Summer 6-15-2022

SILVER BOW CREEK/BUTTE AREA NPL SITE BUTTE PRIORITY SOILS OPERABLE UNIT

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June 15, 2022

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RE: Butte Priority Soils Operable Unit (BPSOU) 2021 Unreclaimed Sites Sampling UR-39 Site Evaluation Summary Report

Agency Representatives:

I am writing to you on behalf of Atlantic Richfield Company to submit the 2021 Unreclaimed Sites Sampling UR-39 Site Evaluation Summary Report, which summarizes sampling and site evaluation activities. The evaluation summary includes the data summary report (DSR) as Appendix A and the data validation report as an attachment (Attachment A) to the DSR.

The report, appendices, and related files may be downloaded at the following link:

https://pioneertechnicalservices.sharepoint.com/:f:/s/submitted/Ej5AOC4GhOtLuqr6H8nOzJkBG8fO6w8n97qvXx02gD-GKA.

If you have any questions or comments, please call me at (907) 355-3914.

Sincerely,

Mike McAnulty

Mike Mc Anulty
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Remediation Management Services Company
An affiliate of **Atlantic Richfield Company**

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CTEC of Butte – email
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BPSOU SharePoint - upload

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling UR-39
Site Evaluation Summary Report

Atlantic Richfield Company

2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling UR-39
Site Evaluation Summary Report

Prepared for:

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Butte, Montana 59701

Prepared by:

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2022

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ABBREVIATIONS AND ACRONYMS

Acronym	Definition	Acronym	Definition
BHRS	Butte Hill Revegetation Specifications	**QA**	Quality Assurance
BPSOU	Butte Priority Soils Operable Unit	**QAPP**	Quality Assurance Project Plan
BSB	Butte-Silver Bow	**QC**	Quality Control
BTC	Blacktail Creek	**RCP**	Reinforced Concrete Pipe
CB	Catch Basin	**ROD**	Record of Decision
CD	Consent Decree	**SBC**	Silver Bow Creek
CY	Cubic Yards	**SD**	Settling Defendants
DSR	Data Summary Report	**SOP**	Standard Operating Procedures
FRESOW	Further Remedial Elements Scope of Work	**UR**	Unreclaimed
mg/kg	milligram per kilogram	**XRF**	X-Ray Fluorescence

1.0 INTRODUCTION

This Butte Priority Soils Operable Unit (BPSOU) Unreclaimed (UR) Site Evaluation Summary presents the declarations of the subsurface soil sampling conducted on July 1, 2021, August 26, 2021, and November 9, 2021, at the UR source area UR-39 within the BPSOU (referred to herein as UR-39 Site or Site).

Unreclaimed solid media sites located within the BPSOU may have potentially been impacted by historical mining. These sites must be evaluated to determine if remedial action is required. Site evaluations are completed to determine if a specific site poses a threat to human health, contributes metals-impacted sediments to existing or planned wet weather control features, or contributes to the degradation of surface water quality as described in the BPSOU Consent Decree (CD), Appendix D, Attachment C Further Remedial Elements Scope of Work (FRESOW) (EPA, 2020).

Source areas within the BPSOU may include upland soil waste, mine waste, and floodplain soil and waste. These source areas have the potential to act as direct or indirect pathways for human exposure, contribute metal inputs to the alluvial and bedrock aquifers, and act as metals sources to surface water (to Blacktail Creek [BTC] and Silver Bow Creek [SBC]) via storm water runoff.

Means and methods used to characterize UR sites and make remediation recommendations are described in the 2021 *UR Sites Quality Assurance Project Plan* (QAPP) (Atlantic Richfield Company, 2021) (referred to herein as the QAPP). Results from Site sampling/inspection activities will be used to make Site declarations and drive remedial action requirements that will be completed by the Settling Defendants (SDs). Contaminated solid media identified within the BPSOU will be addressed through a combination of source removal, capping, and/or land reclamation, as appropriate, to meet the Butte Hill Revegetation Specifications (BHRS) (EPA, 2020). The specific Remedial Action Work Plans will be prepared by the SDs and approved by Agencies prior to implementation.

1.1 Objectives

This Site Evaluation Summary Report presents all Site data and declarations, as required in the FRESOW (EPA, 2020), from the UR-39 Site investigation. Results from the 2021 investigation are summarized in the Data Summary Report (DSR) in Appendix A, which includes a Data Validation Report. General Site and sample station photographs are included in Appendix B.

This Evaluation Summary Report includes information within each related report as described below:

Site Evaluation Summary:

- A summary of all Site data (historical and new).
- A declaration as to whether the Site contains concentrations at or above human health action levels and/or the Waste Identification Criteria in Table 1 in Appendix 1 of the BPSOU CD (EPA, 2020).
- A declaration as to whether historical mine waste at the Site is contributing to the degradation of surface water quality.
- A declaration as to whether the Site contributes metals-impacted sediment to existing or planned wet weather control features.

DSR (Appendix A):

- Investigation objectives.
- Data quality assessment.
- Project objectives and sampling design review.
- Preliminary data review.
- Conclusions on the quality of the data.
- Sampling and analysis summary.

Data Validation Report (Attachment A of the DSR):

- Quality assurance (QA) and quality control (QC) review of inorganic data.
- Level A/B Assessment.
- Assessment of precision, accuracy, representativeness, comparability, completeness, and sensitivity between X-ray fluorescence (XRF) and laboratory data.
- Overall data summary.

The following sections provide details about the items bulleted above.

The land use at the UR-39 Site is residential per professional judgment by the field team lead, informed by current county zoning and guidance listed in the 2006 Record of Decision (ROD) requirements (Appendix A of the BPSOU CD; EPA, 2020). Residential Human health action levels and storm water criteria were referenced to prepare this declaration. The action levels are listed in Table 1.

2.0 SITE DESCRIPTION AND BACKGROUND

Site UR-39 is located in a residential area in the northeastern part of Walkerville, Montana. The Site is referred to as the Belle of Butte. The capped Belle of Butte shaft is located adjacent to Site UR-39 but is not included within the Site boundary because the area around the shaft has been reclaimed. Site UR-39 is bounded on the north by East Clark Street, on the east by a dirt alley, on the south by another dirt alley (north of Academy Street), and on the west by North Main Street and the reclaimed area around the Belle of Butte shaft (Figure 1). Atlantic Richfield Company owns Site UR-39.

Playground equipment is located in the eastern portion of Site UR-39. The playground appears to be actively used based on the presence of bicycles during a Site visit. In the northwestern part of the Site, there are several vehicles that appear to be parked there for the long term. There is a

fence around the reclaimed portion of this parcel which acts as a border for the western and northwestern portions of the Site.

3.0 SITE EVALUATION

The Site was evaluated following the Unreclaimed Area Logic Diagram (Appendix A.3 of the QAPP) to determine if reclamation was warranted. The 2021 Site investigation was completed on July 1, 2021, August 26, 2021, and November 9, 2021. Sampling activities were performed according to specified standard operating procedures (SOPs) as outlined in the QAPP. The DSR in Appendix A includes a description of the 2021 investigation. Composite samples were collected from each location at the specified depth intervals of 0 to 2 inches, 2 to 6 inches, and 6 to 12 inches. Two historical[1] data sets were available from 1993 and 1994. Photographs of the sampling events are included in Appendix B.

3.1 Data Summary

A total of 21 natural soil samples were collected and analyzed by XRF for arsenic, cadmium, copper, lead, zinc, and mercury. Out of the 21 collected soil samples, 7 were submitted to Pace Analytic Services, LLC for laboratory confirmation (per Section 3.2.4, Table 5 of the QAPP) and 2 samples were submitted for laboratory QA and QC. Due to temperature exceedance upon arrival at the laboratory, 3 locations were resampled for mercury. The original sample locations were located and resampled by digging a new pit approximately one foot adjacent to the original sample pit. The DSR in Appendix A details the total XRF samples collected, confirmation laboratory samples submitted, and the QA and QC laboratory samples submitted. Based on the data quality conclusions in the DSR, 100% of the data collected for Site UR-39 in 2021 were deemed usable. Two historical[1] sample locations were collected in 1993 (TCRA Sampling Results) and 1994 (BPSOU Soil Sampling) for XRF analysis on arsenic, cadmium, copper, lead, and zinc.

For samples analyzed by both XRF and the laboratory, the laboratory results were used for the evaluation of the Site. For samples analyzed only by XRF, the XRF results were used for the evaluation of the Site.

3.2 Human Health Action Levels

Table 2 lists the historical data, Table 3 lists the new data, and Table 4 describes the exceedances related to the following findings of the Site investigation:

- Nine lead results from 4 sample stations (UR-39-SS01, UR-39-SS02, UR-39-SS03, and UR-39-OP02) and historical sample #12-01 exceeded the storm water waste criteria listed in Table 2 of the UR QAPP (1,000 milligrams per kilogram [mg/kg]) ranging from 1,636.50 mg/kg to 3,201.90 mg/kg.

[1]All historical data were derived from the Atlantic Richfield Company Geocortex Database (Geocortex Viewer for HTML5 (woodardcurran.com)). Source documents for historical data are referenced if available.

3.3 Screening Criteria for Storm Water

Table 2 lists the historical data, Table 3 lists the new data, and Table 4 describes the exceedances related to the following findings of the Site investigation:

- Subsurface sample BPSOU-UR39-070121-2-6-20 exceeded the copper, lead, and zinc screening criteria for storm water.
- Subsurface samples BPSOU-UR39-070121-6-12-03 and BPSOU-UR39-070121-6-12-06 exceeded the cadmium, lead, and zinc screening criteria for storm water. Note mercury[2] detection limits for these samples were higher than the storm water criteria however were not included in storm water exceedance criteria due to multiple other contaminant results above action levels.

Three samples, each from separate sample stations, collected in 2021 exceeded 3 of the 6 contaminant screening level criteria listed in Table 1. Zero results collected in 2021 exceeded the waste criteria of greater than 5,000 mg/kg. The Site was further evaluated to determine the materiality of the load and the possible contribution to the degradation of surface water per the requirements of the QAPP (Section 2.4, Step 5, page 8).

3.4 Sedimentation Analysis

Contribution to degradation of surface water quality or metals-impacted sediment is determined by evaluating the presence of rills, concentrated outflow, metals-impacted sediment in downstream infrastructure, determining sediment contribution loading upgradient of the Site, and linkage to surface water features (Figure 2).

Presence of rills:
Erosion rills and flow patterns were observed at UR-39. Runoff primarily occurs as a result of run-on from Clark Street to the north, flowing downgradient and along the eastern and southern portions of the Site along a dirt alleyway. The interior of the Site is moderately vegetated with minor evidence of significant flow. There is a primary drainage (MG-C-2852) that runs north and south along the western boundary of the previously reclaimed Belle of Butte (BRES Site No. 8). Significant dumping of miscellaneous materials along MG-C-2852 within the Site, primarily the east slope, by the public is occurring. Evidence of translocation and erosional features along slopes of the drainage leaving the Site are apparent.

Concentrated outflow:
An open drainage channel (grass-lined ditch) runs north to south through the western portion of the UR-39 Site just east of the previously reclaimed area of the Belle of Butte (BRES No. 8). This channel, MG-C-2852, is a Superfund storm water structure within the Upper Missoula Gulch Drainage. The channel is comprised of a storm water ditch that runs along the east side of North Main Street then veers southeast and runs under Clark Street through the Site to an underground 24-inch Reinforced Concrete Pipe (RCP), storm water pipe MG-RCP-2844, at the

[2] Mercury results are non-detected results as described in Section 2.2.3 of the DVR. The detection limit was higher than the screening criteria for storm water. Samples exceeded the screening criteria for storm water regardless of the mercury result due to cadmium, lead, and zinc.

south end of the Site just before a dirt alleyway. Runoff from both sides of the Site generally flows toward the drainage except for flow that runs along the eastern portion of the Site along the dirt alleyway. Flow veers to the southwest along the southeastern portion of the Site and mostly flows downgradient along the alleyway and deposits near the intersection of Dunn Street and an unnamed street heading east. The unnamed inlet of the RCP at the south end of the Site appears partially clogged with sediment and debris; there is evidence of significant deposition of sediment at the head of the structure.

Evaluate Metals Impacted Sediment in Downstream Infrastructure:
Based on sample results from the 2021 sampling event, metals -impacted sediment is a potential concern on the UR-39 Site. Downstream of the unmarked inlet at the south end of the UR-39 Site, storm water and sediment are routed to the Upper Missoula Gulch Drainage Channels (east). This Superfund storm water channel routes water to the Centerville Channels to Catch Basin 1 within the Syndicate Pit, (Syndicate Pit or CB-1). Sediment is captured within CB-1, and surface water continues through the MG stormwater system.

CB-1, CB-8, and CB-9 are maintained under the *Missoula Gulch Catch Basins (CB-1, CB-8, and CB-9) Operations and Maintenance Plan* (Atlantic Richfield Company, 2018). Butte Silver Bow (BSB) Reclamation and Environmental Services personnel monitor conditions of CB-1, CB-8, and CB-9 on a year-round basis and perform maintenance unless severe winter weather prevents access. Based on estimated accumulation models in the Missoula Gulch Catch Basins O&M Plan (Atlantic Richfield Company, 2018), approximately 53 cubic yards (CY) of sediment is expected to accumulate annually in CB-1 as provided by. BSB Department of Reclamation and Environmental Services The infrastructure is in good condition, and sediment buildup does not impede flow rates (Atlantic Richfield Company, 2018).

Evaluate contributing sediment loading above the Site:
Sediment loading is occurring along the northeastern portion of the Site where flow from storm water running along Clark Street is depositing sediment on the Site. Sediment is also accumulating in the storm water channel MG-C-2852 within the Site from upgradient runoff from the drainage basin of the channel.

Direct linkage to surface water features:
A potentially complete pathway from UR-39 to SBC is shown on Figure 2. Surface water leaving the Site is routed to CB-1 and through the Missoula Gulch drainage and stormwater capture and control system designed to route the 100-year storm event. The three primary Missoula Gulch catch basins (CB-1, CB-8, and CB-9) were designed to route a 100-year storm event through the Missoula Gulch drainage and retain a 10-year, 24-hour storm event. These catch basins reduce peak storm water runoff rates and sediment discharge to SBC when properly operated and maintained. Based on the Missoula Gulch O&M Plan (Atlantic Richfield Company, 2018), the maximum designed storage capacity of CB-1 is approximately 9 acre-feet at an adjustable depth (maximum of 8 feet) with orifice plates set at the maximum elevation. This catch basin includes an outlet structure connected to a 24-inch, RCP outfall that can accommodate a 25-year storm event. The discharge pipe leads to the Missoula Gulch storm water system.

The stored runoff water in the catch basins is then dissipated by infiltration and evaporation and rarely flows to SBC. Retained storm water discharges to SBC only when surface water levels in the final catch basin of the system (CB-9) rise above the discharge level of the outlet structure and surface water within the discharge channel cannot be infiltrated into groundwater. As provided in the Missoula Gulch Catch Basin O&M Plan (Atlantic Richfield Company, 2018), discharge from the catch basins is managed to prevent unmitigated discharge to SBC. Water discharged from CB-9 enters a grass-lined channel and is diverted around the Butte Reduction Works area at Lower Area One until it is eventually discharged into SBC west of the existing slag tunnel. This channel is the primary discharge point from the Missoula Gulch storm water catch basins to SBC. Due to the low gradient and length of the ditch, discharge from CB-9 typically infiltrates fully prior to reaching the discharge point.

Infiltrated water is captured via the Hydraulic Control Channel along the northern perimeter of the Butte Treatment Lagoons and treated prior to discharge to SBC.

4.0 DECLARATION CONCLUSION

From the natural soil samples collected (Table 3), 3 samples analyzed exceeded 3 of the 6 contaminant screening level criteria listed in Table 1. No samples exceeded 5,000 mg/kg. Nine samples collected in 2021 and one historical sample exceed human health action levels listed in Table 1. There are Human Health exceedances present at four stations and one historical sample located adjacent to the Site. Human Health exceedances are present at all depth intervals across the Site.

The Site exhibits a potentially complete pathway to SBC through the Missoula Gulch drainage; there is evidence that the Site is possibly contributing metals-impacted sediment to downstream infrastructure captured within CB-1. However, as indicated above, surface water from Missoula Gulch drainage is captured by the catch basin system (CB-1, CB-8, and CB-9), and infiltrated to groundwater. Sediment is retained within the basins, which mitigates potential degradation of surface water due to sediment.

The sedimentation analysis (Section 3.4) concluded the following:

- Evidence of storm water run-on and runoff through and along the Site boundaries.
- Evidence of current metals-impacted sediment within the UR Site boundary translocating off-site.
- Existing Superfund storm water structures include Centerville Channels to Syndicate Pit and Catch Basin 1 downstream of UR-39. CB-1, CB-8, and CB-9 capture potentially impacted surface water and are designed to retain sediment migration from Missoula Gulch drainage to mitigate potential surface water degradation.

Based on the criteria identified in the QAPP and established qualifying data, further actions are recommended to assess the corrective actions to address exceedances described above. Due to Human Health exceedances and proximity to residential areas, the Site should be considered a higher priority Site to receive further remedial action.

5.0 REFERENCES

Atlantic Richfield Company, 2018. Butte Priority Soils Operable Unit (BPSOU) Final Missoula Gulch Catch Basins (CB-1, CB-8, and CB-9) Operations and Maintenance Plan. Atlantic Richfield Company, July 24, 2018.

Atlantic Richfield Company, 2021. Unreclaimed Sites Quality Assurance Project Plan. Atlantic Richfield Company, June 2021.

EPA, 2020. Consent Decree for the Butte Priority Soils Operable Unit. Partial Remedial Design/Remedial Action and Operation and Maintenance. U.S. Environmental Protection Agency. February 13, 2020. Available at https://www.co.silverbow.mt.us/2161/ButtePriority-Soils-Operable-Unit-Conse. Appendix A of the Consent Decree contains the 2006 Record of Decision.

Figures

Site UR-39
Site has high erosion and disturbance from heavy equipment and vehicle travel. Locals recall the site having a large dump that was once removed in the 60's.

HUMAN HEALTH EXCEEDANCE
STORM WATER EXCEEDANCE
NO EXCEEDANCE
HISTORIC SAMPLE STATION
UNRECLAIMED SITE BOUNDARY

N

DISPLAYED AS:
PROJECTION/ZONE: MSP
DATUM: NAD 83
UNITS: INT'L FT
SOURCE: PIONEER/BSB/AR/QSI 2020

0 25 50 100
Feet

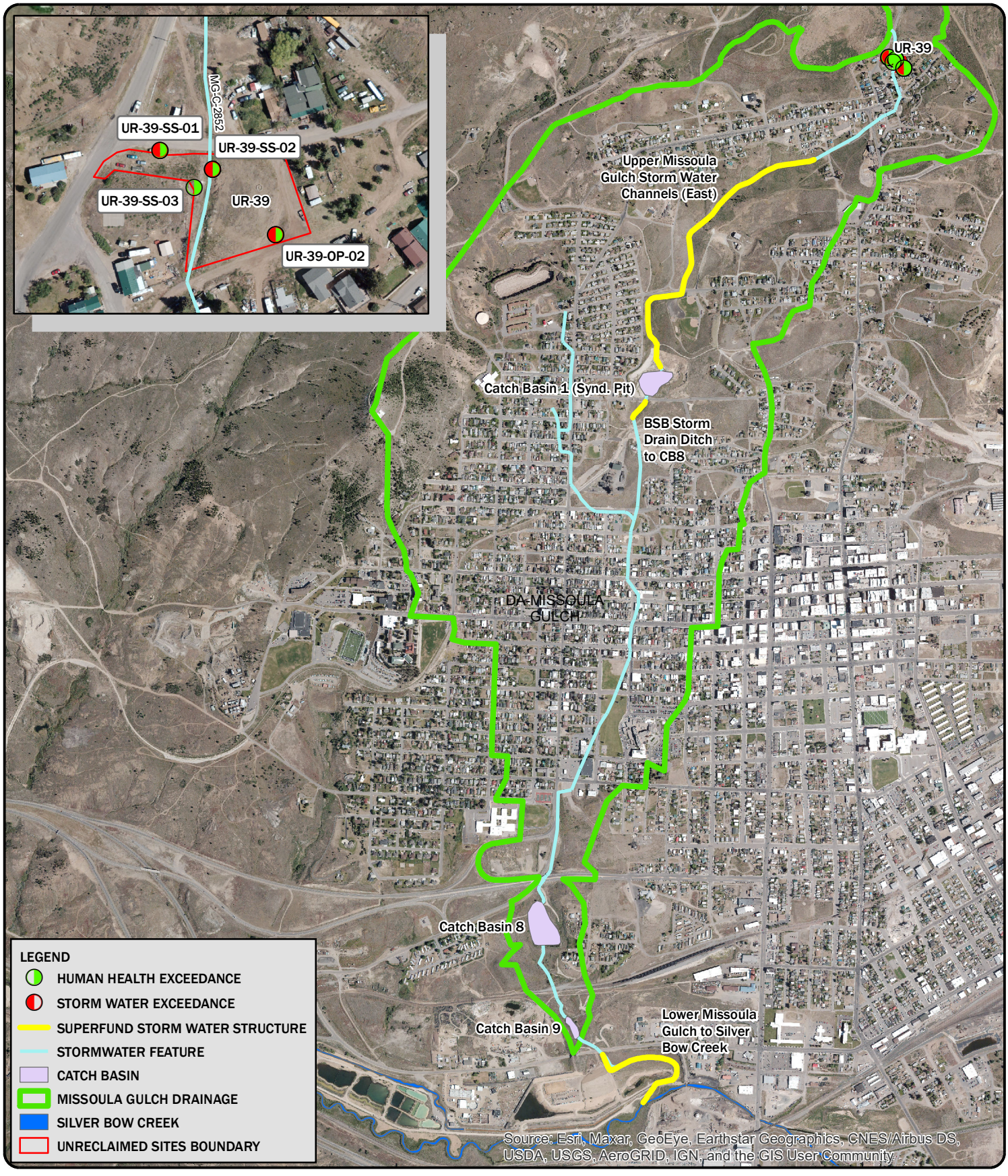
FIGURE 1

PIONEER TECHNICAL SERVICES, INC.

DATE: 3/24/2022

UR-39
2021 UR SITES
SAMPLING AND
EXCEEDANCES

Path: Z:\Shared\Active Projects\ARCO\BPSOU\LandSupport\SolidMedia\Insufficiently_Unreclaimed\SamplingResults\UR_Sampling\UR_Res_UR39-22.mxd



N

DISPLAYED AS:
PROJECTION/ZONE: MSP
DATUM: NAD 83
UNITS: INT'L FT
SOURCE: PIONEER/BSB/QSI 2020

0 800 1,600 3,200
Feet

FIGURE 2

PIONEER TECHNICAL SERVICES, INC.

Unreclaimed Sites
UR-39
Storm Water Features

DATE: 3/24/2022

Path: Z:\Shared\Active Projects\ARCO\BPSOU\LandSupport\SolidMedia\Insufficiently_Unreclaimed\UR_Sampling\DRAINAGE\UR39_SW.mxd

Tables

Table 1. BPSOU Soil Screening Criteria

Analyte	Solid Media	Action/Screening Levels
Lead[1]	Residential	1,200 mg/kg
Arsenic[1]	Residential	250 mg/kg
Mercury[1]	Residential	147 mg/kg
Cadmium [2]		20 mg/kg
Copper [2]		1,000 mg/kg
Zinc [2]		1,000 mg/kg
Lead [2]		1,000 mg/kg
Arsenic [2]		200 mg/kg
Mercury [2]		10 mg/kg

1. From EPA Record of Decision (ROD) BPSOU, Table 12-1 (EPA, 2006a).
2. Waste Identification Criteria in Table 1 in Appendix 1 of the BPSOU Consent Decree (EPA, 2020).
mg/kg: milligrams per kilogram

Table 2: Historical Data Summary

COC (mg/kg)	Sample PSERA9304	Sample #12-01
Arsenic	52.00	115.00
Cadmium	2.00	5.00
Copper	32.00	196.00
Lead	672.00	2,350.00
Zinc	302.00	1,810.00

Storm Water Waste Criteria Exceedance

Human Health Action Level Exceedance

Table 3: New Data Summary

Station	FieldSampleID	Result Type	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)	1+ >HH std	3+ >SW std	1+ >5000	Exceed SW	Exceed
UR-39-OP-01	BPSOU-UR39-070121-0-2-16	XRF	20.26	8.41	90.38	136.59	8.67 U	418.38					
UR-39-OP-01	BPSOU-UR39-070121-2-6-17	XRF	7.82	12.78	43.41	15.68	7.29 U	119.80					
UR-39-OP-01	BPSOU-UR39-070121-6-12-18	XRF	7.41 U	9.94	66.00	13.76	8.67 U	124.66					
UR-39-OP-02	BPSOU-UR39OP02-082621-1	Lab					1.10						
UR-39-OP-02	BPSOU-UR39-070121-0-2-19	Lab	63.50 J+	11.00	530.00	2,110.00	1.40 J-	2,950.00	TRUE				TRUE
UR-39-OP-02	BPSOU-UR39-070121-2-6-20	XRF	178.34	15.08	1,241.01	2,675.75	9.77 U	2,127.04	TRUE	TRUE		TRUE	TRUE
UR-39-OP-02	BPSOU-UR39-070121-6-12-21	XRF	146.75 J	7.65 J	773.69 J	1768.84 J	8.69 UJ	1768.03 J	TRUE				TRUE
UR-39-SS-01	BPSOU-UR39-070121-0-2-01	XRF	15.35 U	21.05	160.03	195.29	8.80 U	4,493.76					
UR-39-SS-01	BPSOU-UR39SS01-110921-1	Lab	12.60	9.70	88.80	261.00	0.11	3,800.00					
UR-39-SS-01	BPSOU-UR39-070121-2-6-02	XRF	47.34 U	19.92	384.43	1,993.05	9.27 U	3,107.08	TRUE				TRUE
UR-39-SS-01	BPSOU-UR39-070121-6-12-03	XRF	107.38	20.30	660.18	3,201.90	10.22 U	3,334.84	TRUE	TRUE		TRUE	TRUE
UR-39-SS-02	BPSOU-UR39-070121-0-2-04	XRF	81.13	16.99	348.64	1,977.05	9.14 U	4,226.53	TRUE				TRUE
UR-39-SS-02	BPSOU-UR39-070121-2-6-05	XRF	88.55	8.83	453.33	1,636.50	9.50 U	3,297.35	TRUE				TRUE
UR-39-SS-02	BPSOU-UR39-070121-6-12-06	XRF	50.96 U	22.32	429.82	2,196.16	10.48 U	4,788.16	TRUE	TRUE		TRUE	TRUE
UR-39-SS-03	BPSOU-UR39SS03-082621-1	Lab					0.75						
UR-39-SS-03	BPSOU-UR39-070121-0-2-07	Lab	19.80	7.00	272.00	901.00	0.36 J-	1,470.00					
UR-39-SS-03	BPSOU-UR39-070121-2-6-08	XRF	46.13 U	15.13	346.53	1,687.70	9.42 U	1,824.22	TRUE				TRUE
UR-39-SS-03	BPSOU-UR39SS03-082621-3	Lab					0.24						
UR-39-SS-03	BPSOU-UR39-070121-6-12-09	Lab	19.20	8.00	198.00	706.00	0.67 J-	1,240.00					
UR-39-SS-04	BPSOU-UR39-070121-0-2-10	XRF	15.09	14.93	79.60	53.65	7.19 U	247.03					
UR-39-SS-04	BPSOU-UR39-070121-2-6-11	XRF	7.77 U	8.59	69.50	33.69	6.94 U	178.23					
UR-39-SS-04	BPSOU-UR39-070121-6-12-12	XRF	7.72 U	10.64	58.28	31.62	6.96 U	175.89					
UR-39-SS-05	BPSOU-UR39-070121-0-2-13	XRF	21.20 U	7.57 U	147.05	340.51	9.62 U	2,354.84					
UR-39-SS-05	BPSOU-UR39-070121-2-6-14	XRF	18.23 U	8.19	159.19	267.84	7.90 U	1,223.05					
UR-39-SS-05	BPSOU-UR39-070121-6-12-15	XRF	17.03	17.00	67.40	87.61	7.05 U	329.37					

Storm Water Waste Criteria Exceedance

Human Health Action Level Exceedance

Table 4: Exceedances

Station	Arsenic (mg/kg)	Cadmium (mg/kg)	Copper (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Zinc (mg/kg)	1+ >HH std	3+ >SW std	1+ >5000	Exceed
UR-39-OP-02	63.50 J+	11.00	530.00	2,110.00	1.40 J-	2,950.00	TRUE			TRUE
UR-39-OP-02	178.34	15.08	1,241.01	2,675.75	9.77 U	2,127.04	TRUE	TRUE		TRUE
UR-39-OP-02	146.75 J	7.65 J	773.69 J	1768.84 J	8.69 UJ	1768.03 J	TRUE			TRUE
UR-39-SS-01	47.34 U	19.92	384.43	1,993.05	9.27 U	3,107.08	TRUE			TRUE
UR-39-SS-01	107.38	20.30	660.18	3,201.90	10.22 U	3,334.84	TRUE	TRUE		TRUE
UR-39-SS-02	81.13	16.99	348.64	1,977.05	9.14 U	4,226.53	TRUE			TRUE
UR-39-SS-02	88.55	8.83	453.33	1,636.50	9.50 U	3,297.35	TRUE			TRUE
UR-39-SS-02	50.96 U	22.32	429.82	2,196.16	10.48 U	4,788.16	TRUE	TRUE		TRUE
UR-39-SS-03	46.13 U	15.13	346.53	1,687.70	9.42 U	1,824.22	TRUE			TRUE
Historical Data										
#12-01	115	5.00	196.00	2,350.00		1,810.00	TRUE			TRUE

Storm Water Waste Criteria Exceedance

Human Health Action Level Exceedance

Appendix A
Data Summary Report
(includes Data Validation Report)

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling
UR-39 Data Summary Report (DSR)

Atlantic Richfield Company

June 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling
UR-39 Data Summary Report (DSR)

Prepared for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Prepared by:

Pioneer Technical Services, Inc.
1101 South Montana Street
Butte, Montana 59701

June 2022

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ABBREVIATIONS AND ACRONYMS

ACRONYM	DEFINITION	ACRONYM	DEFINITION
Atlantic Richfield	Atlantic Richfield Company	**NFG**	National Functional Guidelines
BPSOU	Butte Priority Soils Operable Unit	**NPL**	National Priorities List
CD	Consent Decree	**Pace**	Pace Analytical Services
CFRSSI	Clark Fork River Superfund Site Investigation	**Pioneer**	Pioneer Technical Services, Inc.
DI	Deionized	**QA**	Quality Assurance
DM/DV	Data Management/Data Validation	**QAPP**	Quality Assurance Project Plan
DQA	Data Quality Assessment	**QC**	Quality Control
DSR	Data Summary Report	**SOP**	Standard Operation Procedures
DVR	Data Validation Report	**UR**	Unreclaimed
EPA	Environmental Protection Agency	**XRF**	X-ray Fluorescence
FSP	Field Sampling Plan		

ABSTRACT

This Butte Priority Soils Operable Unit (BPSOU) Unreclaimed (UR) Sites Data Summary Report (DSR) presents results of the subsurface soil sampling conducted on July 1, 2021, August 26, 2021, and November 9, 2021, at the UR source area UR-39 within the BPSOU.

For the event, 7 sample stations were sampled by collecting 3-point composite samples at 3 depth intervals. Each sample was analyzed in the field for pH and by X-ray fluorescence (XRF) for arsenic, cadmium, copper, lead, mercury, and zinc; 7 soil samples of the 21 collected were analyzed by the laboratory for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture. One field duplicate was submitted to the laboratory for the sampling event.

This DSR was prepared by Pioneer Technical Services, Inc. (Pioneer), 1101 S. Montana Street, Butte, Montana, 59701 for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

The information presented in this DSR includes laboratory analytical results from the sampling events.

STATEMENT OF AUTHENTICITY

Consistent with the provisions described in the 2020 U.S. Environmental Protection Agency (EPA) *BPSOU Consent Decree* (CD) (EPA, 2020a), the data sets referenced in this document are considered to be final data generated or evaluated. Data have been designated as enforcement quality and screening quality as described in the *Clark Fork River Superfund Site Investigations* (CFRSSI) *Quality Assurance Project Plan* (QAPP) (ARCO, 1992a) and *CFRSSI Data Management/Data Validation* (DM/DV) *Plan* (ARCO, 1992b) as supplemented by the *CFRSSI DM/DV Plan Addendum* (AERL, 2000a). Consistent with the aforementioned orders, the signatories below hereby stipulate the authenticity and accuracy of the data and hereby waive any evidentiary or other objection as to the authenticity and accuracy of reference in endangerment assessments, public health evaluations, feasibility studies, and remedial design/remedial action documents.

Approved by: _____ _____
Mike Mc Anulty — Date
Liability Manager
Atlantic Richfield Company

Approved by: _____ _____
Nikia Greene — Date
Remedial Project Manager
U.S. Environmental Protection Agency
Region VIII

Approved by: _____ _____
Daryl Reed — Date
State Project Officer
Montana Department of Environmental Quality

Approved by: _____ _____
Scott Sampson — Date
Project Manager
Pioneer Technical Services, Inc.

EXECUTIVE SUMMARY

This BPSOU UR Sites DSR presents the results of the subsurface soil sampling conducted on July 1, 2021, August 26, 2021, and November 9, 2021, at the UR source area UR-39 within the BPSOU.

Sampling was conducted under the guidelines of the *BPSOU UR Sites – Final Field Sampling Plan* (FSP) *Package #1: UR-23, UR-31, UR-32, and UR-39* (Atlantic Richfield Company, 2021a) (referred to herein as FSP) and the 2021 *Final UR Sites QAPP* (Atlantic Richfield Company, 2021b) (referred to herein as QAPP). Information and data from the sampling efforts will be used to characterize the potential contamination at the Site and evaluate potential human health and ecological risks.

This DSR includes all field XRF and soil pH data, laboratory analytical data, and data validation packages. This DSR does not include any analysis or interpretation of the data by Atlantic Richfield Company (Atlantic Richfield).

Paste pH and natural soil samples were collected from seven sample stations (Figure 1). Each sample station was determined based on preliminary Site investigations and Agency approval.

In total, 7 sample stations were sampled by collecting 3-point composite samples at 3 depth intervals. Each sample was analyzed in the field for pH and by XRF for arsenic, cadmium, copper, lead, mercury, and zinc; 7 soil samples of the 21 collected were analyzed by the laboratory for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture. Two field duplicate samples were submitted to the laboratory for the sampling event. Pioneer submitted soil samples to Pace Analytical Services, LLC (Pace) in Minneapolis, Minnesota.

Analytical results were reported in a standard data package. A data validation system was implemented consistent with the procedures described in the CFRSSI DM/DV Plan (ARCO, 1992b) and subsequent addendum (AERL, 2000a). The format for this DSR is consistent with the format established in the *CFRSSI Pilot Data Report Addendum* (AERL, 2000b).

1.0 INTRODUCTION

This report presents the results of soil sampling and analyses for the UR Sites investigation conducted July 1, 2021, August 26, 2021, and November 9, 2021, at the UR source area UR-39 within the Silver Bow Creek/Butte Area National Priorities List (NPL) Site BPSOU area. Activities were consistent with the provisions described in Appendix D of the BPSOU CD (EPA, 2020a). Historical results from previous investigations are summarized in the FSP. The information contained in this report was gathered according to objectives and procedures documented in the FSP and according to the overall soil sampling, analysis objectives, and requirements outlined in the QAPP.

Information referenced throughout this DSR is included in the appendices below:

- Attachment A Data Validation Report (DVR)
- Attachment B Field Forms and Related Documents
- Attachment C Laboratory Data Packages
- Attachment D Electronic Data Deliverable File (included separately)

This investigation's field notebook and datasheets are located at the Atlantic Richfield Contractor (Pioneer) office in Butte, Montana.

All characterization activities and procedures in 2021 followed the QAPP. Sample stations were determined based on preliminary Site investigations and Agency approval. The QAPP describes the quality assurance (QA) and quality control (QC) policies and procedures used during sample collection and analysis. Samples were obtained from the sample stations listed below following the FSP.

Station Field Identification	Sample Identification	Sub Sample Locations (XX)
UR-39-SS-01	**BPSOU-UR39-070121-X-X-XX**	**01, 02, and 03**
UR-39-SS-01	**BPSOU-UR39SS01-110921-X**	
UR-39-SS-02	**BPSOU-UR39-070121-X-X-XX**	**04, 05, and 06**
UR-39-SS-03	**BPSOU-UR39-070121-X-X-XX**	**07, 08, and 09**
UR-39-SS-03	**BPSOU-UR39SS03-082621-X**	
UR-39-SS-04	**BPSOU-UR39-070121-X-X-XX**	**10, 11, and 12**
UR-39-SS-05	**BPSOU-UR39-070121-X-X-XX**	**13, 14, and 15**
UR-39-OP-01	**BPSOU-UR39-070121-X-X-XX**	**16, 17, and 18**
UR-39-OP-02	**BPSOU-UR39-070121-X-X-XX**	**19, 20, and 21**
UR-39-OP-02	**BPSOU-UR39OP02-082621-X**	

*X indicates sample depth interval.

The collected samples were analyzed by XRF. A subset of the samples was sent to Pace in Minneapolis, Minnesota, for laboratory analyses as listed in Section 3.2.4, Table 5 of the QAPP.

The data verification and validation for the XRF and laboratory results are included in Attachment A. All data included in this report are provided as final.

Personnel from Pioneer completed the soil sampling activities. The collected soil data had to undergo rigorous sampling and analysis procedures and meet QA/QC protocols and documentation requirements to be designated as enforcement quality. All data underwent a Stage 2A verification and validation according to *U.S. Environmental Protection Agency* (EPA) *National Functional Guidelines* (NFG) *for Inorganic Superfund Data Review* (EPA, 2020b) and EPA *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). All data presented herein have undergone data validation according to the CFRSSI DM/DV Plan Addendum (AERL, 2000a). Section 3.0 and Attachment A provide information about data quality and validation.

This DSR contains the following information:

- Investigation objectives (Section 1.1).
- Site description and background (Sections 1.2 and 1.3).
- Data quality assessment (Section 2.0).
- Project objectives and sampling design review (Section 2.1).
- Preliminary data review (Section 2.2).
- Conclusions on the quality of the data (Section 2.3).
- Sampling and analysis summary (Section 3.0).
- Deviations (Section 4.0)

Pioneer developed the Standard Operating Procedures (SOPs) that were followed according to the *CFRSSI SOPs* (ARCO, 1992c), and they are included in the QAPP. The SOPs were followed for sampling, data collection, and field/office protocols.

1.1 Investigation Objectives

The QAPP listed the following two objectives:

- The Site will be sampled at three depth intervals: (1) 0 to 2 inches, (2) 2 to 6 inches, and (3) 6 to 12 inches at the Site-specific approved sample stations.
- Opportunistic samples may be obtained in the field at the discretion of field sampling personnel or Agency oversight representative(s). The field team leader will be responsible for determining the appropriate sampling protocol as dictated by the location of the opportunistic sample(s).

The results of the investigation will supplement existing data contained within the Atlantic Richfield Geocortex historical database cited in the FSP. These data will be used to make a Site declaration specifying any areas that do not meet the human health or storm water criteria per Table 1 and Table 2 in the QAPP.

1.2 Investigation Site Description

The UR Sites within the BPSOU could pose a threat to human health or surface water quality due to the presence of historical mine waste. Although many source areas have been previously reclaimed, areas still exist in which soil has not yet been evaluated. Such sites may provide a pathway for human exposure or impact surface water quality via storm water runoff. The UR-39 Site was assessed per the QAPP.

This DSR describes the activities conducted for soil sampling and characterization at the UR-39 Site. Supplemental information provided in the FSP describes the 2021 investigation. Sample stations were determined based on preliminary Site investigations and Agency approval to quantify the potential of human health impacts and/or storm water impacts at depth intervals of 6 to 12 inches, 2 to 6 inches, and 0 to 2 inches.

The following figure summarizes the 2021 sampling effort:

- Figure 1 displays proposed and sampled stations for the 2021 sampling event.

1.3 Background

Site UR-39 is approximately 0.9 acre located in a residential area in the northeastern part of Walkerville. The Site is referred to as the Belle of Butte. The capped Belle of Butte shaft is located adjacent to Site UR-39 but is not included within the Site boundary because the area around the shaft has been reclaimed. Site UR-39 is bounded on the north by East Clark Street, on the east by a dirt alley, on the south by another dirt alley (north of Academy Street), and on the west by North Main Street and the reclaimed area around the Belle of Butte shaft (Figure 1). Atlantic Richfield owns Site UR-39. Playground equipment is located in the eastern portion of Site UR-39. The playground appears to be in active use based on the presence of bicycles during a Site visit. There is a fence around the reclaimed portion of this parcel which acts as a border for the western and northwestern portion of the Site.

2.0 DATA QUALITY OBJECTIVES AND ASSESSMENT

The objective of the Data Quality Assessment (DQA) process (EPA, 2000) is to determine whether the project-specific objectives have been satisfied and if the analytical results are acceptable for project decision making. The DQA process consists of five steps that relate the quality of the results to the intended use of the data:

Step 1: Review sampling design (Section 2.1).
Step 2: Conduct preliminary data review (Section 2.2).
Step 3: Select statistical test(s) as appropriate to evaluate data quality (not applicable).
Step 4: Verify assumptions (not applicable).
Step 5: Draw conclusions about the quality of the data (Section 2.3).

2.1 Project Objectives and Sampling Design Review

Project-specific objectives were defined in the FSP to cover the sampling design requirements outlined in the QAPP.

2.2 Preliminary Data Review

A preliminary data review was conducted to determine if any problems or anomalies were present in the sample collection and analysis procedures. This was completed by evaluating data quality indicators (Section 2.2.1) followed by data verification and validation (Attachment A).

2.2.1 Data Quality Indicators

The DQA process evaluates the results against data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity. An evaluation of each data quality indicator is included in the DVR (Attachment A).

2.3 Data Quality Conclusions

The laboratory samples were collected using standard sampling methods and relevant Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods were based on EPA and other industry-standard practices. Laboratory analytical methods are provided in Table 5 of the QAPP. Sample collection was completed by professionals properly trained in following SOPs and using the equipment. Proper chain of custody and sample handling activities were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analyses using industry-standard methods. The validation checklists are included in the DVR (Attachment A); all data met the Level A and Level B criteria.

Data generated from the collected samples were examined to ensure that project objectives were met. The data quality objectives for the investigation are listed in the QAPP Section 2.4. A data QA/QC review was completed for the sampling event.

For the 2021 Site sampling event, a total of 21 natural soil samples were collected. All samples were analyzed by XRF, and 7 samples were sent to Pace for laboratory analysis. This resulted in a total of 126 natural data points generated by the XRF analyses and 34 natural data points generated by the laboratory analysis. Of the points, 26 (21%) XRF natural data points were designated screening quality, and 100 (79%) XRF natural data points were designated as enforcement quality. For the laboratory natural data points, 4 (12%) were designated screening quality, and 30 (88%) laboratory natural data points were designated as enforcement quality. No data were rejected. The DVR (Attachment A) includes a summary of the analysis. Please note that 20 of the 26 (77%) screening quality XRF data points were qualifications made to the mercury results (Section 2.2.3 of the DVR). Based on the data quality conclusions in the DSR, the data analyzed in the 2021 sampling event were deemed usable.

3.0 SAMPLING AND ANALYSIS SUMMARY

This section summarizes completed tasks that addressed the monitoring objectives described in the QAPP including sampling methods, field analysis methods, and analytical results for the UR soil sampling.

3.1 Soil Sample Collection

Samples were collected following procedures detailed in the QAPPs referenced in Section 1.0, except where modifications of the sampling design or procedures were required. Any modifications are listed in Section 4.0. Sample station locations were selected in cooperation and agreement with Agency oversight personnel.

The general sampling approach consisted of hand-dug pits. The UR Site sampling proceeded as follows.

Sample stations were determined based on preliminary Site investigations and the Agency-approved FSP. Field personnel and representatives from the Agencies (when present) made decisions regarding collection of additional "opportunistic" samples to characterize the Site conditions and characteristics accurately. A minimum of 3 combination samples (9 subsamples) were collected in a 3-point (triangular) pattern. At each point, a subsample of predetermined depth was collected. As a rule, the diagonal distance between the points was 10 feet, depending on the area of soil homogeneity. The diagonal distance could be adjusted in the field to account for soil differences and the presence of obstacles. Three discrete aliquots of equal amounts of soil from each designated subsample location were composited into 1 sample. Materials such as plant matter, debris, and large rocks were removed, to a reasonable extent, before placing the sample in the sample container for laboratory analysis. A portion of the natural sample was placed into a #10 (2 millimeter) disposable sieve screen before running the XRF analyses, and a portion was used for pH analysis. After XRF analyses were complete, the sample was archived in the Pioneer Butte, Montana, office. Samples were collected from the 0 to 12-inch depth at 0- to 2-inch, 2- to 6-inch, and 6- to 12-inch intervals.

3.1.1 Sample Analysis

3.1.1.1 pH

The general UR Site pH analysis proceeded as follows per SOP-SFM-01 in Attachment B of the QAPP:

Composite paste pH samples were collected using disposable trowel scoops, plastic cups, and deionized (DI) water. Roughly 1 inch of fine material was scooped from the sieved material into the bottom of the cup. The DI water was added to the sample, and the cup was swirled until a paste was made, and the Hanna Instruments HI 99121 meter was used to measure the paste pH sample. The meter was decontaminated with DI water after each use. The collected soil was returned to the area where the sample was collected, and the tools were discarded. Soil pH is included in Attachment B.

3.1.1.2 XRF

The general XRF analyses proceeded as follows per SOP-SFM-02 in Attachment B of the QAPP:

Field personnel thoroughly homogenized the natural sample in the bag by kneading the soil and then split roughly one disposable trowel scoop from the natural sample and placed the split sample into a #10 sieve inside a gallon resealable plastic bag (i.e., Ziplock™). If required, the sieved sample was transferred into an additional 1-quart resealable plastic bag so that it fit in the analyzer measurement stand. The material was compacted so that there was a flat surface on the area to be analyzed and visually inspected to ensure that only fines were present. The sample bag was placed on the XRF stand and analyzed. The results were recorded for the selected metals on the XRF field datasheet. Field personnel completed duplicate and replicate XRF analyses on at least 5% of the samples analyzed in the XRF unit.

Soil samples for arsenic, cadmium, copper, mercury, lead, zinc, percent moisture, and associated QA/QC samples were packaged and shipped to Pace for analysis. Field forms are in Attachment B, analytical reports are in Attachment C, data deliverable files are in Attachment D, and soil results (including QA/QC samples), applicable laboratory flags, data validation qualifiers, and reason codes are included in the tables in the DVR in Attachment A.

3.1.1.3 Laboratory Samples

The general laboratory sampling proceeded as follows per SOP-S-01 and SOP-SA-01 in Attachment B of the QAPP:

Composite soil samples were collected in a labeled plastic bag and homogenized after each subsample was collected. After the sample was collected from the 3-point composite, a portion of the sample was removed and placed in a #10 sieve within a separate resealable plastic bag (XRF analyses described in Section 3.1.1.2). Field personnel then sent at least every 1 per 10 samples to the laboratory for analysis. Additional samples were sent to the laboratory for confirmation if the field results were within plus or minus 35 % of the contaminants of concern action/screening levels (Table 1 and Table 2 within the QAPP). Of the seven laboratory samples submitted, four were analyzed for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture. Three of the seven were resampled due to improper preservation of mercury and submitted for mercury and percent moisture analyses.

4.0 DEVIATIONS

During the sampling event, there was one deviation to the QAPP:

- Disposable sieves (#10) were used instead of the stainless-steel sieves (#10) as described in Step 8-a-i in Section 3.2.1 of the QAPP. This section states that *"A deviation from SOP-S-01 may incorporate the use of disposable sieves for field XRF samples in lieu of the stainless-steel sieves."*

5.0 REFERENCES

AERL, 2000a. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan Addendum. June 2000.

AERL, 2000b. Clark Fork River Superfund Site Pilot Data Report Addendum. July 2000.

ARCO, 1992a. Clark Fork River Superfund Site Investigations Quality Assurance Project Plan. May 1992. Prepared by PTI Environmental Services.

ARCO, 1992b. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan. May 1992. PTI Environmental Services, Contract C 117-06-64, April 1992.

ARCO, 1992c. Clark Fork River Superfund Site Investigations Standard Operating Procedures. September 1992.

Atlantic Richfield Company, 2021a. Butte Priority Soils Operable Unit (BPSOU) Unreclaimed Sites - Final Field Sampling Plan Package #1: UR-23, UR-31, UR-32, and UR-39. June 2021.

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EPA, 2000. Guidance for Data Quality Assessment: Practical Methods for Data Analysis. EPA QA/G-9. U.S. Environmental Protection Agency, July 2000.

EPA, 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. U.S. Environmental Protection Agency, January 2009.

EPA, 2020a. Consent Decree for the Butte Priority Soils Operable Unit. Partial Remedial Design/Remedial Action and Operation and Maintenance. U.S. Environmental Protection Agency. February 13, 2020. (Appendix A of the CD contains the EPA 2006 Record of Decision, 2011 Explanation of Significant Differences to the 2006 Record of Decision, and the 2020 Record of Decision Amendment). Available at https://www.co.silverbow.mt.us/2161/ButtePriority-Soils-Operable-Unit-Conse.

EPA, 2020b. U.S. Environmental Protection Agency National Functional Guidelines for Inorganic Superfund Data Review, January 2017.

Figures

Figure 1. Unreclaimed Sites UR-39 Sample Stations

2021 SAMPLED STATIONS

PROPOSED SAMPLE STATIONS

HISTORIC SAMPLE STATION

UNRECLAIMED SITES BOUNDARY

N

DISPLAYED AS:
PROJECTION/ZONE: MSP
DATUM: NAD 83
UNITS: INT'L FT
SOURCE: PIONEER/BSB/AR/QSI 2020.

0 25 50 100
Feet

FIGURE 1

PIONEER TECHNICAL SERVICES, INC.

Unreclaimed Sites
UR-39
2021 Sample Locations

DATE: 3/14/2022

Path: Z:\Shared\Active Projects\ARCO\BPSOU\LandSupport\SolidMedia\Insufficiently_Unreclaimed\UR_Sampling\Unreclaimed_Samplelocations_UR39.mxd

Tables

Table 1. Coordinates for Sample Stations and Identification

Table 1. Coordinates for Sample Stations and Identification			
Station Field Identification	Sample Identification	Northing	Easting
UR-39-SS-01	BPSOU-UR39-070121-X-X-01 BPSOU-UR39-070121-X-X-02 BPSOU-UR39-070121-X-X-03	664596.149	1198253.626
UR-39-SS-02	BPSOU-UR39-070121-X-X-04 BPSOU-UR39-070121-X-X-05 BPSOU-UR39-070121-X-X-06	664565.767	1198338.695
UR-39-SS-03	BPSOU-UR39-070121-X-X-07 BPSOU-UR39-070121-X-X-08 BPSOU-UR39-070121-X-X-09	664536.687	1198308.747
UR-39-SS-04	BPSOU-UR39-070121-X-X-10 BPSOU-UR39-070121-X-X-11 BPSOU-UR39-070121-X-X-12	664495.889	1198415.518
UR-39-SS-05	BPSOU-UR39-070121-X-X-13 BPSOU-UR39-070121-X-X-14 BPSOU-UR39-070121-X-X-15	664460.298	1198366.039
UR-39-OP-01	BPSOU-UR39-070121-X-X-16 BPSOU-UR39-070121-X-X-17 BPSOU-UR39-070121-X-X-18	664528.875	1198417.254
UR-39-OP-02	BPSOU-UR39-070121-X-X-19 BPSOU-UR39-070121-X-X-20 BPSOU-UR39-070121-X-X-21	664460.298	1198439.824

*Datum used is NAD83

Attachment A
Data Validation Report

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling UR-39
Data Validation Report

Atlantic Richfield Company

June 2022

SILVER BOW CREEK/BUTTE AREA NPL SITE
BUTTE PRIORITY SOILS OPERABLE UNIT

Draft Final

2021 Unreclaimed Sites Sampling UR-39
Data Validation Report

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June 2022

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LIST OF ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

Acronym	Definition
°C	Degrees Celsius
%R	Percent Recovery
BPSOU	Butte Priority Soils Operable Unit
CCS	Calibration Check Sample
CFRSSI	Clark Fork River Superfund Site Investigation
COC	Contaminants Of Concern
DM/DV	Data Management/Data Validation
DV	Data Validation
DVR	Data Validation Report
EPA	U.S. Environmental Protection Agency
FSP	Field Sampling Plan
GFAA	Graphite Furnace Atomic Absorption Spectrometry
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LDS	Laboratory Duplicate Sample
LMS	Laboratory Matrix Spike
LMSD	Laboratory Matrix Spike Duplicate
LOD	Limit of Detection
MB	Method Blank
MDL	Method Detection Limit
mg/kg	milligram per kilogram
NFG	National Functional Guidelines
Pace	Pace Analytical Services, LLC
Pioneer	Pioneer Technical Services, Inc.
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
RL	Reporting Limit
RPD	Relative Percent Difference
SDG	Sample Delivery Group
SiO_2	Silicon Dioxide
SOP	Standard Operating Procedure
SRM	Standard Reference Materials
UR	Unreclaimed
XRF	X-Ray Fluorescence

DOCUMENT MODIFICATION SUMMARY

Revision No.	Author	Version	Description	Date
Rev 0	Sara Ward	Draft	Issued for Internal Review	3/15/2022
Rev 1	Sara Ward	Draft Final	Issued for Agency Review	6/15/2022

1.0 DATA VALIDATION REPORT SUMMARY

This Data Validation Report (DVR) summarizes the X-ray fluorescence (XRF) and laboratory analytical results from samples collected from the Unreclaimed (UR) Site UR-39 (referred to as Site). The samples were collected per the *Butte Priority Soils Operable Unit (BPSOU) Unreclaimed Sites – Final Field Sampling Plan (FSP) Package #1; UR-23, UR-31, UR-32, and UR-39* (Atlantic Richfield, 2021a) (referred to herein as the FSP). The 2021 UR-39 sampling event included samples collected under the 2021 *Final Unreclaimed Sites Quality Assurance Project Plan* (QAPP) (Atlantic Richfield, 2021b) (referred to herein as the QAPP).

All data have undergone a Stage 2A data validation as defined in the U.S. Environmental Protection Agency (EPA) *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use* (EPA, 2009). Data validation was conducted in accordance with the QAPP, the *Clark Fork River Superfund Site Investigation* (CFRSSI) *Data Management/Data Validation* (DM/DV) *Plan* (ARCO, 1992a) (referred to herein as the CFRSSI DM/DV Plan) and the *CFRSSI DM/DV Plan Addendum* (AERL, 2000) (referred to herein as the CFRSSI DM/DV Addendum), the *CFRSSI QAPP* (ARCO, 1992b), *EPA National Functional Guidelines* (NFG) *for Inorganic Methods Superfund Data Review* (EPA, 2020), analytical methods, and laboratory standard operating procedures (SOPs). The 2020 EPA National Functional Guidelines for Inorganic Methods Superfund Data Review was followed since it is the most current version. This report details the evaluation of field XRF and laboratory data for the purpose of usability.

This document refers to the tables and attachments listed below:

- Table A1 contains the natural sample results with laboratory qualifiers; data validation qualifiers; enforcement, screening, and rejected classifications; and data validation reason codes.
- Table A2 contains the field duplicate pair samples with results, laboratory qualifiers, data validation qualifiers, data validation reason codes, and quality control (QC) criteria assessment.
- Table A3 contains sample identification information including the field sample name, sample type, sample location, laboratory sample name, sample date, analytical methods, and analytes.
- Table A4 contains the definitions for the laboratory qualifiers; data validation qualifiers; enforcement, screening, and rejected classification codes; and data validation reason codes.
- Table A5 contains the XRF Silicon Dioxide (SiO_2) Standard and Calibration Check Sample (CCS) results.
- Table A6 contains the XRF duplicate and replicate sample results and QC criteria assessment.
- Attachment 1 contains the data validation checklists. Attachment 1.1 and Attachment 1.2 contain the checklists for XRF analyses and laboratory analysis, respectively.
- Attachment 2 contains the Level A/B Assessment Checklist.
- Attachment 3 contains the QC criteria used in the data validation process.

The instrument output for XRF data, produced by Pioneer Technical Services, Inc. (Pioneer), was used to perform the data validation of the XRF results, and the standard data packages received from Pace Analytical Services, LLC (Pace) were used to perform the data validation of the laboratory results.

All data met the Level A and B criteria. Based on the validation process outlined in the CFRSSI DM/DV Plan, the quality of the data is ranked as enforcement quality, screening quality, or it is rejected. Enforcement quality data are defined in the CFRSSI DM/DV Plan as data that meet the Level A and B criteria (Attachment 2) and are not qualified as estimated or rejected after the data validation process. For sample results qualified as estimated "J" by the laboratory because the reported result is between the method detection limit (MDL) and analytical reporting limit (RL), values are considered enforcement data if no other qualifiers were required during validation. Enforcement quality data may be used for all purposes under the Superfund program including the following: site characterization, health and safety, Engineering Evaluation/Cost Analysis, remedial investigation/feasibility studies, evaluation of alternatives, confirmational purposes, risk assessments, and engineering design. Since all samples met the Level A and B documentation criteria, the results that were not qualified as estimated (e.g., J, J+, J-, or UJ) or rejected for some exceedance of quality assurance (QA)/QC criteria were considered "enforcement" quality data and were assigned an "E" in Table A1. Screening quality data, as defined in the CFRSSI DM/DV Plan, are those samples that do not meet the Level B criteria and/or were qualified as estimated (e.g., J, J+, J-, or UJ) during the data validation process. Potential uses of screening quality data, depending on their quality, include site characterization, determining the presence or absence of contaminants, developing or refining sampling and analysis techniques, determining relative concentrations, scoping, and planning for future studies, engineering studies and engineering design, and monitoring during implementation of the response action. Sample results that were qualified as estimated during the validation process were considered "screening" quality data and assigned an "S" in Table A1.

Data rejected during data validation cannot be used for any Superfund activities. No results were rejected.

The summary of data points in this DVR includes only the natural samples and does not include the field QC samples (the field duplicate). Note that the field QC samples underwent the same data validation procedures as the natural samples, and the results are included on the data validation checklists in Attachment 1. The qualifications made to field QC samples are listed in Table A2; however, the qualifications made to these samples are not included in the summary of qualifications made to natural data points, and the field QC samples are not included in Table A1.

For the 2021 Site sampling event, a total of 21 natural soil samples were collected. All samples were analyzed in the field by XRF, and 7 samples were sent to Pace for laboratory analysis of metals. This resulted in a total of 126 natural data points generated by the XRF analyses and 34 natural data points generated by the laboratory analysis. A summary by analysis type is shown below:

Analysis Type	Natural Samples	Data Points	Enforcement Quality Data Points (% of total)	Screening Quality Data Points (% of total)	Rejected Data Points (% of total)
XRF	21	126	100 (79%)	26 (21%)	0 (0%)
Pace	7	34	30 (88%)	4 (12%)	0 (0%)

Please note that 20 of the 26 (77%) screening quality XRF data points were qualifications made to the mercury results due to the lack of a CCS with a known amount of mercury, as discussed in Section 2.2.3.

Table A1 shows the laboratory qualifiers, data validation qualifiers, enforcement or screening designators, and the reason code for the qualification for each natural data point.

2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA

The QC criteria used during the data validation process are listed in Attachment 3.

For XRF data, the QC criteria were derived from the QAPP, the CFRSSI DM/DV Plan and CFRSSI DM/DV Addendum, the CFRSSI QAPP (ARCO, 1992b), the *Niton XL3 Mining QC Sheet* (ThermoFisher Scientific, 2014), and the Pioneer SOP for operating the XL3 XRF analyzer (SOP-SFM-02) (included in the QAPP).

For laboratory data, the QC criteria were derived from the QAPP, CFRSSI DM/DV Addendum, the NFG for Inorganic Superfund Data Review (EPA, 2020), analytical methods, and method-specific laboratory SOPs.

Data validation checklists derived from the CFRSSI DM/DV Addendum were completed for the XRF data and each laboratory report (Attachment 1). The deviations made to the checklists provided in the CFRSSI DM/DV Addendum guidance document are listed below:

- The Laboratory Data Validation Checklist for Metals Analysis by Spectrace XRF was revised slightly to more accurately reflect the information provided by the XRF Analyzer (Niton XL3). The checklist is included in Attachment 1.1. The guidelines for XRF QA and QC are listed in Section 3.6 (Quality Assurance/Quality Control) of the QAPP.
- The Laboratory Data Validation Checklist for Metals Analysis by Inductively Coupled Plasma (ICP) or Graphite Furnace Atomic Absorption Spectrometry (GFAA) was revised slightly to more accurately reflect the information provided in the full data packages provided by Pace and the requirements listed in the NFG (EPA, 2020). The checklist is included in Attachment 1.2.
- The Data Validation Checklist for Field Quality Control was not filled out for each data package. Sections on field duplicates were added to each Laboratory Data Validation Checklist worksheet.

The relevant data validation checklists were completed for each sample delivery group (SDG) and included the data validation performed for the methods and analytes listed below:

Data Validation Checklist	Method	Analyte(s)
XRF	XRF	Arsenic, Cadmium, Copper, Lead, Mercury, and Zinc
Laboratory: Pace	EPA 6010D	Arsenic, Cadmium, Copper, Lead, and Zinc
	EPA 7471B	Mercury
	ASTM D2974	Percent Moisture

One Level A/B Assessment was completed for the Site (Attachment 2).

2.1 Field Quality Control Samples

The QAPP requirement for field duplicate collection frequency is 1 field duplicate sample per 20 natural samples or once per sampling event, whichever is more frequent. Disposable sampling equipment was used to collect soil samples; therefore, equipment rinsate blanks were not collected.

Any qualifications required based on the field QC sample results are detailed in the data validation checklists (Attachment 1) and are listed in Table A1 and Table A2.

Please note that although the field QC samples (field duplicate samples) may receive a qualifier during the data validation process, the enforcement and screening quality summaries and the precision and accuracy assessment summaries do not include the field QC sample results. Only the results of the natural samples are included in the data quality assessment summaries.

2.1.1 Field Duplicate

During the sampling event, 2 field duplicate samples were collected for the 7 natural samples submitted to Pace for analysis (28.6%); therefore, the collection frequency requirement for field duplicates (5%) was met.

The analytical RLs presented in the laboratory reports were used to evaluate the field duplicates. The field duplicate QC criteria assessments are listed in Table A2.

For the 21 natural XRF samples collected at the Site, 1 field duplicate sample (4.8%) was analyzed. However, 18 field duplicate samples (6%) were analyzed for the 300 natural XRF samples collected during the entire sampling event; therefore, the collection frequency requirement for field duplicates (5%) was met.

The QC criteria used to assess field duplicate pair results during data validation are listed in Attachment 3. The field duplicate sample pairs and QC criteria assessments are listed in Table A2. If a field duplicate result was outside the control limit, the parent sample and any samples considered sufficiently similar were qualified as specified in Attachment 3. Any qualifications made to natural samples based on the field duplicate sample results are detailed in the data validation checklists (Attachment 1) and are listed in Table A1 and Section 4.1.

2.1.2 Equipment Rinsate Blank

Disposable sampling equipment was used to collect soil samples; therefore, equipment rinsate blanks were not collected.

2.2 XRF Quality Control Samples

This section summarizes the XRF QC samples evaluated during the data validation of the XRF results.

2.2.1 Energy Calibration Check

The energy calibration check determines whether the characteristic X-ray lines are shifting, which would indicate drift within the instrument. The requirement set forth in the QAPP was the performance of the preprogrammed energy calibration check on the equipment at the beginning of each working day. During the sampling event, the energy calibration check was performed at the beginning of each working day.

2.2.2 Silicon Dioxide Standard

The SiO_2 standard, as provided by Niton, is a "clean" quartz or SiO_2 matrix that contains concentrations of selected analytes near or below the machine's lower limit of detection. Analysis results with the XRF instrument of this SiO_2 standard are used to monitor for cross contamination. The frequency requirement for SiO_2 standard sample analysis set forth in the QAPP is to complete analysis of this sample at the beginning of each day, once per every 20 samples, and at the end of each day's run sequence.

During the sampling event, the frequency requirement for SiO_2 standard samples was not met. One sample was not closed out with a SiO_2 sample, which resulted in the qualification of 6 natural XRF data points for not meeting the SiO_2 frequency. Any qualifications required based on the SiO_2 frequency are detailed in the data validation checklists (Attachment 1) and are listed in Table A1. The SiO_2 sample results are listed on Table A5.

The SiO_2 standard sample results were within the control limits.

2.2.3 Calibration Check Samples

The CCSs help check the accuracy of the XRF instrument and assess the stability and consistency of the analysis for the analytes of interest. The CCSs used were the Niton-provided Standard Reference Materials (SRMs): NIST 2709a-Joaquin Soil (NIST 2709a) sample and a Resource Conservation and Recovery Act (RCRA) sample.

The frequency requirement for CCS analysis set forth in the QAPP is to complete analysis of at least 1 CCS at the start of each day, once per every 20 samples, and as the last analysis each day. The frequency requirement for CCS analyses was not met. One XRF sample was not closed out

with a CCS sample, which resulted in qualification of 6 natural XRF data points for not meeting the CCS frequency. Any qualifications required based on the CCS frequency are detailed in the data validation checklists (Attachment 1) and are listed in Table A1. The CCS sample results are listed in Table A5.

The CCS results were within the control limits. However, there was no CCS that had a known amount of mercury greater than the limit of detection (LOD) for mercury. Therefore, all detected mercury results have been qualified "J" and all non-detected mercury results have been qualified "UJ". This resulted in 20 mercury results qualified "UJ" due to the lack of an appropriate CCS. There was 1 additional mercury result qualified "UJ" due to not meeting the CCS frequency.

Qualification due to lack of an appropriate CCS standard are listed in Table A1.

2.2.4 XRF Duplicate and XRF Replicate Samples

The XRF duplicate and XRF replicate samples help check the precision of the XRF sampling method and instrument. The XRF duplicate sample was analyzed by removing the sample bag from the analytical stand, kneading it once or twice, and analyzing it a second time. The XRF replicate sample was analyzed immediately following the primary sample analysis by restarting the XRF to analyze the same sample a second time with the same soil in the XRF aperture.

The frequency requirement for XRF duplicate and XRF replicate samples set forth in the QAPP is the analysis of each sample once per every 20 samples (5%).

For the 21 natural XRF samples collected at the Site, 1 duplicate sample (4.8%) and 1 replicate sample (4.8%) were analyzed. Therefore, the frequency requirement for XRF duplicate and XRF replicate samples (5%) was not met for the Site. Six natural XRF data points were qualified for not meeting the XRF duplicate and XRF replicate frequency. Any qualifications required based on the XRF duplicate and XRF replicate frequency are detailed in the data validation checklists (Attachment 1) and are listed in Table A1.

Table A6 contains the XRF duplicate and XRF replicate sample pair results with the parent sample results and the QC criteria assessment. If the results were outside the control limit, the parent sample and any sample considered sufficiently similar were qualified "J" if the result was detected and "UJ" if the result was not detected.

The XRF duplicate and XRF replicate sample results were within the control limits.

2.3 Laboratory Quality Control Samples

The laboratory QC sample types vary depending on analytical method. The QC criteria used during data validation to evaluate the applicable laboratory QC samples are listed in Attachment 3 and Section 3.6 of the QAPP.

The Stage 2A data validation includes evaluating the following laboratory QC items as applicable per analytical method:

- Holding Times.
- Preservation.
- Method Blanks (MB).
- Laboratory Control Sample (LCS) and LCS Duplicates (LCSD).
- Laboratory Duplicate Samples (LDS).
- Laboratory Matrix Spike (LMS) and LMS Duplicates (LMSD).

The analytical RLs produced by each laboratory were used to evaluate the laboratory duplicates. The laboratory MDLs were used for the data review and validation of laboratory MB samples.

The appropriate laboratory QC samples were analyzed with each sample group. Any qualifications required based on the laboratory QC sample results are detailed in the data validation checklists (Attachment 1) and are listed in Table A1. Also refer to Section 4.1 and Section 4.2.

3.0 LEVEL A/B ASSESSMENT SUMMARY

Data that meet the Level A and Level B criteria and are not qualified as estimated or rejected are assessed as enforcement quality data and can be used for all Superfund purposes and activities. Data that meet only the Level A criteria and are not rejected can be assessed as screening quality data.

Screening quality data can be used only for certain activities, which include engineering studies and design. Data that do not meet both the Level A and B criteria are designated as unusable. The Level A/B Assessment Checklist for all samples collected for the Site are included as Attachment 2. Sample collection information was recorded in the field logbook, including sample collection date, location, and collection method. This information was reviewed for the Level A/B criteria.

As shown in Attachment 2, all the samples met both Level A and Level B criteria. No data were designated screening quality or rejected based on the results of Level A/B assessment.

4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS, AND SENSITIVITY DATA SUMMARY

This section provides the precision, accuracy, representativeness, comparability, completeness, and sensitivity assessment for the XRF and laboratory data generated from samples collected during the 2021 Site sampling event.

4.1 Precision

Precision is the amount of scatter or variance that occurs in repeated measurements of a particular analyte.

4.1.1 XRF Precision

The precision control limit used for XRF soil samples was a relative percent difference (RPD) less than 35% when both sample results were detections. For XRF data, the precision assessment is based on the RPD of the XRF duplicate, XRF replicate, and field duplicate sample pairs. If an RPD was outside the control limit, the parent sample and samples considered sufficiently similar to the parent sample were qualified. No natural samples were considered sufficiently similar enough to each other to require additional qualifications based on the variability of soil matrices. If the parent sample was a duplicate sample, the duplicate sample's parent sample was considered sufficiently similar and was qualified when applicable.

There were no qualifications made to the natural data points because the XRF duplicate, XRF replicate, or field duplicate pair results did not meet the control limit.

For the XRF results, 126 (100%) of the 126 natural XRF data points met the precision requirements.

4.1.2 Laboratory Precision

Acceptance or rejection of precision measurements is based on the RPD of the laboratory and field duplicates. For example, perfect precision would be a 0% RPD between duplicate samples (both samples have the same analytical result) for results that are greater than 5 times the laboratory RL. For total metals analysis, when both results are greater than 5 times the RL, acceptable precision is an RPD of plus or minus 35% in soil samples. For samples with 1 or both results less than 5 times the RL (including non-detect), acceptable precision is met if the absolute difference between the 2 sample results is less than 2 times the RL. This precision requirement is from Section 2.4.1 of the CFRSSI QAPP (ARCO, 1992b).

There were no qualifications made to the natural data points because the laboratory duplicate or field duplicate pair results did not meet the control limit.

For the laboratory results, 34 (100%) of the 34 natural laboratory data points met the precision requirements.

4.2 Accuracy

Accuracy is the ability of the analytical procedure to determine the actual or known quantity of a particular substance in a sample.

4.2.1 XRF Accuracy

For the XRF data, the SiO_2 standard and CCS are used to assess accuracy. The control limit for these samples is summarized in Attachment 3. If a SiO_2 standard or CCS result was outside the control limit, the natural sample results analyzed in the same run sequence were qualified.

If a SiO_2 standard had a detected result greater than the control limit, the natural sample results analyzed in the same analytical run were qualified "J+" if the natural sample result was a detected result less than 10 times the SiO_2 standard result.

All SiO_2 standard results were within control limits.

If the CCS result was outside the control limits summarized in Attachment 3, the natural sample results in the same analytical run as these CCS results were qualified as "J" for detected results or "UJ" for non-detected results.

All CCS analysis results were within the control limit.

For the XRF results, 126 (100%) of the 126 natural XRF data points did meet the accuracy requirements.

4.2.2 Laboratory Accuracy

For the laboratory data, MB, LCS, LCSD, LMS, and LMSD were used to assess accuracy. The QC criteria used during data validation for each QC sample are summarized in Attachment 3.

Laboratory blanks were analyzed to assess artifacts introduced during analyses that may affect the accuracy of the data. In accordance with the CFRSSI QAPP (ARCO, 1992b), a data point is qualified as "U" if it is less than 5 times an associated blank result (MB) that does not meet the control limit.

The percent recoveries (%R) of the LCS, LCSD, LMS, and LMSD are used to measure accuracy. The LCS and LCSD measure sample preparation and analysis accuracy. The LMS and LMSD measure the effect that the sample matrix has on accuracy. Perfect %R would be 100% (the analysis result is exactly the known concentration of the spike amount in the LMS, LMSD, LCS or LCSD).

For the 2021 Site sampling event, qualifications were made to natural samples due to LMS and/or LMSD results from Pace exceeding control limits. These qualifications are detailed in the data validation checklists for each SDG in Attachment 1.2. There were no qualifications made due to the remaining indicators of accuracy.

There were two natural data points qualified due to an exceedance of the %R for the LMS and/or LMSD (DV Reason Code = S%) as listed below:

Field Sample ID	Method	Analyte	DV Qualifier	DV Reason Code
BPSOU-UR39-070121-0-2-19	SW-846 6010D	Arsenic	J+	S%
BPSOU-UR39-070121-0-2-19	SW-846 7471B	Mercury	J-	Pres, S%

This resulted in 2 (6%) of the 34 natural laboratory data points that did not meet the accuracy requirements, and 32 (94%) of the 34 natural laboratory data points that did meet the accuracy requirements.

4.3 Representativeness

Representativeness is a qualitative parameter that is addressed through proper design of the sampling program. Samples for XRF analyses and laboratory analysis were collected in accordance with the QAPP and FSP.

The XRF and laboratory results were reviewed, and a Stage 2A data validation completed. Based on information provided by Pace, the chain of custody requirements were met for the sample event. All samples were analyzed within the appropriate holding times. Three natural laboratory data points were qualified due to not meeting the preservation requirement (less than 6 degrees Celsius [ºC]) for mercury (DV Reason Code = Pres) as listed below:

Field Sample ID	Method	Analyte	DV Qualifier	DV Reason Code
BPSOU-UR39-070121-0-2-07	SW-846 7471B	Mercury	J-	Pres
BPSOU-UR39-070121-0-2-19	SW-846 7471B	Mercury	J-	Pres, S%
BPSOU-UR39-070121-6-12-09	SW-846 7471B	Mercury	J-	Pres

Samples were re-collected from these three locations on August 26, 2021, and submitted to Pace for analysis of mercury and percent moisture. The samples collected on August 26, 2021, met the preservation requirement for mercury.

The representativeness goals were met.

4.4 Comparability

Comparability is assessed to determine if one set of data can be compared to another set of data. Comparisons are made by examining and comparing the laboratory and field methods used to acquire sample data for different distinct data sets. The data summarized in this report include soil samples collected and analyzed by Pioneer and Pace.

4.4.1 XRF Comparability

The soil samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and XRF methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in SOPs and using the equipment. Proper sample handling was observed during sample collection and analysis.

Consequently, data from past and future soil sampling events at the Site using comparable sampling and XRF analyses may be used in concert with this data set.

4.4.2 Laboratory Comparability

The samples were collected using standard sampling methods and Pioneer SOPs. The sampling design, SOPs, and laboratory analytical methods are based on EPA and other industry standard practices and were documented in the field logbook. Sample collection was completed by professionals who were properly trained in SOPs and using the equipment. Proper chain of

custody and sample handling were observed during sample collection, delivery to the laboratory, and analysis. The analytical laboratories performed the sample analysis using industry standard methods.

Consequently, data from past and future sampling events at the Site using comparable sampling and analytical methods may be used in concert with this data set.

4.5 Completeness

Completeness is assessed to determine if enough valid data were collected to meet the investigation needs. Completeness is assessed by comparing the number of valid sample results to the number of sample results planned for the investigation. The completeness target for this investigation was 95% or greater as designated in the CFRSSI QAPP (ARCO, 1992b).

The completeness for XRF and laboratory samples and results are summarized below:

Analysis Type	Collected Samples vs Planned Samples	Valid Data Points vs Total Data Points
XRF	100%	100%
Laboratory	100%	100%

4.5.1 XRF Completeness

The QAPP and FSP include the planned soil sample locations and list the planned analytical techniques including XRF analyses.

Samples were collected at 7 sample locations during the 2021 Site sampling event as specified in the FSP. All samples that were outlined in the FSP were collected for the Site. The completeness for XRF data based on sample collection was 100%, and the completeness goal was met.

In total, 126 XRF data points were generated. All data points are considered usable because no results were rejected. The 21 XRF samples collected were analyzed by XRF for arsenic, cadmium, copper, lead, mercury, and zinc. Therefore, the completeness for XRF data based on sample analysis was 100%, and the completeness goal was met.

4.5.2 Laboratory Completeness

The requirement for confirmation samples sent to the laboratory per the QAPP is at a rate of 1 per 10 natural XRF samples (10%), with additional samples sent to the laboratory for confirmation if the field results show the contaminant of concern (COC) levels at 35% above or 35% below established action/screening levels to limit decision errors.

For the 2021 Site sampling event, 4 of the 21 natural samples collected and analyzed by XRF were sent to Pace for analysis (19%). All natural samples collected with XRF results requiring confirmation were sent to Pace for analysis. The frequency requirement for the confirmation

samples sent to the laboratory for analysis was met. Therefore, the completeness for laboratory samples based on sample collection was 100%, and the completeness goal was met.

In total, 34 natural laboratory data points were generated by the sampling event. Four laboratory samples collected were analyzed for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture. Due to not meeting the preservation requirement for mercury, 3 of the 4 samples submitted to Pace were re-collected and submitted to Pace for analysis of mercury and percent moisture. All the natural data points were usable because no sample results were rejected. Therefore, the completeness for laboratory data based on sample analysis was 100%, and the completeness goal was met.

4.6 Sensitivity

Sensitivity is a quantitative measure and is evaluated by comparing the detection limit to the project-specific sensitivity requirements.

4.6.1 XRF Sensitivity

The non-detected XRF results were reported as less than the LOD associated with each result.

The QAPP does not specify sensitivity requirements for XRF analyses; therefore, the action/screening levels in the QAPP were used to evaluate sensitivity for each analyte. The QAPP specified that samples must be sent to the laboratory for confirmation if the field results show the COC levels at 35% above or 35% below established action/screening levels to limit decision errors. Therefore, a value of 35% below the BPSOU Soil Screening Criteria for Storm Water COCs listed on Table 2 of the QAPP was used to evaluate sensitivity because they are less than the BPSOU Soil Action Level for Human Health listed in Table 1 of the QAPP. The required detection limit for XRF results is summarized below:

Analyte	Criteria	Units	Action/Screening Level	35% below
Arsenic	Storm Water	mg/kg	200	130
Cadmium	Storm Water	mg/kg	20	13
Copper	Storm Water	mg/kg	1,000	650
Lead	Storm Water	mg/kg	1,000	650
Mercury	Storm Water	mg/kg	10	6.5
Zinc	Storm Water	mg/kg	1,000	650

mg/kg: milligrams per kilogram.

The detection limit for the non-detected XRF results was less than 35% below the minimum action/screening level for each analyte except for the following results:

Field Sample ID	Method	Analyte	Units	Result (<LOD)
BPSOU-UR39-070121-6-12-03	XRF	Mercury	mg/kg	<10.22
BPSOU-UR39-070121-2-6-02	XRF	Mercury	mg/kg	<9.27
BPSOU-UR39-070121-0-2-01	XRF	Mercury	mg/kg	<8.8
BPSOU-UR39-070121-6-12-09	XRF	Mercury	mg/kg	<8.23
BPSOU-UR39-070121-2-6-08	XRF	Mercury	mg/kg	<9.42
BPSOU-UR39-070121-0-2-07	XRF	Mercury	mg/kg	<8.48
BPSOU-UR39-070121-6-12-06	XRF	Mercury	mg/kg	<10.48
BPSOU-UR39-070121-2-6-05	XRF	Mercury	mg/kg	<9.5
BPSOU-UR39-070121-0-2-04	XRF	Mercury	mg/kg	<9.14
BPSOU-UR39-070121-6-12-12	XRF	Mercury	mg/kg	<6.96
BPSOU-UR39-070121-2-6-11	XRF	Mercury	mg/kg	<6.94
BPSOU-UR39-070121-0-2-10	XRF	Mercury	mg/kg	<7.19
BPSOU-UR39-070121-0-2-13	XRF	Mercury	mg/kg	<9.62
BPSOU-UR39-070121-2-6-14	XRF	Mercury	mg/kg	<7.9
BPSOU-UR39-070121-6-12-15	XRF	Mercury	mg/kg	<7.05
BPSOU-UR39-070121-0-2-16	XRF	Mercury	mg/kg	<8.67
BPSOU-UR39-070121-2-6-17	XRF	Mercury	mg/kg	<7.29
BPSOU-UR39-070121-6-12-18	XRF	Mercury	mg/kg	<8.67
BPSOU-UR39-070121-0-2-19	XRF	Mercury	mg/kg	<10.59
BPSOU-UR39-070121-2-6-20	XRF	Mercury	mg/kg	<9.77
BPSOU-UR39-070121-6-12-21	XRF	Mercury	mg/kg	<8.69

mg/kg: milligrams per kilogram. LOD: limit of detection.

These data points are considered usable with the recognition that the LOD for the non-detected results is greater than 35% below the lowest action/screening level.

4.6.2 Laboratory Sensitivity

All sample results from Pace had detections for all analytes.

4.7 Overall Data Summary

The following list shows an overall summary of the validation performed on the data generated by Pioneer for the samples collected during the 2021 Site sampling event.

Analysis Type	Total Natural		Level A/B	DV Qual J, J+, J-, or UJ	DV Qual R	DV Qual U or A	Enforcement Quality	Screening Quality	Rejected
	Samples	Data Points	A/B	Data Points	Data Points	Data Points	Data Points (% of total)	Data Points (% of Total)	Data Points (% of Total)
XRF	21	126	B	26	0	0	100 (79%)	26 (21%)	0 (0%)
Pace	7	34	B	4	0	0	30 (88%)	4 (12%)	0 (0%)

5.0 REFERENCES

AERL, 2000. Clark Fork River Superfund Site Investigations (CFRSSI) Data Management/Data Validation (DM/DV) Plan Addendum. Prepared for ARCO by Exponent, Lake Oswego, Oregon. June 2000.

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TABLES

Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Station (Depth Interval)			UR-39-OP-01(0-2)					UR-39-OP-01(2-6)					UR-39-OP-01(6-12)					UR-39-OP-02(0-2)					UR-39-OP-02(0-2)					UR-39-OP-02(2-6)				
Field Sample ID			BPSOU-UR39-070121-0-2-16					BPSOU-UR39-070121-2-6-17					BPSOU-UR39-070121-6-12-18					BPSOU-UR39-070121-0-2-19					BPSOU-UR39OP02-082621-1					BPSOU-UR39-070121-2-6-20				
Lab Sample ID			N/A					N/A					N/A					10568969004					10577063001					N/A				
Sample Date			7/1/2021					7/1/2021					7/1/2021					7/1/2021					8/26/2021					7/1/2021				
Sample Type			Natural					Natural					Natural					Natural					Natural					Natural				
Method	Analyte	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg	20.26			E		7.82			E		<7.41	<LOD		E		183.61			E							178.34			E	
XRF	Cadmium	mg/kg	8.41			E		12.78			E		9.94			E		20.53			E							15.08			E	
XRF	Copper	mg/kg	90.38			E		43.41			E		66.00			E		680.36			E							1,241.01			E	
XRF	Lead	mg/kg	136.59			E		15.68			E		13.76			E		2,773.99			E							2,675.75			E	
XRF	Mercury	mg/kg	<8.67	<LOD	UJ	S	CX	<7.29	<LOD	UJ	S	CX	<8.67	<LOD	UJ	S	CX	<10.59	<LOD	UJ	S	CX						<9.77	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	418.38			E		119.80			E		124.66			E		3,804.95			E							2,127.04			E	
ASTM D2974	Moisture, Percent	%																1.8	N2		E		6.1	N2		E						
SW-846 6010D	Arsenic	mg/kg																63.5	M1	J+	S	S%										
SW-846 6010D	Cadmium	mg/kg																11.0			E											
SW-846 6010D	Copper	mg/kg																530	P6		E											
SW-846 6010D	Lead	mg/kg																2,110	P6		E											
SW-846 6010D	Zinc	mg/kg																2,950	P6		E											
SW-846 7471B	Mercury	mg/kg																1.4	M1	J-	S	Pres, S%	1.1			E						

Notes:
Depth intervals are inches below ground surface.

Qualification (Qual) and Reason Codes are
defined in Table A4.

< - Not detected at the detection limit.

Abbreviations:
mg/kg - milligram per kilogram

Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Station (Depth Interval)			UR-39-OP-02(6-12)					UR-39-SS-01(0-2)					UR-39-SS-01(0-2)					UR-39-SS-01(2-6)					UR-39-SS-01(6-12)					UR-39-SS-02(0-2)				
Field Sample ID			BPSOU-UR39-070121-6-12-21					BPSOU-UR39-070121-0-2-01					BPSOU-UR39SS01-110921-1					BPSOU-UR39-070121-2-6-02					BPSOU-UR39-070121-6-12-03					BPSOU-UR39-070121-0-2-04				
Lab Sample ID			N/A					N/A					10586986014					N/A					N/A					N/A				
Sample Date			7/1/2021					7/1/2021					11/9/2021					7/1/2021					7/1/2021					7/1/2021				
Sample Type			Natural					Natural					Natural					Natural					Natural					Natural				
Method	Analyte	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg	146.75		J	S	CX, DX, RX	<15.35	<LOD		E							<47.34	<LOD		E		107.38			E		81.13			E	
XRF	Cadmium	mg/kg	7.65		J	S	CX, DX, RX	21.05			E							19.92			E		20.30			E		16.99			E	
XRF	Copper	mg/kg	773.69		J	S	CX, DX, RX	160.03			E							384.43			E		660.18			E		348.64			E	
XRF	Lead	mg/kg	1,768.84		J	S	CX, DX, RX	195.29			E							1,993.05			E		3,201.90			E		1,977.05			E	
XRF	Mercury	mg/kg	<8.69	<LOD	UJ	S	CX, DX, RX	<8.8	<LOD	UJ	S	CX						<9.27	<LOD	UJ	S	CX	<10.22	<LOD	UJ	S	CX	<9.14	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	1,768.03		J	S	CX, DX, RX	4,493.76			E							3,107.08			E		3,334.84			E		4,226.53			E	
ASTM D2974	Moisture, Percent	%											4.6	N2		E																
SW-846 6010D	Arsenic	mg/kg											12.6			E																
SW-846 6010D	Cadmium	mg/kg											9.7			E																
SW-846 6010D	Copper	mg/kg											88.8			E																
SW-846 6010D	Lead	mg/kg											261			E																
SW-846 6010D	Zinc	mg/kg											3,800			E																
SW-846 7471B	Mercury	mg/kg											0.11			E																

Notes:
Depth intervals are inches below ground surface.

Qualification (Qual) and Reason Codes are
defined in Table A4.

< - Not detected at the detection limit.

Abbreviations:
mg/kg - milligram per kilogram

Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Station (Depth Interval)			UR-39-SS-02(2-6)					UR-39-SS-02(6-12)					UR-39-SS-03(0-2)					UR-39-SS-03(0-2)					UR-39-SS-03(2-6)					UR-39-SS-03(6-12)				
Field Sample ID			BPSOU-UR39-070121-2-6-05					BPSOU-UR39-070121-6-12-06					BPSOU-UR39-070121-0-2-07					BPSOU-UR39SS03-082621-1					BPSOU-UR39-070121-2-6-08					BPSOU-UR39-070121-6-12-09				
Lab Sample ID			N/A					N/A					10568969001					10577063003					N/A					10568969003				
Sample Date			7/1/2021					7/1/2021					7/1/2021					8/26/2021					7/1/2021					7/1/2021				
Sample Type			Natural					Natural					Natural					Natural					Natural					Natural				
Method	Analyte	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg	88.55			E		<50.96	<LOD		E		<34.66	<LOD		E							<46.13	<LOD		E		52.50			E	
XRF	Cadmium	mg/kg	8.83			E		22.32			E		20.55			E							15.13			E		16.69			E	
XRF	Copper	mg/kg	453.33			E		429.82			E		294.11			E							346.53			E		214.49			E	
XRF	Lead	mg/kg	1,636.50			E		2,196.16			E		1,059.87			E							1,687.70			E		733.37			E	
XRF	Mercury	mg/kg	<9.5	<LOD	UJ	S	CX	<10.48	<LOD	UJ	S	CX	<8.48	<LOD	UJ	S	CX						<9.42	<LOD	UJ	S	CX	<8.23	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	3,297.35			E		4,788.16			E		2,075.90			E							1,824.22			E		1,720.09			E	
ASTM D2974	Moisture, Percent	%											1.3	N2		E		7.5	N2		E							4.9	N2		E	
SW-846 6010D	Arsenic	mg/kg											19.8			E												19.2			E	
SW-846 6010D	Cadmium	mg/kg											7.0			E												8.0			E	
SW-846 6010D	Copper	mg/kg											272			E												198			E	
SW-846 6010D	Lead	mg/kg											901			E												706			E	
SW-846 6010D	Zinc	mg/kg											1,470			E												1,240			E	
SW-846 7471B	Mercury	mg/kg											0.36		J-	S	Pres	0.75			E							0.67		J-	S	Pres

Notes:
Depth intervals are inches below ground surface.

Qualification (Qual) and Reason Codes are
defined in Table A4.

< - Not detected at the detection limit.

Abbreviations:
mg/kg - milligram per kilogram

Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Station (Depth Interval)			UR-39-SS-03(6-12)					UR-39-SS-04(0-2)					UR-39-SS-04(2-6)					UR-39-SS-04(6-12)					UR-39-SS-05(0-2)					UR-39-SS-05(2-6)				
Field Sample ID			BPSOU-UR39SS03-082621-3					BPSOU-UR39-070121-0-2-10					BPSOU-UR39-070121-2-6-11					BPSOU-UR39-070121-6-12-12					BPSOU-UR39-070121-0-2-13					BPSOU-UR39-070121-2-6-14				
Lab Sample ID			10577063002					N/A					N/A					N/A					N/A					N/A				
Sample Date			8/26/2021					7/1/2021					7/1/2021					7/1/2021					7/1/2021					7/1/2021				
Sample Type			Natural					Natural					Natural					Natural					Natural					Natural				
Method	Analyte	Units	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg						15.09			E		<7.77	<LOD		E		<7.72	<LOD		E		<21.2	<LOD		E		<18.23	<LOD		E	
XRF	Cadmium	mg/kg						14.93			E		8.59			E		10.64			E		<7.57	<LOD		E		8.19			E	
XRF	Copper	mg/kg						79.60			E		69.50			E		58.28			E		147.05			E		159.19			E	
XRF	Lead	mg/kg						53.65			E		33.69			E		31.62			E		340.51			E		267.84			E	
XRF	Mercury	mg/kg						<7.19	<LOD	UJ	S	CX	<6.94	<LOD	UJ	S	CX	<6.96	<LOD	UJ	S	CX	<9.62	<LOD	UJ	S	CX	<7.9	<LOD	UJ	S	CX
XRF	Zinc	mg/kg						247.03			E		178.23			E		175.89			E		2,354.84			E		1,223.05			E	
ASTM D2974	Moisture, Percent	%	6.5	N2		E																										
SW-846 6010D	Arsenic	mg/kg																														
SW-846 6010D	Cadmium	mg/kg																														
SW-846 6010D	Copper	mg/kg																														
SW-846 6010D	Lead	mg/kg																														
SW-846 6010D	Zinc	mg/kg																														
SW-846 7471B	Mercury	mg/kg	0.24			E																										

Notes:
Depth intervals are inches below ground surface.

Qualification (Qual) and Reason Codes are
defined in Table A4.

< - Not detected at the detection limit.

Abbreviations:
mg/kg - milligram per kilogram

Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes

Station (Depth Interval)			UR-39-SS-05(6-12)				
Field Sample ID			BPSOU-UR39-070121-6-12-15				
Lab Sample ID			N/A				
Sample Date			7/1/2021				
Sample Type			Natural				
Method	Analyte	Units	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg	17.03			E	
XRF	Cadmium	mg/kg	17.00			E	
XRF	Copper	mg/kg	67.40			E	
XRF	Lead	mg/kg	87.61			E	
XRF	Mercury	mg/kg	<7.05	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	329.37			E	
ASTM D2974	Moisture, Percent	%					
SW-846 6010D	Arsenic	mg/kg					
SW-846 6010D	Cadmium	mg/kg					
SW-846 6010D	Copper	mg/kg					
SW-846 6010D	Lead	mg/kg					
SW-846 6010D	Zinc	mg/kg					
SW-846 7471B	Mercury	mg/kg					

Notes:
Depth intervals are inches below ground surface.

Qualification (Qual) and Reason Codes are
defined in Table A4.

< - Not detected at the detection limit.

Abbreviations:
mg/kg - milligram per kilogram

Table A2. Field Duplicate Pair Samples with Results, Laboratory Qualifiers, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Assessment

Station (Depth Interval)			UR-39-SS-03(0-2)						UR-39-SS-03(0-2)-FD									
Field Sample ID			BPSOU-UR39-070121-0-2-07						BPSOU-UR39-070121-0-2-07-FD									
Lab Sample ID			10568969001						10568969002									
Sample Date			7/1/2021						7/1/2021									
Sample Type			Natural						Field Duplicate									
Method	Analyte	Units	Result	Lab Qual	DV Qual	Reason Code	DF	RL	Result	Lab Qual	DV Qual	Reason Code	DF	RL	Control Limit[1]	ABS DIF	RPD	Meets Control Limit?
XRF	Arsenic	mg/kg	<34.66	<LOD			1	N/A	59.48				1	N/A	N/A		-	-
XRF	Cadmium	mg/kg	20.55				1	N/A	21.31				1	N/A	RPD≤35%		4%	Yes
XRF	Copper	mg/kg	294.11				1	N/A	316.06				1	N/A	RPD≤35%		7%	Yes
XRF	Lead	mg/kg	1,059.87				1	N/A	855.72				1	N/A	RPD≤35%		21%	Yes
XRF	Mercury	mg/kg	<8.48	<LOD	UJ	CX	1	N/A	<8.62	<LOD	UJ	CX	1	N/A	N/A		-	-
XRF	Zinc	mg/kg	2,075.90				1	N/A	1,893.74				1	N/A	RPD≤35%		9%	Yes
ASTM D2974	Moisture, Percent	%	1.3	N2			1	0.1	1.6	N2			1	0.1	RPD≤35%		21%	Yes
SW-846 6010D	Arsenic	mg/kg	19.8				2	1.9	20.5				2	1.9	RPD≤35%		3%	Yes
SW-846 6010D	Cadmium	mg/kg	7.0				2	0.29	6.3				2	0.29	RPD≤35%		11%	Yes
SW-846 6010D	Copper	mg/kg	272				2	0.97	310				2	0.97	RPD≤35%		13%	Yes
SW-846 6010D	Lead	mg/kg	901				2	0.97	1,150				2	0.97	RPD≤35%		24%	Yes
SW-846 6010D	Zinc	mg/kg	1,470				2	3.9	1,420				2	3.9	RPD≤35%		3%	Yes
SW-846 7471B	Mercury	mg/kg	0.36		J-	Pres	1	0.020	0.37		J-	Pres	1	0.019	RPD≤35%		3%	Yes

Station (Depth Interval)			UR-39-SS-03(0-2)						UR-39-SS-03(0-2)-FD									
Field Sample ID			BPSOU-UR39SS03-082621-1						BPSOU-UR39SS03-082621-1-FD									
Lab Sample ID			10577063003						10577063004									
Sample Date			8/26/2021						8/26/2021									
Sample Type			Natural Sample						Field Duplicate									
Method	Analyte	Units	Result	Lab Qual	DV Qual	Reason Code	DF	RL	Result	Lab Qual	DV Qual	Reason Code	DF	RL	Control Limit[1]	ABS DIF	RPD	Meets Control Limit?
ASTM D2974	Moisture, Percent	%	7.5	N2			1	0.1	8.1	N2			1	0.1	RPD≤35%		8%	Yes
SW-846 7471B	Mercury	mg/kg	0.75				1	0.02	0.7				1	0.02	RPD≤35%		7%	Yes

Notes:

Qualification (Qual) and Reason Codes are defined in Table A4.

< - Not detected at the detection limit.

The qualifications made to the field duplicate samples (DV Qual/Reason Code) are not included in the summary of qualifications made to natural samples discussed in the Data Validation Report.

Depth intervals are inches below ground surface.

Abbreviations:

DF - dilution factor

RL - reporting limit

ABS DIF - absolute difference

RPD - relative percent difference

mg/kg - milligram per kilogram

Footnotes:

1. If the control limit is an absolute difference less than 2 times the reporting limit, the minimum adjusted reporting limit will be used.

Table A3. Sample Identification

Station ID	Field Sample ID	Sample Type	Depth Interval (in bgs)	Sample Date	XRF[1]	Lab ID	ASTM D2974	SW-846 6010D	SW-846 7471B
UR-39-OP-01	BPSOU-UR39-070121-0-2-16	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-OP-01	BPSOU-UR39-070121-2-6-17	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-OP-01	BPSOU-UR39-070121-6-12-18	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-OP-02	BPSOU-UR39-070121-0-2-19	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	10568969004	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-39-OP-02	BPSOU-UR39OP02-082621-1	Natural	0 - 2	8/26/2021	N/A	10577063001	moisture		Hg
UR-39-OP-02	BPSOU-UR39-070121-2-6-20	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-OP-02	BPSOU-UR39-070121-6-12-21	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-01	BPSOU-UR39-070121-0-2-01	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-01	BPSOU-UR39SS01-110921-1	Natural	0 - 2	11/9/2021	N/A	10586986014	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-39-SS-01	BPSOU-UR39-070121-2-6-02	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-01	BPSOU-UR39-070121-6-12-03	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-02	BPSOU-UR39-070121-0-2-04	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-02	BPSOU-UR39-070121-2-6-05	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-02	BPSOU-UR39-070121-6-12-06	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-03	BPSOU-UR39-070121-0-2-07	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	10568969001	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-39-SS-03	BPSOU-UR39SS03-082621-1	Natural	0 - 2	8/26/2021	N/A	10577063003	moisture		Hg
UR-39-SS-03	BPSOU-UR39-070121-0-2-07-FD	Field Duplicate	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	10568969002	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-39-SS-03	BPSOU-UR39SS03-082621-1-FD	Field Duplicate	0 - 2	8/26/2021	N/A	10577063004	moisture		Hg
UR-39-SS-03	BPSOU-UR39-070121-2-6-08	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-03	BPSOU-UR39-070121-6-12-09	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	10568969003	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-39-SS-03	BPSOU-UR39SS03-082621-3	Natural	6 - 12	8/26/2021	N/A	10577063002	moisture		Hg
UR-39-SS-04	BPSOU-UR39-070121-0-2-10	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-04	BPSOU-UR39-070121-2-6-11	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-04	BPSOU-UR39-070121-6-12-12	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-05	BPSOU-UR39-070121-0-2-13	Natural	0 - 2	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-05	BPSOU-UR39-070121-2-6-14	Natural	2 - 6	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-39-SS-05	BPSOU-UR39-070121-6-12-15	Natural	6 - 12	7/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			

[1]**Footnote**: Samples collected on 8/26/2021 were re-collected for Mercury and percent moisture analysis.
Sample collected on 11/9/2021 was re-collected for lab analyses.

Abbreviations:
in bgs - inches below ground surface
As - arsenic
Cd - cadmium
Cu - copper
Pb - lead
Hg - mercury
Zn - zinc

Table A4. Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Codes; and Reason Codes Definitions

Lab Qual (Pace Analytical Services [Pace] Qualifiers)

M1 = Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

N2 = The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply.

P6 = Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

XRF Qual (XRF Qualifiers)

<LOD = Not detected at the reporting limit.

DV Qual (Data Validation Qualifiers)

J = The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.

J- = The result is an estimated quantity, but the result may be biased low

J+ = The result is an estimated quantity, but the result may be biased high.

UJ = The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.

S/E (Screening/Enforcement Quality Designation)

E = Enforcement quality.

S = Screening quality.

R = Unusable (Rejected) quality.

Reason Code (Data Validation Reason Codes)

CX = Qualified because frequency of check samples was not satisfied.

DX = Qualified because XRF duplicate frequecy not met.

RX = Qualified because XRF replicate frequecy not met.

Pres = Qualified because preservation requirement was not met.

S% = Qualified due to percent recovery of the matrix spike outside of control limits.

Table A5. XRF SiO2 Standard and Calibration Check Sample Results

		Analyte	Arsenic		Cadmium		Copper		Lead		Mercury		Zinc	
Standard Type	Sample ID	Analysis Date	Result (mg/kg)	Meets Control Limit (<10 mg/kg)	Result (mg/kg)	Meets Control Limit (<50 mg/kg)	Result (mg/kg)	Meets Control Limit (<20 mg/kg)	Result (mg/kg)	Meets Control Limit (<10 mg/kg)	Result (mg/kg)	Meets Control Limit (<10 mg/kg)	Result (mg/kg)	Meets Control Limit (<10 mg/kg)
SiO2	P_20210701_92951_531	7/1/2021	<3.32	Yes	15.73	Yes	<13.56	Yes	<4.49	Yes	<4.77	Yes	<6.6	Yes
SiO2	P_20210701_92951_558	7/1/2021	<3.33	Yes	17.00	Yes	<13.65	Yes	<4.53	Yes	<4.99	Yes	<6.64	Yes

		Analyte	Arsenic		Cadmium		Copper		Lead		Mercury		Zinc	
Standard Type	Sample ID	Analysis Date	Result (mg/kg)	Meets Control Limit (0-35 mg/kg)	Result (mg/kg)	Meets Control Limit (0-60 mg/kg)	Result (mg/kg)	Meets Control Limit (0-60 mg/kg)	Result (mg/kg)	Meets Control Limit (0-35 mg/kg)	Result (mg/kg)	Meets Control Limit (0-12 mg/kg)	Result (mg/kg)	Meets Control Limit (50-160 mg/kg)
NIST 2709a	P_20210701_92951_532	7/1/2021	15.10	Yes	13.25	Yes	31.72	Yes	9.60	Yes	<6.36	Yes	92.20	Yes
NIST 2709a	P_20210701_92951_559	7/1/2021	10.47	Yes	15.45	Yes	29.36	Yes	13.12	Yes	<6.73	Yes	95.78	Yes

		Analyte	Arsenic		Cadmium		Copper		Lead		Mercury		Zinc	
Standard Type	Sample ID	Analysis Date	Result (mg/kg)	Meets Control Limit (400-600 mg/kg)	Result (mg/kg)	Meets Control Limit (400-600 mg/kg)	Result (mg/kg)	Meets Control Limit (N/A)	Result (mg/kg)	Meets Control Limit (400-600 mg/kg)	Result (mg/kg)	Meets Control Limit (N/A)	Result (mg/kg)	Meets Control Limit (N/A)
RCRA	P_20210701_92951_533	7/1/2021	459.16	Yes	470.54	Yes	45.46	N/A	489.57	Yes	<6.61	N/A	51.80	N/A
RCRA	P_20210701_92951_560	7/1/2021	456.83	Yes	479.12	Yes	33.95	N/A	480.07	Yes	<7.05	N/A	46.02	N/A

Notes:

< - Not detected value is the XRF error for analysis.

Abbreviations:

mg/kg - milligram per kilogram

SiO2 - Silicon Dioxide standard

NIST 2709a - NIST 2709a- Joaquin Soil sample

RCRA - Resource Conservation and Recovery Act Sample

Table A6. XRF Duplicate and Replicate Sample Results and QC Criteria Assessment

				Analyte	Arsenic		Cadmium		Copper		Lead		Mercury		Zinc	
Standard Type	Sample ID	Sample Name	Parent Sample	Analysis Date	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD	Result (mg/kg)	RPD
Natural	P_20210701_92951_555	BPSOU-UR39-070121-2-6-20		7/1/2021	178.34		15.08		1,241.01		2,675.75		<9.77		2,127.04	
XRF Replicate	P_20210701_92951_557	BPSOU-UR39-070121-2-6-20-R	BPSOU-UR39-070121-2-6-20	7/1/2021	135.99	27.0%	12.39	19.6%	1,112.78	10.9%	2,887.52	7.6%	<9.91	ND	2,206.53	3.7%
XRF Duplicate	P_20210701_92951_556	BPSOU-UR39-070121-2-6-20-D	BPSOU-UR39-070121-2-6-20	7/1/2021	182.60	2.4%	14.64	3.0%	934.60	28.2%	2,706.22	1.1%	<9.36	ND	2,058.57	3.3%

Notes:

< - Not detected value is the XRF error for analysis.

Abbreviations:

mg/kg - milligram per kilogram

ND = non-detected

RPD = relative percent differnce

Attachment 1
Data Validation Checklists

Attachment 1.1
Data Validation Checklists for XRF Analyses

Data Validation Checklist XRF Sample Analysis

Site: Butte Priority Soils Operable Unit
Project: Unreclaimed Sites 2021
Sample Date: 7/1/2021
Data Validator: Sara Ward
Case No: P_20210701
Sample Matrix: Soil
Analysis Dates: 7/1/2021
Validation Dates: 10/19/2021
Laboratory: Pioneer Technical Services, Inc.
Analyses: Arsenic; Cadmium; Copper; Lead; Mercury; Zinc

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
As, Cd, Cu, Pb, Hg, Zn	Pioneer	Soil	XRF	N/A	7/1/2021	7/1/2021	N/A	N/A

Were any data flagged because of holding time? Y [ ] N [X]

What sample preparation steps were performed (i.e. drying, sieving etc.)? Drying and sieving

Were the samples prepped according to the SAP/QAPP? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments:

2. Energy Calibration (System Check)

Was the energy calibration performed at the frequency of once per day? Y [X] N [ ]

Was the energy calibration Resolution below 195? Y [X] N [ ]

Did the energy calibration run for at least 50 seconds? Y [X] N [ ]

Describe Any Actions Taken: None required

Comments:

3. SiO_2 Standards

Was the SiO_2 Standard analyzed at the beginning of analysis? Y [X] N [ ]

Was the SiO_2 Standard analyzed at the frequency of 1 per 20 samples? Y [ ] N [X]

Were the SiO_2 Standard results within the control limits? Y [X] N [ ]

Were any data flagged because of the SiO_2 Standard results? Y [X] N [ ]

Describe Any Actions Taken: The SiO_2 Standard was not analyzed at the end of the run, as required. The following samples were not closed out with the analysis of the SiO2 Standard and are qualified "J/UJ":

Sample	As (mg/kg)	Qual	Cd (mg/kg)	Qual	Cu (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	146.75	J	7.65	J	773.69	J
BPSOU-UR32-070121-0-2-10	16.95	J	ND	UJ	96.43	J
BPSOU-UR32-070121-2-6-11	65.34	J	ND	UJ	446.79	J
BPSOU-UR32-070121-6-12-12	ND	UJ	ND	UJ	372.31	J

Sample	Pb (mg/kg)	Qual	Hg (mg/kg)	Qual	Zn (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	1768.84	J	ND	UJ	1768.03	J
BPSOU-UR32-070121-0-2-10	229.72	J	ND	UJ	238.77	J
BPSOU-UR32-070121-2-6-11	692.14	J	ND	UJ	811.54	J
BPSOU-UR32-070121-6-12-12	562.69	J	ND	UJ	1015.51	J

Comments: Detections for cadmium (15.73 mg/kg and 17 mg/kg) in the bracketing SiO_2 Standards did not require qualifications since the detections were below the control limit (50 mg/kg).

4. Calibration Check Samples

Were the appropriate Calibration Check Samples (CCS) analyzed at the beginning of analysis?	Y	X	N	
Were the appropriate CCS analyzed at the frequency of 1 per 20 natural samples?	Y		N	X
Were CCS results within the control limits?	Y	X	N	
Were any data flagged because of CCS problems?	Y	X	N	

Describe Any Actions Taken: The three CCS were not analyzed at the end of the run, as required. The following samples were not closed out with the analysis of the CCS and are qualified "J/UJ":

Sample	As (mg/kg)	Qual	Cd (mg/kg)	Qual	Cu (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	146.75	J	7.65	J	773.69	J
BPSOU-UR32-070121-0-2-10	16.95	J	ND	UJ	96.43	J
BPSOU-UR32-070121-2-6-11	65.34	J	ND	UJ	446.79	J
BPSOU-UR32-070121-6-12-12	ND	UJ	ND	UJ	372.31	J

Sample	Pb (mg/kg)	Qual	Hg (mg/kg)	Qual	Zn (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	1768.84	J	ND	UJ	1768.036	J
BPSOU-UR32-070121-0-2-10	229.72	J	ND	UJ	238.77	J
BPSOU-UR32-070121-2-6-11	692.14	J	ND	UJ	811.54	J
BPSOU-UR32-070121-6-12-12	562.69	J	ND	UJ	1015.51	J

All the samples above had the same qualifications for failure to analyze the SiO_2 Standard at the correct frequency.

There were no calibration check samples that had a known amount (true value) of mercury greater than the limit of detection (LOD). Therefore, all mercury results have been qualified "UJ". The above samples were previously qualified "UJ" due to the samples not being closed out with the analysis of an CCS; therefore, the final qualification is "UJ".

Comments:

5. Duplicate Sample Results

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y		N	X
Were Duplicate Sample results within the control window?	Y		N	X
Were any data flagged because of duplicate sample results?	Y	X	N	

Describe Any Actions Taken: Only one XRF duplicate sample was analyzed, and there were 24 natural samples analyzed. The following samples did not have an associated XRF duplicate and are qualified "J/UJ":

Sample	As (mg/kg)	Qual	Cd (mg/kg)	Qual	Cu (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	146.75	J	7.65	J	773.69	J
BPSOU-UR32-070121-0-2-10	16.95	J	ND	UJ	96.43	J
BPSOU-UR32-070121-2-6-11	65.34	J	ND	UJ	446.79	J
BPSOU-UR32-070121-6-12-12	ND	UJ	ND	UJ	372.31	J

Sample	Pb (mg/kg)	Qual	Hg (mg/kg)	Qual	Zn (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	1768.84	J	ND	UJ	1768.036	J
BPSOU-UR32-070121-0-2-10	229.72	J	ND	UJ	238.77	J
BPSOU-UR32-070121-2-6-11	692.14	J	ND	UJ	811.54	J
BPSOU-UR32-070121-6-12-12	562.69	J	ND	UJ	1015.51	J

All the samples above had the same qualifications for failure to analyze the SiO_2 Standard and CCS standards at the correct frequency.

Comments: The following XRF duplicate sample was analyzed on 7/1/2021:

XRF Duplicate Sample	**Primary Sample**
BPSOU-UR39-070121-2-6-20-D	BPSOU-UR39-070121-2-6-20

The following XRF field duplicate sample was analyzed on 7/1/2021:

XRF Field Duplicate Sample	**Primary Sample**
BPSOU-UR39-070121-0-2-07-FD	BPSOU-UR39-070121-0-2-07

6. Replicate Sample Results

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y		N	X
Were replicate sample results within the control window?	Y	X	N	
Were any data flagged because of replicate sample results?	Y	X	N	

Describe Any Actions Taken: Only one XRF replicate sample was analyzed, and there were 24 natural samples analyzed. The following samples did not have an associated XRF replicate and are qualified "J/UJ":

Sample	As (mg/kg)	Qual	Cd (mg/kg)	Qual	Cu (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	146.75	J	7.65	J	773.69	J
BPSOU-UR32-070121-0-2-10	16.95	J	ND	UJ	96.43	J
BPSOU-UR32-070121-2-6-11	65.34	J	ND	UJ	446.79	J
BPSOU-UR32-070121-6-12-12	ND	UJ	ND	UJ	372.31	J

Sample	Pb (mg/kg)	Qual	Hg (mg/kg)	Qual	Zn (mg/kg)	Qual
BPSOU-UR39-070121-6-12-21	1768.84	J	ND	UJ	1768.036	J
BPSOU-UR32-070121-0-2-10	229.72	J	ND	UJ	238.77	J
BPSOU-UR32-070121-2-6-11	692.14	J	ND	UJ	811.54	J
BPSOU-UR32-070121-6-12-12	562.69	J	ND	UJ	1015.51	J

All the samples above had the same qualifications for failure to analyze the SiO_2 Standard, CCS standards, and XRF duplicate samples at the correct frequency.

Comments: The following XRF replicate sample was analyzed on 7/1/2021:

XRF Replicate Sample	Primary Sample
BPSOU-UR39-070121-2-6-20-R	BPSOU-UR39-070121-2-6-20

7. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y	X	N	

If so, explain: On this WO P_20210701, the following qualifications were made:

Three (3) arsenic results were qualified "J" due to failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
One (1) arsenic result was qualified "UJ" due to a non-detect result and failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
Three (3) cadmium results were qualified "UJ" due to a non-detect results and failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
One (1) cadmium result was qualified "J" due to failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
Four (4) copper results were qualified "J" due to failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
Four (4) lead results were qualified "J" due to failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
Four (4) mercury results were qualified "UJ" due to a non-detect results and failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.
Twenty (20) mercury results have been qualified "UJ" due to the lack of an appropriate calibration check sample.
Four (4) zinc results were qualified "J" due to failure to analyze the SiO2 standard, CCS standards, XRF duplicate samples, and XRF replicate samples at the correct frequency.

Comments:

8. Authorization of Data Validation

Data Validator
Name: Sara Ward

Signature: Sara Ward **Date:** 10/19/2021

Reviewed by: Josie McElroy **Date:** 10/21/2021

Attachment 1.2
Data Validation Checklists for Laboratory Analyses

Stage 2A Data Validation Checklist for Sample Analysis

Site: Butte Priority Soils Operable Unit
Project: Unreclaimed Sites 2021
Sample Date(s): 07/01/2021
Data Validator: Sara Ward
Case No: 10568969
Sample Matrix: Soil
Analysis Date(s): 07/12/2021, 07/15/2021, 07/16/2021
Validation Date(s): 10/15/2021
Laboratory: Pace Analytical
Analyses: As, Cd, Cu, Pb, Zn (EPA 6010D), Hg (EPA 7471B), and Percent Moisture (ASTM D2974)

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date(s):	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
As, Cd, Cu, Pb, and Zn	Pace	Soil	EPA 6010D	6 months	07/01/2021	07/16/2021	Y	N/A
Hg			EPA 7471B	28 days		07/15/2021	Y	N/A
Percent Moisture			ASTM D2974	N/A		7/12/2021	Y	N/A

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [X] N [ ]

Describe Any Actions Taken: The receiving temperature as reported by the laboratory was 10.7°C. Since the receiving temperature was greater than 6.0ºC, the mercury results were qualified "J-". The samples were shipped on ice and analyzed within holding time.

Sample ID	Mercury Results (mg/kg)	Qualifier
BPSOU-UR39-070121-0-2-07	0.36	J-
BPSOU-UR39-070121-0-2-07-FD	0.37	J-
BPSOU-UR39-070121-6-12-09	0.67	J-
BPSOU-UR39-070121-0-2-19	1.4	J-

Comments:

2. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch? Y [X] N [ ]
Were MBs within the control window? Y [X] N [ ]
Were any data flagged because of blank problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: MBs for EPA 6010D and EPA 7471B were non-detect. A MB was not analyzed for ASTM D2974.

3. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch? Y [X] N [ ]
Were LCS results within the control window? Y [X] N [ ]
Were any data flagged because of LCS problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The LCS %R were within limits for EPA 6010D and EPA 7471B. An LCS was not analyzed for ASTM D2974.

Work Order: 10568969

4. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LDS results within the control window?	Y	X	N	
Were any data flagged because of LDS problems?	Y		N	X

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 755218, an LMS/LMS Duplicate (LMSD) generated from BPSOU-UR39-070121-0-2-19 and an LMS/LMSD generated from a sample not from this work order were used for the LDS calculations. The RPDs were within control limits.

For method EPA 6010D batch 755217, an LMS/LMS Duplicate (LMSD) generated from BPSOU-UR39-070121-0-2-19 and an LMS/LMSD generated from a sample not from this work order were used for the LDS calculations. The RPDs were within control limits.

For ASTM D2974, a duplicate generated from BPSOU-UR39-070121-0-2-19 and a duplicate generated from a sample not from this work order were used for the LDS calculations. The RPDs were within control limits.

5. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y	X	N	

Describe Any Actions Taken: For method EPA 7471B batch 755218, an LMS/LMSD was generated from BPSOU-UR39-070121-0-2-19. The %R of the LMSD for mercury (72%) was outside control limits (80-120%). Sample BPSOU-UR39-070121-0-2-19 was qualified "J-" for mercury. This sample had a previous qualification of "J-" due to a temperature exceedance; therefore, the final qualification is "J-". Per the NFG, "*For a spike sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2017). Since no samples are considered sufficiently similar, no additional qualifications were warranted.

For method EPA 6010D batch 755217, an LMS/LMSD was generated from BPSOU-UR39-070121-0-2-19. The %R of the LMS for arsenic (131%) was outside control limits (75-125%). Sample BPSOU-UR39-070121-0-2-19 was qualified "J+" for arsenic. Per the NFG, "*For a spike sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2017). Since no samples are considered sufficiently similar, no additional qualifications were warranted.

Comments: For method EPA 7471B batch 755218, an additional LMS/LMSD was generated from a sample not from this work order. The %R of the LMS/MSD for mercury (41% and 301%, respectively) were outside control limits (80-120%). The parent sample was not from this work order; therefore, no qualifications were warranted.

For method EPA 6010D batch 755217, an LMS/LMSD was generated from BPSOU-UR39-070121-0-2-19. The %R of the LMS for copper (160%) and the %R of the LMS/LMSD for lead (897% and 1860%, respectively) and zinc (456% and 469%, respectively) were outside control limits (75-125%). Per the NFG, *"Spike recovery limits do not apply when the original sample concentration is ≥ 4 times the spike added. In such an event, the data shall be reported unflagged, even if the %R does not meet acceptance criteria"* (EPA, 2017). The original sample concentrations were greater than 4 times the spike added for these analytes; therefore, no qualifications were warranted. An additional LMS/LMSD was generated from a sample not from this work order. The %R of the LMS/LMSD for copper (43% and 15%, respectively), lead (-217% and -41%, respectively), and zinc (8% and 295%, respectively) were outside control limits (75-125%). The parent sample was not from this work order; therefore, no qualifications were warranted. All other %R were within limits.

An LMS was not analyzed for ASTM D2974.

6. Field Blanks

Were field blanks submitted as specified in the QAPP?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None Required.

Comments: Field blanks were not required as there is no sampling equipment re-used.

7. Field Duplicates

Were field duplicates submitted as specified in the QAPP?	Y	X	N		N/A	
Were results for field duplicates within the control window?	Y	X	N		N/A	
Were any data qualified because of field duplicate problems?	Y		N	X	N/A	

Describe Any Actions Taken: None Required.

Comments: One field duplicate pair was submitted on this work order, BPSOU-UR39-070121-0-2-07 and BPSOU-UR39-070121-0-2-07-FD. The precision for all analytes was within control limits.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10568969, the following qualifications were made:

In addition to the qualifications outlined in the sections above, results which were reported between the method detection limit and the reporting limit were qualified "A" when no additional qualifications were warranted.

The table below lists the qualifications on the natural samples:

Field ID	Analyte	Final Qualification	Reason Code
BPSOU-UR39-070121-0-2-07	Mercury	J-	Pres
BPSOU-UR39-070121-6-12-09	Mercury	J-	Pres
BPSOU-UR39-070121-0-2-19	Mercury	J-	Pres, S%
BPSOU-UR39-070121-0-2-19	Arsenic	J+	S%

The table below lists the qualifications on the field quality control samples:

Field ID	Analyte	Final Qualification	Reason Code
BPSOU-UR39-070121-0-2-07-FD	Mercury	J-	Pres

Reason for qualification:
Pres = The receipt temperature was outside of required range.
S% = Laboratory matrix spike recovery was outside control limits.

Comments:

9. Authorization of Data Validation

Data Validator
Name: Sara Ward **Reviewed by:** Josie McElroy

Signature: Sara Ward Josie McElroy

Date: 10/15/2021 10/19/2021

Stage 2A Data Validation Checklist for Sample Analysis

Site: Butte Priority Soils Operable Unit
Project: Unreclaimed Sites 2021
Sample Date(s): 08/26/2021
Data Validator: Sara Ward

Case No: 10577063
Sample Matrix: Soil
Analysis Date(s): 09/07/2021, 09/13/2021
Validation Date(s): 10/15/2021

Laboratory: Pace Analytical
Analyses: Hg (EPA 7471B) and Percent Moisture (ASTM D2974)

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date(s):	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
Hg	Pace	Soil	EPA 7471B	28 days	08/26/2021	09/13/2021	Y	N/A
Percent Moisture			ASTM D2974	N/A		09/07/2021	Y	N/A

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The receiving temperature as reported by the laboratory was 4.2°C. The samples were shipped on ice and analyzed within holding time.

2. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch? Y [X] N [ ]
Were MBs within the control window? Y [X] N [ ]
Were any data flagged because of blank problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The MB for EPA 7471B was non-detect. A MB was not analyzed for ASTM D2974.

3. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch? Y [X] N [ ]
Were LCS results within the control window? Y [X] N [ ]
Were any data flagged because of LCS problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The LCS %R was within limits for EPA 7471B. An LCS was not analyzed for ASTM D2974.

4. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch? Y [X] N [ ]
Were LDS results within the control window? Y [X] N [ ]
Were any data flagged because of LDS problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 768325, an LMS/LMS Duplicate (LMSD) generated from BPSOU-UR39OP02-082621-1 was used for the LDS calculation. The RPD was within control limits.

For ASTM D2974, a duplicate generated from BPSOU-UR39SS03-082621-1 and a duplicate generated from a sample not from this work order were used for the LDS calculations. The RPDs were within control limits.

Work Order: 10577063

5. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N	
Were LMS results within the control window?	Y		N	X
Were any data flagged because of LMS problems?	Y		N	X

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 768325, an LMS/LMSD was generated from BPSOU-UR39OP02-082621-1. All %R were within control limits.

An LMS was not analyzed for ASTM D2974.

6. Field Blanks

Were field blanks submitted as specified in the QAPP?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None Required.

Comments: Field blanks were not required as there is no sampling equipment re-used.

7. Field Duplicates

Were field duplicates submitted as specified in the QAPP?	Y	X	N		N/A	
Were results for field duplicates within the control window?	Y	X	N		N/A	
Were any data qualified because of field duplicate problems?	Y		N	X	N/A	

Describe Any Actions Taken: None Required.

Comments: One field duplicate pair was submitted on this work order, BPSOU-UR39SS03-082621-1 and BPSOU-UR39SS03-082621-1-FD. The precision for mercury and percent moisture was within control limits.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of?	Y		N	X

If so, explain:

Comments: No qualifications were warranted on work order 10577063.

9. Authorization of Data Validation

Data Validator

Name: Sara Ward

Reviewed by: Josie McElroy

Signature: Sara Ward

Josie McElroy

Date: 10/15/2021

10/19/2021

Work Order: 10577063

Stage 2A Data Validation Checklist for Sample Analysis

Site: Butte Priority Soils Operable Unit
Project: Unreclaimed Sites 2021
Sample Date(s): 11/08/2021, 11/09/2021
Data Validator: Sara Ward
Case No: 10586986
Sample Matrix: Soil
Analysis Date(s): 11/11/2021, 11/18/2021, 11/23/2021
Validation Date(s): 11/30/2021
Laboratory: Pace Analytical
Analyses: As, Cd, Cu, Pb, Zn (EPA 6010D), Hg (EPA 7471B), and Percent Moisture (ASTM D2974)

1. Holding Times

Analyte	Laboratory	Matrix	Method	Holding Times	Collection Date(s):	Analysis Date(s)	Holding Time Met (Y/N)	Affected Data Flagged (Y/N)
As, Cd, Cu, Pb, and Zn	Pace	Soil	EPA 6010D	6 months	11/08/2021, 11/09/2021	11/18/2021	Y	N/A
Hg			EPA 7471B	28 days		11/23/2021	Y	N/A
Percent Moisture			ASTM D2974	N/A		11/11/2021	Y	N/A

Were any data flagged because of holding time? Y [ ] N [X]
Were any data flagged because of preservation problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The receiving temperature as reported by the laboratory was -0.3°C. The samples were shipped on ice and analyzed within holding time.

2. Blanks

Were Method Blanks (MBs) analyzed at the frequency of 1 per analytical batch? Y [X] N [ ]
Were MBs within the control window? Y [X] N [ ]
Were any data flagged because of blank problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: MBs for EPA 7471B and EPA 6010D were non-detect. A MB was not analyzed for ASTM D2974.

3. Laboratory Control Samples

Were Laboratory Control Samples (LCS) analyzed at the frequency of 1 per batch? Y [X] N [ ]
Were LCS results within the control window? Y [X] N [ ]
Were any data flagged because of LCS problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: The LCS %R were within limits for EPA 6010D and EPA 7471B. An LCS was not analyzed for ASTM D2974.

4. Duplicate Sample Results

Were Laboratory Duplicate Samples (LDS) analyzed at the frequency of 1 per batch? Y [X] N [ ]
Were LDS results within the control window? Y [ ] N [X]
Were any data flagged because of LDS problems? Y [ ] N [X]

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 785182, an LMS/LMS Duplicate (LMSD) generated from a sample not from this work order was used for the LDS calculation. The RPD was within control limits.

For method EPA 6010D batch 782996, an LMS/LMS Duplicate (LMSD) generated from a sample not from this work order was used for the LDS calculations. The RPD for zinc (27%) was outside control limits (20%). Since the parent sample was not from this work order, no qualifications were warranted. All other RPDs were within control limits.

For ASTM D2974, a duplicate generated from a sample not from this work order and a duplicate generated from BPSOU-UR30SS02-110821-1 were used for the LDS calculations. The RPDs were within control limits.

Work Order: 10586986

5. Matrix Spike Sample Results

Were Laboratory Matrix Spike Samples (LMS) analyzed at the frequency of 1 per batch?	Y	X	N			
Were LMS results within the control window?	Y		N	X		
Were any data flagged because of LMS problems?	Y		N	X		

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 785182, an LMS/LMSD was generated from a sample not from this work order. The %R of the LMS/LMSD for mercury were within control limits (80-120%).

For method EPA 6010D batch 782996, an LMS/LMSD was generated from a sample not from this work order. The %R of the LMS/LMSD for copper (0% and -3%, respectively) and zinc (18% and 187%, respectively) were outside control limits (75-125%). Since the parent sample was not from this work order, no qualifications were warranted. All other %R were within limits.

An LMS was not analyzed for ASTM D2974.

6. Field Blanks

Were field blanks submitted as specified in the QAPP?	Y		N		N/A	X
Were field blanks within the control window?	Y		N		N/A	X
Were any data qualified because of field blank problems?	Y		N		N/A	X

Describe Any Actions Taken: None Required.

Comments: Field blanks were not required as there is no sampling equipment re-used.

7. Field Duplicates

Were field duplicates submitted as specified in the QAPP?	Y	X	N		N/A	
Were results for field duplicates within the control window?	Y		N	X	N/A	
Were any data qualified because of field duplicate problems?	Y	X	N		N/A	

Describe Any Actions Taken: One field duplicate pair was submitted on this work order, BPSOU-UR30SS01-110821-3 and BPSOU-UR30SS01-110821-3-FD. The lead and percent moisture results for the natural sample and field duplicate were greater than 5 times the reporting limit, but the RPDs was greater than 35%. The lead and percent moisture results for BPSOU-UR30SS01-110821-3 and BPSOU-UR30SS01-110821-3-FD were qualified "J". Per the NFG, "*For a duplicate sample analysis that does not meet the technical criteria, apply the action to all samples of the same matrix if the samples are considered sufficiently similar"* (EPA, 2017). No samples were considered sufficiently similar; therefore, no additional qualifications were warranted.

Comments: The precision for all remaining analytes was within control limits.

8. Overall Assessment

Are there analytical limitations of the data that users should be aware of? Y [X] N [ ]

If so, explain: On this WO 10586986, the following qualifications were made:

In addition to the qualifications outlined in the sections above, results which were reported between the method detection limit and the reporting limit were qualified "A" when no additional qualifications were warranted.

The table below lists the qualifications on the natural samples:

Field ID	Analyte	Final Qualification	Reason Code
BPSOU-UR30SS01-110821-3	Lead	J	FD
BPSOU-UR30SS01-110821-3	Percent Moisture	J	FD
BPSOU-UR30SS02-110821-2	Mercury	A	<RL

The table below lists the qualifications on the field quality control samples:

Field ID	Analyte	Final Qualification	Reason Code
BPSOU-UR30SS01-110821-3-FD	Lead	J	FD
BPSOU-UR30SS01-110821-3-FD	Percent Moisture	J	FD

Reason for qualification:
FD = Field duplicate precision was outside control limits.
<RL = The result is above the method detection limit and below the reporting limit.

Comments:

9. Authorization of Data Validation

Data Validator
Name: Sara Ward **Reviewed by:** Josie McElroy

Signature: Sara Ward Josie McElroy

Date: 11/30/2021 12/1/2021

Attachment 2
Level A/B Assessment Checklist

Level A/B Assessment Checklist

1. General Information

Site: Butte Priority Soils Operable Unit
Project: Unreclaimed Sites 2021
Client: Atlantic Richfield Company
Sample Matrix: Soil

2. Screening Result

Data are:

1. Unusable
2. Level A
3. Level B 10568969, 10577063, 10586986, and P_20210701_92951

I. **Level A**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Sampling date	Yes	Logbook
2. Sampling team or leader	Yes	Logbook
3. Physical description of sampling location	Yes	Logbook
4. Sample depth (soils)	Yes	Logbook
5. Sample collection technique	Yes	Logbook
6. Field preparation technique	Yes	Logbook
7. Sample preservation technique	Yes	Logbook
8. Sample shipping records	Yes	Logbook and Chain of Custody (CoC)

II**. Level B**

Criteria – The following must be fully documented.	Yes/No	Comments
1. Field instrumentation methods and standardization complete	Yes	Logbook
2. Sample container preparation	Yes	Logbook
3. Collection of field replicates (1/20 minimum)	Yes	Logbook
4. Proper and decontaminated sampling equipment	Yes	Logbook
5. Field custody documentation	Yes	Logbook and CoC
6. Shipping custody documentation	Yes	Logbook and CoC
7. Traceable sample designation number	Yes	Logbook Lab Report, and CoC
8. Field notebook(s), custody records in secure repository	Yes	
9. Completed field forms	Yes	Logbook and Field Data Sheets

Attachment 3
Data Validation Quality Control Criteria

XRF							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Action**			**Reference**
				Associated Sample Result Detected	**Associated Sample Result Non-Detected**	**Reason Code**	
System Check	Performed daily, prior to sample analysis	Performed daily, prior to sample analysis	System Check not performed	Professional Judgment J/R	Professional Judgment UJ/R	CX	SOP-SFM-02
		Resolution < 195	Resolution ≥ 195	Professional Judgment J/R	Professional Judgment UJ/R	SC	
SiO_2 Standard	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 Niton XL3 Soil QC Sheet
		Arsenic ≤10 mg/kg Cadmium ≤50 mg/kg Copper ≤20 mg/kg Lead ≤10 mg/kg Mercury ≤10 mg/kg Zinc ≤10 mg/kg	>10 mg/kg >50 mg/kg >20 mg/kg >10 mg/kg >10 mg/kg >10 mg/kg	Results < 10x the SiO2 result - J+	No Qualification	B	
Calibration Check Samples	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Performed daily, prior to sample analysis, at least 1 for every 20 sample analyses, and at end of each day of analysis	Frequency criteria not met	J	UJ	CX	SOP-SFM-02 Niton XL3 Soil QC Sheet
		NIST Standard: Arsenic 0 - 35 mg/kg Cadmium 0 - 60 mg/kg Copper 0 - 60 mg/kg Lead 0 - 35 mg/kg Mercury 0 - 12 mg/kg Zinc 50 - 160 mg/kg	< Lower Control Limit	J-	UJ	CSS	
		RCRA Standard: Arsenic 400 - 600 mg/kg Cadmium 400 - 600 mg/kg Lead 400 - 600 mg/kg	> Upper Control Limit	J+	No Qualification		
XRF Duplicate	1 per 20 samples	RPD ≤ 35% for detected results	Frequency criteria not met	J	UJ	DX	SOP-SFM-02 UR QAPP
			RPD ≤ 35%	No Qualification	No Qualification	D%	
			RPD > 35%	J	UJ		
XRF Replicate	1 per 20 samples	RPD ≤ 35% for detected results	Frequency criteria not met	J	UJ	RX	SOP-SFM-02 UR QAPP
			RPD ≤ 35%	No Qualification	No Qualification	R%	
			RPD > 35%	J	UJ		
Field Duplicate	1 per 20 samples	RPD ≤ 35% for detected results	Frequency criteria not met	J	UJ	FDX	UR QAPP
			RPD ≤ 35%	No Qualification	No Qualification	FD	
			RPD > 35%	J	UJ		

Laboratory							
Quality Control	**Frequency**	**Acceptance Criteria**	**Criteria**	**Data Validation Action**			**Reference**
				Associated Sample Result -Detected	**Associated Sample Result - Non-Detected**	**Reason Code**	
Laboratory Quality Control Samples							
Holding Time	Every Sample	EPA 6010D (metals/metalloids)	≤ 6 months	J-	Professional Judgement UJ or R	H	NFG
		EPA 7471B (mercury)	≤ 28 days	J-	Professional Judgement UJ or R		
Preservation	Every Sample	EPA 6010D (metals/metalloids)	N/A (solids)	No Qualification	No Qualification	Pres	NFG
		EPA 7471B (mercury)	≤ 6 ºC	No Qualification	No Qualification		
			≥ 6 ºC but ≤ 10 ºC	Professional Judgement J	Professional Judgement UJ		
			> 10 ºC	J-	Professional Judgement UJ or R		
Method Blank (MB)	One per batch of up to 20 samples.	≤ 1/2 RL (6010D) ≤ Absolute Value of RL (7471B)	≤ 1/2 RL (6010D) or Absolute Value of RL (7471B)	No Qualification	No Qualification	MB	CFRSSI QAPP Pace SOP
			> 1/2 RL (6010D) or Absolute Value of RL (7471B)	sample result < 10x blank detection: U	No Qualification		
Laboratory Control Sample (LCS)	One per batch of up to 20 samples.	%R 80-120% (all methods)	%R < 40%	J-	R	L%	CFRSSI QAPP NFG Pace SOP
			%R 40-79%	J-	UJ		
			%R 80-120%	No Qualification	No Qualification		
			%R > 120%	J+	No Qualification		
			%R > 150%	R	No Qualification		
Laboratory Duplicate Sample (LDS)[3]	One per batch of up to 20 samples.	All methods: 1. If both original sample and duplicate sample results are ≥ 5x the RL, then RPD ≤ 20% (LCSD/MSD), RPD ≤35% (soil); 2. If original sample or duplicate sample result < 5x the RL, then absolute difference between sample and duplicate ≤ 2x RL (soils)	Both original and duplicate sample results are ≥ 5x the RL and RPD ≤ 20% (LCSD/MSD), RPD ≤35% (soil).	No Qualification	No Qualification	D%	CFRSSI QAPP NFG Pace SOP
			Both original and duplicate sample results are ≥ 5x the RL and RPD is > 20% (LCSD/MSD), > 35% (soil).	J	UJ		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result < 5x the RL, and absolute difference between sample and duplicate ≤ 2x RL (soils)	No Qualification	No Qualification		
			Original sample or duplicate sample result is < 5x the RL and absolute difference between the sample and duplicate > 2x RL (soil).	J	UJ		
Laboratory Matrix Spike (LMS)	One per batch of up to 20 samples.	6010D - %R 75-125% 7471B - %R 80-120% if sample analyte concentration < 4x spike concentration	%R < 30%	J-	R	S%	CFRSSI QAPP NFG Pace SOP
			%R 30-74% (6010D) %R 30-79% (7471B)	J-	UJ		
			%R 75-125% (6010D) %R 80-120% (7471B)	No Qualification	No Qualification		
			%R >125% (6010D) %R >120% (7471B)	J+	No Qualification		
			sample analyte concentration ≥ 4x spike concentration	No Qualification	No Qualification		

Field Quality Control Samples							
Field Duplicate Sample	One per 20 samples collected.	All methods: 1. If both original sample and duplicate sample results are ≥ 5x the RL, RPD ≤ 35% (soil); 2. If original sample or duplicate sample result < 5x the RL, then absolute difference between sample and duplicate ≤ 2x RL (soils)	Both original and duplicate sample results are ≥ 5x the RL and RPD RPD ≤35% (soil).	No Qualification	No Qualification	FD	CFRSSI QAPP NFG
			Both original and duplicate sample results are ≥ 5x the RL and RPD is > 35% (soil).	J	UJ		
			RPD > 100%	Professional Judgement	Professional Judgement		
			Original sample or duplicate sample result < 5x the RL, and absolute difference between sample and duplicate ≤ 2xRL (soils)	No Qualification	No Qualification		
			Original sample or duplicate sample result is < 5x the RL and absolute difference between the sample and duplicate > 2xRL (soil).	J	UJ		

Notes:

1. Associated sample results:

For Field Blank results that do not meet technical criteria, apply action to all samples in the SDG.

For Field Duplicate results that do not meet technical criteria, apply action to field duplicate pair and any samples from the same sample location in the SDG.

For MB and LCS results that do not meet technical criteria, apply action to all samples in the analytical batch.

For LDS or LMS/MSD results that do not meet technical criteria, apply action to the parent sample and, per the NFG, "apply the action to all samples of the same matrix if the samples are considered sufficiently similar."

For holding time and preservation that do not meet technical criteria, apply action to sample.

2. For consistency in validations between validators, if a sample result is reported as non-detect, the MDL is used for the duplicate absolute difference calculations.

3. An LCS, an LMS, or an original sample may all be used to perform a laboratory duplicate. If a LCS Duplicate or LMS Duplicate is used, the QC sample must also meet the applicable %R technical criteria.

Qualifications:

U - Non-detect
UJ - Estimated non-detect
J - Estimated
J+ - Estimated high
J- - Estimated low
R - Rejected

Abbreviations:

MDL - method detection limit
RL - reporting limit
%R - percent recovery
RPD - relative percent difference

References:

CFRSSI QAPP - ARCO, 1992. Clark Fork River Superfund Site Investigations (CFRSSI) Quality Assurance Project Plan (QAPP). Prepared for ARCO by PTI Environmental Services, Bellevue, Washington. May 1992.

NFG - EPA, 2020. National Functional Guidelines for Inorganic Superfund Methods Data Review. November 2020.

-- Available at EPA's Superfund Analytical Services and Contract Laboratory Program website: https://www.epa.gov/clp/contract-laboratory-program-national-functional-guidelines-data-review

SOP-SFM-02 - Operating XL3-X-Ray Fluorescence Analyzer General. Pioneer Technical Services, Inc. January 2018.

UR QAPP - Silver Bow Creek/Butte Area NPL Site Butte Priority Soils Operable Unit 2022 Final Unrelaimed Sites Quality Assurance Project Plan (QAPP). Prepared for Atlantic Richfield Company by Pioneer Technical Services, Inc, Butte, Montana. June 2021.

Niton XL3 Soil QC Sheet - Niton XL3 Soil QC Certificate of Calibration. Thermo Fisher Scientific. June 2014.

Pace SOP -

EPA 6010D - ENV-SOP-MIN4-0052: Metals Analysis by ICP - Method 6010 and 200.7

EPA 7471B - ENV-SOP-MIN4-0054: Mercury in Liquid and Solid/Semi-Solid Waste by 7470A, 7471, 7471B, and 245.1

Attachment B
Field Forms and Related Documents

7/1/21 Thurs. UR39

6:00] On site @ Pioneer office to calibrate pH probe and go through FAF

Sampling Crew: Cole D., Jesse S, Molly S., Mathew S.

Hanna pH probe 1 (H199121)

Cal Check verified

Live Readings	Buffer
4.01 @ 20.13°C	4.0
7.01 @ 19.98°C	7.0
10.05 @ 20.00°C	10.0

Cal within 0.1 requirement

On-site @ 7:00 - Did Site Reconisance to confirm + flag pre determined Sample locations. Id 2 Site for Opp Sample Collection. Opp 1 area between play ground eqip to verify no contamination, Opp 2 area along SE Cocover + gravel road. Site had lots of Mn + Fe staining. Appears ~~CD's~~ impacted.

- Dave Swanson EPA rep on site @ 7:15 for ~ ½ hour

7/1/21 Thurs. UR39

7:30] Began digging Grab sample holes @ each Sample Site location. Began @ Sample Site 1 and continued in chronological order.

Sampled locations after digging. Samples were collected per procedures on pg. 2 for each sample site. Samples collected Recorded electronically. XRF Analysis Recorded on FDS + Electronically Refer to FDS for Sample (XRF/Lab) ID.

- Note: Resident adjacent to site Stopped by (Dave McLewen?. Dave has lived in same house since he was born + is approx 70 years old. Explained Site used to be large hole w/ mine ore stockpiled. Was processed on + off through the years pending metal prices. They removed the ore Piles + filled in hole in the 60's he believes.

7/1/21 Thurs. UR 39

- Decon digging Equip per procedures on Pg. 3-4 DI Bottle, BBQ
- Samples collected preserved per Pg. 4

- Summary of Laboratory Samples Collected either by 1 in 10 Requirement or within ± 35% criteria

BPSOU-UR39-070121-0-2-07 @ 8:15
Total Metals 6010/7471 As, Cd, Cu, Pb, Zn, Hg
Field Duplicate Sample
BPSOU-UR39-070121-0-2-07-FD @ 8:20
Parent sample BPSOU-UR39-070121-0-2-07
Total Metals 6010/7471 As, Cd, Cu, Pb, Zn, Hg
BPSOU-UR39-070121-6-12-09 @ 8:05
Total metals 6010/7471 As, Cd, Cu, Pb, Zn, Hg
BPSOU-UR39-070121-0-2-19 @ 10:25
Total metals 6010/7471 As, Cd, Cu, Pb, Zn, Hg

- Marked holes on Figure 4 located on Survey 123 Tablet.
- off site @ 11:30.

7/1/21 Thurs UR32

- On site @ UR32 to determine extents of contamination encountered @ Sample site 1 yesterday. Could not deliniate @ time due to not running XRF until later. will submit Revised CD Electronic Survey for supplemental investigation.

- Dave Swanson EPA Rep on Site. Done on board w/ decision making process.
- Opportunistic sample area 15' to NE of Sample Site 1 @ UR32. Refer to Field Sheet for Sample ID.
- Sample Collection procedures outlined on pg. 2 for OPP Samples Collected.
- locations of sub sample holes marked on Figure 4 Tablet
- Ran XRF. Indicated potential contamination from Sample Site 1 is more localized & may be a result from potential preservative in treated timbers encountered at that site from 2-6".

7/1/21 Thurs UR32

- Samples collected + Data on FDS + electronically.
off site @ 12:30
Daily Sample Collection Summary = 21 ~~Nat~~ +1FD for XRF, 4 natural lab Samples that include 1 FD
Samples stored/preserved per pg. 4

[signature]
7/1/21

7-6-21 ~~Mon.~~ Tues.

- 10:30 on site @ Pioneer office to prep + ship samples collected last week @ UR33 + UR39 to PACE Minneapolis for laboratory Analysis
- Shipped 1 cooler w/ 2 COCs.
1 for samples collected @ UR32 + 1 for samples @ UR39
FedEx Standard overnight
Tracking - 4278 9926 2454
[signature] 7/6/21

8/26/21 Thurs UR-39

12:00 on Site @ Pioneer office to go through FAF.
Sampling Crew: Jesse S., Molly S.
Samples collected @ UR32 and UR39 on 8/26/21 are samples determined to be re collected. Samples will be collected for Mercury analysis only. The following samples that Hg is going to be re collected for are:

BPSOU-UR32-063021-0-2-01
BPSOU-UR32-063021-2-6-02
BPSOU-UR32-063021-0-2-04
BPSOU-UR32-063021-6-12-09
BPSOU-UR32-063021-6-12-09-FD
BPSOU-UR39-070121-0-2-07
BPSOU-UR39-070121-0-2-07-FD
BPSOU-UR39-070121-6-12-09
BPSOU-UR39-070121-0-2-19

1226 On Site @ Belle of Butte UR-39. Did Site Recon to Confirm utilities. South East of Ditch there is recent surface

8/26/21 Thurs UR-39

Excavation from Heavy equipment. It appears top 6" were scraped toward the Storm water ditch.

Samples Collected from Slotted holes of Samples listed on P.17

BPSOU-UR39OP02-082621-1 @ 12:35 JS
Recollected for Hg on: ~~BPSOU-UR39-070121-0-2-19~~
BPSOU-UR39-070121-0-2-19

BPSOU-UR39SS03-082621-3 @ 12:45
Recollected for Hg on:
BPSOU-UR39-070121-6-12-09

BPSOU-UR39SS03-082621-1 @ 1250
Recollected for Hg on:
BPSOU-UR39-070121-0-2-07

BPSOU-UR39SS03-082621-1-FD @ 1255
Recollected for Hg:
BPSOU-UR39-070121-0-2-07-FD
* Field Duplicate

For Geo Reference See Sample locations referenced on 070121 under the Sample ID's on Pg. 17.

Off Site @ 1315

On Site @ 1325 at UR32
Sample Crew: Jesse S., Molly S.
Samples Collected from Slotted holes of Samples on P.17

BPSOU-UR32SS01-082621-1 @ ~~1330~~ 1405 JS
Recollected for Hg on:
BPSOU-UR32-063021-0-2-01

BPSOU-UR32SS01-082621-2 @ 1400
Recollected for Hg on:
BPSOU-UR32-063021-2-6-02

BPSOU-UR32SS02-082621-1 @ 1330
Recollected for Hg on:
BPSOU-UR32-063021-0-2-04

BPSOU-UR32SS03-082621-3 @ 1345
Recollected for Hg on:
BPSOU-UR32-063021-6-12-09

BPSOU-UR32SS03-082621-3-FD @ 1350
Recollected for Hg on:
BPSOU-UR32-063021-6-12-09-FD

Rite in the Rain.

10/20/21

Samples preserved per Pg 4.
1 lab Sample submitted in qt bag for As, Cd, Cu, Pb, Zn by 6010 + Hg by 7471. Shipped 1 cooler chilled on ICE with 1 COC with Sample from UR-40. Shipped by FedEx on 10/20/21 overnight tracking! 427899346450

Sampling Crew for the day was Jesse S., Mathew S.

10/20/21

10/20/21

SS01 Sample location 1 XRF Samples were collected and analyzed on 7/1/21 @ Site UR-39
BPSOU-UR39-070121-6-12-03 @ 0750
BPSOU-UR39-070121-2-6-02 @ 0755
BPSOU-UR39-070121-0-2-01 @ 0800
* No lab Samples

SS02 Sample location 2 XRF Samples Collected and analyzed on 7/1/21 @ Site UR-39
BPSOU-UR39-070121-6-12-06 @ 0800
BPSOU-UR39-070121-2-6-05 @ 0805
BPSOU-UR39-070121-0-2-04 @ 0810
* No lab Samples

SS03 Sample location 3 XRF Samples Collected and analyzed on 7/1/21 @ Site UR-39
BPSOU-UR39-070121-2-6-08 @ 0810
Lab Samples listed on Pg 14 for 08, 07, 07-FD

SS04 Sample location 4 XRF Samples Collected and analyzed on 7/1/21 @ Site UR-39
BPSOU-UR39-070121-6-12-12 @ 0840
BPSOU-UR39-070121-2-6-11 @ 0845
BPSOU-UR39-070121-0-2-10 @ 0850
* no lab Samples

10/20/21

SSOS Sample location S XRF Samples collected and analyzed on 7/1/21 @ Site UR-39

BPSOU-UR39-070121-6-12-15 @ 0855
BPSOU-UR39-070121-2-6-14 @ 0900
BPSOU-UR39-070121-0-2-13 @ 0905
No lab Samples

OP01 Opportunistic Sample location 1 XRF Samples collected and analyzed on 7/1/21 @ Site UR-39

BPSOU-UR39-070121-6-12-18 @ 0930
BPSOU-UR39-070121-2-6-17 @ 0935
BPSOU-UR39-070121-0-2-16 @ 0940
No lab Samples

OP02 Opportunistic Sample location 2 XRF Samples analyzed and collected on 7/1/21 @ Site UR-39

BPSOU-UR39-070121-2-6-20 @ 1020
BPSOU-UR39-070121-6-12-21 @ 1015
Lab Sample Listed on pg 14 for Sample 19.

BPSOU: Unreclaimed Sites Field XRF and Soil pH Results

Site Number: 39 Operator: JS, MS, CD, MS
Land Use: Residential XRF Unit #: 92951
pH probe #: 1

*Reference 2021 UR Confirmation Sample Decision Tree for more information on declaring the need for a confirmation sample.

Soil Action/Screening Levels (mg/kg)							
Residential	250			1,200		10	
Non-Residential				2,300			
Recreational	1,000						
Commercial	500						
Storm Water	200	20	1000	1000	1000	10	

XRF Reading #	Sample Name	Depth (inches)	Soil pH (s.u.)	Date Collected	Time Collected	Date Analysed	XRF Results (mg/kg)						Lab Sample
							As	Cd	Cu	Pb	Zn	Hg	
525	BPSOU-UR39- SYSTEM CHECK	—	—	7/1/21		7/1/21		Time	56.3	Sec	RES:	166.7	
530	BPSOU-UR39- SYSTEM CHECK	—	—	7/1/21		7/1/21		Time	56.4	Sec	RES:	168.8	
531	BPSOU-UR39- SIO2	NA	NA				<3	16	<14	<4	<7	<5	
532	BPSOU-UR39- NIST	↓	↓				15	13	32	10	92	<6	
533	BPSOU-UR39- RCRA						459	471	45	490	52	<7	
534	BPSOU-UR39- USGS	↓					65	15	211	635	759	<7	
535	BPSOU-UR39- 070121-6-12-03	6-12	4.66		0750		107	20	660	3202	3335	<10	
536	BPSOU-UR39- 070121-2-6-02	2-6	4.93		0755		<47	20	384	1993	3107	<9	
537	BPSOU-UR39- 070121-0-2-01	0-2	5.65		0800		<15	21	160	195	4494	<9	
538	BPSOU-UR39- 070121-6-12-09	6-12	5.12		0805		53	17	214	733	1720	<8	yes
539	BPSOU-UR39- 070121-2-6-08	2-6	5.10		0810		<46	15	347	1688	1824	<9	
540	BPSOU-UR39- 070121-0-2-07	0-2	6.07		0815		<35	21	294	1060	2076	<8	yes
541	BPSOU-UR39- 070121-0-2-07-FD	0-2	6.07		0815 0820		59	21	316	656	1894	<9	yes
542	BPSOU-UR39- 070121-6-12-06	6-12	4.64		0860		<51	22	430	2196	4788	<10	
543	BPSOU-UR39- 070121-2-6-05	2-6	4.25		0805		89	9	453	1636	3297	<10	
544	BPSOU-UR39- 070121-0-2-04	0-2	4.55		0810		81	17	349	1977	4227	<9	
545	BPSOU-UR39- 070121-6-12-12	6-12	6.29		0840		<8	11	58	32	176	<7	
546	BPSOU-UR39- 070121-2-6-11	2-6	6.94		0845		<8	9	70	34	178	<7	
547	BPSOU-UR39- 070121-0-2-10	0-2	7.49		0850		15	15	80	54	247	<7	
548	BPSOU-UR39- 070121-0-2-13	0-2	7.04		0905		<21	<8	147	341	2355	<10	
549	BPSOU-UR39- 070121-2-6-14	2-6	7.31		0900		<18	8	159	268	1223	<8	
550	BPSOU-UR39- 070121-6-12-15	6-12	7.34	7/1/21	0855	7/1/21	17	17	67	88	329	<7	

* XRF machine stopped working.

BPSOU: Unreclaimed Sites [illegible] XRF and Soil pH Results

Site Number: 39 Operator: JS, MS, CD, MS
Land Use: Residential XRF Unit #: 92951
pH probe #: 1

*Reference 2021 UR Confirmation Sample Decision Tree for more information on declaring the need for a confirmation sample.

Soil Action/Screening Levels (mg/kg)						
Residential	250			1,200		10
Non-Residential				2,300		
Recreational	1,000					
Commercial	500					
Storm Water	200	20	1000	1000	1000	10

XRF Reading #	Sample Name	Depth (inches)	Soil pH (s.u.)	Date Collected	Time Collected	Date Analysed	XRF Results (mg/kg)						Lab Sample
							As	Cd	Cu	Pb	Zn	Hg	
551	BPSOU-UR39-070121-0-2-16	0-2	~~7.49~~ 7.55	7.21 7/1/21	0940	7/1/21	20	8	90	137	418	<9	
552	BPSOU-UR39-070121-2-6-17	2-6	~~7.64~~ 7.55	7.89 7/1/21	0935	"	8	13	43	16	120	<7	
553	BPSOU-UR39-070121-6-12-18	6-12	7.50	7/1/21	0930	"	<7	10	66	14	125	<9	
554	BPSOU-UR39-070121-0-2-19	0-2	5.60	"	1025	"	184	21	680	2774	3805	<11	yes
555	BPSOU-UR39-070121-2-6-20	2-6	4.62	"	1020	"	178	15	1241	2676	2127	<10	
556	BPSOU-UR39-070121-2-6-20-D	2-6	4.62	"	1020	"	183	15	935	2706	2059	<9	
557	BPSOU-UR39-070121-2-6-20-R	2-6	4.62	"	1020	"	136	12	1113	2886	2207	<10	
558	BPSOU-UR39-SIO2	NA	NA	"		"	<3	17	<14	<5	<7	<5	
559	BPSOU-UR39-NIST	↓	↓	"		"	10	15	29	13	96	<7	
560	BPSOU-UR39-RCRA			"		"	457	479	34	480	46	<7	
561	BPSOU-UR39-USGS			"		"	84	20	197	807	783	<8	
562	BPSOU-UR39-070121-6-12-21	6-12	4.67	7/1/21	1015	7/1/21	147	8	774	1769	1768	<9	
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												
	BPSOU-UR39-												

Attachment C
Laboratory Data Packages

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

July 20, 2021

Scott Sampson
Pioneer Technical Services
1101 S. Montana Street
Butte, MT 59701

RE: Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Dear Scott Sampson:

Enclosed are the analytical results for sample(s) received by the laboratory on July 08, 2021. The results relate only to the samples included in this report. Results contained within this report conform to the most current version of the TNI standards, BP LaMP Technical Requirements Revision 12.1, and any applicable Quality Assurance Project Plan (QAPP), or Work Plan unless otherwise narrated in the body of this report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Anderson
jennifer.anderson@pacelabs.com
(612)607-6436
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
1800 Elm Street SE, Minneapolis, MN 55414--Satellite Air Lab
A2LA Certification #: 2926.01*
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009*
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014*
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605*
Georgia Certification #: 959
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086*
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064*
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137*
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240*
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081*
New Jersey Certification #: MN002
New York Certification #: 11647*
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Ohio VAP Certification (1800) #: CL110*
Oklahoma Certification #: 9507*
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001*
Pennsylvania Certification #: 68-00563*
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192*
Utah Certification #: MN00064*
Vermont Certification #: VT-027053137
Virginia Certification #: 460163*
Washington Certification #: C486*
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208
*Please Note: Applicable air certifications are denoted with an asterisk (*).

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
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SAMPLE SUMMARY

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10568969001	**BPSOU-UR39-070121-0-2-07**	Solid	07/01/21 08:15	07/08/21 09:00
10568969002	**BPSOU-UR39-070121-0-2-07-FD**	Solid	07/01/21 08:20	07/08/21 09:00
10568969003	**BPSOU-UR39-070121-6-12-09**	Solid	07/01/21 08:05	07/08/21 09:00
10568969004	**BPSOU-UR39-070121-0-2-19**	Solid	07/01/21 10:25	07/08/21 09:00

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10568969001	**BPSOU-UR39-070121-0-2-07**	EPA 6010D	DCF	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10568969002	**BPSOU-UR39-070121-0-2-07-FD**	EPA 6010D	DCF	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10568969003	**BPSOU-UR39-070121-6-12-09**	EPA 6010D	DCF	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10568969004	**BPSOU-UR39-070121-0-2-19**	EPA 6010D	DCF	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1

PASI-M = Pace Analytical Services - Minneapolis

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: BPAR-PIONEER-MT
Date: July 20, 2021

General Information:
4 samples were analyzed for EPA 6010D by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 755217

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10568969004,10568971004

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 4026724)
  - Arsenic

P6: Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

- MS (Lab ID: 4026724)
  - Copper
  - Lead
  - Zinc
- MS (Lab ID: 4026726)
  - Copper
  - Lead
  - Zinc
- MSD (Lab ID: 4026725)
  - Lead
  - Zinc

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: BPAR-PIONEER-MT
Date: July 20, 2021

QC Batch: 755217

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10568969004,10568971004

P6: Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

- MSD (Lab ID: 4026727)
  - Copper
  - Lead
  - Zinc

Additional Comments:

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Method: **EPA 7471B**
Description: 7471B Mercury
Client: BPAR-PIONEER-MT
Date: July 20, 2021

General Information:
4 samples were analyzed for EPA 7471B by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 755218

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10568969004,10568971004

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 4026733)
  - Mercury
- MSD (Lab ID: 4026732)
  - Mercury
- MSD (Lab ID: 4026734)
  - Mercury

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Sample: BPSOU-UR39-070121-0-2-07 **Lab ID: 10568969001** Collected: 07/01/21 08:15 Received: 07/08/21 09:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**19.8**	mg/kg	1.9	0.40	2	07/10/21 22:12	07/16/21 13:42	7440-38-2	
Cadmium	**7.0**	mg/kg	0.29	0.058	2	07/10/21 22:12	07/16/21 13:42	7440-43-9	
Copper	**272**	mg/kg	0.97	0.27	2	07/10/21 22:12	07/16/21 13:42	7440-50-8	
Lead	**901**	mg/kg	0.97	0.22	2	07/10/21 22:12	07/16/21 13:42	7439-92-1	
Zinc	**1470**	mg/kg	3.9	1.6	2	07/10/21 22:12	07/16/21 13:42	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.36**	mg/kg	0.020	0.0085	1	07/11/21 07:34	07/15/21 13:07	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**1.3**	%	0.10	0.10	1		07/12/21 16:34		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Sample: BPSOU-UR39-070121-0-2-07-FD **Lab ID: 10568969002** Collected: 07/01/21 08:20 Received: 07/08/21 09:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**20.5**	mg/kg	1.9	0.40	2	07/10/21 22:12	07/16/21 13:44	7440-38-2	
Cadmium	**6.3**	mg/kg	0.29	0.058	2	07/10/21 22:12	07/16/21 13:44	7440-43-9	
Copper	**310**	mg/kg	0.97	0.27	2	07/10/21 22:12	07/16/21 13:44	7440-50-8	
Lead	**1150**	mg/kg	0.97	0.22	2	07/10/21 22:12	07/16/21 13:44	7439-92-1	
Zinc	**1420**	mg/kg	3.9	1.6	2	07/10/21 22:12	07/16/21 13:44	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.37**	mg/kg	0.019	0.0083	1	07/11/21 07:34	07/15/21 13:09	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**1.6**	%	0.10	0.10	1		07/12/21 16:34		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Sample: BPSOU-UR39-070121-6-12-09 **Lab ID: 10568969003** Collected: 07/01/21 08:05 Received: 07/08/21 09:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**19.2**	mg/kg	2.1	0.42	2	07/10/21 22:12	07/16/21 13:45	7440-38-2	
Cadmium	**8.0**	mg/kg	0.31	0.062	2	07/10/21 22:12	07/16/21 13:45	7440-43-9	
Copper	**198**	mg/kg	1.0	0.29	2	07/10/21 22:12	07/16/21 13:45	7440-50-8	
Lead	**706**	mg/kg	1.0	0.23	2	07/10/21 22:12	07/16/21 13:45	7439-92-1	
Zinc	**1240**	mg/kg	4.1	1.7	2	07/10/21 22:12	07/16/21 13:45	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.67**	mg/kg	0.018	0.0076	1	07/11/21 07:34	07/15/21 13:11	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.9**	%	0.10	0.10	1		07/12/21 16:34		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Sample: BPSOU-UR39-070121-0-2-19 **Lab ID: 10568969004** Collected: 07/01/21 10:25 Received: 07/08/21 09:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**63.5**	mg/kg	1.9	0.38	2	07/10/21 22:12	07/16/21 13:47	7440-38-2	M1
Cadmium	**11.0**	mg/kg	0.28	0.056	2	07/10/21 22:12	07/16/21 13:47	7440-43-9	
Copper	**530**	mg/kg	0.93	0.26	2	07/10/21 22:12	07/16/21 13:47	7440-50-8	P6
Lead	**2110**	mg/kg	0.93	0.21	2	07/10/21 22:12	07/16/21 13:47	7439-92-1	P6
Zinc	**2950**	mg/kg	3.7	1.5	2	07/10/21 22:12	07/16/21 13:47	7440-66-6	P6
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**1.4**	mg/kg	0.10	0.044	5	07/11/21 07:34	07/15/21 14:20	7439-97-6	M1
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**1.8**	%	0.10	0.10	1		07/12/21 16:34		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

QC Batch: 755218
QC Batch Method: EPA 7471B
Analysis Method: EPA 7471B
Analysis Description: 7471B Mercury Solids
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10568969001, 10568969002, 10568969003, 10568969004

METHOD BLANK: 4026729 Matrix: Solid
Associated Lab Samples: 10568969001, 10568969002, 10568969003, 10568969004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	<0.0072	0.017	0.0072	07/15/21 13:04	

LABORATORY CONTROL SAMPLE: 4026730

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.47	0.48	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4026731 4026732

Parameter	Units	10568969004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	1.4	0.48	0.49	2.0	1.8	115	72	80-120	10	20	M1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4026733 4026734

Parameter	Units	10568971004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	31.7	0.54	0.54	31.9	33.3	41	301	80-120	4	20	M1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

QC Batch: 755217
QC Batch Method: EPA 3050B
Analysis Method: EPA 6010D
Analysis Description: 6010D Solids
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10568969001, 10568969002, 10568969003, 10568969004

METHOD BLANK: 4026722 Matrix: Solid
Associated Lab Samples: 10568969001, 10568969002, 10568969003, 10568969004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/kg	<0.19	0.93	0.19	07/16/21 13:31	
Cadmium	mg/kg	<0.028	0.14	0.028	07/16/21 13:31	
Copper	mg/kg	<0.13	0.47	0.13	07/16/21 13:31	
Lead	mg/kg	<0.11	0.47	0.11	07/16/21 13:31	
Zinc	mg/kg	<0.77	1.9	0.77	07/16/21 13:31	

LABORATORY CONTROL SAMPLE: 4026723

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.2	44.0	93	80-120	
Cadmium	mg/kg	47.2	47.5	101	80-120	
Copper	mg/kg	47.2	46.6	99	80-120	
Lead	mg/kg	47.2	46.6	99	80-120	
Zinc	mg/kg	47.2	46.5	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4026724 4026725

Parameter	Units	10568969004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	63.5	48.5	49	127	116	131	108	75-125	9	20	M1
Cadmium	mg/kg	11.0	48.5	49	54.1	55.7	89	91	75-125	3	20	
Copper	mg/kg	530	48.5	49	607	580	160	103	75-125	5	20	P6
Lead	mg/kg	2110	48.5	49	2540	3010	897	1860	75-125	17	20	P6
Zinc	mg/kg	2950	48.5	49	3170	3180	456	469	75-125	0	20	P6

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4026726 4026727

Parameter	Units	10568971004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	155	53.7	55.8	215	198	112	78	75-125	8	20	
Cadmium	mg/kg	4.6	53.7	55.8	54.6	55.4	93	91	75-125	1	20	
Copper	mg/kg	667	53.7	55.8	690	675	43	15	75-125	2	20	P6
Lead	mg/kg	1770	53.7	55.8	1650	1750	-217	-41	75-125	6	20	P6
Zinc	mg/kg	1040	53.7	55.8	1050	1210	8	295	75-125	14	20	P6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

QC Batch: 755355
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight / %M by ASTM D2974
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10568969001, 10568969002, 10568969003, 10568969004

SAMPLE DUPLICATE: 4027800

Parameter	Units	10568969004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	1.8	2.0	10	30	N2

SAMPLE DUPLICATE: 4027801

Parameter	Units	10568971004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	10.4	10.5	1	30	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

WORKORDER QUALIFIERS

WO: 10568969

[1]	The samples were received outside of required temperature range. Analysis was completed upon client approval.

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10568969

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10568969001	**BPSOU-UR39-070121-0-2-07**	EPA 3050B	755217	EPA 6010D	755370
10568969002	**BPSOU-UR39-070121-0-2-07-FD**	EPA 3050B	755217	EPA 6010D	755370
10568969003	**BPSOU-UR39-070121-6-12-09**	EPA 3050B	755217	EPA 6010D	755370
10568969004	**BPSOU-UR39-070121-0-2-19**	EPA 3050B	755217	EPA 6010D	755370
10568969001	**BPSOU-UR39-070121-0-2-07**	EPA 7471B	755218	EPA 7471B	755626
10568969002	**BPSOU-UR39-070121-0-2-07-FD**	EPA 7471B	755218	EPA 7471B	755626
10568969003	**BPSOU-UR39-070121-6-12-09**	EPA 7471B	755218	EPA 7471B	755626
10568969004	**BPSOU-UR39-070121-0-2-19**	EPA 7471B	755218	EPA 7471B	755626
10568969001	**BPSOU-UR39-070121-0-2-07**	ASTM D2974	755355		
10568969002	**BPSOU-UR39-070121-0-2-07-FD**	ASTM D2974	755355		
10568969003	**BPSOU-UR39-070121-6-12-09**	ASTM D2974	755355		
10568969004	**BPSOU-UR39-070121-0-2-19**	ASTM D2974	755355		

bp rm

Laboratory Management Program (LaMP) Chain of Custody Record
Soil, Sediment and Groundwater Samples

BP Site Node Path: _____ Req Due Date (mm/dd/yy): 07/20/21 Rush TAT Yes 14 day No _____

BP/RM Facility No: _____ Lab Work Order Number: _____

Lab Name: Pace Analytical	BP/ARC Facility Address:	Consultant/Contractor:	Pioneer Technical Services
Lab Address: 1700 Elm Street SE, Minneapolis, MN 55414	City, State, ZIP Code:	Consultant/Contractor Project No:	BPSOU Unreclaimed Sampling
Lab PM: Jennifer Anderson	Lead Regulatory Agency:	Address:	1101 S. Montana St.
Lab Phone: 612-607-6436	California Global ID No.:	Consultant/Contractor PM:	Scott Sampson
Lab Shipping Accnt:	Enfos Proposal No:	Phone: 406-697-0946 Email:	ssampson@pioneer-technical.com
Lab Bottle Order No:	Accounting Mode: Provision ____ OOC-BU ____ OOC-RM ____	Send/Submit EDD to:	Scott Sampson
Other Info:	Stage Activity	Invoice To:	BP-RM _____ BP-Other _____

BP/RM PM: Mike Mc Anulty

PM Phone: 406-723-1822

PM Email: mcanumc@bp.com

Requested Analyses

Report Type & QC Level

Limited (Standard) Package _____

Limited Plus Package _____

Full Package Level 2

WO# : 10568969

10568969

Lab No.	Unique Sample ID, must follow format of SAMPLENAMEYYYYMMDD Examples: MW01_20190101; BH01_3-5_20190101	Time	Depth Unit	Grab (G) or Composite (C)	Total Number of Containers	Matrix	Analysis	Total Metals 6010 As, Cd, Cu, Pb, Zn	7471 Mercury	Filtered (Y/N)	Preservation											
	BPSOU-UR39-070121-0-2-07	8:15	in	c	1	soil		x	x													001
	BPSOU-UR39-070121-0-2-07-FD	8:20	in	c	1	soil		x	x													no lab QA 002
	BPSOU-UR39-070121-6-12-09	8:05	in	c	1	soil		x	x													003
	BPSOU-UR39-070121-0-2-19	10:25	in	c	1	soil		x	x													Matrix Spike 004

Sampler's Name: Cole Dallaserra	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: Pioneer Technical Services	Cole Dallaserra /PTS	7/5/21	11:00	M / Pace	7/8/21	9:00
Ship Method: FedEx Overnight 7/5/2021						
Shipment Tracking No: 4278 9926 2454						

Special Instructions: *Maximum 14 day TAT

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank (Yes) / No | Cooler Temp on Receipt: 10.7 °F/C | Trip Blank: Yes (No) | MS/MSD Sample Submitted: Yes / No

BP LaMP Soil/H2O COC March 2019

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) - ESI**	Document Revised: 12Aug2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0149 Rev.01**	Pace Analytical Services - **Minneapolis**

Sample Condition Upon Receipt – ESI Tech Specs

Client Name: BP - Pioneer Tech.

Project #: **WO#: 10568969**

PM: SRD Due Date: 07/22/21

CLIENT: BP-TREC

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: 427899262454 See Exceptions ☐ ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No **Seals Intact?** ☒ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☒ None ☐ Other: _____ **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☒ T1(0461) ☐ T2(1336) ☐ T3(0459) ☐ T4(0254) ☐ T5(0489) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 10.7 °C **Average Corrected Temp (no temp blank only):** _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

Correction Factor: True **Cooler Temp Corrected w/temp blank:** 10.7 °C

USDA Regulated Soil: (☐ N/A, water sample/Other: _____)
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No
Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No
If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

Date/Initials of Person Examining Contents: 7/8/21 JT1

Chain of Custody Present and Filled Out?	☒ Yes	☐ No		**COMMENTS:** 1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Sample Volume?	☒ Yes	☐ No		
Triple Volume Provided for MS/MSD (if more than 10 samples)?	☐ Yes	☐ No	☒ N/A	7.
Correct Containers Used?	☒ Yes	☐ No		8. ziplock bags
-Pace Containers Used?	☒ Yes	☐ No		
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC	☒ Yes	☐ No		11. **If no, write ID/ Date/Time on Container Below:** **See Exception** ☐ **ENV-FRM-MIN4-0142**
Matrix: ☐ Water ☒ Soil ☐ Oil ☐ Other _____				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample # ☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☒ N/A	
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS *If adding preservative to a container it must be added to associated field and equipment blanks (verify with PM first)	☐ Yes	☐ No	☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** **See Exception** ☐ **ENV-FRM-MIN4-0142**
				Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☒ N/A	13. **See Exception** ☐ **ENV-FRM-MIN4-0140**
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☒ N/A	14. Pace Trip Blank Lot # (if purchased): _____
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	

Temp Log: Temp must be maintained at <6°C during login, record temp every 20 mins

Opened Time: 12:45	Temp: 10.7	Corrected Temp: 10.7	
Time: 13:00	put in cooler		
Time:	Temp:	Corrected Temp:	

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution: Notified Scott of temperature.

Project Manager Review: _____ **Date:** 07/08/2021

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Labeled by: JT1 (1)

From:	Scott Sampson
To:	Jennifer Anderson
Subject:	RE: Temperature - BPSOU Unreclaimed Sampling Pace Projects 10568969 / 10568971
Date:	Thursday, July 8, 2021 6:47:17 PM
Attachments:	image001.png image002.png

Jennifer,

Thanks for the notice. Please proceed and qualify as noted.

Scott

From: Jennifer Anderson <Jennifer.Anderson@pacelabs.com>
Sent: Thursday, July 8, 2021 5:18 PM
To: Scott Sampson <ssampson@Pioneer-technical.com>
Subject: Temperature - BPSOU Unreclaimed Sampling Pace Projects 10568969 / 10568971

Hi Scott,

We received the samples for the attached COCs today and it was noted that they arrived over 6 degrees Celsius. The samples arrived at 10.7 degrees Celsius, the 6010 metals are not temperature sensitive but mercury in soils are unfortunately. Looking at the shipped date, it appears that the samples were delayed in transit.

We will plan to proceed with the analysis and qualify accordingly. Please let me know if its preferred not to proceed.

Thank you!
Jennifer

Jennifer Anderson, PMP
Project Manager | Pace Environmental Sciences
1700 Elm Street SE Suite 200, Minneapolis, MN 55414
Direct 612.607.6436 | Main 612.607.6400 | www.pacelabs.com

Please let your Project Manager know if your project is related to a permit or if your permit has recently been updated.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

September 13, 2021

Scott Sampson
Pioneer Technical Services
1101 S. Montana Street
Butte, MT 59701

RE: Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Dear Scott Sampson:

Enclosed are the analytical results for sample(s) received by the laboratory on August 31, 2021. The results relate only to the samples included in this report. Results contained within this report conform to the most current version of the TNI standards, BP LaMP Technical Requirements Revision 12.1, and any applicable Quality Assurance Project Plan (QAPP), or Work Plan unless otherwise narrated in the body of this report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Anderson
jennifer.anderson@pacelabs.com
(612)607-6436
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
1800 Elm Street SE, Minneapolis, MN 55414--Satellite Air Lab
A2LA Certification #: 2926.01*
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009*
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014*
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605*
Georgia Certification #: 959
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086*
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064*
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137*
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240*
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081*
New Jersey Certification #: MN002
New York Certification #: 11647*
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Ohio VAP Certification (1800) #: CL110*
Oklahoma Certification #: 9507*
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001*
Pennsylvania Certification #: 68-00563*
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192*
Utah Certification #: MN00064*
Vermont Certification #: VT-027053137
Virginia Certification #: 460163*
Washington Certification #: C486*
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208
*Please Note: Applicable air certifications are denoted with an asterisk (*).

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10577063001	**BPSOU-UR39OP02-082621-1**	Solid	08/26/21 12:35	08/31/21 13:10
10577063002	**BPSOU-UR39SS03-082621-3**	Solid	08/26/21 12:45	08/31/21 13:10
10577063003	**BPSOU-UR39SS03-082621-1**	Solid	08/26/21 12:50	08/31/21 13:10
10577063004	**BPSOU-UR39SS03-082621-1-FD**	Solid	08/26/21 12:55	08/31/21 13:10

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10577063001	**BPSOU-UR39OP02-082621-1**	EPA 7471B	LMW	1
		ASTM D2974	JL5	1
10577063002	**BPSOU-UR39SS03-082621-3**	EPA 7471B	LMW	1
		ASTM D2974	JL5	1
10577063003	**BPSOU-UR39SS03-082621-1**	EPA 7471B	LMW	1
		ASTM D2974	JL5	1
10577063004	**BPSOU-UR39SS03-082621-1-FD**	EPA 7471B	LMW	1
		ASTM D2974	JL5	1

PASI-M = Pace Analytical Services - Minneapolis

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Method: **EPA 7471B**
Description: 7471B Mercury
Client: BPAR-PIONEER-MT
Date: September 13, 2021

General Information:
4 samples were analyzed for EPA 7471B by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Sample: BPSOU-UR39OP02-082621-1 **Lab ID: 10577063001** Collected: 08/26/21 12:35 Received: 08/31/21 13:10 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**1.1**	mg/kg	0.039	0.017	2	09/08/21 11:41	09/13/21 14:34	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**6.1**	%	0.10	0.10	1		09/07/21 10:39		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Sample: BPSOU-UR39SS03-082621-3 **Lab ID: 10577063002** Collected: 08/26/21 12:45 Received: 08/31/21 13:10 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.24**	mg/kg	0.019	0.0084	1	09/08/21 11:41	09/13/21 14:24	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**6.5**	%	0.10	0.10	1		09/07/21 10:40		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Sample: BPSOU-UR39SS03-082621-1 **Lab ID: 10577063003** Collected: 08/26/21 12:50 Received: 08/31/21 13:10 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.75**	mg/kg	0.020	0.0088	1	09/08/21 11:41	09/13/21 14:25	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**7.5**	%	0.10	0.10	1		09/07/21 10:40		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Sample: BPSOU-UR39SS03-082621-1-FD **Lab ID: 10577063004** Collected: 08/26/21 12:55 Received: 08/31/21 13:10 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.70**	mg/kg	0.020	0.0086	1	09/08/21 11:41	09/13/21 14:29	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**8.1**	%	0.10	0.10	1		09/07/21 10:40		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

QC Batch: 768325 Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10577063001, 10577063002, 10577063003, 10577063004

METHOD BLANK: 4094702 Matrix: Solid
Associated Lab Samples: 10577063001, 10577063002, 10577063003, 10577063004

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	<0.0079	0.018	0.0079	09/13/21 14:16	

LABORATORY CONTROL SAMPLE: 4094703

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.47	0.47	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4094704 4094705

Parameter	Units	10577063001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	1.1	0.5	0.5	1.7	1.6	112	90	80-120	7	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

QC Batch: 768331
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight / %M by ASTM D2974
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10577063001, 10577063002, 10577063003, 10577063004

SAMPLE DUPLICATE: 4094715

Parameter	Units	10576614001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	8.4	7.4	12	30	N2

SAMPLE DUPLICATE: 4094716

Parameter	Units	10577063003 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.5	8.4	11	30	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BPSOU Unreclaimed Sites
Pace Project No.: 10577063

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10577063001	**BPSOU-UR39OP02-082621-1**	EPA 7471B	768325	EPA 7471B	769506
10577063002	**BPSOU-UR39SS03-082621-3**	EPA 7471B	768325	EPA 7471B	769506
10577063003	**BPSOU-UR39SS03-082621-1**	EPA 7471B	768325	EPA 7471B	769506
10577063004	**BPSOU-UR39SS03-082621-1-FD**	EPA 7471B	768325	EPA 7471B	769506
10577063001	**BPSOU-UR39OP02-082621-1**	ASTM D2974	768331		
10577063002	**BPSOU-UR39SS03-082621-3**	ASTM D2974	768331		
10577063003	**BPSOU-UR39SS03-082621-1**	ASTM D2974	768331		
10577063004	**BPSOU-UR39SS03-082621-1-FD**	ASTM D2974	768331		

WO# : 10577063

10577063

Laboratory Management Program (LaMP) Chain of Custody Record
Soil, Sediment and Groundwater Samples

BP Site Node Path: BP-USA-MT-SilverBow-ButtePrioritySoils-PmPv4-BPSSoils

Req Due Date (mm/dd/yy): _____ Rush TAT Yes _____ No X

BP/RM Facility No: _____

Lab Work Order Number: _____

Lab Name: Pace Analytical Services	BP/ARC Facility Address: 1146 Centennial	
Lab Address: 1700 Elm Street, Minneapolis, MN 55414	City, State, ZIP Code: Butte, MT 59701	Consultant/Contractor Project No: BPSOU Unreclaimed Sites
Lab PM: Jennifer Anderson	Lead Regulatory Agency: EPA	Address:
Lab Phone: 612-607-6436	California Global ID No.:	Consultant/Contractor PM: Scott Sampson
Lab Shipping Acct:	Enfos Proposal No: D014Z-0071	Phone: 406-697-0946 Email: ssampson@pioneer-technical.com
Lab Bottle Order No:	Accounting Mode: Provision 10 OOC-BU ____ OOC-RM ____	Send/Submit EDD to: Scott Sampson
Other Info:	Stage Define Activity 101 OMM	Invoice To: BP-RM ____ BP-Other ____
BP/RM PM: Michael C Mcanulty	Sample Details / Requested Analyses	Report Type & QC Level
PM Phone: (907) 355-3914		Limited (Standard) Package ____
PM Email: mcanumc@bp.com		Limited Plus Package ____
		Full Package Level 2

Lab No.	Sample Description Example: BPSOU-UR05SS01-2-07	Date	Time	Matrix	Start Depth	End Dep.	Depth Unit	Grab (G) or Composite (C)	Total Number of Containers	Filt	Pres	Analysis: 7471 Mercury	Comments
	BPSOU-UR39OP02-082621-1	8/26/21	12:35	soil			IN	C				X	001
	BPSOU-UR39SS03-082621-3	8/26/21	12:45	soil			IN	C				X	002
	BPSOU-UR39SS03-082621-1	8/26/21	12:50	soil			IN	C				X	003
	BPSOU-UR39SS03-082621-1-FD	8/26/21	12:55	soil			IN	C				X	004

	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Name: Cole Dallasera						
Sampler's Company: Pioneer Technical Services	Jesse Lin / PTS	8/30/21	1530	J Anderson /Pace	08/31/21	13:10
Ship Method: Fed Ex Ship Date: 8/30/21						
Shipment Tracking No: 6178 9934 6478						

Special Instructions:

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 4.2 °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

BP LaMP Soil/H2O COC July 2018

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) - ESI**	Document Revised: 12Aug2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0149 Rev.01**	Pace Analytical Services - **Minneapolis**

Sample Condition Upon Receipt – ESI Tech Specs

Client Name: BP-Pioneer

Project #: **WO#: 10577063**

PM: JMA Due Date: 09/14/21

CLIENT: BP-PIONEER

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: 4278 9934 6472 See Exceptions ☐ ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: _____ **Temp Blank?** ☑ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☐ T3(0459) ☐ T4(0254) ☒ T5(0489) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** 4.2 °C **Average Corrected Temp (no temp blank only):** _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

Correction Factor: 0.0 **Cooler Temp Corrected w/temp blank:** 4.2 °C

USDA Regulated Soil: (☐ N/A, water sample/Other: _____) **Date/Initials of Person Examining Contents:** 9/15/21 IB

Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☑ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☑ Yes	☐ No		1.
Chain of Custody Relinquished?	☑ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☑ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐
Rush Turn Around Time Requested?	☐ Yes	☑ No		6.
Sufficient Sample Volume?	☑ Yes	☐ No		
Triple Volume Provided for MS/MSD (if more than 10 samples)?	☑ Yes	☐ No	☐ N/A	7.
Correct Containers Used?	☑ Yes	☐ No		8.
-Pace Containers Used?	☐ Yes	☑ No		
Containers Intact?	☑ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC	☑ Yes	☐ No		11. **If no, write ID/ Date/Time on Container Below:** **See Exception** ☐ ENV-FRM-MIN4-0142
Matrix: ☐ Water ☑ Soil ☐ Oil ☐ Other _____				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☑ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS *If adding preservative to a container it must be added to associated field and equipment blanks (verify with PM first)	☐ Yes	☐ No	☑ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** **See Exception** ☐ ENV-FRM-MIN4-0142
				Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Extra labels present on soil VOA or WIDRO contaners?	☐ Yes	☐ No	☑ N/A	13. **See Exception** ☐ ENV-FRM-MIN4-0140
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☑ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	Pace Trip Blank Lot # (if purchased): _____

Temp Log: Temp must be maintained at <6°C during login, record temp every 20 mins		
Opened Time: 11:20	Temp: 4.2	Corrected Temp: 4.2
Time: 11:30	put in cooler	
Time:	Temp:	Corrected Temp:

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: _____ **Date:** 09/03/2021

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Labeled by: AFI (2)

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

November 23, 2021

Scott Sampson
Pioneer Technical Services
1101 S. Montana Street
Butte, MT 59701

RE: Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Dear Scott Sampson:

Enclosed are the analytical results for sample(s) received by the laboratory on November 10, 2021. The results relate only to the samples included in this report. Results contained within this report conform to the most current version of the TNI standards, BP LaMP Technical Requirements Revision 12.1, and any applicable Quality Assurance Project Plan (QAPP), or Work Plan unless otherwise narrated in the body of this report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Minneapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jennifer Anderson
jennifer.anderson@pacelabs.com
(612)607-6436
Project Manager

Enclosures

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Pace Analytical Services, LLC - Minneapolis MN
1700 Elm Street SE, Minneapolis, MN 55414
A2LA Certification #: 2926.01*
1800 Elm Street SE, Minneapolis, MN 55414--Satellite Air Lab
Alabama Certification #: 40770
Alaska Contaminated Sites Certification #: 17-009*
Alaska DW Certification #: MN00064
Arizona Certification #: AZ0014*
Arkansas DW Certification #: MN00064
Arkansas WW Certification #: 88-0680
California Certification #: 2929
Colorado Certification #: MN00064
Connecticut Certification #: PH-0256
EPA Region 8 Tribal Water Systems+Wyoming DW Certification #: via MN 027-053-137
Florida Certification #: E87605*
Georgia Certification #: 959
Hawaii Certification #: MN00064
Idaho Certification #: MN00064
Illinois Certification #: 200011
Indiana Certification #: C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky DW Certification #: 90062
Kentucky WW Certification #: 90062
Louisiana DEQ Certification #: AI-03086*
Louisiana DW Certification #: MN00064
Maine Certification #: MN00064*
Maryland Certification #: 322
Michigan Certification #: 9909
Minnesota Certification #: 027-053-137*
Minnesota Dept of Ag Approval: via MN 027-053-137
Minnesota Petrofund Registration #: 1240*
Mississippi Certification #: MN00064
Missouri Certification #: 10100
Montana Certification #: CERT0092
Nebraska Certification #: NE-OS-18-06
Nevada Certification #: MN00064
New Hampshire Certification #: 2081*
New Jersey Certification #: MN002
New York Certification #: 11647*
North Carolina DW Certification #: 27700
North Carolina WW Certification #: 530
North Dakota Certification #: R-036
Ohio DW Certification #: 41244
Ohio VAP Certification (1700) #: CL101
Ohio VAP Certification (1800) #: CL110*
Oklahoma Certification #: 9507*
Oregon Primary Certification #: MN300001
Oregon Secondary Certification #: MN200001*
Pennsylvania Certification #: 68-00563*
Puerto Rico Certification #: MN00064
South Carolina Certification #:74003001
Tennessee Certification #: TN02818
Texas Certification #: T104704192*
Utah Certification #: MN00064*
Vermont Certification #: VT-027053137
Virginia Certification #: 460163*
Washington Certification #: C486*
West Virginia DEP Certification #: 382
West Virginia DW Certification #: 9952 C
Wisconsin Certification #: 999407970
Wyoming UST Certification #: via A2LA 2926.01
USDA Permit #: P330-19-00208
*Please Note: Applicable air certifications are denoted with an asterisk (*).

Pace Analytical Services, LLC
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Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10586986001	**BPSOU-UR30SS01-110821-1**	Solid	11/08/21 10:55	11/10/21 08:50
10586986002	**BPSOU-UR30SS01-110821-2**	Solid	11/08/21 10:50	11/10/21 08:50
10586986003	**BPSOU-UR30SS01-110821-3**	Solid	11/08/21 10:40	11/10/21 08:50
10586986004	**BPSOU-UR30SS01-110821-3-FD**	Solid	11/08/21 10:45	11/10/21 08:50
10586986005	**BPSOU-UR30SS02-110821-1**	Solid	11/08/21 11:40	11/10/21 08:50
10586986006	**BPSOU-UR30SS02-110821-2**	Solid	11/08/21 11:35	11/10/21 08:50
10586986007	**BPSOU-UR30SS02-110821-3**	Solid	11/08/21 11:30	11/10/21 08:50
10586986008	**BPSOU-UR30SS03-110821-1**	Solid	11/08/21 11:10	11/10/21 08:50
10586986009	**BPSOU-UR30SS03-110821-2**	Solid	11/08/21 11:05	11/10/21 08:50
10586986010	**BPSOU-UR30SS03-110821-3**	Solid	11/08/21 11:00	11/10/21 08:50
10586986011	**BPSOU-UR30SS04-110821-1**	Solid	11/08/21 11:30	11/10/21 08:50
10586986012	**BPSOU-UR30SS04-110821-2**	Solid	11/08/21 11:25	11/10/21 08:50
10586986013	**BPSOU-UR30SS04-110821-3**	Solid	11/08/21 11:20	11/10/21 08:50
10586986014	**BPSOU-UR39SS01-110921-1**	Solid	11/09/21 09:15	11/10/21 08:50

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10586986001	BPSOU-UR30SS01-110821-1	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986002	BPSOU-UR30SS01-110821-2	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986003	BPSOU-UR30SS01-110821-3	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986004	BPSOU-UR30SS01-110821-3-FD	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986005	BPSOU-UR30SS02-110821-1	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986006	BPSOU-UR30SS02-110821-2	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986007	BPSOU-UR30SS02-110821-3	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986008	BPSOU-UR30SS03-110821-1	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986009	BPSOU-UR30SS03-110821-2	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986010	BPSOU-UR30SS03-110821-3	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986011	BPSOU-UR30SS04-110821-1	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986012	BPSOU-UR30SS04-110821-2	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986013	BPSOU-UR30SS04-110821-3	EPA 6010D	DM	5

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SAMPLE ANALYTE COUNT

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Lab ID	Sample ID	Method	Analysts	Analytes Reported
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10586986014	**BPSOU-UR39SS01-110921-1**	EPA 6010D	DM	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1

PASI-M = Pace Analytical Services - Minneapolis

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PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Method: **EPA 6010D**
Description: 6010D MET ICP
Client: BPAR-PIONEER-MT
Date: November 23, 2021

General Information:
14 samples were analyzed for EPA 6010D by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 782996

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10586983001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 4168645)
  - Copper
- MSD (Lab ID: 4168646)
  - Copper

P6: Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.

- MS (Lab ID: 4168645)
  - Zinc
- MSD (Lab ID: 4168646)
  - Zinc

R1: RPD value was outside control limits.

- MSD (Lab ID: 4168646)
  - Zinc

Additional Comments:

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PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Method: **EPA 7471B**
Description: 7471B Mercury
Client: BPAR-PIONEER-MT
Date: November 23, 2021

General Information:
14 samples were analyzed for EPA 7471B by Pace Analytical Services Minneapolis. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS01-110821-1 **Lab ID: 10586986001** Collected: 11/08/21 10:55 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**19.2**	mg/kg	2.0	0.30	2	11/11/21 12:01	11/18/21 11:55	7440-38-2	
Cadmium	**1.2**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 11:55	7440-43-9	
Copper	**316**	mg/kg	0.99	0.14	2	11/11/21 12:01	11/18/21 11:55	7440-50-8	
Lead	**81.5**	mg/kg	0.99	0.20	2	11/11/21 12:01	11/18/21 11:55	7439-92-1	
Zinc	**758**	mg/kg	4.0	0.44	2	11/11/21 12:01	11/18/21 11:55	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.099**	mg/kg	0.020	0.0085	1	11/23/21 09:39	11/23/21 15:52	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.8**	%	0.10	0.10	1		11/11/21 13:02		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS01-110821-2 **Lab ID: 10586986002** Collected: 11/08/21 10:50 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**19.0**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 11:57	7440-38-2	
Cadmium	**0.63**	mg/kg	0.30	0.069	2	11/11/21 12:01	11/18/21 11:57	7440-43-9	
Copper	**326**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 11:57	7440-50-8	
Lead	**40.7**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 11:57	7439-92-1	
Zinc	**424**	mg/kg	4.1	0.45	2	11/11/21 12:01	11/18/21 11:57	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.050**	mg/kg	0.019	0.0084	1	11/23/21 09:39	11/23/21 15:54	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**3.3**	%	0.10	0.10	1		11/11/21 13:02		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS01-110821-3 **Lab ID: 10586986003** Collected: 11/08/21 10:40 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**16.4**	mg/kg	2.3	0.35	2	11/11/21 12:01	11/18/21 11:59	7440-38-2	
Cadmium	**0.41**	mg/kg	0.34	0.078	2	11/11/21 12:01	11/18/21 11:59	7440-43-9	
Copper	**323**	mg/kg	1.1	0.17	2	11/11/21 12:01	11/18/21 11:59	7440-50-8	
Lead	**36.7**	mg/kg	1.1	0.24	2	11/11/21 12:01	11/18/21 11:59	7439-92-1	
Zinc	**193**	mg/kg	4.6	0.51	2	11/11/21 12:01	11/18/21 11:59	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.056**	mg/kg	0.022	0.0095	1	11/23/21 09:39	11/23/21 15:57	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**14.6**	%	0.10	0.10	1		11/11/21 13:02		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS01-110821-3-FD **Lab ID: 10586986004** Collected: 11/08/21 10:45 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**11.8**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:00	7440-38-2	
Cadmium	**0.39**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 12:00	7440-43-9	
Copper	**290**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:00	7440-50-8	
Lead	**25.4**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:00	7439-92-1	
Zinc	**170**	mg/kg	4.0	0.45	2	11/11/21 12:01	11/18/21 12:00	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.049**	mg/kg	0.018	0.0079	1	11/23/21 09:39	11/23/21 15:59	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**3.1**	%	0.10	0.10	1		11/11/21 13:02		N2

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS02-110821-1 **Lab ID: 10586986005** Collected: 11/08/21 11:40 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**24.4**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:17	7440-38-2	
Cadmium	**0.52**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 12:17	7440-43-9	
Copper	**180**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:17	7440-50-8	
Lead	**47.6**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:17	7439-92-1	
Zinc	**105**	mg/kg	4.0	0.45	2	11/11/21 12:01	11/18/21 12:17	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.042**	mg/kg	0.019	0.0083	1	11/23/21 09:39	11/23/21 16:00	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**5.1**	%	0.10	0.10	1		11/11/21 13:02		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS02-110821-2 **Lab ID: 10586986006** Collected: 11/08/21 11:35 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**14.8**	mg/kg	1.0	0.15	1	11/11/21 12:01	11/18/21 12:47	7440-38-2	
Cadmium	**0.15**	mg/kg	0.15	0.034	1	11/11/21 12:01	11/18/21 12:47	7440-43-9	
Copper	**656**	mg/kg	0.50	0.073	1	11/11/21 12:01	11/18/21 12:47	7440-50-8	
Lead	**5.6**	mg/kg	2.5	0.51	5	11/11/21 12:01	11/18/21 12:50	7439-92-1	
Zinc	**54.8**	mg/kg	2.0	0.22	1	11/11/21 12:01	11/18/21 12:47	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.010J**	mg/kg	0.018	0.0079	1	11/23/21 09:39	11/23/21 16:02	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**3.4**	%	0.10	0.10	1		11/11/21 13:03		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS02-110821-3 **Lab ID: 10586986007** Collected: 11/08/21 11:30 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**15.7**	mg/kg	1.1	0.16	1	11/11/21 12:01	11/18/21 12:48	7440-38-2	
Cadmium	**<0.036**	mg/kg	0.16	0.036	1	11/11/21 12:01	11/18/21 12:48	7440-43-9	
Copper	**456**	mg/kg	0.53	0.078	1	11/11/21 12:01	11/18/21 12:48	7440-50-8	
Lead	**2.0**	mg/kg	1.1	0.22	2	11/11/21 12:01	11/18/21 12:19	7439-92-1	
Zinc	**39.2**	mg/kg	2.1	0.24	1	11/11/21 12:01	11/18/21 12:48	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**<0.0087**	mg/kg	0.020	0.0087	1	11/23/21 09:39	11/23/21 16:07	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**9.5**	%	0.10	0.10	1		11/11/21 13:03		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS03-110821-1 **Lab ID: 10586986008** Collected: 11/08/21 11:10 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**16.4**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:21	7440-38-2	
Cadmium	**0.55**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 12:21	7440-43-9	
Copper	**251**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:21	7440-50-8	
Lead	**66.2**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:21	7439-92-1	
Zinc	**235**	mg/kg	4.0	0.45	2	11/11/21 12:01	11/18/21 12:21	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.039**	mg/kg	0.019	0.0085	1	11/23/21 09:39	11/23/21 16:09	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**6.7**	%	0.10	0.10	1		11/11/21 13:03		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS03-110821-2 **Lab ID: 10586986009** Collected: 11/08/21 11:05 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**18.6**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:23	7440-38-2	
Cadmium	**0.57**	mg/kg	0.31	0.070	2	11/11/21 12:01	11/18/21 12:23	7440-43-9	
Copper	**216**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:23	7440-50-8	
Lead	**69.1**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:23	7439-92-1	
Zinc	**149**	mg/kg	4.1	0.46	2	11/11/21 12:01	11/18/21 12:23	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.053**	mg/kg	0.019	0.0082	1	11/23/21 09:39	11/23/21 16:10	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.3**	%	0.10	0.10	1		11/11/21 13:03		N2

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS03-110821-3 **Lab ID: 10586986010** Collected: 11/08/21 11:00 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**19.7**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:24	7440-38-2	
Cadmium	**0.63**	mg/kg	0.31	0.070	2	11/11/21 12:01	11/18/21 12:24	7440-43-9	
Copper	**225**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:24	7440-50-8	
Lead	**131**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:24	7439-92-1	
Zinc	**138**	mg/kg	4.1	0.46	2	11/11/21 12:01	11/18/21 12:24	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.041**	mg/kg	0.020	0.0085	1	11/23/21 09:39	11/23/21 16:12	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.3**	%	0.10	0.10	1		11/11/21 13:04		N2

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS04-110821-1 **Lab ID: 10586986011** Collected: 11/08/21 11:30 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**41.8**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:26	7440-38-2	
Cadmium	**1.7**	mg/kg	0.30	0.069	2	11/11/21 12:01	11/18/21 12:26	7440-43-9	
Copper	**198**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:26	7440-50-8	
Lead	**119**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:26	7439-92-1	
Zinc	**636**	mg/kg	4.0	0.45	2	11/11/21 12:01	11/18/21 12:26	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.084**	mg/kg	0.019	0.0084	1	11/23/21 09:39	11/23/21 16:13	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**5.6**	%	0.10	0.10	1		11/11/21 13:04		N2

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS04-110821-2 **Lab ID: 10586986012** Collected: 11/08/21 11:25 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**24.8**	mg/kg	2.0	0.30	2	11/11/21 12:01	11/18/21 12:28	7440-38-2	
Cadmium	**2.7**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 12:28	7440-43-9	
Copper	**146**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:28	7440-50-8	
Lead	**109**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:28	7439-92-1	
Zinc	**624**	mg/kg	4.0	0.44	2	11/11/21 12:01	11/18/21 12:28	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.076**	mg/kg	0.019	0.0083	1	11/23/21 09:39	11/23/21 16:15	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**5.3**	%	0.10	0.10	1		11/11/21 13:04		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR30SS04-110821-3 **Lab ID: 10586986013** Collected: 11/08/21 11:20 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**21.9**	mg/kg	2.0	0.31	2	11/11/21 12:01	11/18/21 12:29	7440-38-2	
Cadmium	**1.6**	mg/kg	0.30	0.068	2	11/11/21 12:01	11/18/21 12:29	7440-43-9	
Copper	**130**	mg/kg	1.0	0.15	2	11/11/21 12:01	11/18/21 12:29	7440-50-8	
Lead	**87.8**	mg/kg	1.0	0.21	2	11/11/21 12:01	11/18/21 12:29	7439-92-1	
Zinc	**444**	mg/kg	4.0	0.45	2	11/11/21 12:01	11/18/21 12:29	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.083**	mg/kg	0.019	0.0083	1	11/23/21 09:39	11/23/21 16:17	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.6**	%	0.10	0.10	1		11/11/21 13:04		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Sample: BPSOU-UR39SS01-110921-1 **Lab ID: 10586986014** Collected: 11/09/21 09:15 Received: 11/10/21 08:50 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010D MET ICP	Analytical Method: EPA 6010D Preparation Method: EPA 3050B Pace Analytical Services - Minneapolis								
Arsenic	**12.6**	mg/kg	1.9	0.29	2	11/11/21 12:01	11/18/21 12:31	7440-38-2	
Cadmium	**9.7**	mg/kg	0.29	0.066	2	11/11/21 12:01	11/18/21 12:31	7440-43-9	
Copper	**88.8**	mg/kg	0.96	0.14	2	11/11/21 12:01	11/18/21 12:31	7440-50-8	
Lead	**261**	mg/kg	0.96	0.20	2	11/11/21 12:01	11/18/21 12:31	7439-92-1	
Zinc	**3800**	mg/kg	3.8	0.43	2	11/11/21 12:01	11/18/21 12:31	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Minneapolis								
Mercury	**0.11**	mg/kg	0.018	0.0078	1	11/23/21 09:39	11/23/21 16:18	7439-97-6	
Dry Weight / %M by ASTM D2974	Analytical Method: ASTM D2974 Pace Analytical Services - Minneapolis								
Percent Moisture	**4.6**	%	0.10	0.10	1		11/11/21 13:04		N2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

QC Batch: 785182 Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10586986001, 10586986002, 10586986003, 10586986004, 10586986005, 10586986006, 10586986007, 10586986008, 10586986009, 10586986010, 10586986011, 10586986012, 10586986013, 10586986014

METHOD BLANK: 4180640 Matrix: Solid
Associated Lab Samples: 10586986001, 10586986002, 10586986003, 10586986004, 10586986005, 10586986006, 10586986007, 10586986008, 10586986009, 10586986010, 10586986011, 10586986012, 10586986013, 10586986014

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	<0.0084	0.019	0.0084	11/23/21 15:30	

LABORATORY CONTROL SAMPLE: 4180641

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.47	0.47	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4180642 4180643

Parameter	Units	10586983001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	0.044	0.54	0.54	0.57	0.54	98	92	80-120	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

QC Batch: 782996
QC Batch Method: EPA 3050B
Analysis Method: EPA 6010D
Analysis Description: 6010D Solids
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10586986001, 10586986002, 10586986003, 10586986004, 10586986005, 10586986006, 10586986007, 10586986008, 10586986009, 10586986010, 10586986011, 10586986012, 10586986013, 10586986014

METHOD BLANK: 4168643 Matrix: Solid
Associated Lab Samples: 10586986001, 10586986002, 10586986003, 10586986004, 10586986005, 10586986006, 10586986007, 10586986008, 10586986009, 10586986010, 10586986011, 10586986012, 10586986013, 10586986014

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/kg	<0.15	0.98	0.15	11/18/21 11:30	
Cadmium	mg/kg	<0.033	0.15	0.033	11/18/21 11:30	
Copper	mg/kg	<0.072	0.49	0.072	11/18/21 11:30	
Lead	mg/kg	<0.10	0.49	0.10	11/18/21 11:30	
Zinc	mg/kg	<0.22	2.0	0.22	11/18/21 11:30	

LABORATORY CONTROL SAMPLE: 4168644

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.2	46.1	98	80-120	
Cadmium	mg/kg	47.2	48.5	103	80-120	
Copper	mg/kg	47.2	47.2	100	80-120	
Lead	mg/kg	47.2	47.4	101	80-120	
Zinc	mg/kg	47.2	47.8	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4168645 4168646

Parameter	Units	10586983001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/kg	13.2	56	58.7	58.9	61.0	82	81	75-125	3	20	
Cadmium	mg/kg	0.73	56	58.7	48.4	49.5	85	83	75-125	2	20	
Copper	mg/kg	201	56	58.7	201	199	0	-3	75-125	1	20	M1
Lead	mg/kg	73.5	56	58.7	134	132	109	100	75-125	2	20	
Zinc	mg/kg	309	56	58.7	320	419	18	187	75-125	27	20	P6,R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

QC Batch: 782990
QC Batch Method: ASTM D2974
Analysis Method: ASTM D2974
Analysis Description: Dry Weight / %M by ASTM D2974
Laboratory: Pace Analytical Services - Minneapolis
Associated Lab Samples: 10586986001, 10586986002, 10586986003, 10586986004, 10586986005, 10586986006, 10586986007, 10586986008, 10586986009, 10586986010, 10586986011, 10586986012, 10586986013, 10586986014

SAMPLE DUPLICATE: 4168630

Parameter	Units	10586983001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	18.1	18.8	4	30	N2

SAMPLE DUPLICATE: 4168631

Parameter	Units	10586986005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.1	5.1	1	30	N2

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.
P6	Matrix spike recovery was outside laboratory control limits due to a parent sample concentration notably higher than the spike level.
R1	RPD value was outside control limits.

Pace Analytical Services, LLC
1700 Elm Street
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BPSOU Unreclaimed Sampling
Pace Project No.: 10586986

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10586986001	BPSOU-UR30SS01-110821-1	EPA 3050B	782996	EPA 6010D	783368
10586986002	BPSOU-UR30SS01-110821-2	EPA 3050B	782996	EPA 6010D	783368
10586986003	BPSOU-UR30SS01-110821-3	EPA 3050B	782996	EPA 6010D	783368
10586986004	BPSOU-UR30SS01-110821-3-FD	EPA 3050B	782996	EPA 6010D	783368
10586986005	BPSOU-UR30SS02-110821-1	EPA 3050B	782996	EPA 6010D	783368
10586986006	BPSOU-UR30SS02-110821-2	EPA 3050B	782996	EPA 6010D	783368
10586986007	BPSOU-UR30SS02-110821-3	EPA 3050B	782996	EPA 6010D	783368
10586986008	BPSOU-UR30SS03-110821-1	EPA 3050B	782996	EPA 6010D	783368
10586986009	BPSOU-UR30SS03-110821-2	EPA 3050B	782996	EPA 6010D	783368
10586986010	BPSOU-UR30SS03-110821-3	EPA 3050B	782996	EPA 6010D	783368
10586986011	BPSOU-UR30SS04-110821-1	EPA 3050B	782996	EPA 6010D	783368
10586986012	BPSOU-UR30SS04-110821-2	EPA 3050B	782996	EPA 6010D	783368
10586986013	BPSOU-UR30SS04-110821-3	EPA 3050B	782996	EPA 6010D	783368
10586986014	BPSOU-UR39SS01-110921-1	EPA 3050B	782996	EPA 6010D	783368
10586986001	BPSOU-UR30SS01-110821-1	EPA 7471B	785182	EPA 7471B	785546
10586986002	BPSOU-UR30SS01-110821-2	EPA 7471B	785182	EPA 7471B	785546
10586986003	BPSOU-UR30SS01-110821-3	EPA 7471B	785182	EPA 7471B	785546
10586986004	BPSOU-UR30SS01-110821-3-FD	EPA 7471B	785182	EPA 7471B	785546
10586986005	BPSOU-UR30SS02-110821-1	EPA 7471B	785182	EPA 7471B	785546
10586986006	BPSOU-UR30SS02-110821-2	EPA 7471B	785182	EPA 7471B	785546
10586986007	BPSOU-UR30SS02-110821-3	EPA 7471B	785182	EPA 7471B	785546
10586986008	BPSOU-UR30SS03-110821-1	EPA 7471B	785182	EPA 7471B	785546
10586986009	BPSOU-UR30SS03-110821-2	EPA 7471B	785182	EPA 7471B	785546
10586986010	BPSOU-UR30SS03-110821-3	EPA 7471B	785182	EPA 7471B	785546
10586986011	BPSOU-UR30SS04-110821-1	EPA 7471B	785182	EPA 7471B	785546
10586986012	BPSOU-UR30SS04-110821-2	EPA 7471B	785182	EPA 7471B	785546
10586986013	BPSOU-UR30SS04-110821-3	EPA 7471B	785182	EPA 7471B	785546
10586986014	BPSOU-UR39SS01-110921-1	EPA 7471B	785182	EPA 7471B	785546
10586986001	BPSOU-UR30SS01-110821-1	ASTM D2974	782990		
10586986002	BPSOU-UR30SS01-110821-2	ASTM D2974	782990		
10586986003	BPSOU-UR30SS01-110821-3	ASTM D2974	782990		
10586986004	BPSOU-UR30SS01-110821-3-FD	ASTM D2974	782990		
10586986005	BPSOU-UR30SS02-110821-1	ASTM D2974	782990		
10586986006	BPSOU-UR30SS02-110821-2	ASTM D2974	782990		
10586986007	BPSOU-UR30SS02-110821-3	ASTM D2974	782990		
10586986008	BPSOU-UR30SS03-110821-1	ASTM D2974	782990		
10586986009	BPSOU-UR30SS03-110821-2	ASTM D2974	782990		
10586986010	BPSOU-UR30SS03-110821-3	ASTM D2974	782990		
10586986011	BPSOU-UR30SS04-110821-1	ASTM D2974	782990		
10586986012	BPSOU-UR30SS04-110821-2	ASTM D2974	782990		
10586986013	BPSOU-UR30SS04-110821-3	ASTM D2974	782990		
10586986014	BPSOU-UR39SS01-110921-1	ASTM D2974	782990		

Laboratory Management Program (LaMP) Chain of Custody Record
Soil, Sediment and Groundwater Samples

BP Site Node Path: _____ Req Due Date (mm/dd/yy): 11/23/21 Rush TAT Yes 14 day No _____

BP/RM Facility No: _____ Lab Work Order Number: _____

Lab Name: Pace Analytical	BP/ARC Facility Address:	Consultant/Contractor:	Pioneer Technical Services
Lab Address: 1700 Elm Street SE, Minneapolis, MN 55414	City, State, ZIP Code:	Consultant/Contractor Project No:	BPSOU Unreclaimed Sampling
Lab PM: Jennifer Anderson	Lead Regulatory Agency:	Address:	1101 S. Montana St.
Lab Phone: 612-607-6436	California Global ID No.:	Consultant/Contractor PM:	Scott Sampson
Lab Shipping Accnt:	Enfos Proposal No:	Phone: 406-697-0946 Email:	ssampson@pioneer-technical.com
Lab Bottle Order No:	Accounting Mode: Provision ____ OOC-BU ____ OOC-RM ____	Send/Submit EDD to:	Scott Sampson
Other Info:	Stage Activity	Invoice To:	BP-RM _____ BP-Other _____

BP/RM PM: Mike Mc Anulty	
PM Phone: 406-723-1822	
PM Email: mcanumc@bp.com	

Requested Analyses

Report Type & QC Level

Limited (Standard) Package —

Limited Plus Package —

Full Package Level 2

WO# : 10586986

10586986

Lab No.	Unique Sample ID, must follow format of SAMPLENAMEYYYYMMDD Examples: MW01_20190101; BH01_3-5_20190101	Time	Depth Unit	Grab (G) or Composite (C)	Total Number of Containers	Matrix	Analysis	Total Metals 6010 As, Cd, Cu, Pb, Zn	7471 Mercury	Filtered (Y/N)	Preservation	
	BPSOU-UR30SS01-110821-1	10:55	in	c	1	soil		x	x			001
	BPSOU-UR30SS01-110821-2	10:50	in	c	1	soil		x	x			002
	BPSOU-UR30SS01-110821-3	10:40	in	c	1	soil		x	x			003
	BPSOU-UR30SS01-110821-3-FD	10:45	in	c	1	soil		x	x			004
	BPSOU-UR30SS02-110821-1	11:40	in	c	1	soil		x	x			005
	BPSOU-UR30SS02-110821-2	11:35	in	c	1	soil		x	x			006
	BPSOU-UR30SS02-110821-3	11:30	in	c	1	soil		x	x			007

Sampler's Name: Jesse Sims	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: Pioneer Technical Services	Jesse Sims/PTS	11/9/2021	1600	ACPACK	11/10/21	8:50
Ship Method: FedEx Overnight Ship Date: 11/9/21						
Shipment Tracking No: 4278 9934 6439						

Special Instructions: *Maximum 14 day TAT

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 0.3 °F/C | Trip Blank: Yes (No) | MS/MSD Sample Submitted: Yes (No)

BP LaMP Soil/H2O COC March 2019

Laboratory Management Program (LaMP) Chain of Custody Record

Soil, Sediment and Groundwater Samples

BP Site Node Path: _____ Req Due Date (mm/dd/yy): 11/23/21 Rush TAT Yes 14 day No _____

BP/RM Facility No: _____ Lab Work Order Number: _____

Lab Name: Pace Analytical	BP/ARC Facility Address:	Consultant/Contractor:	Pioneer Technical Services
Lab Address: 1700 Elm Street SE, Minneapolis, MN 55414	City, State, ZIP Code:	Consultant/Contractor Project No:	BPSOU Unreclaimed Sampling
Lab PM: Jennifer Anderson	Lead Regulatory Agency:	Address:	1101 S. Montana St.
Lab Phone: 612-607-6436	California Global ID No.:	Consultant/Contractor PM:	Scott Sampson
Lab Shipping Accnt:	Enfos Proposal No:	Phone: 406-697-0946 Email:	ssampson@pioneer-technical.com
Lab Bottle Order No:	Accounting Mode: Provision ____ OOC-BU ____ OOC-RM ____	Send/Submit EDD to:	Scott Sampson
Other Info:	Stage Activity	Invoice To:	BP-RM _____ BP-Other _____

BP/RM PM: Mike Mc Anulty

PM Phone: 406-723-1822

PM Email: mcanumc@bp.com

Requested Analyses

Filtered (Y/N)

Preservation

Report Type & QC Level

Limited (Standard) Package _

Limited Plus Package _

Full Package Level 2

Lab No.	Unique Sample ID, must follow format of SAMPLENAMEYYYYMMDD Examples: MW01_20190101; BH01_3-5_20190101	Time	Depth Unit	Grab (G) or Composite (C)	Total Number of Containers	Matrix	Analysis	Total Metals 6010 As, Cd, Cu, Pb, Zn	7471 Mercury	Comments
	BPSOU-UR30SS03-110821-1	11:10	in	c	1	soil		x	x	008
	BPSOU-UR30SS03-110821-2	11:05	in	c	1	soil		x	x	009
	BPSOU-UR30SS03-110821-3	11:00	in	c	1	soil		x	x	010
	BPSOU-UR30SS04-110821-1	11:30	in	c	1	soil		x	x	011
	BPSOU-UR30SS04-110821-2	11:25	in	c	1	soil		x	x	012
	BPSOU-UR30SS04-110821-3	11:20	in	c	1	soil		x	x	013
	BPSOU-UR39SS01-110921-1	9:15	in	c	1	soil		x	x	014

Sampler's Name: Jesse Sims	Relinquished By / Affiliation	Date	Time	Accepted By / Affiliation	Date	Time
Sampler's Company: Pioneer Technical Services	Jesse Sims/PTS	11/9/2021	1600	AC/PACE	11/10/21	8:50
Ship Method: FedEx Overnight Ship Date: 11/9/21						
Shipment Tracking No: 4278 9934 6439						

Special Instructions: *Maximum 14 day TAT

THIS LINE - LAB USE ONLY: Custody Seals In Place: Yes / No | Temp Blank: Yes / No | Cooler Temp on Receipt: 0.3 °F/C | Trip Blank: Yes / No | MS/MSD Sample Submitted: Yes / No

BP LaMP Soil/H2O COC March 2019

Pace Analytical®	Document Name: **Sample Condition Upon Receipt (SCUR) - ESI**	Document Revised: 12Aug2020 **Page 1 of 1**
	Document No.: **ENV-FRM-MIN4-0149 Rev.01**	Pace Analytical Services - **Minneapolis**

Sample Condition Upon Receipt – ESI Tech Specs

Client Name: BPNM

Project #: WO#: 10586986

PM: JMA Due Date: 11/23/21

CLIENT: BP-PIONEER

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Pace ☐ SpeeDee ☐ Commercial

Tracking Number: 427899346439 See Exceptions ☐ ENV-FRM-MIN4-0142

Custody Seal on Cooler/Box Present? ☒ Yes ☐ No **Seals Intact?** ☒ Yes ☐ No **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Packing Material: ☐ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other:_____ **Temp Blank?** ☒ Yes ☐ No

Thermometer: ☐ T1(0461) ☐ T2(1336) ☐ T3(0459) ☒ T4(0254) ☐ T5(0489) **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Dry ☐ Melted

Temp should be above freezing to 6°C **Cooler Temp Read w/temp blank:** -2.3 °C **Average Corrected Temp (no temp blank only):** _____ °C ☐ See Exceptions ENV-FRM-MIN4-0142 ☐ 1 Container

Correction Factor: +NIL **Cooler Temp Corrected w/temp blank :** -0.3 °C

USDA Regulated Soil: (☐ N/A, water sample/Other:_____)
Did samples originate in a quarantine zone within the United States: AL, AR, CA, FL, GA, ID, LA. MS, NC, NM, NY, OK, OR, SC, TN, TX or VA (check maps)? ☐ Yes ☒ No

Date/Initials of Person Examining Contents: AC 11/10/21
Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present and Filled Out?	☒ Yes	☐ No		1.
Chain of Custody Relinquished?	☒ Yes	☐ No		2.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	3.
Samples Arrived within Hold Time?	☒ Yes	☐ No		4.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No		5. ☐ Fecal Coliform ☐ HPC ☐ Total Coliform/E coli ☐ BOD/cBOD ☐ Hex Chrome ☐ Turbidity ☐ Nitrate ☐ Nitrite ☐ Orthophos ☐
Rush Turn Around Time Requested?	☐ Yes	☒ No		6.
Sufficient Sample Volume?	☒ Yes	☐ No		
Triple Volume Provided for MS/MSD (if more than 10 samples)?	☐ Yes	☒ No	☐ N/A	7.
Correct Containers Used? AC 11/10/21	☒ Yes	☐ No		8.
-Pace Containers Used?	☐ Yes	☐ No		
Containers Intact?	☒ Yes	☐ No		9.
Field Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	10. Is sediment visible in the dissolved container? ☐ Yes ☐ No
Is sufficient information available to reconcile the samples to the COC	☒ Yes	☐ No		11. **If no, write ID/ Date/Time on Container Below:** **See Exception** ☐ **ENV-FRM-MIN4-0142**
Matrix: ☐ Water ☒ Soil ☐ Oil ☐ Other_____				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	12. Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, <2pH, NaOH >9 Sulfide, NaOH>10 Cyanide)	☐ Yes	☐ No	☒ N/A	☐ NaOH ☐ HNO_3 ☐ H_2SO_4 ☐ Zinc Acetate
Exceptions: VOA, Coliform, TOC/DOC Oil and Grease, DRO/8015 (water) and Dioxin/PFAS *If adding preservative to a container it must be added to associated field and equipment blanks (verify with PM first)	☐ Yes	☐ No	☒ N/A	Positive for Res. Chlorine? ☐ Yes ☐ No **pH Paper Lot#** **See Exception** ☐ **ENV-FRM-MIN4-0142**
				Res. Chlorine | 0-6 Roll | 0-6 Strip | 0-14 Strip
Extra labels present on soil VOA or WIDRO containers?	☐ Yes	☐ No	☒ N/A	13. **See Exception** ☐ **ENV-FRM-MIN4-0140**
Headspace in VOA Vials (greater than 6mm)?	☐ Yes	☐ No	☒ N/A	
3 Trip Blanks Present?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	Pace Trip Blank Lot # (if purchased):_____

Temp Log: Temp must be maintained at <6°C during login, record temp every 20 mins			**CLIENT NOTIFICATION/RESOLUTION**	**Field Data Required?** ☐ Yes ☐ No
Opened Time: 10:34	Temp: -0.3	Corrected Temp: -0.3	Person Contacted:	Date/Time:
Time: 10:55	put in cooler		Comments/Resolution:	
Time:	Temp:	Corrected Temp:		

Project Manager Review: _____ **Date:** 11/12/2021

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Labeled by: AC (1)

Attachment C.2 - XRF Data

XRF Sample ID	Sample Type	Field Sample ID	Analysis Date	Units	Arsenic Result	Arsenic Error	Cadmium Result	Cadmium Error	Copper Result	Copper Error	Lead Result	Lead Error	Mercury Result	Mercury Error	Zinc Result	Zinc Error
P_20210701_92951_531	SiO2	SiO2	7/1/2021	mg/kg	<LOD	3.32	15.73	4.37	<LOD	13.56	<LOD	4.49	<LOD	4.77	<LOD	6.60
P_20210701_92951_532	NIST 2709a	NIST 2709a	7/1/2021	mg/kg	15.10	4.29	13.25	5.12	31.72	13.34	9.60	4.80	<LOD	6.36	92.20	10.54
P_20210701_92951_533	RCRA	RCRA	7/1/2021	mg/kg	459.16	20.22	470.54	10.86	45.46	13.40	489.57	20.87	<LOD	6.61	51.80	8.46
P_20210701_92951_534	USGS SdAR-M2	USGS SdAR-M2	7/1/2021	mg/kg	65.00	19.80	15.12	5.06	210.70	20.11	835.40	25.04	<LOD	7.05	758.68	26.98
P_20210701_92951_535	Natural	BPSOU-UR39-070121-6-12-03	7/1/2021	mg/kg	107.38	41.73	20.30	5.49	660.18	34.76	3,201.90	53.75	<LOD	10.22	3,334.84	61.66
P_20210701_92951_536	Natural	BPSOU-UR39-070121-2-6-02	7/1/2021	mg/kg	<LOD	47.34	19.92	5.39	384.43	26.97	1,993.05	41.02	<LOD	9.27	3,107.08	57.41
P_20210701_92951_537	Natural	BPSOU-UR39-070121-0-2-01	7/1/2021	mg/kg	<LOD	15.35	21.05	5.26	160.03	19.68	195.29	13.12	<LOD	8.80	4,493.76	66.92
P_20210701_92951_538	Natural	BPSOU-UR39-070121-6-12-09	7/1/2021	mg/kg	52.50	19.56	16.69	5.36	214.49	21.70	733.37	24.81	<LOD	8.23	1,720.09	42.35
P_20210701_92951_539	Natural	BPSOU-UR39-070121-2-6-08	7/1/2021	mg/kg	<LOD	46.13	15.13	5.59	346.53	27.63	1,687.70	39.86	<LOD	9.42	1,824.22	46.64
P_20210701_92951_540	Natural	BPSOU-UR39-070121-0-2-07	7/1/2021	mg/kg	<LOD	34.66	20.55	5.48	294.11	24.22	1,059.87	29.85	<LOD	8.48	2,075.90	46.75
P_20210701_92951_541	Field Duplicate	BPSOU-UR39-070121-0-2-07-FD	7/1/2021	mg/kg	59.48	21.20	21.31	5.45	316.06	24.83	855.72	26.90	<LOD	8.62	1,893.74	44.71
P_20210701_92951_542	Natural	BPSOU-UR39-070121-6-12-06	7/1/2021	mg/kg	<LOD	50.96	22.32	5.48	429.82	29.17	2,196.16	44.18	<LOD	10.48	4,788.16	72.98
P_20210701_92951_543	Natural	BPSOU-UR39-070121-2-6-05	7/1/2021	mg/kg	88.55	29.81	8.83	5.01	453.33	29.47	1,636.50	38.05	<LOD	9.50	3,297.35	60.45
P_20210701_92951_544	Natural	BPSOU-UR39-070121-0-2-04	7/1/2021	mg/kg	81.13	31.25	16.99	5.22	348.64	25.53	1,977.05	40.13	<LOD	9.14	4,226.53	65.59
P_20210701_92951_545	Natural	BPSOU-UR39-070121-6-12-12	7/1/2021	mg/kg	<LOD	7.72	10.64	5.13	58.28	15.48	31.62	6.73	<LOD	6.96	175.89	14.49
P_20210701_92951_546	Natural	BPSOU-UR39-070121-2-6-11	7/1/2021	mg/kg	<LOD	7.77	8.59	5.13	69.50	16.12	33.69	6.74	<LOD	6.94	178.23	14.68
P_20210701_92951_547	Natural	BPSOU-UR39-070121-0-2-10	7/1/2021	mg/kg	15.09	6.40	14.93	5.23	79.60	16.38	53.65	7.80	<LOD	7.19	247.03	16.82
P_20210701_92951_548	Natural	BPSOU-UR39-070121-0-2-13	7/1/2021	mg/kg	<LOD	21.20	<LOD	7.57	147.05	21.48	340.51	18.50	<LOD	9.62	2,354.84	53.17
P_20210701_92951_549	Natural	BPSOU-UR39-070121-2-6-14	7/1/2021	mg/kg	<LOD	18.23	8.19	5.11	159.19	20.06	267.84	15.55	<LOD	7.90	1,223.05	36.22
P_20210701_92951_550	Natural	BPSOU-UR39-070121-6-12-15	7/1/2021	mg/kg	17.03	7.41	17.00	5.14	67.40	15.36	87.61	9.14	<LOD	7.05	329.37	18.63
P_20210701_92951_551	Natural	BPSOU-UR39-070121-0-2-16	7/1/2021	mg/kg	20.26	9.86	8.41	5.39	90.38	19.06	136.59	12.27	<LOD	8.67	418.38	23.24
P_20210701_92951_552	Natural	BPSOU-UR39-070121-2-6-17	7/1/2021	mg/kg	7.82	4.54	12.78	5.17	43.41	15.20	15.68	5.59	<LOD	7.29	119.80	12.67
P_20210701_92951_553	Natural	BPSOU-UR39-070121-6-12-18	7/1/2021	mg/kg	<LOD	7.41	9.94	5.50	66.00	18.82	13.76	6.15	<LOD	8.67	124.66	14.39
P_20210701_92951_554	Natural	BPSOU-UR39-070121-0-2-19	7/1/2021	mg/kg	183.61	40.05	20.53	5.62	680.36	35.80	2,773.99	50.82	<LOD	10.59	3,804.95	66.80
P_20210701_92951_555	Natural	BPSOU-UR39-070121-2-6-20	7/1/2021	mg/kg	178.34	38.44	15.08	5.25	1,241.01	44.98	2,675.75	48.76	<LOD	9.77	2,127.04	49.23
P_20210701_92951_556	XRF Duplicate	BPSOU-UR39-070121-2-6-20-D	7/1/2021	mg/kg	182.60	38.39	14.64	5.28	934.60	39.37	2,706.22	48.68	<LOD	9.36	2,058.57	48.01
P_20210701_92951_557	XRF Replicate	BPSOU-UR39-070121-2-6-20-R	7/1/2021	mg/kg	135.99	39.46	12.39	5.21	1,112.78	42.72	2,887.52	50.51	<LOD	9.91	2,206.53	49.98
P_20210701_92951_558	SiO2	SiO2	7/1/2021	mg/kg	<LOD	3.33	17.00	4.41	<LOD	13.65	<LOD	4.53	<LOD	4.99	<LOD	6.64
P_20210701_92951_559	NIST 2709a	NIST 2709a	7/1/2021	mg/kg	10.47	4.27	15.45	5.14	29.36	13.33	13.12	5.10	<LOD	6.73	95.78	10.77
P_20210701_92951_560	RCRA	RCRA	7/1/2021	mg/kg	456.83	20.03	479.12	10.98	33.95	12.84	480.07	20.65	<LOD	7.05	46.02	8.29
P_20210701_92951_561	USGS SdAR-M2	USGS SdAR-M2	7/1/2021	mg/kg	83.66	19.71	19.55	5.15	197.44	19.76	807.30	24.66	<LOD	7.53	782.80	27.42
P_20210701_92951_562	Natural	BPSOU-UR39-070121-6-12-21	7/1/2021	mg/kg	146.75	30.21	7.65	4.78	773.69	34.83	1,768.84	38.06	<LOD	8.69	1,768.03	42.98
P_20210701_92951_564	Natural	BPSOU-UR32-070121-0-2-10	7/1/2021	mg/kg	16.95	10.66	<LOD	7.05	96.43	16.12	229.72	13.57	<LOD	6.70	238.77	15.94
P_20210701_92951_565	Natural	BPSOU-UR32-070121-2-6-11	7/1/2021	mg/kg	65.34	19.06	<LOD	6.90	446.79	27.60	692.14	23.94	<LOD	8.01	811.54	29.38
P_20210701_92951_566	Natural	BPSOU-UR32-070121-6-12-12	7/1/2021	mg/kg	<LOD	30.60	<LOD	7.63	372.31	32.53	562.69	26.19	<LOD	10.51	1,015.51	39.61

Notes:

[1] XRF Sample ID is P_"Analysis Date"_"XRF Instrument Number"_"XRF Reading Number"

Abbreviations:

mg/kg - milligram per kilogram
SiO2 - Silicon Dioxide standard
NIST 2709a - NIST 2709a- Joaquin Soil sample
RCRA - Resource Conservation and Recovery Act Sample
<LOD - not detected (less than detection limit)

Attachment D
Electronic Data Deliverable File

Included separately

Appendix B
Site Photographs

Atlantic Richfield Company

PhotoNumber: UR39-1	Photographer: Cole Dallaserra
Date: 07/01/2021 07:10	Photo Direction: South West
Description: General view of sample site 1 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-2	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North East
Description: View of UR-39 sample site 1	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-3	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: South West
Description: View of sample site 2 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-4	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North West
Description: View of sample site 2 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-5	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North
Description: View of visually impacted mine waste sloughing off in to drainage below sample site 2 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-6	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North East
Description: View of sample site 3 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-7	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: West
Description: View of sample site 3 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-8	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North
Description: View of sample site 4 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-9	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North East
Description: View of sample site 4 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-10	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North East
Description: View of sample site 5 at UR-39	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-11	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: South West
Description: View of opportunistic sample location. 1st opportunistic sample location and sample site 6	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-12	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: South East
Description: View of miscellaneous debris that's been dumped in drainage	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-13	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: North
Description: Jew of miscellaneous debris dumped in drainage	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-14	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: South West
Description: View of opportunistic sample area 2 sample site 7	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	

Atlantic Richfield Company

PhotoNumber: UR39-15	Photographer: Cole Dallaserra
Date: 07/01/2021	Photo Direction: South East
Description: View of opportunistic area 2 sample site 7	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	