):
    a. Total arsenic was detected in both the unprocessed and processed silica sand blank (0.108 J mg/kg and 0.165 J mg/kg, respectively). However, as mentioned in Discussion Item #2, arsenic was detected in the method blank, and therefore is reported at the RL and qualified as non-detect (U) in the processed and unprocessed silica sand blanks. No further qualification is required.
    b. Total lead was detected in both the unprocessed and processed silica sand blanks (0.396 mg/kg and 26.5 mg/kg, respectively). According to the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), when the blank result is greater than the RL, but the field sample result is less than 10 times the blank sample result, then the result is reported at the preparation blank result and qualified as estimated with a high bias (J+). Therefore, the lead results in all samples will be reported at 26.5 mg/kg J+.
    c. Total zinc was detected in the unprocessed and processed silica sand blank (1.70 mg/kg and 2.33 mg/kg, respectively). According to the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), when the blank result is greater than the RL, and the field sample result is greater than 10 times the blank sample result, then no qualification is needed.

Table 4. Silica Blank Sample Analysis

Sample Date	Analyte	Unprocessed Concentration (mg/kg)	Processed Concentration (mg/kg)
3/9/2023	total arsenic	3.00 U	3.00 U
	total cadmium	<0.072	<0.072
	total lead	**0.396**	**26.5**
	total zinc	**1.70**	**2.33**
	total mercury	<0.011	<0.011

< = less than the method detection limit shown
J = concentration is an estimate
U = concentration is not detected above the reporting limit shown based on internal data validation

3 Data Validation and Quality Assessment Summary of Water Results

Alta's Stage 2A validation of the analytical data and review of the field data are summarized in Table 5. Procedures/checks that require further discussion are explained below the tables, as necessary.

Table 5. Data Quality Review Summary for Surface Water, Wall Wash Water, and SPLP Extract

Data Validation Procedure or Check	Acceptable Frequency? [a]	Acceptable Performance? [b]	Data Qualified?	Discussion Item Number
Sample condition upon receipt at laboratory	--	Y	N	
Preservation	--	Y	N	1
Holding times	--	N	N	2
Laboratories followed specified analytical methods and show analysis dates	--	N	N	3
Requested target analyte results are reported with lab qualifiers and units	--	Y	N	
Requested reporting limits are present	--	Y	N	4
Method blanks	Y	N	Y	5
Surrogate Recoveries/Deuterated Monitoring Compounds Recoveries	--			
Laboratory Control Samples (LCS)	Y	Y	N	
Laboratory Control Sample Duplicates (LCSDs)	--			
Matrix Spikes (MS)	N	Y	Y	6
Matrix Spike Duplicates (MSD)	N	Y	Y	6
Field Duplicates (Table 6)	Y	Y	N	7
Field Blank	Y	Y	N	8
Rinsate Blank (Table 7)	Y	N	N	9
Equipment Blank (Table 8)	Y	N	Y	10

[a] Frequencies as defined in the QAPP (Alta 2023).

[b] As defined in the QAPP (Alta 2023), or based on professional judgment of the data validator.

-- = not applicable

Discussion Items:

1. **Preservation:**
   a. Alkalinity is determined in the laboratory (Pace) by how much acid is needed to reach a pH of 4.5 from the starting pH of each sample. There are sample narratives for alkalinity for samples PSRC-WW-1, PSRC-WW-2, PSRC-WW-3, and PSRC-WW-EB. Prior to running the alkalinity analysis, headspace comments are added when a sample container has headspace (or when a container is not completely filled) because headspace can affect alkalinity results

with a low bias, especially over a long period of time. According to the Sample Summary report, there was a span of eight days between sample collection and sample preparation at the laboratory (Pace). No qualifications are necessary.

b. Per the laboratory's (Pace's) Standard Operating Procedure, pH is read at room temp with a pH temperature compensating probe that corrects to a temperature of 25°C. There are sample narratives for pH for samples PSRC-WW-1, PSRC-WW-2, PSRC-WW-3, and PSRC-WW-EB reporting that these pH values were recorded at temperatures 18.3°C or 18.5°C. No qualification is necessary.

2. **Holding times:** Most holding times were met for those analyses listed in Table 1 except for the following instance:
   a. pH: For samples PSRC-WW-1, PSRC-WW-2, PSRC-WW-3, and PSRC-WW-EB, the holding time is 15 minutes after sample collection, which occurred on March 1, 2023. The laboratory prepared these samples on March 8, 2023. Based on professional judgment, no qualification is necessary.
3. **Laboratories followed specified analytical methods:** Most analyses in the QAPP (Alta 2023) were followed by the laboratory except for the following:
   a. Anions sulfate and chloride were requested to be analyzed using USEPA Method 300.0. The laboratory used USEPA Method 9056A instead.
   b. Cations calcium, potassium, magnesium, and sodium were requested to be analyzed using USEPA Method 6020. The laboratory used USEPA Method 6010B instead.
   c. pH was requested to be analyzed using SM 4500-H+B. The laboratory used USEPA Method 9040C instead.
4. **Requested reporting limits are present:** Most RLs met QAPP limits (Alta 2023). However, the RL for potassium and sodium were elevated due to dilution. Nevertheless, there are no screening levels for these two COCs; therefore, based on professional judgment, no qualifications are necessary.
5. **Method blanks:** A laboratory or method blank is a sample of known matrix where the specific constituents requested for analysis are known to be absent or are present at concentrations less than the laboratory minimum limit of detection. The laboratory blank is analyzed to evaluate the accuracy of the analysis. Most method blank results were less than the MDL (or considered to be not detected) except for the following instances:
   a. For SDG L1592379 (water): Total and dissolved lead and zinc were detected in the method blank at concentrations that are greater than the MDL and less than the RL. Based on the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), if the associated field sample results from PSRC-WW-1, PSRC-WW-2, PSRC-WW-3, and PSRC-WW-EB are less than the RL, then those detections will be reported at the RL and qualified as not detected (U). However, when a detection is greater than the RL, then those detections do not require qualification.
      i. Total lead was detected with a concentration of 0.00175 J milligrams per liter (mg/L) in the method blank. Associated sample PSRC-WW-EB had a concentration of 0.00332 mg/L total lead, which is above the RL, and will not require qualification.
      ii. Dissolved lead was detected with a concentration of 0.00191 J mg/L in the method blank. Associated sample PSRC-WW-EB had a concentration of 0.00220 mg/L, which is above the RL, and will not require qualification.
      iii. Total zinc was detected with a concentration of 0.0148 J mg/L in the method blank. Associated sample PSRC-WW-EB had a concentration of 0.00584 J mg/L, which is below the RL. Therefore, total zinc in this sample will be reported at the RL and qualified as not detected (U).

iv. Dissolved zinc was detected with a concentration of 0.00310 J mg/L in the method blank. Associated sample PSRC-WW-EB had a concentration of 0.00646 J mg/L, which is below the RL. Therefore, dissolved zinc in this sample will be reported at the RL and qualified as not detected (U).

b. For SDG X3C0131 (SPLP extract): Total arsenic, total lead, and total zinc were detected in the method blank at concentrations that are greater than the MDL and less than the RL. Based on the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), due to detections in the method blank of total arsenic, total lead, and total zinc below the RL, detections of total arsenic, total lead, and total zinc in SPLP samples that are less than the RL will be reported at the RL and qualified as U. The following actions will be applied in the associated samples PSRC-SL-1 (as received and sieved), PSRC-SL-2 (as received and sieved), and PSRC-SL-3 (as received and sieved):
   i. For total arsenic:
      1. In the sieved samples, total arsenic was detected between the MDL and RL; therefore, arsenic will be reported at the RL and qualified as not-detected (U).
      2. In the as received samples, total arsenic was detected above the RL and requires no qualification.
   ii. For total lead, all sample results were detected above the RL and do not require qualification.
   iii. For total zinc:
      1. In PSRC-SL-2 (sieved) and PSRC-SL-3 (sieved), total zinc was detected between the MDL and RL; therefore, total zinc will be reported at the RL and qualified as not-detected (U).
      2. In all other samples, total zinc was detected above the RL and requires no qualification.

6. **Matrix Spike/Matrix Spike Duplicate (MS/MSD):** An MS sample has a known amount of the target analyte added to project matrix before analysis to assess possible matrix interferences on the analysis. According to the QAPP (Alta 2023), a site-specific MS/MSD sample was to be collected (an equal volume of matrix collected from a specific site location) at a frequency of 1:20 samples.
   a. SDG L1592379 (water): Extra volume for MS/MSD analyses was not collected at any of the sample locations. Therefore, the laboratory analyzed an MS/MSD sample from a different site. According to the National Functional Guidelines for Inorganics: ICP-MS and mercury (USEPA 2020), for a MS/MSD sample analysis that does not meet the technical criteria, detected results should be qualified as estimated (J) and non-detected results should be qualified as estimated (UJ) for all samples of the same matrix, if the samples are considered sufficiently similar. As a result, the following analytes will be qualified:

Sample ID	Analyte(s)	Applied Qualifier
PSRC-SW-1	total and dissolved arsenic total and dissolved zinc	J
	total and dissolved cadmium total and dissolved lead total and dissolved mercury	UJ

Sample ID	Analyte(s)	Applied Qualifier
PSRC-SW-1-FB	total and dissolved arsenic total and dissolved cadmium total and dissolved lead total and dissolved mercury total and dissolved zinc	UJ
PSRC-SW-1-FD	total and dissolved arsenic total and dissolved zinc	J
	total and dissolved cadmium total and dissolved lead total and dissolved mercury	UJ
PSRC-SW-1-RB	dissolved zinc	J
	total and dissolved arsenic total and dissolved cadmium total and dissolved lead total and dissolved mercury total zinc	UJ

b. SDG X3C0131 (SPLP extract): An MS/MSD was used from sample PSRC-SL-1 (sieved). The total zinc MS/MSD %Rs (45.4% and 43.0%, respectively) were below the lower limit (75.0%). No post-digestion spike was performed. Therefore, according to the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), detections of total zinc in PSRC-SL-1 (sieved) will be qualified as estimated with a low bias (J-).

7. **Field Duplicate:** The Alta field crew collected the following surface water field duplicate sample as guided in the QAPP (Alta 2023), which meets the criteria of 1 duplicate sample for every 20 field samples:

   - PRSC-SW-1 (original) / PRSC-SW-1-FD (duplicate)

   Although total and dissolved arsenic and total and dissolved zinc were detected in both the original and duplicate sample as shown in Table 5 below, the detections were less than 5 times the analyte-specific RLs. Additionally, the absolute difference between the original and duplicate concentrations of these detected analytes are less than the analyte-specific RL. No additional qualifications are necessary.

Table 6. Field Duplicate Analysis for Surface Water

Sample ID	Sample Date	Analyte	Original Concentration (mg/L)		Duplicate Concentration (mg/L)		RPD
PRSC-SW-1 / PRSC-SW-1-FD	3/1/2023	hardness as CaCO3	250		244		NC
		total mercury	0.000200	UJ	0.000200	UJ	NA
		dissolved mercury	0.000200	UJ	0.000200	UJ	NA
		total arsenic	0.000857	J	0.000795	J	NC
		dissolved arsenic	0.000676	J	0.000658	J	NC
		total cadmium	0.00100	UJ	0.00100	UJ	NA
		dissolved cadmium	0.00100	UJ	0.00100	UJ	NA
		total lead	0.00200	UJ	0.00200	UJ	NA
		dissolved lead	0.00200	UJ	0.00200	UJ	NA
		total zinc	0.007670	J	0.00663	J	NC
		dissolved zinc	0.005540	J	0.00520	J	NC

Relative Percent Difference (RPD) = |X1-X2|/((X1+X2)/2)*100

Where: X1 = Original Concentration and X2 = Duplicate Concentration

NA = RPD cannot be calculated because one or more of the results are not detected.

NC = Non-calculable; original or duplicate concentrations were less than 5x analyte-specific reporting limits and the absolute difference between the original and duplicate concentrations are less than the analyte-specific reporting limits (USEPA 2020)

mg/L = milligrams per liter

UJ = result is estimated based on internal data validation and not detected above the method detection limit

J = the result is estimated

8. **Field Blank:** The Alta field crew collected the surface water field blank sample labeled PSRC-SW-1-FB as guided in the QAPP (Alta 2023), which meets the criteria of 1 field blank sample for every 20 field samples. None of the analytes were detected above the MDL. No qualifications are necessary.
9. **Rinsate Blank:** The Alta field crew collected the surface water rinsate blank sample labeled PSRC-SW-1-RB from a churn splitter as guided in the QAPP (Alta 2023), which meets the criteria of 1 blank sample for every 20 field samples. As shown in Table 7 below, dissolved zinc was detected with a concentration of 0.00373 J mg/L, which is below the RL. Based on the National Functional Guidelines for Inorganics: ICP-MS (USEPA 2020), field samples from similar sample types (or all surface water samples) had dissolved zinc concentrations less than the RL. Therefore, dissolved zinc in PSRC-SW-1 will be reported at the RL and qualified as not detected (U).

Table 7. Rinsate Blank Analysis

Sample ID	Sample Date	Analyte	Reported Concentration (mg/L)	
PSRC-SW-1-RB	3/1/2023	hardness as $CaCO_3$	30.0	U
		total mercury	0.000200	UJ
		dissolved mercury	0.000200	UJ
		total arsenic	0.00200	UJ
		dissolved arsenic	0.00200	UJ
		total cadmium	0.00100	UJ
		dissolved cadmium	0.00100	UJ
		total lead	0.00200	UJ
		dissolved lead	0.00200	UJ
		total zinc	0.0250	UJ
		dissolved zinc	**0.00373**	J

mg/L = milligrams per liter

J = result is an estimate

U = not detected above the method detection limit

UJ = result is estimated based on internal data validation and not detected above the method detection limit

10. **Equipment Blank:** The Alta field crew collected the wall wash equipment blank sample labeled PSRC-WW-EB from plastic sheeting and caulk as guided in the QAPP (Alta 2023), which meets the criteria of 1 blank sample for every 20 field samples. Table 8 below shows the following analytes with detections: hardness as $CaCO_3$, chloride, sulfate, calcium, magnesium, potassium, sodium, total and dissolved arsenic, and total and dissolved lead. Although total and dissolved zinc were detected above the MDL but below the RL, these results were raised to the RL and qualified as not detected (U) based on method blank detections (see Discussion Item #5a above). Based on professional judgment, field samples from similar sample types (or all wall wash samples) that have concentrations less than 10 times the equipment blank detections will be qualified as estimated (J) while non-detects will not require any qualification (Table 8).

Table 8. Equipment Blank Analysis

Sample ID	Sample Date	Analyte	Reported Concentration (mg/L)	
PSRC-WW-EB	3/1/2023	**hardness as $CaCO_3$**	**226**	
		chloride	**25.2**	
		sulfate	**12.0**	
		total mercury	0.000200	U
		dissolved mercury	0.000200	U
		calcium	**76.1**	
		magnesium	**18.0**	
		potassium	**1.27**	J
		sodium	**8.11**	
		total arsenic	**0.00070**	J
		dissolved arsenic	**0.00063**	J
		total cadmium	0.00100	U
		dissolved cadmium	0.00100	U
		total lead	**0.00332**	
		dissolved lead	**0.00220**	
		total zinc	0.0250	U
		dissolved zinc	0.0250	U

U = not detected above the method detection limit or reporting limit (total and dissolved zinc)
J = result is an estimate

Table 9. Equipment Blank Analysis Qualifying Actions

Sample ID	Analyte	Action
PSRC-WW-1	hardness as $CaCO_3$, chloride, sulfate, calcium, magnesium, potassium, sodium, and dissolved arsenic	J
	total arsenic, total and dissolved lead, and total and dissolved zinc	no qualifications are necessary
PSRC-WW-2	hardness as $CaCO_3$, chloride, sulfate, calcium, magnesium, potassium, and sodium	J
	total and dissolved arsenic, total and dissolved lead, and total and dissolved zinc	no qualifications are necessary
PSRC-WW-3	hardness as $CaCO_3$, chloride, sulfate, calcium, magnesium, potassium, sodium, and dissolved arsenic	J
	total arsenic, total and dissolved lead, and total and dissolved zinc	no qualifications are necessary

4 Overall Assessment

4.1 Data Accuracy and Precision

Based on this data quality review, Alta determines the laboratory and field data to be of acceptable quality except for the qualifications that are discussed below.

4.1.1 Accuracy

Alta's QAO qualified the following data based on accuracy results (LCS or MS):

- Total and dissolved arsenic, and total and dissolved zinc are qualified as estimated (J) in samples PSRC-SW-1 and PSRC-SW-1-FD due to the MS analysis not sourced from the site.
- Dissolved zinc in sample PSRC-SW-1-RB is qualified as estimated (J) due to the MS analysis not sourced from the site.
- All results in PSRC-SW-1, PSRC-SW-1-FD, PSRC-SW-1-FB, and PSRC-SW-1-RB that are below the method detection limit are qualified as estimated (UJ) due to the MS analysis not sourced from the site.
- Total zinc in sample PSRC-SL-1 (sieved) will be qualified as estimated with a low bias (J-) based on a low MS/MSD %R.

4.1.2 Precision

Alta's QAO will qualify the following data based on precision results (MSD or field duplicate):

- Total and dissolved arsenic, and total and dissolved zinc are qualified as estimated (J) in samples PSRC-SW-1 and PSRC-SW-1-FD due to the MSD analysis not sourced from the site.
- Dissolved zinc in sample PSRC-SW-1-RB is qualified as estimated (J) due to the MSD analysis not sourced from the site.
- All results in PSRC-SW-1, PSRC-SW-1-FD, PSRC-SW-1-FB, and PSRC-SW-1-RB that are below the method detection limit are qualified as estimated (UJ) due to the MSD analysis not sourced from the site.

4.2 Data Sensitivity

Method blanks, field blanks, rinsate blanks, silica sand blanks, and equipment blanks were collected to assess sample collection and decontamination methods in the field and laboratory. The following data is qualified based on detections in a blank sample:

- Total arsenic in samples PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1 will be reported at the RL and qualified as not detected (U) based on a detection in the method blank.
- Total arsenic in samples PSRC-SL-1 (sieved), PSRC-SL-2 (sieved), and PSRC-SL-3 (sieved) will be reported at the RL and qualified as not detected (U) based on a method blank detection.
- Total zinc in samples PSRC-SL-2 (sieved) and PSRC-SL-3 (sieved) will be reported at the RL and qualified as not detected (U) based on a method blank detection.
- Total lead in samples PSRC-DU1-ISM-0-0.5'-1, PSRC-DU1-ISM-0-0.5'-2, PSRC-DU1-ISM-0-0.5'-3, PSRC-DU1-ISM-0-0.5'-3 (Dup1), PSRC-DU1-ISM-0-0.5'-3 (Dup2), PSRC-

DU2-ISM-0-0.5'-1, and PSRC-DU3-ISM-0-0.5'-1 will be reported at the processed silica blank result (26.5 mg/kg) and qualified as estimated with a high bias (J+).

- Total and dissolved zinc in sample PSRC-WW-EB will be reported at the RL and qualified as not detected (U) based on a detection in the method blank.
- Hardness as CaCO3, chloride, sulfate, calcium, magnesium, potassium, sodium, and dissolved arsenic will be qualified as estimated (J) in sample PSRC-WW-1 based on the equipment blank analysis.
- Hardness as CaCO3, chloride, sulfate, calcium, magnesium, potassium, and sodium will be qualified as estimated (J) in sample PSRC-WW-2 based on the equipment blank analysis.
- Hardness as CaCO3, chloride, sulfate, calcium, magnesium, potassium, sodium, and dissolved arsenic will be qualified as estimated (J) in sample PSRC-WW-3 based on the equipment blank analysis.
- Total and dissolved zinc in samples PSRC-SW-1 and PSRC-SW-1-FD will be reported at the RL and qualified as not detected (U) based on a detection in the method blank.

It should be noted that one or more sample and/or QC results were flagged "B," "E," "T8," and "V" by the laboratory to indicate QC parameters that did not meet the laboratory or method QC criteria. These flags are qualitative and do not necessarily indicate that data validation qualifier should be assigned. Except for "J" flags, laboratory-assigned qualifiers are for informational purposes only. Data validation qualifiers, if assigned, supersede the laboratory-assigned flags.

4.3 Data Usability

The Alta QAO did not reject any data; therefore, according to the QAPP (Alta 2023), the completeness for this sampling event is calculated at 100%, which meets the DQO of 90%.

5 References and Resources Used

Alta Science & Engineering, Inc. (Alta), 2023. Site Assessment Quality Assurance Project Plan for the Panhandle Smelting and Refining Company, Ponderay, Idaho. Prepared for the City of Ponderay. January 26.

Interstate Technology & Regulatory Council (ITRC), 2020. Incremental Sampling Methodology (ISM) Update ISM-2. October.

Standard Method (SM). 2320 alkalinity In: Standard Methods For the Examination of Water and Wastewater.

U.S. Environmental Protection Agency (USEPA), 1971. Method 130.1: Hardness, Total (mg/L as CaCO3) (Colorimetric, Automated EDTA) by Spectrophotometer.

USEPA, 1994a. Method 7471A (SW-846): Mercury in Solid or Semisolid Waste (Manual Cold-vapor Technique). Revision 1, September.

USEPA,1994b. Method 7470A (SW-846): Mercury in Liquid Waste (Manual Cold-vapor Technique). Revision 1, September.

USEPA, 1996. Method 6010B: Inductively Coupled Plasma-Atomic Emission Spectrometry. Revision 2, December.

USEPA, 2002. USEPA Guidance on Environmental Data Verification and Data Validation. USEPA QA/G-8; November.

USEPA, 2004. Method 9040C: pH Electrometric Measurement. Revision 3, November.

USEPA, 2007. Method 9056A: Determination of Inorganic Anions by Ion Chromatography. Revision 1, February.

USEPA, 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. OSWER No. 9200.1-85, USEPA 540-R-08-005 prepared by the Office of Solid Waste and Emergency Response; January.

USEPA, 2014. Method 6020B: Inductively Coupled Plasma-Mass Spectrometry. Revision 2, July.

USEPA, 2020. National Functional Guidelines for Inorganic Superfund Methods Data Review, Office of Superfund Remediation and Technology Innovation (OSRTI). OLEM 9240.1-66, USEPA-542-R-20-006; November.

Appendix E

Geotechnical results and test pit soil logs

Alta Science & Engineering, Inc.

TEST PIT TP-1

(Page 1 of 1)

Project No.:	: 22075-30
Site:	: Ponderay, ID
Logged By:	: Tom Jenkins
Reviewed By:	: Brett McLees - PGL 1755
Signature:	:

Date Started	: 3/1/23 12:50
Date Completed	: 3/1/23 14:50
Excavator	: McGilliury
Excavation Method	: Mini Excavator BobcatE50
Ground Elevation	: ~2,115
Test Pit Depth	: 6'
Other:	: Located SE of MW-1 and
	: SW of furthest south
	: roaster
	: 48.30156, -1165315

Depth (ft)	Sample ID	Column	USCS	MATERIAL DESCRIPTION
0	TP-1		SM	SILTY SAND: 50% subangular course sand well sorted sands, 50% fines. Dark Brown, heavy root material some red brick in this zone, some charcoal, dry to slightly moist, non plastic.
			ML	SILTY CLAY: with very fine sands, 50% clays; 50% silts with fine sand, low plasticity, yellowish brown - tan to light grey, dry, crumbles when dry. <1" ribbon when wettened. very stiff (dry) very thinly bedded, high dry strength.
			SM	SILTY SAND: 80% sands; 20% fines, non plastic, light brown, moist to slightly moist, soft, lithics; quartz, loose, decomposed driftwood at 2'
5			SM	SILTY CLAY: 60% clay; 40% silt, trace sands, similar to 1-2' with slightly higher clay content and less fine sand, dry to slightly moist, crumbles when dry. >1" ribbon when wetted, very stiff (dry), very thinly bedded, yellow-orange mottling iron, tan buff to light grey, high dry strength
10				

Alta Science & Engineering, Inc.

TEST PIT TP-2

Project No.:	: 22075-30
Site:	: Ponderay, ID
Logged By:	: Tom Jenkins
Reviewed By:	: Brett McLees - PGL 1755
Signature:	:

Date Started	: 3/1/23 10:30
Date Completed	: 3/1/23 11:45
Excavator	: McGilliury
Excavation Method	: Mini Excavator BobcatE50
Ground Elevation	: ~2,117
Test Pit Depth	: 6'
Other:	: West end of central
	: roaster
	: 48.30191, -116.53145

Depth (ft)	Sample ID	Column	USCS	MATERIAL DESCRIPTION
0			SM	SILTY SAND: 50% sand, 40% fines, course, subangular, well graded, Dark Brown, roots and red brick, steel I-beam and concrete footing, non plastic, dry to slightly moist
			SM	SILTY SAND: 80% sand, 20% fines, sand course to fine, rounded, well graded, light grey, non plastic, highly disturbed iron historical building activities, dry to slightly moist, 4" layer sandy silt; 80% silt, 20% sand, brownish red with charcoal (not throughout full horizon) some bricks.
	TP-1		CL	SILTY CLAY: with trace sands, 50% silt, 50% clay, tan-buff, light grey, dry to slightly moist, cumbles when dry, >1" ribbon when wetted, very stiff (dry) very thinly bedded (<1/2" layers), high dry strength
5				
10				

Alta Science & Engineering, Inc.

TEST PIT TP-3

Project No.:	: 22075-30
Site:	: Ponderay, ID
Logged By:	: Tom Jenkins
Reviewed By:	: Brett McLees
Signature:	:

Date Started	: 3/1/23 12:00
Date Completed	: 3/1/23 13:00
Excavator	: McGilliury
Excavation Method	: Mini Excavator BobcatE50
Ground Elevation	: ~2,117
Test Pit Depth	: 6'
Other:	: Located N of furthest N : roaster between roaster : and footpath that leads to : slagpile

Depth (ft)	Sample ID	Column	USCS	MATERIAL DESCRIPTION
0	TP-1		SM	SANDY SILT: 50% subangular course sand (well sorted), 50% fines. Dark Brown, heavy root, some charcoal, dry to slightly moist, no plasticity.
			ML	SILTY CLAY: with very fine sands, 50% clays, 50% fines, yellow brown to tan, dry, crumbles when dry, <1" ribbon when wetted, very stiff (dry), medium plasticity (when wet).
			SM	SILTY SAND: 80% sands (well sorted, very fine); 20% fines, non plastic, light brown, moist to slightly moist to moist, soft, non plastic, lithics: quartz
5			CL	SILTY CLAY: 60% clay; 40% silt, trace sands, similar to 4-4.5',lighter grey, dry, >1" ribbon when wetted, very stiff (dry), high dry strength
10				

TABLE 1
CITY OF PONDERAY SMELTER CLOSE
SUMMARY OF SOIL DATA

Sample Type	Sample Identification	Sample Depth (ft.)	USCS Soil Classification	Delivered Moisture (%)	Atterberg Limits			Grain Size Distribution			Specific Gravity	Moisture/Density Relationship Standard Proctor		Additional Tests Comments (See Notes)
					LL	PL	PI	% Finer 3/4"	% Finer #4	% Finer #200		Dry Density (pcf)	Moisture (%)	
Pail	PSRC-TP-1-2'-4'-030123	2-4	CL-ML	--	22	16	6	100	100	63	--	--	--	
Pail	PSRC-TP-1-4'-6'-030123	4-6	CL	--	33	20	13	100	99	85	--	--	--	
Pail	PSRC-TP-2-0.5'-2'-030123	0.5-2	SM	--	NP	NP	NP	97	95	29	--	--	--	
Pail	PSRC-TP-2-2'-6'-030123	2-6	CL-ML	--	26	19	7	100	99	68	--	--	--	
Pail	PSRC-TP-3-1'-6'-030123	1-6	CL	--	27	17	10	100	100	73	--	--	--	

NOTES:

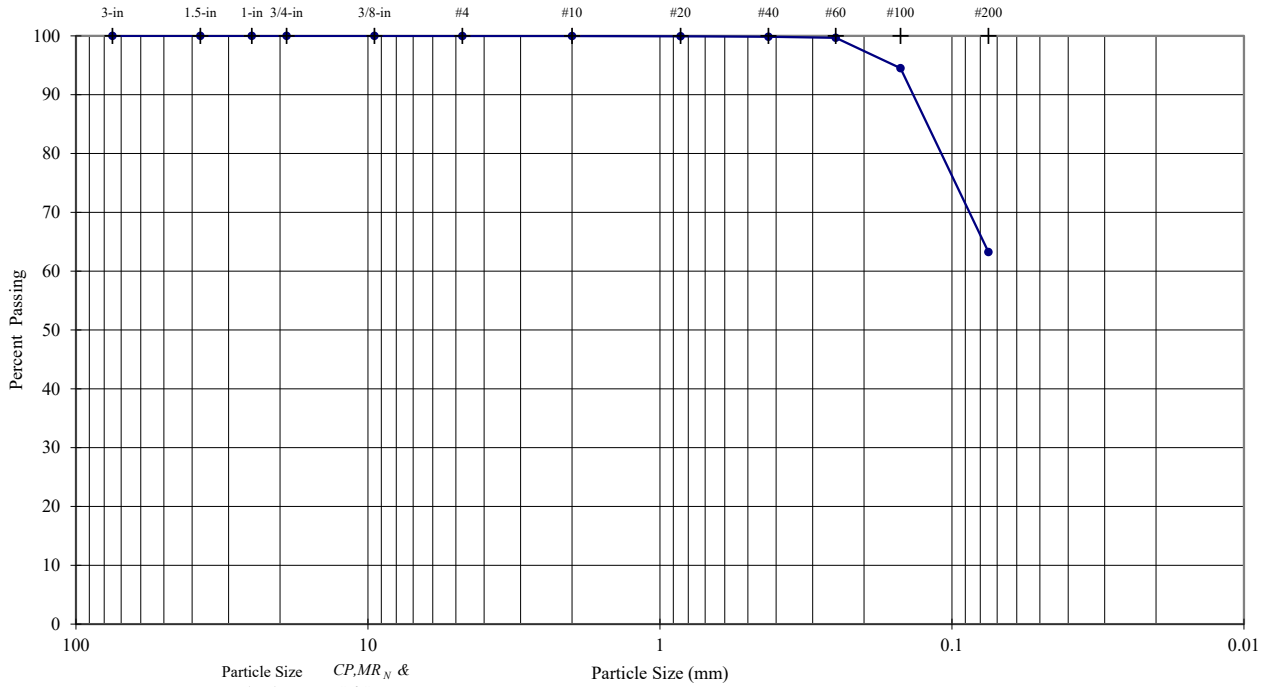
LL= LIQUID LIMIT
PL= PLASTIC LIMIT
PI= PLASTIC INDEX
SL= SHRINKAGE LIMIT
UW= UNIT WEIGHT

T = TRIAXIAL TEST
U = UNCONFINED COMPRESSION TEST
C = CONSOLIDATION TEST
DS = DIRECT SHEAR TEST
PERM = PERMEABILITY
CP = COMPRESSION PERMEABILITY

PARTICLE-SIZE DISTRIBUTION & ATTERBERG LIMITS

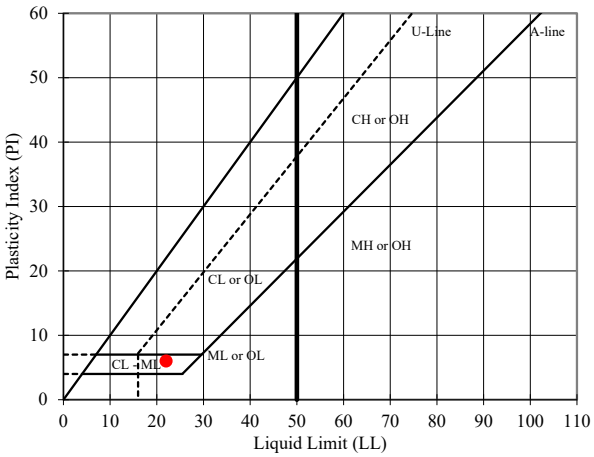
ASTM D421, D6913 (Method A), D4318

PROJECT NAME: **City of Ponderay Smelter Close**
SAMPLE ID: **PSRC-TP-1-2'-4'-030123** DEPTH (ft): **2-4**
TYPE: **Pail**



Sieve Analysis
Composite sieving, No. 4 (4.75-mm) separating sieve.

Sieve	Particle Size (mm)	CP,MR_N & $SubS,MR_N$	% Passing
3-in	75.0	0.0	**100.0**
1.5-in	37.5	0.0	**100.0**
1-in	25.0	0.0	**100.0**
3/4-in	19.0	0.0	**100.0**
3/8-in	9.5	0.0	**100.0**
#4	4.75	2.6	**100.0**
#10	2.00	0.01	**100.0**
#20	0.850	0.10	**99.9**
#40	0.425	0.17	**99.8**
#60	0.250	0.38	**99.7**
#100	0.150	11.06	**94.5**
#200	0.075	66.88	**63.3**



USCS Description (ASTM D 2487):

Sandy silty clay, brown, wet

USCS **CL-ML**

S,M_d	12729.1
$SubS,FCPR_{first}$	0.0%

LL	**22**
PL	**16**
PI	**6**

As-Received Moisture Content (%)

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Notes: Specimens obtained from sample following air-dried procedures.
0 g of particles were removed from sample prior to sieve analysis testing.
Particle size analysis sample was not dispersed
Dry mass of finer fraction and finer fraction subspecimen calculated using an auxilliary water content sample.
Sieve analysis mass values are directly mesaured or calculated individual masses. Mass measurements for water content and material loss calculations, total mass of coarse and fine portions, and finer portion subspecimen cumulative mass retained omitted for brevity and are available upon request.
Sample prepared for Atterberg Limits testing by the dry method.
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving.
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device.

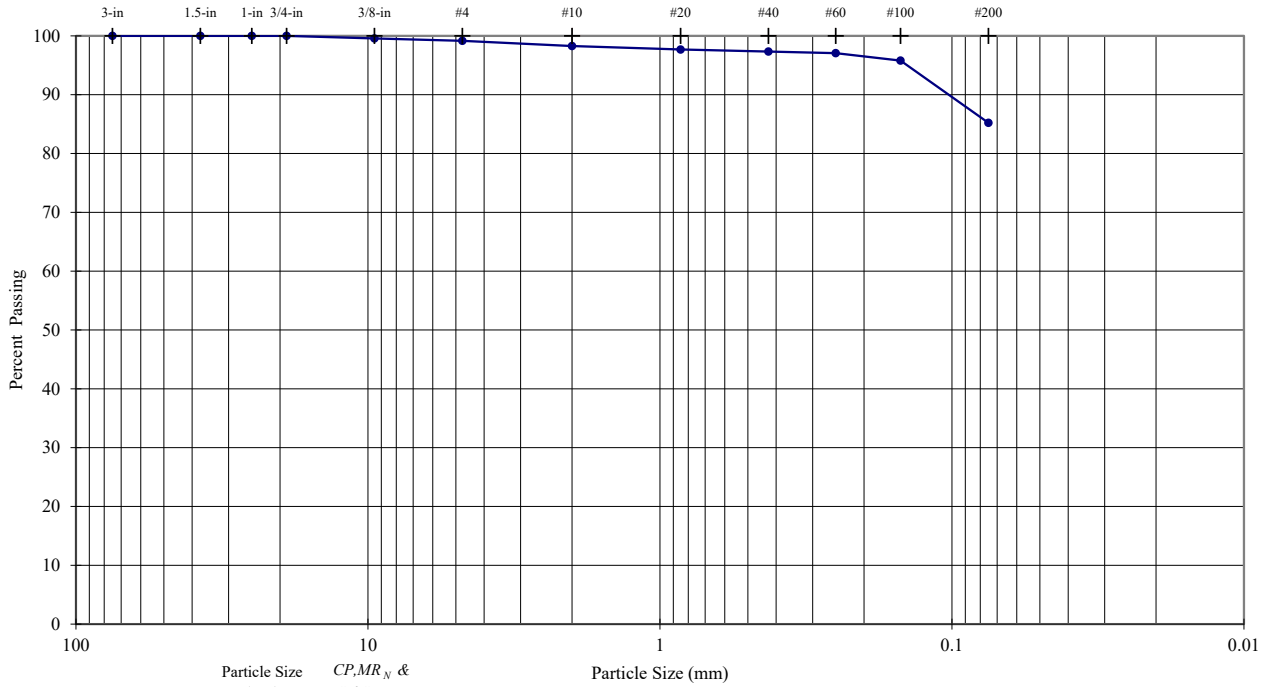
TECH	GDB
DATE	30-Mar-2023
REVIEW	MB

March-23 31405771.000.02.LBR

PARTICLE-SIZE DISTRIBUTION & ATTERBERG LIMITS

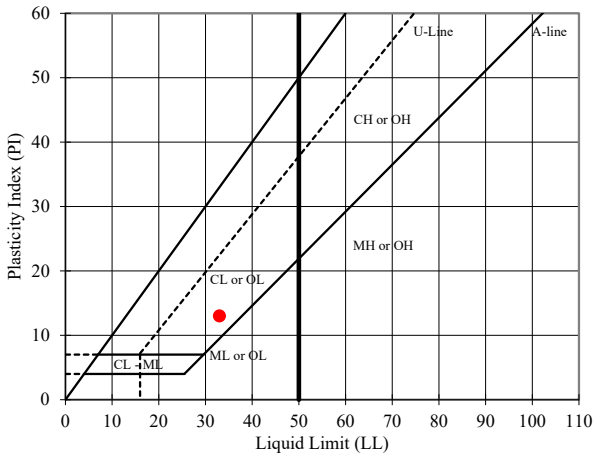
ASTM D421, D6913 (Method A), D4318

PROJECT NAME: **City of Ponderay Smelter Close**
SAMPLE ID: **PSRC-TP-1-4'-6'-030123** DEPTH (ft): **4-6**
TYPE: **Pail**



Sieve Analysis
Composite sieving, No. 4 (4.75-mm) separating sieve.

Sieve	Particle Size (mm)	CP,MR_N & $SubS,MR_N$	% Passing
3-in	75.0	0.0	**100.0**
1.5-in	37.5	0.0	**100.0**
1-in	25.0	0.0	**100.0**
3/4-in	19.0	0.0	**100.0**
3/8-in	9.5	50.9	**99.6**
#4	4.75	48.3	**99.2**
#10	2.00	1.94	**98.3**
#20	0.850	1.31	**97.7**
#40	0.425	0.77	**97.3**
#60	0.250	0.59	**97.1**
#100	0.150	2.78	**95.8**
#200	0.075	23.21	**85.2**



USCS Description (ASTM D 2487):

Lean clay, light olive brown, moist

USCS **CL**

S,M_d	11821.4
$SubS,FCPR_{first}$	0.0%

LL	**33**
PL	**20**
PI	**13**

As-Received Moisture Content (%)

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Notes: Specimens obtained from sample following air-dried procedures.
0 g of particles were removed from sample prior to sieve analysis testing.
Particle size analysis sample was not dispersed
Dry mass of finer fraction and finer fraction subspecimen calculated using an auxilliary water content sample.
Sieve analysis mass values are directly mesaured or calculated individual masses. Mass measurements for water content and material loss calculations, total mass of coarse and fine portions, and finer portion subspecimen cumulative mass retained omitted for brevity and are available upon request.
Sample prepared for Atterberg Limits testing by the dry method.
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving.
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device.

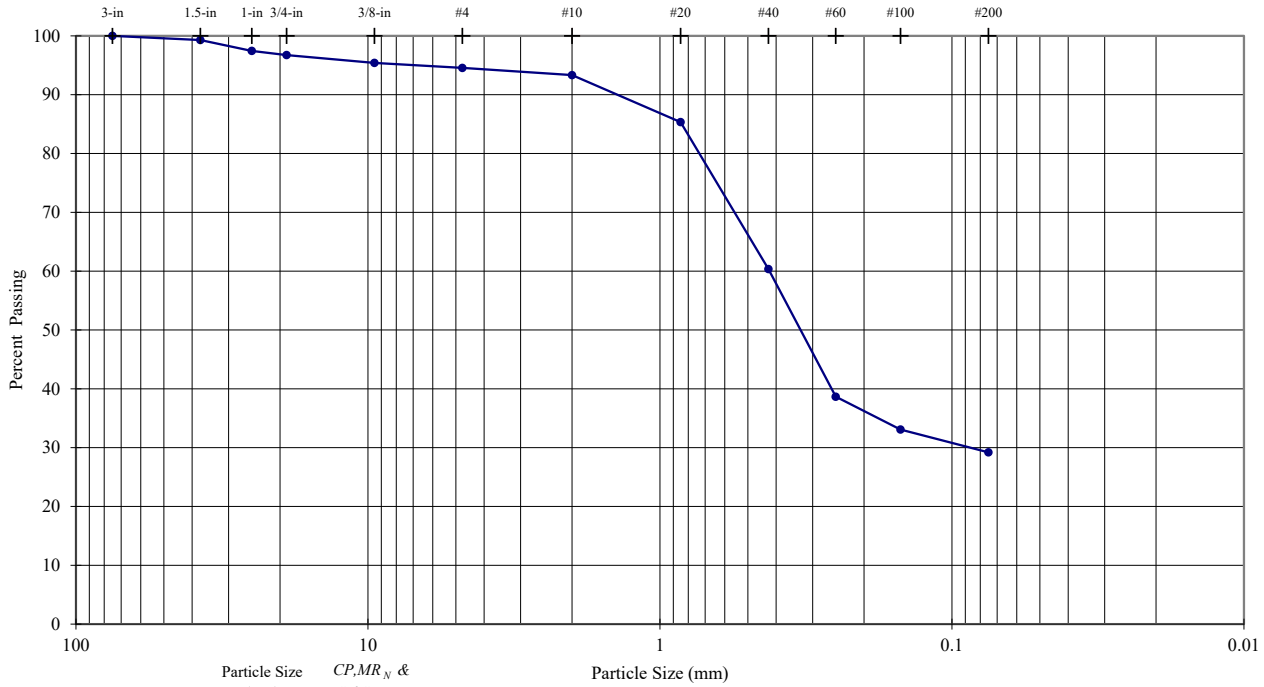
TECH	GDB
DATE	30-Mar-2023
REVIEW	MB

April-23 31405771.000.02.LBR

PARTICLE-SIZE DISTRIBUTION & ATTERBERG LIMITS

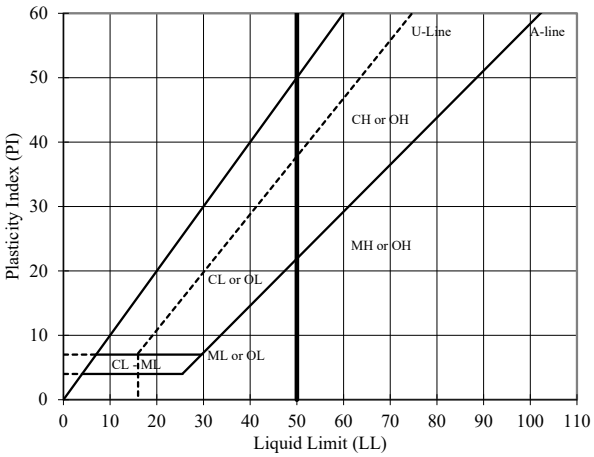
ASTM D421, D6913 (Method A), D4318

PROJECT NAME: **City of Ponderay Smelter Close**
SAMPLE ID: **PSRC-TP-2-0.5'-2'-030123** DEPTH (ft): **0.5-2**
TYPE: **Pail**



Sieve Analysis
Composite sieving, No. 4 (4.75-mm) separating sieve.

Sieve	Particle Size (mm)	CP,MR_N & $SubS,MR_N$	% Passing
3-in	75.0	0.0	**100.0**
1.5-in	37.5	79.9	**99.3**
1-in	25.0	209.4	**97.4**
3/4-in	19.0	79.8	**96.7**
3/8-in	9.5	151.0	**95.4**
#4	4.75	96.3	**94.6**
#10	2.00	2.97	**93.3**
#20	0.850	19.41	**85.3**
#40	0.425	60.64	**60.4**
#60	0.250	52.68	**38.7**
#100	0.150	13.54	**33.1**
#200	0.075	9.41	**29.2**



USCS Description (ASTM D 2487):

Silty sand, dark grayish brown, moist

USCS **SM**

S,M_d	11316.9
$SubS,FCPR_{first}$	0.0%

LL	**NP**
PL	**NP**
PI	**NP**

As-Received Moisture Content (%)

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Notes: Specimens obtained from sample following air-dried procedures.
0 g of particles were removed from sample prior to sieve analysis testing.
Particle size analysis sample was not dispersed
Dry mass of finer fraction and finer fraction subspecimen calculated using an auxilliary water content sample.
Sieve analysis mass values are directly mesaured or calculated individual masses. Mass measurements for water content and material loss calculations, total mass of coarse and fine portions, and finer portion subspecimen cumulative mass retained omitted for brevity and are available upon request.
Sample prepared for Atterberg Limits testing by the dry method.
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving.
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device.

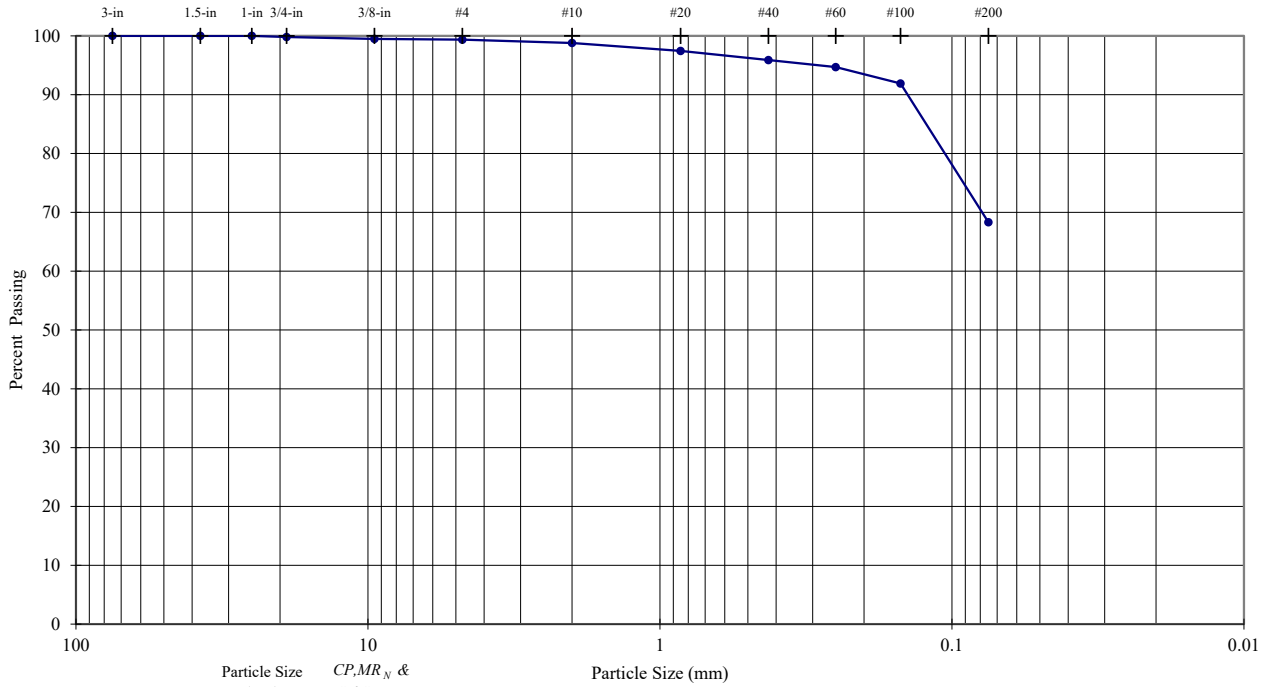
TECH	GDB
DATE	29-Mar-2023
REVIEW	MB

April-23 31405771.000.02.LBR

PARTICLE-SIZE DISTRIBUTION & ATTERBERG LIMITS

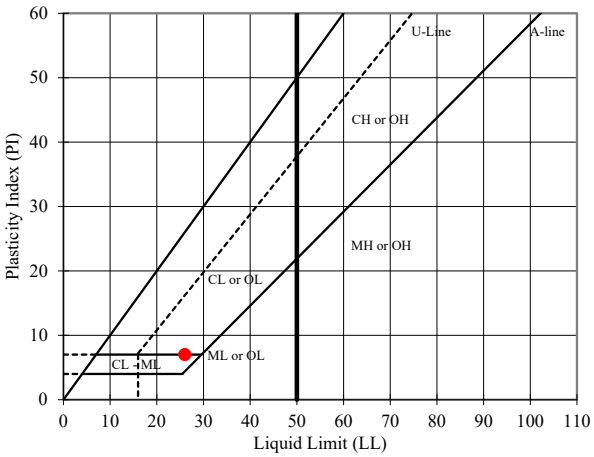
ASTM D421, D6913 (Method A), D4318

PROJECT NAME: **City of Ponderay Smelter Close**
SAMPLE ID: **PSRC-TP-2-2'-6'-030123** DEPTH (ft): **2-6**
TYPE: **Pail**



Sieve Analysis
Composite sieving, No. 4 (4.75-mm) separating sieve.

Sieve	Particle Size (mm)	CP,MR_N & $SubS,MR_N$	% Passing
3-in	75.0	0.0	**100.0**
1.5-in	37.5	0.0	**100.0**
1-in	25.0	0.0	**100.0**
3/4-in	19.0	32.4	**99.8**
3/8-in	9.5	53.8	**99.5**
#4	4.75	20.9	**99.4**
#10	2.00	1.25	**98.8**
#20	0.850	3.00	**97.4**
#40	0.425	3.43	**95.9**
#60	0.250	2.65	**94.7**
#100	0.150	6.18	**91.9**
#200	0.075	52.23	**68.3**



USCS Description (ASTM D 2487):

Sandy silty clay, brown, moist

USCS **CL-ML**

S,M_d	16601.5
$SubS,FCPR_{first}$	0.0%

LL	**26**
PL	**19**
PI	**7**

As-Received Moisture Content (%)

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Notes: Specimens obtained from sample following air-dried procedures.
0 g of particles were removed from sample prior to sieve analysis testing.
Particle size analysis sample was not dispersed
Dry mass of finer fraction and finer fraction subspecimen calculated using an auxilliary water content sample.
Sieve analysis mass values are directly mesaured or calculated individual masses. Mass measurements for water content and material loss calculations, total mass of coarse and fine portions, and finer portion subspecimen cumulative mass retained omitted for brevity and are available upon request.
Sample prepared for Atterberg Limits testing by the dry method.
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving.
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device.

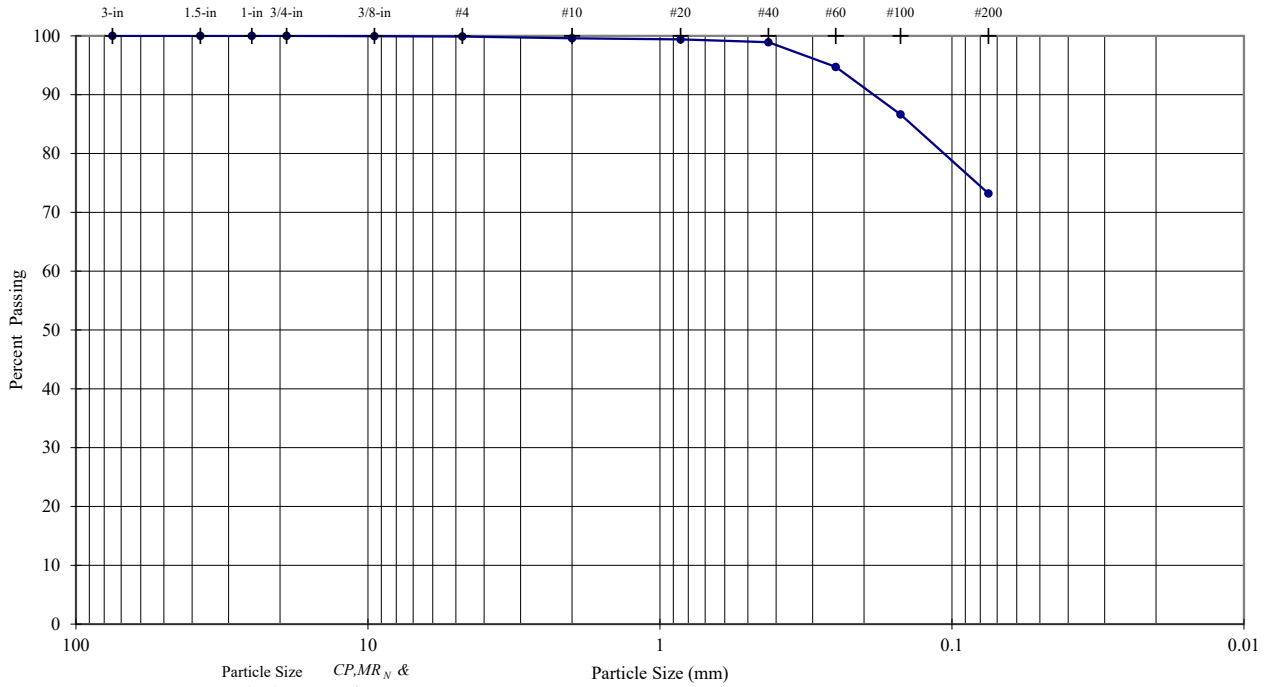
TECH	GDB
DATE	1-Apr-2023
REVIEW	MB

March-23 31405771.000.02.LBR

PARTICLE-SIZE DISTRIBUTION & ATTERBERG LIMITS

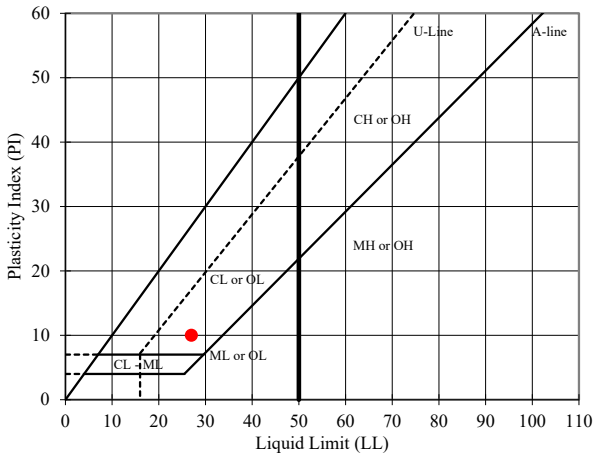
ASTM D421, D6913 (Method A), D4318

PROJECT NAME: **City of Ponderay Smelter Close**
SAMPLE ID: **PSRC-TP-3-1'-6'-030123** DEPTH (ft): **1-6**
TYPE: **Pail**



Sieve Analysis
Composite sieving, No. 4 (4.75-mm) separating sieve.

Sieve	Particle Size (mm)	CP,MR_N & $SubS,MR_N$	% Passing
3-in	75.0	0.0	**100.0**
1.5-in	37.5	0.0	**100.0**
1-in	25.0	0.0	**100.0**
3/4-in	19.0	0.0	**100.0**
3/8-in	9.5	6.9	**99.9**
#4	4.75	7.2	**99.9**
#10	2.00	0.67	**99.6**
#20	0.850	0.44	**99.4**
#40	0.425	1.06	**98.9**
#60	0.250	9.40	**94.7**
#100	0.150	18.05	**86.6**
#200	0.075	30.01	**73.2**



USCS Description (ASTM D 2487):

Lean clay with sand, light olive brown, wet

USCS **CL**

S,M_d	13045.9
$SubS,FCPR_{first}$	0.0%

LL	**27**
PL	**17**
PI	**10**

As-Received Moisture Content (%)

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Notes: Specimens obtained from sample following air-dried procedures.
0 g of particles were removed from sample prior to sieve analysis testing.
Particle size analysis sample was not dispersed
Dry mass of finer fraction and finer fraction subspecimen calculated using an auxilliary water content sample.
Sieve analysis mass values are directly mesaured or calculated individual masses. Mass measurements for water content and material loss calculations, total mass of coarse and fine portions, and finer portion subspecimen cumulative mass retained omitted for brevity and are available upon request.
Sample prepared for Atterberg Limits testing by the dry method.
Material retained on No. 40 sieve removed from Atterberg Limits sample by sieving.
Plastic Limit test performed by hand rolling. Method A Liquid Limit test performed using mechanical device.

TECH	GDB
DATE	29-Mar-2023
REVIEW	MB

Appendix F
Archaeological Monitoring report

RESULTS OF ARCHAEOLOGICAL MONITORING AT THE PANHANDLE SMELTING AND REFINING COMPANY SITE (10BR539), NEAR PONDERAY, IDAHO, IN MARCH 2023

By Robert Lee Sappington

31 March 2023

Introduction

Alta Science & Engineering, Inc. (Alta) is working with the City of Ponderay (City) to develop a public park in proximity to Lake Pend Oreille at the location of the former Panhandle Smelting and Refining Company (PSRC) site. Prior to development of the park, Alta and the City are conducting a series of soil tests. After reviewing a description of the planned undertaking, the Idaho State Historic Preservation Office (SHPO) recommended that an archaeologist monitor all ground-disturbing excavation associated with soil testing in the vicinity of the PSRC site. Monitoring was previously conducted at the site in November 2011 (Sappington and Longstaff 2012a) and again in May 2012 (Sappington and Longstaff 2012b) prior to the development of the adjacent Pend Oreille Bay Trail. At that time historic cultural resources were encountered in 16 of the 19 test pits and it was evident that historic artifacts and features are frequent in the vicinity of the site.

The PSRC site is an inactive facility located approximately 400 feet south of the community of Ponderay. The PSRC site consists of original smelter ruins, a small pile of unprocessed ore, several building depressions, and a slag dump. The slag dump appears to be weathering onto the beach and it is known locally as Black Rock.

The PSRC site was recorded as archaeological site 10BR539 in 1985 (Miss and Hudson 1986). Prior to a modification of a railroad grade, the U. S. Army Corps of Engineers, Seattle District (COE), requested an evaluation of the site to determine its eligibility for nomination to the National Register of Historic Places (Renk 2001). That report provides an excellent history of the smelter and the author concluded that 10BR589 was eligible for the National Register under criteria A and D (Renk 2001).

Access to the PSRC site is by the adjacent trail which has increased pedestrian and vehicle traffic and the area has become a popular swimming and recreation destination during the summer. There are elevated levels of lead, zinc, and other metals in the slag dump and nearby soil. The topography is mostly glacial terrace with some localized flood plain and the soils are predominantly sand overlying silt and clay (IDEQ 2006:4).

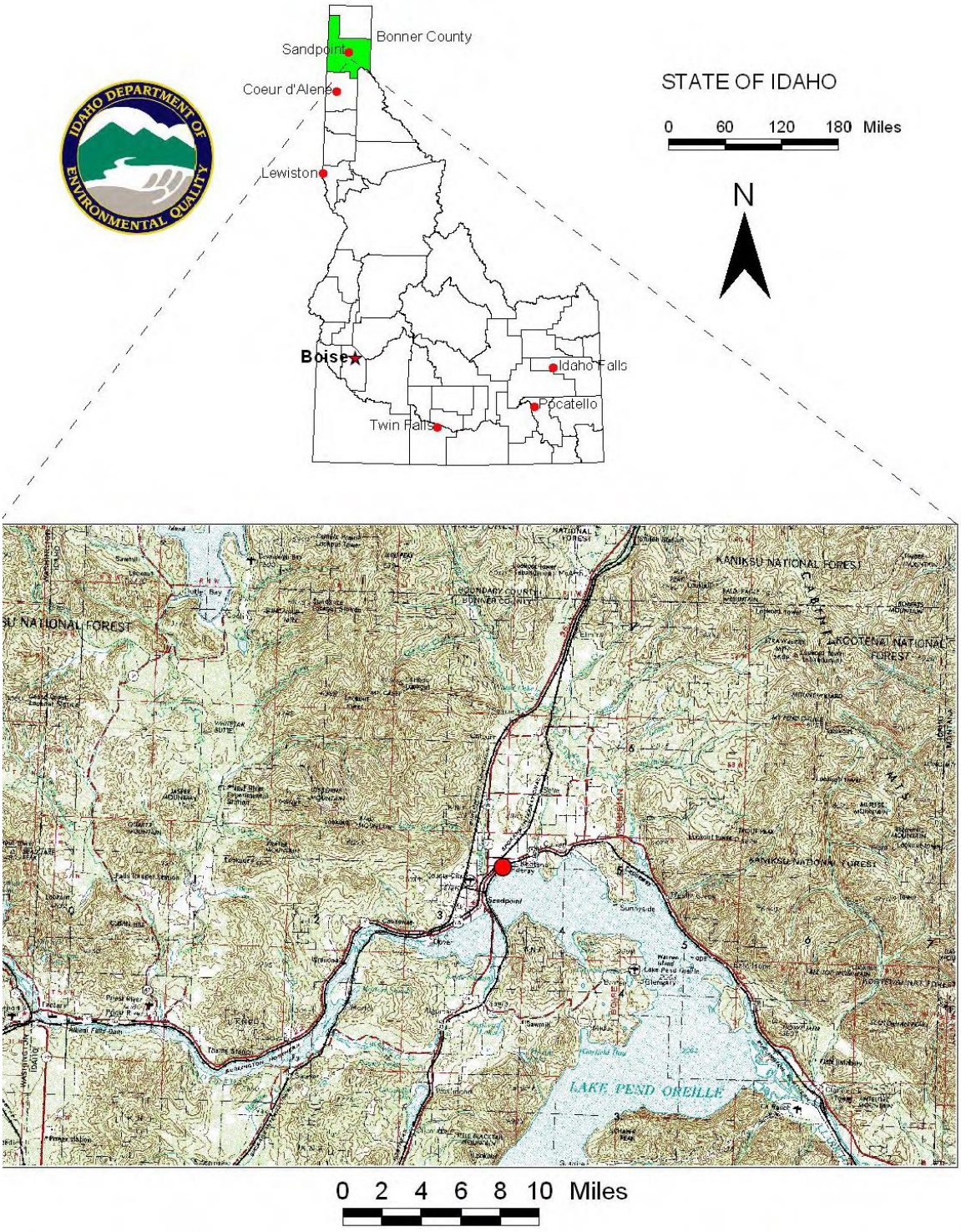

Figure 1. Map of the general project area. The location of the Panhandle Smelting and Refinery Company (PSRC) site (10BR539) is indicated by the red circle (adapted from IDEQ 2006: Figure 2-1).

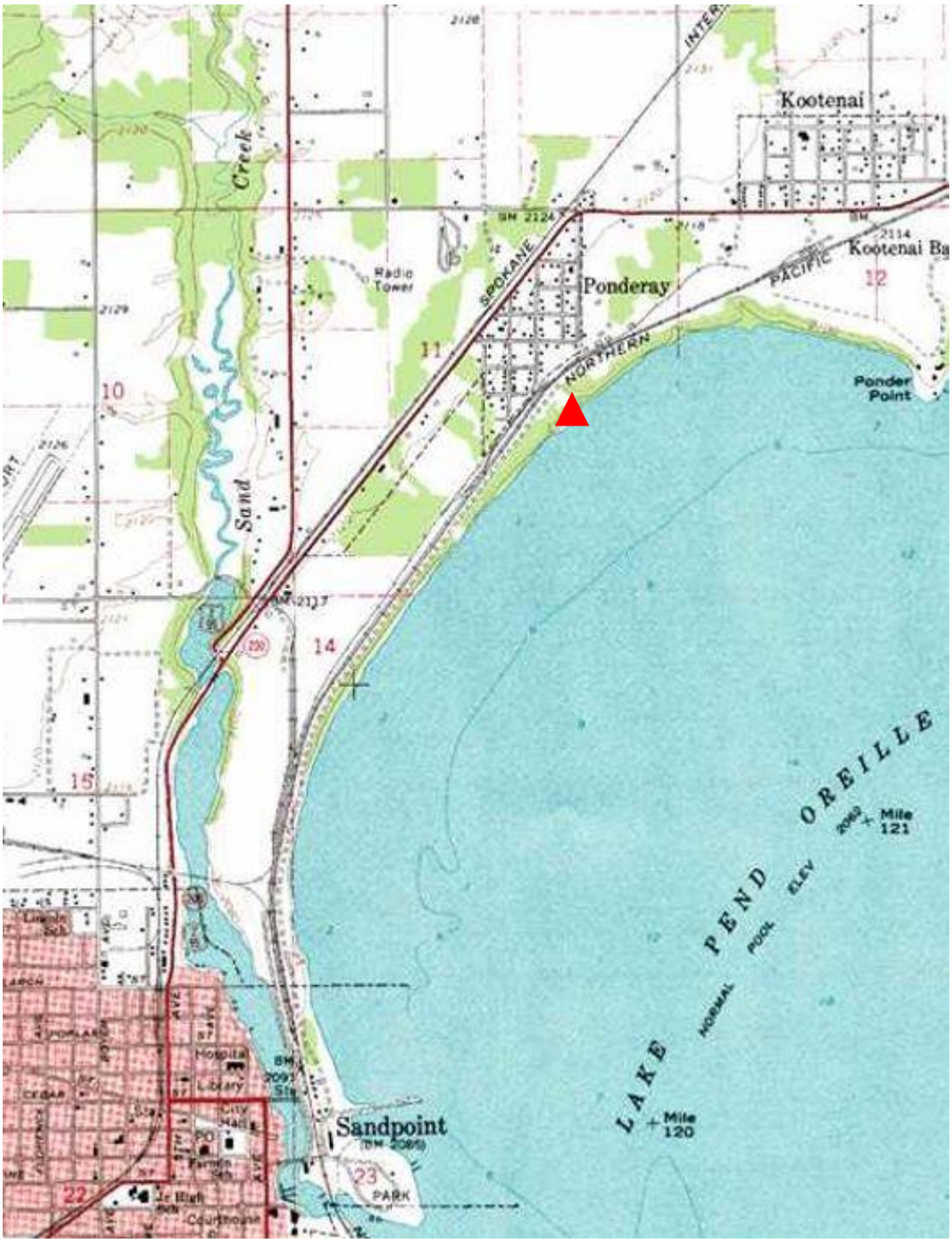

Figure 2. Location of the PSRC project area. The APE is indicated by the red triangle. Adapted from the Sandpoint, ID quadrangle.

Figure 3. Aerial photo map of the project area showing the PSRC site. The locations of the three test pits excavated in March 2023 are indicated by the pushpins (labeled and provided by Tom Jenkins, Alta). Note the BNSF railroad tracks at the upper left and Black Rock and Lake Pend Oreille at the lower right.

The history of the PSRC site is one of contentious management, accusations, and lawsuits rather than a record of actual smelting. Planning for the smelter began in 1902 and the townsite of Panhandle (the name was changed to Ponderay by early 1905) began to grow up adjacent to the smelter at that time. Construction of the smelter began in 1904; the first lead bars were poured in 1907 and the smelter ran sporadically through March 1909. Following foreclosures and various sales, salvage crews dismantled the plant by December 1922 (IDEQ 2006:4). Since that time, there has been little activity in the area with the exception of recent recreational use.

The project area is located well within the territory of the Kalispel Indians (Lahren 1998: Figure 1). Like other Plateau tribes, the Kalispel followed a seasonal round with subsistence based on a combination of wild foods including fish, game, and plant. Settlement centered on winter camps that were situated along the major drainages such as the Pend Oreille River while other seasonal camps were at locations where camas, berries, game, and other resources could be gathered and hunted. There are numerous precontact sites around Lake Pend Oreille but none appear to be in the vicinity of the APE.

Discussion

The author met with Alta, IDEQ, and City personnel at the trail access in Sandpoint on 1 March 2023. All personnel traveled along the trail to the PSRC site and the author monitored the mechanical excavation of three soil test pits. The locations of the units had been previously determined and all were within the boundaries of 10BR539. The project area was heavily vegetated and the surface of the APE was covered by snow so that no artifacts or features were visible. Excavation was conducted using a Bobcat E50 excavator and the author recorded GPS points at each test pit using a Garmin Etrex 32 instrument. The target depth of all units was 6 feet (72 inches) below the surface (BS), and the width of each unit was approximately 2 feet; the length of each trench varied with conditions and results. Changes in soil composition, texture, and color were recorded by Alta environmental scientist Tom Jenkins and the following descriptions have been adapted by the author from Mr. Jenkins' field notes. After each unit was excavated and the soil samples were collected that unit was backfilled. Representative sediment samples were collected Alta personnel for later analysis; no artifacts or samples were collected by the archaeological monitor.

TP 1

This was the third unit excavated (Figures 4-5). It was located in proximity to a former smoke stack (534744 mE/5349926 mN). The upper stratum (0-12 inches BS) was dark brown silty sand and several red common bricks were noted. The second stratum (12-24 inches BS) was yellowish brown-tan to light gray clay silt with very fine sands; it was glaciofluvial or glaciolacustrine in origin. The third stratum (24-48 inches BS) was light brown silty sand that was glaciofluvial or glaciolacustrine in origin. The basal stratum (48-72 inches BS and below) was tan buff to light gray silty clay that was similar to Stratum 2 but with slightly higher clay content and less fine sand; it was also glaciofluvial or glaciolacustrine in origin. Cultural material was limited to several scattered bricks at or near the surface; the underlying strata were natural with no evidence of artifacts or historic disturbance.

Figure 4. Photograph of TP 1 taken at the beginning of excavation. The view is to the south (note Lake Pend Oreille in the background).


Figure 5. Photograph of TP 1 taken at the end of excavation. The south wall of the unit is 6 feet below the surface. The view is to the south.

TP 2

This was the first unit excavated (Figures 6-8) It was situated in proximity to a former roaster (534748 mE/55349966 mN). The edge of a concrete slab with an embedded vertical iron I-beam (from the former roaster) was immediately encountered and the excavation shifted slightly to the south. Three strata were delineated. Stratum 1 was dark brown silty sand and was limited to the upper 6 inches. Stratum 2 (6-24 inches BS) was light gray silty sand; it showed evidence of historic disturbance including some charcoal. Stratum 3 (24-72 inches BS) continued into the floor of the unit; it consisted of tan-buff light gray silty clay with traces of sand that represented natural glaciofluvial or glaciolacustrine depositional processes. The upper two strata contained bricks and exhibited historic disturbance to a depth of 24 inches BS while the underlying stratum was undisturbed and natural.

Figure 6. Photograph of TP 2 taken at the beginning of excavation. The view is to the northeast.

Figure 7. Photograph of TP2 taken during the initial stages of excavation. The I-beam is in the lower center foreground to the right of the red brick. The view is to the southeast.

Figure 8. Photograph of TP2 taken at the end of excavation. The wall of the trench is 6 feet below the surface. The view is to the southeast.

TP 3

This was the second unit excavated (534767 mE/5349967 mN). It was located between the footpath and the slagpile in proximity to a roaster pile and several former buildings. Four strata were delineated. The uppermost strata (0-12 inches BS) consisted of dark brown sandy silt and it had several red common bricks. Stratum 2 (12-48 inches BS) consisted of yellow brown to tan clay silt with very fine sands that were deposited by glaciofluvial to glaciolacustrine processes. Stratum 3 (48 to 54 inches BS) consisted of light brown silty sand that was also deposited by glaciofluvial or glaciolacustrine processes. Stratum 4 (54 to 72 inches BS and continuing into the floor) consisted of lighter gray silty clay and was similar to the previous stratum.

Figure 9. Photograph of TP 3 taken at the start of excavation. The view is to the north.

Figure 10. Photograph of TP 3 taken at the end of excavation. The exposed wall is 6 feet below the surface. The view is to the east.

Summary and Management Recommendations

Archaeological monitoring was conducted at the Panhandle Smelting and Refining Company site during subsurface soil testing on 1 March 2023. Three test pits were excavated to 6 feet below the surface and sediments were similar in all units. The only cultural materials observed were red common bricks which were at or near the surface of all three units and continued to 24 inches BS in TP 2. There was no evidence of lithic material, fire-modified rocks, or any indication of a pre-contact occupation in any of the test units.

The PSRC site was considered eligible for nomination to National Register of Historic Places in 2001 under criteria A and D. Although the structures are gone and surface indications are minimal, there is clear subsurface evidence of the site. The results of monitoring in March 2023 are similar to those from previous projects in 2011 and 2012. It is therefore recommended that future ground-disturbing activities at the site continue to be monitored by a qualified archaeologist.

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1986 *Cultural Resources Reconnaissance of the Albeni Falls Project, Northern Idaho*. Technical report prepared by Cultural Resource Consultants, Inc. Sandpoint, Idaho for the U.S. Army Corps of Engineers, Seattle District, North Pacific Division, Contract No. DACW67-85-M-0024.

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Sappington, Robert Lee and Laura Longstaff
2012a *Results of Archaeological Monitoring at the Panhandle Smelting and Refining Company Site (10BR539), for the Pend Oreille Bay Trail Project, Near Ponderay, Idaho*. Report prepared for Terragraphics Environmental Engineering, Inc. and Idaho Department of Environmental Quality.

2012b *Results of Archaeological Monitoring at the Panhandle Smelting and Refining Company Site (10BR539), for the Pend Oreille Bay Trail Project, Near Ponderay, Idaho in May 2012*. Report prepared for Terragraphics Environmental Engineering, Inc. and Idaho Department of Environmental Quality.