

Montana Tech Library

**Digital Commons @ Montana Tech**

---

Silver Bow Creek/Butte Area Superfund Site

Montana Superfund

---

Summer 7-26-2022

## **Draft Final 2021 Unreclaimed Sites Sampling UR-24 Site Evaluation Summary Report**

Pioneer Technical Services, Inc.

Follow this and additional works at: [https://digitalcommons.mtech.edu/superfund\\_silverbowbutte](https://digitalcommons.mtech.edu/superfund_silverbowbutte)



Part of the [Environmental Health and Protection Commons](#), [Environmental Indicators and Impact Assessment Commons](#), and the [Environmental Monitoring Commons](#)

---

# Atlantic Richfield Company

## Mike Mc Anulty

Liability Manager

317 Anaconda Road

Butte MT 59701

Direct (406) 782-9964

Fax (406) 782-9980

July 26, 2022

Nikia Greene  
Remedial Project Manager  
US EPA – Montana Office  
Baucus Federal Building  
10 West 15th Street, Suite 3200  
Helena, Montana 59626

Erin Agee  
Senior Assistant Regional Counsel  
US EPA Region 8 Office of Regional Counsel  
CERCLA Enforcement Section  
1595 Wynkoop Street  
Denver, CO 80202  
Mail Code: 8ORC-C

Daryl Reed  
DEQ Project Officer  
P.O. Box 200901  
Helena, Montana 59620-0901

Jonathan Morgan, Esq.  
DEQ, Legal Counsel  
P.O. Box 200901  
Helena, Montana 59620-0901

**RE: 2021 Unreclaimed Sites Sampling UR-24 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-24 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/EhDfp18u6RFGna4wYbJ6fBkB36mo30fpR6RUrIiPsrPXMA>.

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

Sincerely,

*Mike McAnulty*

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

# Atlantic Richfield Company

317 Anaconda Road  
Butte MT 59701  
Direct (406) 782-9964  
Fax (406) 782-9980

Cc: Patricia Gallery / Atlantic Richfield - email  
Chris Greco / Atlantic Richfield – email  
Josh Bryson / Atlantic Richfield - email  
Mike Mc Anulty / Atlantic Richfield - email  
Loren Burmeister / Atlantic Richfield – email  
Dave Griffis / Atlantic Richfield - email  
Jean Martin / Atlantic Richfield - email  
Irene Montero / Atlantic Richfield - email  
David A. Gratson / Environmental Standards / email  
Mave Gasaway / DGS - email  
Brianne McClafferty / Holland & Hart - email  
Joe Vranka / EPA - email  
David Shanight / CDM - email  
Curt Coover / CDM - email  
James Freeman / DOJ - email  
John Sither / DOJ - email  
Dave Bowers / DEQ - email  
Carolina Balliew / DEQ - email  
Matthew Dorrington / DEQ – email  
Wil George / DEQ – email  
Jim Ford / NRDP - email  
Pat Cunneen / NRDP - email  
Harley Harris / NRDP - email  
Katherine Hausrath / NRDP - email  
Meranda Flugge / NRDP - email  
Ted Duaine / MBMG - email  
Gary Icopini / MBMG - email  
Becky Summerville / MR - email  
Kristen Stevens / UP - email  
Robert Bylsma / UP - email  
John Gilmour / Kelley Drye - email  
Leo Berry / BNSF - email  
Robert Lowry / BNSF - email  
Brooke Kuhl / BNSF – email  
Lauren Knickrehm / BNSF - email  
Jeremie Maehr / Kennedy Jenks - email  
Annika Silverman / Kennedy Jenks - email  
Matthew Mavrinac / RARUS - email  
Harrison Roughton / RARUS - email  
Brad Gordon / RARUS - email  
Mark Neary / BSB - email  
Eric Hassler / BSB - email

# Atlantic Richfield Company

317 Anaconda Road  
Butte MT 59701  
Direct (406) 782-9964  
Fax (406) 782-9980

Julia Crain / BSB - email  
Chad Anderson / BSB - email  
Brandon Warner / BSB – email  
Abigail Peltomaa / BSB - email  
Eileen Joyce / BSB – email  
Sean Peterson/BSB – email  
Gordon Hart / BSB – email  
Jeremy Grotbo / BSB – email  
Karen Maloughney / BSB – email  
Josh Vincent / WET - email  
Craig Deeney / TREC - email  
Scott Bradshaw / TREC - email  
Brad Archibald / Pioneer - email  
Pat Sampson / Pioneer - email  
Joe McElroy / Pioneer – email  
Andy Dare / Pioneer – email  
Karen Helfrich / Pioneer - email  
Leesla Jonart / Pioneer - email  
Randa Colling / Pioneer – email  
Ian Magruder/ CTEC- email  
CTEC of Butte – email  
Scott Juskiewicz / Montana Tech – email

File: MiningSharePoint@bp.com - email  
BPSOU SharePoint - upload



---

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

---

*Draft Final*

*2021 Unreclaimed Sites Sampling UR-24  
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-24  
Site Evaluation Summary Report***

Prepared for:

***Atlantic Richfield Company***  
317 Anaconda Road  
Butte, Montana 59701

Prepared by:

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

**2022**

## TABLE OF CONTENTS

	<u>Page</u>
<b>LIST OF FIGURES .....</b>	<b>II</b>
<b>LIST OF TABLES .....</b>	<b>II</b>
<b>LIST OF APPENDICES .....</b>	<b>II</b>
<b>ABBREVIATIONS AND ACRONYMS.....</b>	<b>III</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Objectives .....	1
<b>2.0 SITE DESCRIPTION AND BACKGROUND.....</b>	<b>2</b>
<b>3.0 SITE EVALUATION .....</b>	<b>3</b>
3.1 Data Summary .....	3
3.2 Human Health Action Levels.....	3
3.3 Screening Criteria for Storm Water .....	3
3.4 Sedimentation Analysis .....	4
<b>4.0 DECLARATION CONCLUSION .....</b>	<b>5</b>
<b>5.0 REFERENCES.....</b>	<b>6</b>

## **LIST OF FIGURES**

Figure 1. Unreclaimed Sites UR-24 2021 Samples and Exceedances

Figure 2. Unreclaimed Sites UR-24 Storm Water Features

## **LIST OF TABLES**

Table 1. BPSOU Soil Screening Criteria

Table 2. New Data Summary

## **LIST OF APPENDICES**

Appendix A Data Summary Report (includes Data Validation Report)

Appendix B Site Photographs

### ABBREVIATIONS AND ACRONYMS

<b>Acronym</b>	<b>Definition</b>	<b>Acronym</b>	<b>Definition</b>
<b>BHRS</b>	Butte Hill Revegetation Specifications	<b>QAPP</b>	Quality Assurance Project Plan
<b>BPSOU</b>	Butte Priority Soils Operable Unit	<b>QC</b>	Quality Control
<b>BTC</b>	Blacktail Creek	<b>RCRA</b>	Resource Conservation and Recovery Act
<b>CCR</b>	Construction Completion Report	<b>SBC</b>	Silver Bow Creek
<b>CD</b>	Consent Decree	<b>SD</b>	Settling Defendants
<b>DSR</b>	Data Summary Report	<b>SOP</b>	Standard Operating Procedures
<b>FRESOW</b>	Further Remedial Elements Scope of Work	<b>UR</b>	Unreclaimed
<b>QA</b>	Quality Assurance	<b>XRF</b>	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 September 1, 2021, at the UR source area UR-24 within the BPSOU (referred to herein as UR-24 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 to 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 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-24 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 listed 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-24 Site is recreational per professional judgment by the field team lead, informed by current county zoning and guidance listed in the 2020 Record of Decision Amendment (RODA) (Appendix A of the BPSOU CD; EPA, 2020). Human health action levels and storm water criteria for recreational space were referenced to prepare this declaration. The action levels are listed in Table 1.

## **2.0 SITE DESCRIPTION AND BACKGROUND**

Site UR-24 is approximately 0.7 acre. It is located within the Copper Mountain Recreation Park on Beef Trail Road (Figure 1). The site is part of an east-facing slope along an unnamed drainage west of the football fields and east of the driving range. The site has areas with moderate vegetation and significant bare areas. Many of the bare areas appear to have exposed mine waste.

There is also metal debris and other garbage protruding through the ground within UR-24. Rilling has developed in some of the bare areas with fine-grained soils.

Butte-Silver Bow owns Site UR-24. The nearest residence is about 1,300 feet south of Site UR-24 and higher in the drainage. There is fencing around the Copper Mountain Recreation Park, but there is no fencing specifically around Site UR-24. Site UR-24 is in the Grove Gulch drainage basin of the BPSOU.

### **3.0 SITE EVALUATION**

The Site was evaluated following the Unreclaimed Area Logic Diagram (Appendix A.3 of the QAPP) to determine if reclamation is warranted. The 2021 Site investigation was completed on September 1, 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. Photographs of the sampling events are included in Appendix B.

#### **3.1 Data Summary**

A total of 18 natural soil samples were collected and analyzed by XRF for arsenic, cadmium, copper, lead, zinc, and mercury. Out of the 18 collected soil samples, 5 were submitted to Pace Analytic Services, LLC for laboratory confirmation (per Section 3.2.4, Table 5 of the QAPP) and 1 sample was submitted for laboratory QA and QC. 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, the data collected in 2021 were deemed usable. There were no historical data available within the surrounding area of the Site.

For samples analyzed by both XRF and laboratory, the laboratory results were used for the evaluation of the Site to provide remedial recommendations. 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 new data and describes the following findings of the 2021 investigation:

- There were no parameters that exceeded the human health action levels.

#### **3.3 Screening Criteria for Storm Water**

Table 2 lists the new data and describes the following findings of the 2021 investigation:

No samples collected in 2021 exceeded 3 of the 6 contaminant screening level criteria listed in Table 1. No samples exceeded 5,000 milligrams per kilogram (mg/kg); therefore, it is recommended the Site not be analyzed further to determine the materiality of the load to the



degradation of surface water since no waste criteria exceedances were identified. Additionally, off-site sediment migration is mitigated by existing Superfund storm water infrastructure located downstream. Copper Mountain Park Channel routes surface water and sediment to the Copper Mountain Park Basin.

### **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:**

Rills were observed throughout the site. Some appear to be active, and some show signs of stabilization as vegetation has become established. The far north portion of the Site near UR-24-SS-05 appears to have recently received some repairs that included capping and revegetation efforts. Moderate to heavy sediment deposits were observed at the toe of the slope within the drainage. However, ditch inspection notes from the Butte-Silver Bow Operation and Maintenance (O&M) Geodatabase<sup>1</sup> indicate sediments do not appear to be migrating downstream through the grass-lined channel.

#### **Concentrated Outflow:**

Copper Mountain Park Channel, also known as GG-C-2041, is an open drainage Superfund storm water structure that runs south to north along the eastern edge (toe of UR-24) as shown on Figure 2. This channel is part of the Grove Gulch Drainage. The channel is comprised of a grass-lined ditch that flows through separate segments of the reach and ultimately discharges into the Copper Mountain Park Basin that is just east of the Copper Mountain Sports Complex. The channel appears to be in good condition and is well vegetated. According to the Construction Completion Report (CCR) for the Clark Mill and Tailing Remedial Action, the ditch is called out as Ditch 1. The ditch is a geosynthetic, clay-lined, trapezoidal ditch that routes storm water to the Timber Butte Sediment Pond and prevents infiltration. No design specifications were detailed in the CCR (Atlantic Richfield Company, 1997). Overflow from the Copper Mountain Park Basin outlets to GG-O-1, then discharges to BTC via the Grove Gulch drainage.

#### **Evaluate Metals Impacted Sediment in Downstream Infrastructure:**

Based on sampling results discussed previously, surface and sub-surface sediment in exceedance of waste identification criteria are not present on the UR-24 Site. As stated above, storm water with any sediment it carries, is routed to the Grove Gulch drainage via GG-O-1. From GG-O-1, storm water and sediment are discharged downgradient northeast via grass-lined channels and culverts under Hansen Road, Rowe Road, and Lexington Avenue to be discharged at the Grove Gulch area. The Grove Gulch drainage outlets to BTC via outlet GG-O-2 (Figure 2).

---

<sup>1</sup> Information was obtained from the Butte Silver Bow O&M Data report geodatabase. The data base is maintained internally by Butte-Silver Bow.

**Evaluate Contributing Sediment Loading Above the Site:**

There does not appear to be any sediment loading contributed by sites upslope of UR-24. The area upgradient of UR-24 is comprised of the Old BSB Landfill Resource Conservation and Recovery Act (RCRA) site and is mostly well established with vegetation.

**Direct Linkage to Surface Water Features:**

A potentially complete pathway from UR-24 Site to BTC is shown on Figure 2 (BTC, upstream of its confluence with SBC, through the Grove Gulch drainage [Figure 2]). Due to the length of the heavily vegetated shallow drainage, low gradient, and existing storm water basin, discharge from the Site likely deposits sediment before reaching BTC.

**4.0 DECLARATION CONCLUSION**

From the data collected in 2021 (Table 2), no samples analyzed exceeded 3 of the 6 contaminant screening level criteria listed in Table 1. No samples exceeded 5,000 mg/kg. Therefore, the Site does not exceed human health action levels and contains no discernable source of degradation to surface water quality. The sedimentation analysis (Section 3.4) indicates the following:

- Documentation of rills and soil loss from the Site.
- No evidence of sediment in exceedance of human health or waste identification criteria within the UR-24 Site boundary.
- Existing Superfund storm water downstream infrastructure, Copper Mountain Park Channel, routes surface water and sediment to the Copper Mountain Park Basin and is designed to retain sediment migration.

A potentially complete pathway from the UR-24 Site to BTC through the Grove Gulch drainage is present; however, data collected from UR-24 summarized herein does not substantiate direct impacts to human health or contribution of metals-impacted sediment to surface water degradation. Based on the criteria identified in the CD (EPA, 2020), further remedial actions are not warranted.

## 5.0 REFERENCES

Atlantic Richfield Company, 1997. Clark Tailings Consolidated Waste Management Area Construction Completion Report.

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

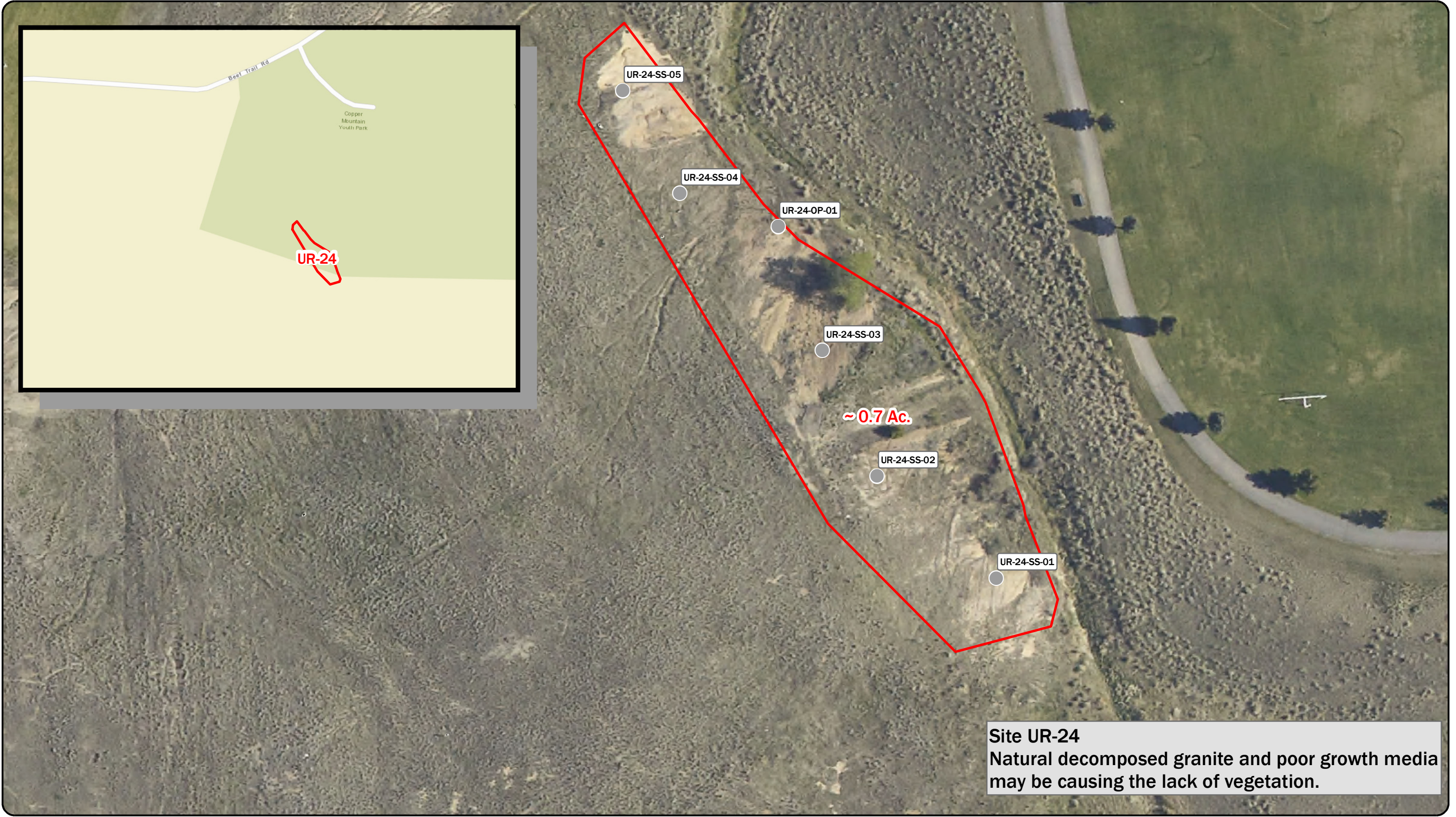
EPA, 2020. Consent Decree for the Butte Priority Soils Operable Unit. Partial Remedial Design/Remedial Action and Operation and Maintenance. U.S. Environmental Protection Agency. February 13, 2020. Available at <https://www.co.silverbow.mt.us/2161/ButtePriority-Soils-Operable-Unit-Conse>. Appendix A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

# Figures

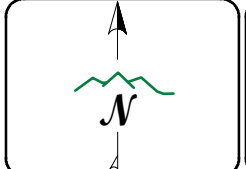
**Figure 1. Unreclaimed Sites UR-24 2021 Samples and Exceedances**

**Figure 2. Unreclaimed Sites UR-24 Storm Water Features**





- HUMAN HEALTH EXCEEDANCE
- STORM WATER EXCEEDANCE
- WASTE EXCEEDANCE
- RESULTS BELOW ACTION LEVEL
- UNRECLAIMED SITE BOUNDARY

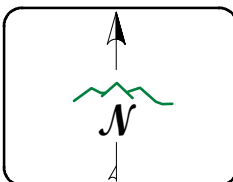
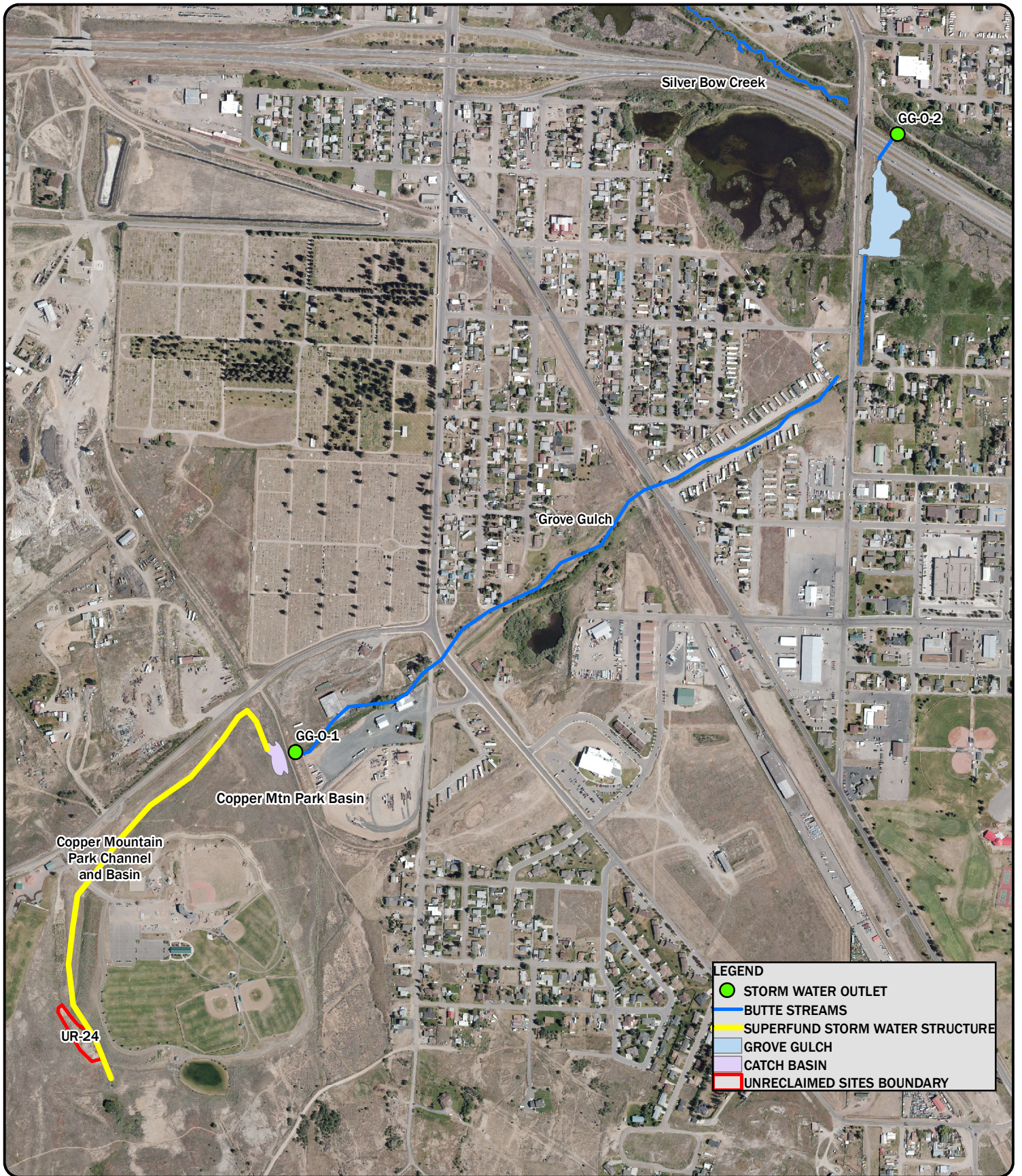


DISPLAYED AS:  
 PROJECTION/ZONE: MSP  
 DATUM: NAD 83  
 UNITS: INT'L FT  
 SOURCE: PIONEER/AR/QSI 2020



**FIGURE 1**  
 UR-24  
 2021 UR SITES  
 SAMPLING AND  
 EXCEEDANCES  
 DATE: 7/26/2022





DISPLAYED AS: \_\_\_\_\_  
 PROJECTION / ZONE: MSP \_\_\_\_\_  
 DATUM: NAD 83 \_\_\_\_\_  
 UNITS: INT'L FT \_\_\_\_\_  
 SOURCE: PIONEER / BSB / QSI 2020 \_\_\_\_\_  
 0 400 800 1,600  
 Feet

**FIGURE 2**  
  
**Unreclaimed Sites**  
**UR-24**  
**Storm Water Features**  
 DATE: 7/26/2022



## Tables

- Table 1. BPSOU Soil Screening Criteria**
- Table 2. New Data Summary**

**Table 1. BPSOU Soil Screening Criteria**

<b>Analyte</b>	<b>Solid Media</b>	<b>Action/Screening Levels</b>
<b>Lead<sub>1</sub></b>	Non-Residential	2,300 mg/kg
<b>Arsenic<sub>1</sub></b>	Recreational	1,000 mg/kg
<b>Cadmium<sup>2</sup></b>		20 mg/kg
<b>Copper<sup>2</sup></b>		1,000 mg/kg
<b>Zinc<sup>2</sup></b>		1,000 mg/kg
<b>Lead<sup>2</sup></b>		1,000 mg/kg
<b>Arsenic<sup>2</sup></b>		200 mg/kg
<b>Mercury<sup>2</sup></b>		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: 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-24-OP-01	BPSOU-UR24OP01-090121-1	XRF	111.57	7.31 U	74.32	192.65	6.95 U	704.10					
UR-24-OP-01	BPSOU-UR24OP01-090121-2	Lab	102.00	1.40	64.70	169.00	0.08	502.00					
UR-24-OP-01	BPSOU-UR24OP01-090121-3	XRF	209.78	7.50 U	90.11	306.25	7.14 U	627.97					
UR-24-SS-01	BPSOU-UR24SS01-090121-1	XRF	171.12	7.47 U	127.88	405.77	7.00 U	418.83					
UR-24-SS-01	BPSOU-UR24SS01-090121-2	Lab	72.50	0.70	55.00	158.00 J+	0.065 J-	207.00 J+					
UR-24-SS-01	BPSOU-UR24SS01-090121-3	XRF	132.39	7.24 U	77.32	295.54	6.48 U	266.68					
UR-24-SS-02	BPSOU-UR24SS02-090121-1	XRF	41.36	7.05 U	51.24	114.87	6.35 U	385.64					
UR-24-SS-02	BPSOU-UR24SS02-090121-2	XRF	13.39	6.66 U	40.22	42.93	6.05 U	259.43					
UR-24-SS-02	BPSOU-UR24SS02-090121-3	XRF	54.34	10.42	61.40	131.25	7.59 U	2,231.84					
UR-24-SS-03	BPSOU-UR24SS03-090121-1	Lab	83.10	2.40	118.00	152.00	0.12	847.00					
UR-24-SS-03	BPSOU-UR24SS03-090121-2	Lab	104.00	2.70	167.00	194.00	0.17	1,070.00					
UR-24-SS-03	BPSOU-UR24SS03-090121-3	Lab	269.00	4.20	258.00	512.00	0.23	1,620.00					
UR-24-SS-04	BPSOU-UR24SS04-090121-1	XRF	296.78	7.33 U	134.72	298.72	7.15 U	473.76					
UR-24-SS-04	BPSOU-UR24SS04-090121-2	XRF	305.14	8.17	106.78	327.06	6.69 U	513.99					
UR-24-SS-04	BPSOU-UR24SS04-090121-3	XRF	149.42	7.36 U	94.44	203.99	6.42 U	604.71					
UR-24-SS-05	BPSOU-UR24SS05-090121-1	XRF	37.04	7.03 U	84.91	28.86	6.39 U	126.19					
UR-24-SS-05	BPSOU-UR24SS05-090121-2	XRF	41.24	7.10 U	89.10	32.97	5.96 U	104.50					
UR-24-SS-05	BPSOU-UR24SS05-090121-3	XRF	267.92	7.31 U	114.26	229.72	7.15 U	316.89					

Storm Water Waste Criteria 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-24 Data Summary Report (DSR)*

*Atlantic Richfield Company*

**July 2022**

---

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

---

***Draft Final***

***2021 Unreclaimed Sites Sampling  
UR-24 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

**July 2022**

# TABLE OF CONTENTS

	<u>Page</u>
<b>LIST OF FIGURES .....</b>	<b>II</b>
<b>LIST OF TABLES .....</b>	<b>III</b>
<b>LIST OF ATTACHMENTS .....</b>	<b>IV</b>
<b>ABBREVIATIONS AND ACRONYMS.....</b>	<b>V</b>
<b>ABSTRACT.....</b>	<b>VI</b>
<b>STATEMENT OF AUTHENTICITY.....</b>	<b>VII</b>
<b>EXECUTIVE SUMMARY .....</b>	<b>VIII</b>
<b>1.0 INTRODUCTION.....</b>	<b>1</b>
1.1 Investigation Objectives.....	2
1.2 Investigation Site Description.....	2
1.3 Background.....	3
<b>2.0 DATA QUALITY OBJECTIVES AND ASSESSMENT .....</b>	<b>3</b>
2.1 Project Objectives and Sampling Design Review .....	3
2.2 Preliminary Data Review .....	3
2.2.1 Data Quality Indicators .....	4
2.3 Data Quality Conclusions .....	4
<b>3.0 SAMPLING AND ANALYSIS SUMMARY .....</b>	<b>4</b>
3.1 Soil Sample Collection .....	4
3.1.1 Sample Analysis.....	5
<b>4.0 DEVIATIONS .....</b>	<b>6</b>
<b>5.0 REFERENCES.....</b>	<b>7</b>

## **LIST OF FIGURES**

Figure 1. Unreclaimed Sites UR-24 Sample Stations

## **LIST OF TABLES**

Table 1. Coordinates for Sample Stations and Identification

## **LIST OF ATTACHMENTS**

Attachment A Data Validation Report

Attachment B Field Forms and Related Documents

Attachment C Laboratory Data Packages

Attachment D Electronic Data Deliverable File



## ABBREVIATIONS AND ACRONYMS

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

## **ABSTRACT**

This Butte Priority Soils Operable Unit (BPSOU) Unreclaimed (UR) Sites Data Summary Report (DSR) presents results of the subsurface soil sampling conducted on September 1, 2021, at the UR source area UR-24 within the BPSOU.

For the event, 6 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; 5 of the 18 collected soil samples 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) *Consent Decree (CD) for the BPSOU* (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  
Liability Manager  
Atlantic Richfield Company  
Date \_\_\_\_\_

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

Approved by: \_\_\_\_\_  
Daryl Reed  
State Project Officer  
Montana Department of Environmental Quality  
Date \_\_\_\_\_

Approved by: \_\_\_\_\_  
Scott Sampson  
Project Manager  
Pioneer Technical Services, Inc.  
Date \_\_\_\_\_

## EXECUTIVE SUMMARY

This BPSOU UR Sites DSR presents the results of the subsurface soil sampling conducted on September 1, 2021, at the UR source area UR-24 within the BPSOU.

Sampling was conducted under the guidelines of the *BPSOU UR Sites – Final Field Sampling Plan (FSP) #2: Unreclaimed Sites UR-24, UR-26, and UR-40* (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 6 sample stations (Figure 1). Each sample station was determined based on preliminary Site investigations and Agency approval.

In total, 6 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; 5 of the 18 collected soil samples 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. 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 on September 1, 2021, at the UR source area UR-24 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 and 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 analyses. Samples were obtained from the sample stations listed below following the FSP.

<b>Station Field Identification</b>	<b>Sample Identification</b>
UR-24-SS-01	BPSOU-UR24SS01-090121-X
UR-24-SS-02	BPSOU-UR24SS02-090121-X
UR-24-SS-03	BPSOU-UR24SS03-090121-X
UR-24-SS-04	BPSOU-UR24SS04-090121-X
UR-24-SS-05	BPSOU-UR24SS05-090121-X
UR-24-OP-01	BPSOU-UR24OP01-090121-X

\*X indicates sample depth interval.

Samples collected 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 *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) 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. This 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-24 Site was assessed per the QAPP.

This DSR describes the activities conducted for soil sampling and characterization at the UR-24 Site. Supplemental information provided in the FSP described 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 the proposed and sampled stations for the 2021 sampling event.

### **1.3 Background**

Site UR-24 is approximately 0.7 acre owned by Butte-Silver Bow. It is located within the Copper Mountain Recreation Park on Beef Trail Road (Figure 1). The Site is part of an east-facing slope along an unnamed drainage west of the football fields and east of the driving range. The Site has areas with moderate vegetation and areas that are significantly bare. Many of the bare areas were suspected to contain exposed mine waste. There is also metal debris and other garbage protruding through the ground within UR-24. Rilling has developed in some of the bare areas with fine-grained soils. The nearest residence is about 1,300 feet south of Site UR-24 and higher in the drainage. There is fencing around the Copper Mountain Recreation Park, but there is no fencing specifically around Site UR-24. Site UR-24 is in the Grove Gulch drainage basin of the BPSOU.

## **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. The analytical laboratories performed the sample analyses using industry-standard methods. Laboratory analytical methods are provided in Table 5 of the QAPP. Sample collection was completed by professionals professionally 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 validation checklists are included in the DVR (Attachment A); all data met the Level A and Level B criteria.

Data generated from the samples collected 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 18 natural soil samples were collected. All samples were analyzed by XRF, and 5 samples were sent to Pace for laboratory analysis. This resulted in a total of 108 natural data points generated by the XRF analyses and 35 natural data points generated by the laboratory analysis. Of the data points, 18 (17%) XRF natural data points were designated screening quality, and 90 (83%) XRF natural data points were designated as enforcement quality. For the laboratory natural data points, 3 (9%) were designated screening quality, and 32 (91%) laboratory natural data points were designated as enforcement quality. No data were rejected. The DVR (Attachment A) includes a summary of the analyses. Please note that 18 of the 18 (100%) screening quality XRF data points were qualifications made to the mercury results due to the lack of a calibration check sample (CCS) (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. Coordinates and identification of the sample stations are included in Table 1. 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, prior to 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 prior to running the XRF analyses, and a portion was used for pH analysis. After XRF analyses were complete, the sample was archived in the Pioneer office in Butte, Montana. 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. Approximately 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. 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 results are 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, split approximately 1 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 analysis described in Section 3.1.1.2). Field personnel then sent a minimum of every 1 per 10 samples to the laboratory for analysis. Additional samples were sent to the laboratory for confirmation if the field results were 35% above or 35% below the contaminants of concern (COC) action/screening levels (Table 1 and Table 2 within the QAPP). Laboratory samples were analyzed for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture.

## **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.”*

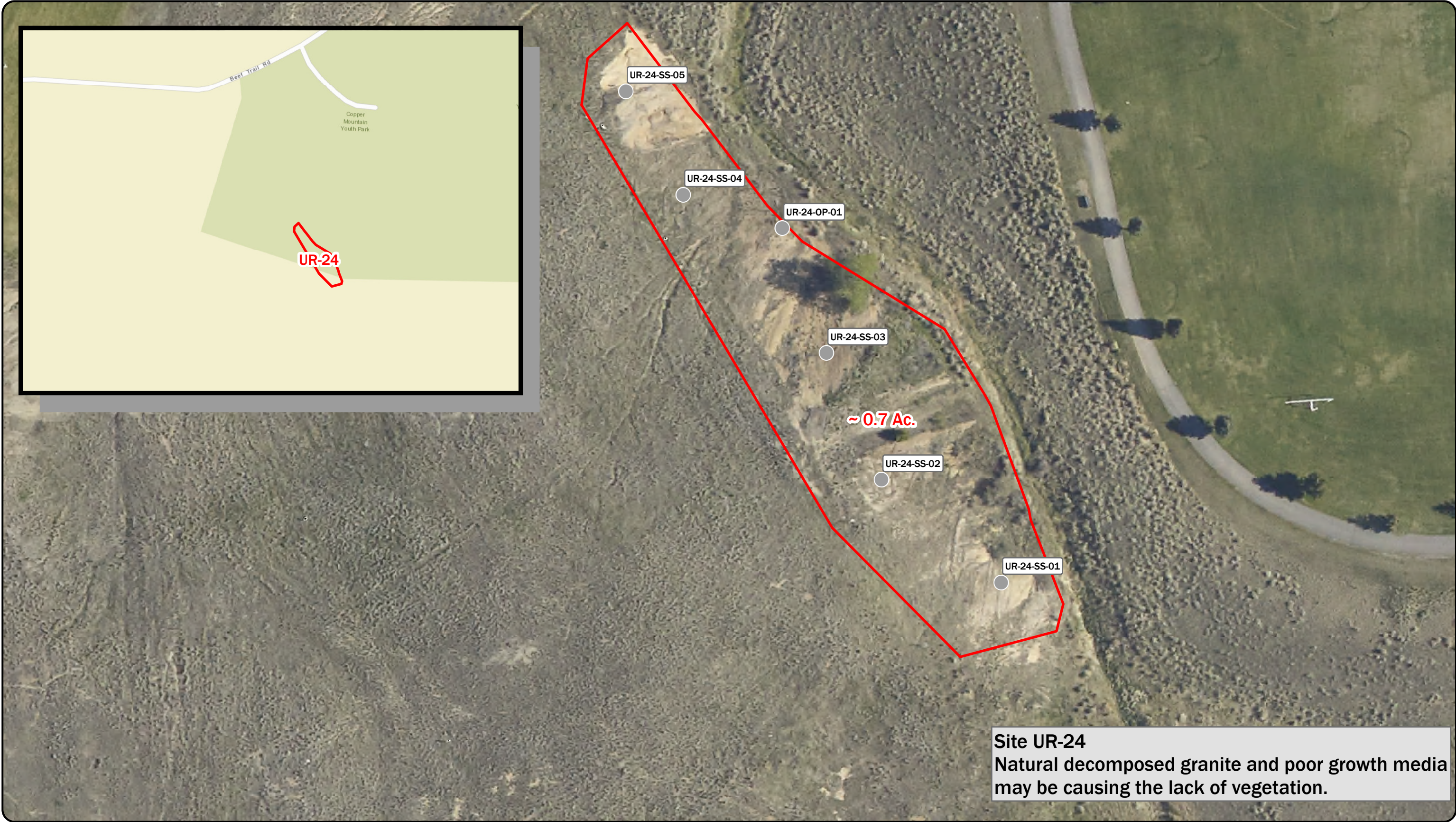
## 5.0 REFERENCES

- 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. BPSOU Unreclaimed Sites - Final Field Sampling Plan (FSP) #2; Unreclaimed Sites UR-24, UR-26, and UR-40. September 2021.
- Atlantic Richfield Company, 2021b. Final Unreclaimed Sites Quality Assurance Project Plan. June 2021.
- 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-24 Sample Stations**





**Site UR-24**  
 Natural decomposed granite and poor growth media may be causing the lack of vegetation.

<ul style="list-style-type: none"> <li><span style="color: green;">●</span> HUMAN HEALTH EXCEEDANCE</li> <li><span style="color: red;">●</span> STORM WATER EXCEEDANCE</li> <li><span style="color: yellow;">●</span> WASTE EXCEEDANCE</li> </ul>	<ul style="list-style-type: none"> <li><span style="color: grey;">●</span> RESULTS BELOW ACTION LEVEL</li> <li><span style="border: 2px solid red; display: inline-block; width: 15px; height: 10px;"></span> UNRECLAIMED SITE BOUNDARY</li> </ul>		<p>DISPLAYED AS:        PROJECTION/ZONE: MSP        DATUM: NAD 83        UNITS: INT'L ET        SOURCE: PIONEER/AR/QSI 2020</p>		<p>I W X U H #</p> <p>X U 057</p> <p>5354# U #/IWHV#</p> <p>VD P SOIQ J # QG #</p> <p>H [ FHHGDQ FHV</p> <p>DATE: 7/26/2022</p>
---	--	--	---	--	---



# Tables

**Table 1. Coordinates for Sample Stations and Identification**

<b>Table 1. Coordinates for Sample Stations and Identification</b>			
<b>Station Field Identification</b>	<b>Sample Identification</b>	<b>Northing</b>	<b>Easting</b>
UR-24-SS-01	BPSOU-UR24SS01-090121-X	644187.832	1194403.196
UR-24-SS-02	BPSOU-UR24SS02-090121-X	644244.134	1194337.441
UR-24-SS-03	BPSOU-UR24SS03-090121-X	644313.57	1194307.232
UR-24-SS-04	BPSOU-UR24SS04-090121-X	644400.274	1194228.558
UR-24-SS-05	BPSOU-UR24SS05-090121-X	644456.923	1194197.056
UR-24-OP-01	BPSOU-UR24OP01-090121-X	644381.938	1194282.934

\*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-24  
Data Validation Report*

*Atlantic Richfield Company*

July 2022

---

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

---

***Draft Final***

***2021 Unreclaimed Sites Sampling UR-24  
Data Validation Report***

Prepared for:

***Atlantic Richfield Company***  
317 Anaconda Road  
Butte, Montana 59701

Prepared by:

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

**July 2022**

# TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 DATA VALIDATION REPORT SUMMARY .....</b>	<b>1</b>
<b>2.0 QUALITY ASSURANCE/QUALITY CONTROL REVIEW OF INORGANIC DATA .....</b>	<b>3</b>
2.1 Field Quality Control Samples.....	4
2.1.1 Field Duplicate.....	4
2.1.2 Equipment Rinsate Blank .....	5
2.2 XRF Quality Control Samples.....	5
2.2.1 Energy Calibration Check.....	5
2.2.2 Silicon Dioxide Standard .....	5
2.2.3 Calibration Check Samples.....	5
2.2.4 XRF Duplicate and XRF Replicate Samples .....	6
2.3 Laboratory Quality Control Samples.....	6
<b>3.0 LEVEL A/B ASSESSMENT SUMMARY .....</b>	<b>7</b>
<b>4.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, COMPLETENESS, AND SENSITIVITY DATA SUMMARY .....</b>	<b>7</b>
4.1 Precision.....	7
4.1.1 XRF Precision.....	7
4.1.2 Laboratory Precision.....	8
4.2 Accuracy .....	8
4.2.1 XRF Accuracy .....	8
4.2.2 Laboratory Accuracy .....	9
4.3 Representativeness.....	9
4.4 Comparability .....	10
4.4.1 XRF Comparability.....	10
4.4.2 Laboratory Comparability.....	10
4.5 Completeness .....	10
4.5.1 XRF Completeness .....	11
4.5.2 Laboratory Completeness .....	11
4.6 Sensitivity .....	11
4.6.1 XRF Sensitivity.....	12
4.6.2 Laboratory Sensitivity.....	12
4.7 Overall Data Summary .....	13
<b>5.0 REFERENCES.....</b>	<b>14</b>

## **LIST OF TABLES**

- Table A1. Natural Sample Results with Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Classifications; and Data Validation Reason Codes
- Table A2. Field Duplicate Pair Samples with Results, Laboratory Qualifiers, Data Validation Qualifiers, Data Validation Reason Codes, and QC Criteria Assessment
- Table A3. Sample Identification
- Table A4. Laboratory Qualifiers; Data Validation Qualifiers; Enforcement, Screening, and Rejected Codes; and Reason Codes Definitions
- Table A5. XRF SiO<sub>2</sub> Standard and Calibration Check Sample Results
- Table A6. XRF Duplicate and Replicate Sample Results and QC Criteria Assessment

## **LIST OF ATTACHMENTS**

- Attachment 1 Data Validation Checklists
- Attachment 1.1 Data Validation Checklists for XRF Analyses
  - Attachment 1.2 Data Validation Checklists for Laboratory Analyses
- Attachment 2 Level A/B Assessment Checklist
- Attachment 3 Data Validation Quality Control Criteria

## ACRONYMS AND ABBREVIATIONS

Acronym	Definition
%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 <sub>2</sub>	Silicon Dioxide
SOP	Standard Operating Procedure
SRM	Standard Reference Materials
UR	Unreclaimed
XRF	X-Ray Fluorescence

### **DOCUMENT MODIFICATION SUMMARY**

<b>Revision No.</b>	<b>Author</b>	<b>Version</b>	<b>Description</b>	<b>Date</b>
Rev 0	Sara Ward	Draft	Issued for Internal Review	3/14/2022
Rev 1	Sara Ward	Draft Final	Issued for Agency Review	7/26/2022

## 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) UR-24 Site (referred to as Site). The samples were collected per the *Butte Priority Soils Operable Unit (BPSOU) Unreclaimed Sites – Final Field Sampling Plan (FSP) #2; Unreclaimed Sites UR-24, UR-26, and UR-40* (Atlantic Richfield Company, 2021a) (referred to herein as the FSP). The 2021 UR-24 sampling event included samples collected under the *2021 Final Unreclaimed Sites Quality Assurance Project Plan (QAPP)* (Atlantic Richfield Company, 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 *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 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<sub>2</sub>) 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 quality 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 18 natural soil samples were collected. All samples were analyzed in the field by XRF, and 5 samples were sent to Pace for laboratory analysis of metals. This resulted in a total of 108 natural data points generated by the XRF analyses and 35 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	18	108	90 (83%)	18 (17%)	0 (0%)
Pace	5	35	32 (91%)	3 (9%)	0 (0%)

Please note that 18 of the 18 (100%) 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 Plan 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 QC 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, 1 field duplicate sample was collected for the 5 natural samples submitted to Pace for analysis (20%); 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 18 natural XRF samples collected at the Site, 1 field duplicate sample (5.6%) was analyzed; 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<sub>2</sub> standard, as provided by Niton, is a "clean" quartz or SiO<sub>2</sub> matrix that contains concentrations of selected analytes near or below the machine's lower limit of detection (LOD). Analysis results with the XRF instrument of this SiO<sub>2</sub> standard are used to monitor for cross contamination. The frequency requirement for the SiO<sub>2</sub> 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<sub>2</sub> standard samples was met. Results are listed in Table A5.

The SiO<sub>2</sub> 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): a 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 met. 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 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 18 mercury results qualified “UJ” due to the lack of an appropriate CCS.

• Qualifications 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 18 natural XRF samples collected at the Site, 1 duplicate sample (5.6%) and 1 replicate sample (5.6%) were analyzed. Therefore, the frequency requirement for XRF duplicate and XRF replicate samples (5%) was met for the Site.

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 the 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 the evaluation of 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, 108 (100%) of the 108 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, 35 (100%) of the 35 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<sub>2</sub> standard and CCS are used to assess accuracy. The control limit for these samples is summarized in Attachment 3. If a SiO<sub>2</sub> standard or CCS result was outside the control limit, the natural sample results analyzed in the same run sequence were qualified.

If a SiO<sub>2</sub> 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<sub>2</sub> standard result.

All SiO<sub>2</sub> 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, 108 (100%) of the 108 natural XRF data points met the accuracy requirements.

#### 4.2.2 Laboratory Accuracy

For the laboratory data, the 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 3 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-UR24SS01-090121-2	SW-846 6010D	Lead	J+	S%
BPSOU-UR24SS01-090121-2	SW-846 6010D	Zinc	J+	S%
BPSOU-UR24SS01-090121-2	SW-846 7471B	Mercury	J-	S%

This resulted in 3 (9%) of the 35 natural laboratory data points that did not meet the accuracy requirements, and 32 (91%) of the 35 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 analyses 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. Preservation requirements were met for all samples and all samples were analyzed within the appropriate holding times.

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 includes 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 using the SOPs and 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 using the SOPs and 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 have been 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 6 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, 108 XRF data points were generated. All data points are considered usable because no results were rejected. The 18 collected XRF samples 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, 5 of the 18 natural samples collected and analyzed by XRF were sent to Pace for analysis (28%). 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, 35 natural laboratory data points were generated by the sampling event. The 5 collected laboratory samples were analyzed for arsenic, cadmium, copper, lead, mercury, zinc, and percent moisture. All the natural data points were usable since 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 were 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-UR24SS01-090121-1	XRF	Mercury	mg/kg	<7
BPSOU-UR24SS01-090121-2	XRF	Mercury	mg/kg	<6.89
BPSOU-UR24SS02-090121-3	XRF	Mercury	mg/kg	<7.59
BPSOU-UR24SS03-090121-1	XRF	Mercury	mg/kg	<7.56
BPSOU-UR24SS03-090121-2	XRF	Mercury	mg/kg	<7.2
BPSOU-UR24SS03-090121-3	XRF	Mercury	mg/kg	<8.61
BPSOU-UR24SS04-090121-1	XRF	Mercury	mg/kg	<7.15
BPSOU-UR24SS04-090121-2	XRF	Mercury	mg/kg	<6.69
BPSOU-UR24SS05-090121-3	XRF	Mercury	mg/kg	<7.15
BPSOU-UR24OP01-090121-1	XRF	Mercury	mg/kg	<6.95
BPSOU-UR24OP01-090121-2	XRF	Mercury	mg/kg	<7.28
BPSOU-UR24OP01-090121-3	XRF	Mercury	mg/kg	<7.14

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 higher 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	18	108	B	18	0	0	90 (83%)	18 (17%)	0 (0%)
Pace	5	35	B	3	0	0	32 (91%)	3 (9%)	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.
- ARCO, 1992a. Clark Fork River Superfund Site Investigations Data Management/Data Validation Plan, Atlantic Richfield Company, 1992.
- ARCO, 1992b. Clark Fork River Superfund Site Investigation, Quality Assurance Project Plan, Atlantic Richfield Company, 1992.
- Atlantic Richfield, 2021a. BPSOU Unreclaimed Sites - Final Field Sampling Plan (FSP) #2; Unreclaimed Sites UR-24, UR-26, and UR-40. August 2021.
- Atlantic Richfield, 2021b. Final Unreclaimed Sites Quality Assurance Project Plan. June 2021.
- EPA, 2009. Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. U.S. Environmental Protection Agency, January 2009.
- EPA, 2020. U.S. Environmental Protection Agency National Functional Guidelines for Inorganic Superfund Data Review, November 2020.
- ThermoFisher Scientific, 2014. Niton XL3 Mining QC Sheet, Document: 140-00072, March 2014.

## **TABLES**

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

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

**Table A3.** Sample Identification

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

**Table A5.** XRF SiO<sub>2</sub> Standard and Calibration Check Sample Results

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

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-24-OP-01(0-2)					UR-24-OP-01(2-6)					UR-24-OP-01(6-12)					UR-24-SS-01(0-2)					UR-24-SS-01(2-6)					UR-24-SS-01(6-12)				
Field Sample ID			BPSOU-UR24OP01-090121-1					BPSOU-UR24OP01-090121-2					BPSOU-UR24OP01-090121-3					BPSOU-UR24SS01-090121-1					BPSOU-UR24SS01-090121-2					BPSOU-UR24SS01-090121-3				
Lab Sample ID			N/A					10577877006					N/A					N/A					10577877001					N/A				
Sample Date			9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021				
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	111.57			E		224.29			E		209.78			E		171.12			E		151.44			E		132.39			E	
XRF	Cadmium	mg/kg	<7.31	<LOD		E		<7.4	<LOD		E		<7.5	<LOD		E		<7.47	<LOD		E		11.25			E		<7.24	<LOD		E	
XRF	Copper	mg/kg	74.32			E		125.84			E		90.11			E		127.88			E		86.74			E		77.32			E	
XRF	Lead	mg/kg	192.65			E		300.07			E		306.25			E		405.77			E		249.75			E		295.54			E	
XRF	Mercury	mg/kg	<6.95	<LOD	UJ	S	CX	<7.28	<LOD	UJ	S	CX	<7.14	<LOD	UJ	S	CX	<7	<LOD	UJ	S	CX	<6.89	<LOD	UJ	S	CX	<6.48	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	704.10			E		793.79			E		627.97			E		418.83			E		354.56			E		266.68			E	
ASTM D2974	Moisture, Percent	%						3.7	N2		E												7.9	N2		E						
SW-846 6010D	Arsenic	mg/kg						102			E												72.5			E						
SW-846 6010D	Cadmium	mg/kg						1.4			E												0.70			E						
SW-846 6010D	Copper	mg/kg						64.7			E												55			E						
SW-846 6010D	Lead	mg/kg						169			E												158	M1	J+	S	S%					
SW-846 6010D	Zinc	mg/kg						502			E												207	M1	J+	S	S%					
SW-846 7471B	Mercury	mg/kg						0.075			E												0.065	M1	J-	S	S%					

**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-24-SS-02(0-2)					UR-24-SS-02(2-6)					UR-24-SS-02(6-12)					UR-24-SS-03(0-2)					UR-24-SS-03(2-6)					UR-24-SS-03(6-12)					UR-24-SS-04(0-2)				
Field Sample ID			BPSOU-UR24SS02-090121-1					BPSOU-UR24SS02-090121-2					BPSOU-UR24SS02-090121-3					BPSOU-UR24SS03-090121-1					BPSOU-UR24SS03-090121-2					BPSOU-UR24SS03-090121-3					BPSOU-UR24SS04-090121-1				
Lab Sample ID			N/A					N/A					N/A					10577877002					10577877003					10577877004					N/A				
Sample Date			9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021				
Sample Type			Natural					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	Result	Lab Qual	DV Qual	S/E	Reason Code
XRF	Arsenic	mg/kg	41.36			E		13.39			E		54.34			E		155.83			E		191.72			E		374.51			E		296.78			E	
XRF	Cadmium	mg/kg	<7.05	<LOD		E		<6.66	<LOD		E		10.42			E		9.84			E		<7.1	<LOD		E		<7.11	<LOD		E		<7.33	<LOD		E	
XRF	Copper	mg/kg	51.24			E		40.22			E		61.40			E		162.49			E		289.25			E		314.40			E		134.72			E	
XRF	Lead	mg/kg	114.87			E		42.93			E		131.25			E		219.58			E		261.81			E		572.12			E		298.72			E	
XRF	Mercury	mg/kg	<6.35	<LOD	UJ	S	CX	<6.05	<LOD	UJ	S	CX	<7.59	<LOD	UJ	S	CX	<7.56	<LOD	UJ	S	CX	<7.2	<LOD	UJ	S	CX	<8.61	<LOD	UJ	S	CX	<7.15	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	385.64			E		259.43			E		2,231.84			E		1,156.59			E		1,532.80			E		1,961.57			E		473.76			E	
ASTM D2974	Moisture, Percent	%																3.5	N2		E		8.1	N2		E		9.5	N2		E						
SW-846 6010D	Arsenic	mg/kg																83.1			E		104			E		269			E						
SW-846 6010D	Cadmium	mg/kg																2.4			E		2.7			E		4.2			E						
SW-846 6010D	Copper	mg/kg																118			E		167			E		258			E						
SW-846 6010D	Lead	mg/kg																152			E		194			E		512			E						
SW-846 6010D	Zinc	mg/kg																847			E		1,070			E		1,620			E						
SW-846 7471B	Mercury	mg/kg																0.12			E		0.17			E		0.23			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-24-SS-04(2-6)					UR-24-SS-04(6-12)					UR-24-SS-05(0-2)					UR-24-SS-05(2-6)					UR-24-SS-05(6-12)				
Field Sample ID			BPSOU-UR24SS04-090121-2					BPSOU-UR24SS04-090121-3					BPSOU-UR24SS05-090121-1					BPSOU-UR24SS05-090121-2					BPSOU-UR24SS05-090121-3				
Lab Sample ID			N/A					N/A					N/A					N/A					N/A				
Sample Date			9/1/2021					9/1/2021					9/1/2021					9/1/2021					9/1/2021				
Sample Type			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
XRF	Arsenic	mg/kg	305.14			E		149.42			E		37.04			E		41.24			E		267.92			E	
XRF	Cadmium	mg/kg	8.17			E		<7.36	<LOD		E		<7.03	<LOD		E		<7.1	<LOD		E		<7.31	<LOD		E	
XRF	Copper	mg/kg	106.78			E		94.44			E		84.91			E		89.10			E		114.26			E	
XRF	Lead	mg/kg	327.06			E		203.99			E		28.86			E		32.97			E		229.72			E	
XRF	Mercury	mg/kg	<6.69	<LOD	UJ	S	CX	<6.42	<LOD	UJ	S	CX	<6.39	<LOD	UJ	S	CX	<5.96	<LOD	UJ	S	CX	<7.15	<LOD	UJ	S	CX
XRF	Zinc	mg/kg	513.99			E		604.71			E		126.19			E		104.50			E		316.89			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-24-SS-03(6-12)						UR-24-SS-03(6-12)-FD									
Field Sample ID			BPSOU-UR24SS03-090121-3						BPSOU-UR24SS03-090121-3-FD									
Lab Sample ID			10577877004						10577877005									
Sample Date			9/1/2021						9/1/2021									
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 <sup>1</sup>	ABS DIF	RPD	Meets Control Limit?
XRF	Arsenic	mg/kg	374.51				1	N/A	380.58				1	N/A	RPD≤35%		2%	Yes
XRF	Cadmium	mg/kg	<7.11	<LOD			1	N/A	<7.23	<LOD			1	N/A	N/A		-	-
XRF	Copper	mg/kg	314.40				1	N/A	262.67				1	N/A	RPD≤35%		18%	Yes
XRF	Lead	mg/kg	572.12				1	N/A	512.20				1	N/A	RPD≤35%		11%	Yes
XRF	Mercury	mg/kg	<8.61	<LOD	UJ	CX	1	N/A	<7.63	<LOD	UJ	CX	1	N/A	N/A		-	-
XRF	Zinc	mg/kg	1,961.57				1	N/A	1,463.02				1	N/A	RPD≤35%		29%	Yes
ASTM D2974	Moisture, Percent	%	9.5	N2			1	0.1	9.0	N2			1	0.1	RPD≤35%		5%	Yes
SW-846 6010D	Arsenic	mg/kg	269				1	1.1	251				1	1.1	RPD≤35%		7%	Yes
SW-846 6010D	Cadmium	mg/kg	4.2				1	0.16	4.1				1	0.16	RPD≤35%		2%	Yes
SW-846 6010D	Copper	mg/kg	258				1	0.5	230				1	0.54	RPD≤35%		11%	Yes
SW-846 6010D	Lead	mg/kg	512				1	0.5	475				1	0.54	RPD≤35%		7%	Yes
SW-846 6010D	Zinc	mg/kg	1,620				1	2.1	1,420				1	2.2	RPD≤35%		13%	Yes
SW-846 7471B	Mercury	mg/kg	0.23				1	0.019	0.3				1	0.021	RPD≤35%		30%	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	Lab ID	ASTM D2974	SW-846 6010D	SW-846 7471B
UR-24-OP-01	BPSOU-UR24OP01-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-OP-01	BPSOU-UR24OP01-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877006	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-OP-01	BPSOU-UR24OP01-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-01	BPSOU-UR24SS01-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-01	BPSOU-UR24SS01-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877001	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-SS-01	BPSOU-UR24SS01-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-02	BPSOU-UR24SS02-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-02	BPSOU-UR24SS02-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-02	BPSOU-UR24SS02-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-03	BPSOU-UR24SS03-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877002	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-SS-03	BPSOU-UR24SS03-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877003	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-SS-03	BPSOU-UR24SS03-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877004	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-SS-03	BPSOU-UR24SS03-090121-3-FD	Field Duplicate	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	10577877005	moisture	As, Cd, Cu, Pb, Zn	Hg
UR-24-SS-04	BPSOU-UR24SS04-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-04	BPSOU-UR24SS04-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-04	BPSOU-UR24SS04-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-05	BPSOU-UR24SS05-090121-1	Natural	0 - 2	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-05	BPSOU-UR24SS05-090121-2	Natural	2 - 6	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			
UR-24-SS-05	BPSOU-UR24SS05-090121-3	Natural	6 - 12	9/1/2021	As, Cd, Cu, Pb, Hg, Zn	N/A			

**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.

**XRF Qual (XRF Qualifiers)**

<LOD = Not detected at the reporting limit.

**DV Qual (Data Validation Qualifiers)**

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 XRF check samples was not satisfied.

S% = Qualified due to percent recovery of the laboratory 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_20210901_98052_336	9/1/2021	1.63	Yes	10.07	Yes	<7.05	Yes	<2.1	Yes	<2.97	Yes	<3.55	Yes
SiO2	P_20210901_98052_361	9/1/2021	<2.66	Yes	7.32	Yes	<11.88	Yes	<3.37	Yes	<4.93	Yes	<5.83	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_20210901_98052_337	9/1/2021	13.50	Yes	8.51	Yes	31.85	Yes	11.56	Yes	<6.09	Yes	95.02	Yes
NIST 2709a	P_20210901_98052_362	9/1/2021	11.85	Yes	15.70	Yes	35.23	Yes	11.32	Yes	<6.59	Yes	79.49	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_20210901_98052_338	9/1/2021	510.67	Yes	509.93	Yes	20.03	N/A	470.16	Yes	<6.79	N/A	45.25	N/A
RCRA	P_20210901_98052_363	9/1/2021	487.55	Yes	519.19	Yes	18.87	N/A	467.13	Yes	<7.24	N/A	40.77	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

Standard Type	Sample ID	Sample Name	Parent Sample	Analyte	Arsenic		Cadmium		Copper		Lead		Mercury		Zinc	
					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_20210901_98052_358	BPSOU-UR24OP01-090121-3		9/1/2021	209.78		<7.5		90.11		306.25		<7.14		627.97	
XRF Replicate	P_20210901_98052_359	BPSOU-UR24OP01-090121-3-R	BPSOU-UR24OP01-090121-3	9/1/2021	229.42	8.9%	<7.6	ND	94.02	4.3%	277.48	9.9%	<7.2	ND	842.18	29.1%
XRF Duplicate	P_20210901_98052_360	BPSOU-UR24OP01-090121-3-D	BPSOU-UR24OP01-090121-3	9/1/2021	205.06	2.3%	9.00	ND	87.34	3.1%	268.17	13.3%	<6.97	ND	698.28	10.6%

Notes:

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

Abbreviations:

mg/kg - milligram per kilogram

ND = non-detected

RPD = relative percent difference

# **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:** 9/1/2021  
**Data Validator:** Sara Ward

**Case No:** P\_20210901  
**Sample Matrix:** Soil  
**Analysis Dates:** 9/1/2021  
**Validation Dates:** 10/20/2021

**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	9/1/2021	9/1/2021	N/A	N/A
<p>Were any data flagged because of holding time? Y <input type="checkbox"/> N <input checked="" type="checkbox"/></p> <p>What sample preparation steps were performed (i.e. drying, sieving etc.)? Drying and sieving</p> <p>Were the samples prepped according to the SAP/QAPP? Y <input checked="" type="checkbox"/> N <input type="checkbox"/></p> <p>Describe Any Actions Taken: None required</p> <p>Comments:</p>								

**2. Energy Calibration (System Check)**

Was the energy calibration performed at the frequency of once per day?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Was the energy calibration Resolution below 195?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Did the energy calibration run for at least 50 seconds?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Describe Any Actions Taken:	None required			
Comments:				

**3. SiO<sub>2</sub> Standards**

Was the SiO <sub>2</sub> Standard analyzed at the beginning of analysis?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Was the SiO <sub>2</sub> Standard analyzed at the frequency of 1 per 20 samples?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were the SiO <sub>2</sub> Standard results within the control limits?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were any data flagged because of the SiO <sub>2</sub> Standard results?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>
Describe Any Actions Taken:	None required			
Comments:	Detections for arsenic (1.63 mg/kg) and cadmium (10.07 mg/kg and 7.32 mg/kg) in the SiO <sub>2</sub> Standards did not require qualifications since the detections were below the control limit for arsenic (10 mg/kg) and cadmium (50 mg/kg).			

**4. Calibration Check Samples**

Were the appropriate Calibration Check Samples (CCS) analyzed at the beginning of analysis?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were the appropriate CCS analyzed at the frequency of 1 per 20 natural samples?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were CCS results within the control limits?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were any data flagged because of CCS problems?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Describe Any Actions Taken:	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".			
Comments:				

**5. Duplicate Sample Results**

Were Duplicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>				
Were Duplicate Sample results within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>				
Were any data flagged because of duplicate sample results?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>				
Describe Any Actions Taken: None required								
Comments: The following XRF field duplicate sample was analyzed on 9/1/2021:								
<table border="1"><thead><tr><th>XRF Field Duplicate Sample</th><th>Primary Sample</th></tr></thead><tbody><tr><td>BPSOU-UR24SS03-090121-3-FD</td><td>BPSOU-UR24SS03-090121-3</td></tr></tbody></table>		XRF Field Duplicate Sample	Primary Sample	BPSOU-UR24SS03-090121-3-FD	BPSOU-UR24SS03-090121-3			
XRF Field Duplicate Sample	Primary Sample							
BPSOU-UR24SS03-090121-3-FD	BPSOU-UR24SS03-090121-3							
The following XRF duplicate sample was analyzed on 9/1/2021:								
<table border="1"><thead><tr><th>XRF Duplicate Sample</th><th>Primary Sample</th></tr></thead><tbody><tr><td>BPSOU-UR24OP01-090121-3-D</td><td>BPSOU-UR24OP01-090121-3</td></tr></tbody></table>		XRF Duplicate Sample	Primary Sample	BPSOU-UR24OP01-090121-3-D	BPSOU-UR24OP01-090121-3			
XRF Duplicate Sample	Primary Sample							
BPSOU-UR24OP01-090121-3-D	BPSOU-UR24OP01-090121-3							

**6. Replicate Sample Results**

Were Replicate Samples analyzed at the frequency of 1 per 20 natural samples?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>				
Were replicate sample results within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>				
Were any data flagged because of replicate sample results?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>				
Describe Any Actions Taken: None required								
Comments: The following XRF replicate sample was analyzed on 9/1/2021:								
<table border="1"><thead><tr><th>XRF Replicate Sample</th><th>Primary Sample</th></tr></thead><tbody><tr><td>BPSOU-UR24OP01-090121-3-R</td><td>BPSOU-UR24OP01-090121-3</td></tr></tbody></table>		XRF Replicate Sample	Primary Sample	BPSOU-UR24OP01-090121-3-R	BPSOU-UR24OP01-090121-3			
XRF Replicate Sample	Primary Sample							
BPSOU-UR24OP01-090121-3-R	BPSOU-UR24OP01-090121-3							

**7. Overall Assessment**

Are there analytical limitations of the data that users should be aware of?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
If so, explain: On this WO P_20210901, the following qualifications were made: Eighteen (18) mercury results have been qualified "UJ" due to the lack of an appropriate calibration check sample.				
Comments:				

**8. Authorization of Data Validation**

Data Validator <b>Name:</b> Sara Ward	
<b>Signature:</b> <u>Sara Ward</u>	<b>Date:</b> <u>10/20/2021</u>
<b>Reviewed by:</b> <u>Josie McElroy</u>	<b>Date:</b> <u>10/21/2021</u>



**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):** 09/01/2021  
**Data Validator:** Sara Ward

**Case No:** 10577877  
**Sample Matrix:** Soil  
**Analysis Date(s):** 09/10/2021, 09/16/2021, 09/17/2021  
**Validation Date(s):** 10/18/2021

**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	09/01/2021	09/16/2021	Y	N/A
Hg			EPA 7471B	28 days		09/17/2021	Y	N/A
Percent Moisture			ASTM D2974	N/A		09/10/2021	Y	N/A

Were any data flagged because of holding time? Y  N

Were any data flagged because of preservation problems? Y  N

Describe Any Actions Taken: None Required.

Comments: The receiving temperature as reported by the laboratory was 2.4°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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were MBs within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were any data flagged because of blank problems?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>

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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were LCS results within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were any data flagged because of LCS problems?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>

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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were LDS results within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>
Were any data flagged because of LDS problems?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>

Describe Any Actions Taken: None Required.

Comments: For method EPA 7471B batch 769097, an LMS/LMS Duplicate (LMSD) generated from BPSOU-UR24SS01-090121-2 was used for the LDS calculation. The RPD was within control limits.

For method EPA 6010D batch 769094, an LMS/LMS Duplicate (LMSD) generated from BPSOU-UR24SS01-090121-2 was used for the LDS calculations. The RPDs were within control limits.

For ASTM D2974, a duplicate generated from BPSOU-UR24OP01-090121-2 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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	
Were LMS results within the control window?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>	
Were any data flagged because of LMS problems?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	

Describe Any Actions Taken: For method EPA 7471B batch 769097, an LMS/LMSD was generated from BPSOU-UR24SS01-090121-2. The %R of the LMS/MSD for mercury (58% and 60%, respectively) were outside control limits (80-120%); therefore, BPSOU-UR24SS01-090121-2 was qualified "J-" for mercury. 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 769094, an LMS/LMSD was generated from BPSOU-UR24SS01-090121-2. The %R of the LMS/MSD for lead (176% and 131%, respectively) and the %R of the LMS for zinc (141%) were outside control limits (75-125%); therefore, BPSOU-UR24SS01-090121-2 was qualified "J+" for lead and zinc. 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. All other %R were within limits.

Comments: An LMS was not analyzed for ASTM D2974.

**6. Field Blanks**

Were field blanks submitted as specified in the QAPP?	Y	<input type="checkbox"/>	N	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
Were field blanks within the control window?	Y	<input type="checkbox"/>	N	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>
Were any data qualified because of field blank problems?	Y	<input type="checkbox"/>	N	<input type="checkbox"/>	N/A	<input checked="" type="checkbox"/>

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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	N/A	<input type="checkbox"/>
Were results for field duplicates within the control window?	Y	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	N/A	<input type="checkbox"/>
Were any data qualified because of field duplicate problems?	Y	<input type="checkbox"/>	N	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>

Describe Any Actions Taken: None Required.

Comments: One field duplicate pair was submitted on this work order, BPSOU-UR24SS03-090121-3 and BPSOU-UR24SS03-090121-3-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	<input checked="" type="checkbox"/>	N	<input type="checkbox"/>	
---	---	-------------------------------------	---	--------------------------	--

If so, explain: On this WO 10577877, 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-UR24SS01-090121-2	Lead	J+	S%
BPSOU-UR24SS01-090121-2	Zinc	J+	S%
BPSOU-UR24SS01-090121-2	Mercury	J-	S%

Reason for qualification:  
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:**

10/18/2021

10/19/2021

# **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 10577877 and P\_20210901\_98052

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 <sub>2</sub> 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	>10 mg/kg	Results < 10x the SiO <sub>2</sub> result - J+	No Qualification	B	
		Cadmium ≤50 mg/kg	>50 mg/kg				
		Copper ≤20 mg/kg	>20 mg/kg				
		Lead ≤10 mg/kg	>10 mg/kg				
		Mercury ≤10 mg/kg	>10 mg/kg				
Zinc ≤10 mg/kg	>10 mg/kg						
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	< Lower Control Limit	J-	UJ	
			Cadmium 0 - 60 mg/kg				
			Copper 0 - 60 mg/kg				
		RCRA Standard	Lead 0 - 35 mg/kg	> Upper Control Limit	J+	No Qualification	
			Mercury 0 - 12 mg/kg				
Zinc 50 - 160 mg/kg							
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	
<b>Laboratory Quality Control Samples</b>							
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 °C	No Qualification	No Qualification		
			≥ 6 °C but ≤ 10 °C	Professional Judgement J	Professional Judgement UJ		
			> 10 °C	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) <sup>3</sup>	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 $\geq 5x$ the RL, RPD $\leq 35\%$ (soil); 2. If original sample or duplicate sample result $< 5x$ the RL, then absolute difference between sample and duplicate $\leq 2x$ RL (soils)	Both original and duplicate sample results are $\geq 5x$ the RL and RPD $\leq 35\%$ (soil).	No Qualification	No Qualification	FD	CFRSSI QAPP NFG
			Both original and duplicate sample results are $\geq 5x$ 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 $\leq 2xRL$ (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:**

- 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.
- 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.
- 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**

M:90 K:60

pd

BPSOU: Unreclaimed Sites Field XRF and Soil pH Results

Site Number: 24 Operator: JS, MS, CD, MS  
 Land Use: Recreational XRF Unit #: 92951-98052  
 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		
335	BPSOU-UR24 System Check			9/10/1		Time: 53.7 sec, Res: 1169.2								-
336	BPSOU-UR24 SiO2					9/1/21	2	10	<7	<2	<4	<3		-
337	BPSOU-UR24 NIST						14	9	32	12	95	<6		-
338	BPSOU-UR24 ECDA						511	510	20	470	45	<7		-
339	BPSOU-UR24 USGS SDAR-MA						68	22	219	812	702	<7		-
340	BPSOU-UR24SS01-090121-1	0-2	3.85	9/1/21	9:20		(171)	<7	128	406	419	(27)		-
341	BPSOU-UR24SS01-090121-2	2-6	3.57		9:15		(151)	11	87	250	355	(27)		Yes
342	BPSOU-UR24SS01-090121-3	6-12	3.56		9:10		(132)	<7	77	296	267	<6		-
343	BPSOU-UR24SS02-090121-1	0-2	6.73		9:35		41	<7	51	115	386	<6		-
344	BPSOU-UR24SS02-090121-2	2-6	7.17		9:30		13	<7	40	43	259	<6		-
345	BPSOU-UR24SS03-090121-3	6-12	6.33		9:25		54	10	61	131	(2232)	(29)		-
346	BPSOU-UR24SS03-090121-1	0-2	4.63		9:55		(156)	10	162	220	(1152)	(28)		Yes
347	BPSOU-UR24SS03-090121-2	2-6	4.55		9:50		(192)	<7	289	262	(1533)	(27)		Yes
348	BPSOU-UR24SS03-090121-3	6-12	4.24		9:45		(375)	<7	314	572	(1962)	(29)		Yes
349	BPSOU-UR24SS03-090121-3-FD	6-12	4.24		9:40		(381)	<7	263	512	(1463)	(28)		Yes
350	BPSOU-UR24SS04-090121-1	0-2	3.85		10:10		(297)	<7	135	299	474	(27)		-
351	BPSOU-UR24SS04-090121-2	2-6	3.99		10:05		(305)	8	107	327	514	(27)		-
352	BPSOU-UR24SS04-090121-3	6-12	4.36		10:00		(149)	<7	94	204	605	<6		-
353	BPSOU-UR24SS05-090121-1	0-2	7.60		10:35		37	<7	85	29	126	<6		-
354	BPSOU-UR24SS05-090121-2	2-6	7.33		10:30		41	<7	89	33	105	<6		-
355	BPSOU-UR24SS05-090121-3	6-12	7.05		10:25		(268)	<7	114	230	317	(27)		-





20 8/26/21

Thurs

UR/30

- Decon digging equipment Per Procedures on pg 3-4 DI Bottle!
- Samples collected PRESERVED Per pg 4.

UR-30 Geo Reference Sample locations refer to Sample ID on pg 17 for 063021.

Off site @ 1415

Samples collected  
on 8/26/21

were shipped  
8/30/21. 2 COCs in  
1 cooler on ice.

Fed Ex Overnight.

Tracking: 4528 9934 6472

*Jessie*  
8/26/21

9/1/21

Wed.

UR-24 21

0630] On Site @ Parrot Office to calibrate pH Probe and go through FAF.

Sampling Crew: Cole D., Jesse J., Molly S., Matthew S.  
Hannah pH Probe 1 (H199121)

Cal checks verified

Live	Readings	Buffer
3.95 @	9.3°C	4.00
6.96 @	9.5°C	7.00
10.02 @	10.6°C	10.00

Cal within 0.1 requirement

730] On Site @ UR-24 Copper MIN Sports Complex. Did Site Recon to confirm and flag pre-determined sample locations.

XRF machine had tech difficulties starting up. XRF reading #567 to #578 should be discarded. Machine was freezing and not operating correctly. Site UR-24 XRF readings start at #~~579~~<sup>55</sup> #335 due to new XRF unit. XRF unit #92951 changed to #98052. XRF Passed System checks and Standards requirements.

*Rite in the Rain*



9/1/21

Wed

UR-24

0900] Began digging holes @ sample locations and collecting samples. Held OPI area after site walk through due to the presence of accumulated/deposited sediment @ the toe of the slope just below UR24SS03. Done Swanson EPA Rep on site & confirmed/agreed w/ logic to add OPI locations. Sub sample locations @ OPI were spaced in a linear line. All other locations sampled in triangulation pattern w/ the pre-determined centroid location used as one of the subsample locations. The following samples were collected per the procedures outlined on page 2 + 3 and summarized below for each soil sample site

SS01 Sample Site 1  
BPSOV-UR24SS01-090121-1 @ 9:20 analyzed for XRF.

9/1/21

Wed

UR-24

BPSOV-UR24SS01-090121-2 @ 9:15  
 Ran for XRF. Also submitted Lab natural split due to request by onsite EPA Rep due to low pH of this sampling location (3.57<sub>sw</sub>) Lab sample to confirm metals concentration in low pH media. Submitted lat 2:00 for As, Cd, Cu, Pb, + Zn by 6010 + Hg by 7471

BPSOV-UR24SS01-090121-3 @ 9:10  
 Ran XRF. No Lab required.  
SS02 Sample Site 2

BPSOV-UR24SS02-090121-1 @ 9:35  
 Ran XRF. No Lab required

BPSOV-UR24SS02-090121-2 @ 9:30  
 Ran XRF. No Lab required

BPSOV-UR24SS02-090121-3 @ 9:25  
 Ran XRF. No Lab required

SS03 Sample Site 3

BPSOV-UR24SS03-090121-1 @ 9:55  
 Ran XRF. Retained Lab natural split for submitted due to 3 constituents being w/in  $\pm 35\%$  of Storm Water Action Levels. Submitted 1 Q.t 2:00 for As, Cd, Cu, Pb, Zn by 6010

9/1/21 Wed UR24  
+ Hwy by 7471.

BPSOV-UR24SS03-090121-2 @ 9:50  
Ran XRF. <sup>Submitted</sup> No Lab Required <sup>Lot for metals</sup>

BPSOV-UR24SS03-090121-3 @ 9:45  
Ran XRF + Submitted Lab due

to 1 in 10 Requirement for  
Lab confirmation.

BPSOV-UR24SS03-090121-3-FD @ 9:48

Collected Field Duplicate per  
req. for 1 FD per sampling  
event. Paint Sample =

BPSOV-UR24SS03-090121-3 @ 9:45

SS04 Sample Site 4

BPSOV-UR24SS04-090121-1 @ 10:10

Ran XRF. No Lab Required

BPSOV-UR24SS04-090121-2 @ 10:05

Ran XRF. No Lab Required

BPSOV-UR24SS04-090121-3 @ 10:00

Ran XRF. No Lab Required

SS05 Sample Site 5

BPSOV-UR24SS05-090121-1 @ 10:35

Ran XRF. No Lab Required

BPSOV-UR24SS05-090121-2 @ 10:30

Ran XRF. No Lab Required

BPSOV-UR24SS05-090121-3 @ 10:25

Ran XRF. No Lab Required

9/1/21 Wed UR24

OP01 Opportunistic Sample Site 1

BPSOV-UR24OP01-090121-1 @ 10:20

Ran XRF. No Lab Required.

BPSOV-UR24OP01-090121-2 @ 10:15

Ran XRF. Collected + Submitted  
Lab split due to  $\pm 35\%$  Criteria  
for 3 Storm Water COCs. 1 @  
Ziplock for As, Cd, Cu, Pb, Zn by Gold  
+ Hwy by 7471

BPSOV-UR24OP01-090121-3 @ 10:10

Ran XRF. No Lab Required

UR24 Site Sampling /

Characterization completed.

All data Collected Electronically  
& on FDS. Decon of digging  
Equip + Sample pres completed  
as outlined on pg 3 + 4  
respectively. Collected 5 natural  
Samples + 1 Field Duplicate

Chell Pallan  
9/1/21



# **Attachment C**

## **Laboratory Data Packages**

September 21, 2021

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

RE: Project: BPSOU Unreclaimed Sampling  
Pace Project No.: 10577877

Dear Scott Sampson:

Enclosed are the analytical results for sample(s) received by the laboratory on September 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



## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## CERTIFICATIONS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

---

### **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 (\*).

---

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## SAMPLE SUMMARY

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10577877001	BPSOU-UR24SS01-090121-2	Solid	09/01/21 09:15	09/08/21 10:15
10577877002	BPSOU-UR24SS03-090121-1	Solid	09/01/21 09:55	09/08/21 10:15
10577877003	BPSOU-UR24SS03-090121-2	Solid	09/01/21 09:50	09/08/21 10:15
10577877004	BPSOU-UR24SS03-090121-3	Solid	09/01/21 09:45	09/08/21 10:15
10577877005	BPSOU-UR24SS03-090121-3-FD	Solid	09/01/21 09:40	09/08/21 10:15
10577877006	BPSOU-UR24OP01-090121-2	Solid	09/01/21 10:15	09/08/21 10:15

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

### SAMPLE ANALYTE COUNT

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

Lab ID	Sample ID	Method	Analysts	Analytes Reported
10577877001	BPSOU-UR24SS01-090121-2	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10577877002	BPSOU-UR24SS03-090121-1	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10577877003	BPSOU-UR24SS03-090121-2	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10577877004	BPSOU-UR24SS03-090121-3	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10577877005	BPSOU-UR24SS03-090121-3-FD	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1
10577877006	BPSOU-UR24OP01-090121-2	EPA 6010D	IP	5
		EPA 7471B	LMW	1
		ASTM D2974	JDL	1

PASI-M = Pace Analytical Services - Minneapolis

### REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

---

**Method:** EPA 6010D

**Description:** 6010D MET ICP

**Client:** BPAR-PIONEER-MT

**Date:** September 21, 2021

**General Information:**

6 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: 769094

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10577877001

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

- MS (Lab ID: 4098141)
  - Lead
- MSD (Lab ID: 4098142)
  - Lead
  - Zinc

**Additional Comments:**

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## PROJECT NARRATIVE

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

---

**Method:** EPA 7471B

**Description:** 7471B Mercury

**Client:** BPAR-PIONEER-MT

**Date:** September 21, 2021

**General Information:**

6 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: 769097

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10577877001

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

- MS (Lab ID: 4098149)
  - Mercury
- MSD (Lab ID: 4098150)
  - Mercury

**Additional Comments:**

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

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24SS01-090121-  
2 **Lab ID:** 10577877001 **Collected:** 09/01/21 09:15 **Received:** 09/08/21 10:15 **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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>72.5</b>	mg/kg	1.0	0.16	1	09/10/21 10:15	09/16/21 10:08	7440-38-2	
Cadmium	<b>0.70</b>	mg/kg	0.16	0.036	1	09/10/21 10:15	09/16/21 10:08	7440-43-9	
Copper	<b>55.0</b>	mg/kg	0.52	0.076	1	09/10/21 10:15	09/16/21 10:08	7440-50-8	
Lead	<b>158</b>	mg/kg	0.52	0.11	1	09/10/21 10:15	09/16/21 10:08	7439-92-1	M1
Zinc	<b>207</b>	mg/kg	2.1	0.23	1	09/10/21 10:15	09/16/21 10:08	7440-66-6	M1
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.065</b>	mg/kg	0.019	0.0083	1	09/10/21 11:35	09/17/21 15:09	7439-97-6	M1
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>7.9</b>	%	0.10	0.10	1		09/10/21 14:16		N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.



### ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24SS03-090121-1 **Lab ID:** 10577877002 Collected: 09/01/21 09:55 Received: 09/08/21 10:15 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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>83.1</b>	mg/kg	1.0	0.15	1	09/10/21 10:15	09/16/21 10:17	7440-38-2	
Cadmium	<b>2.4</b>	mg/kg	0.15	0.034	1	09/10/21 10:15	09/16/21 10:17	7440-43-9	
Copper	<b>118</b>	mg/kg	0.50	0.074	1	09/10/21 10:15	09/16/21 10:17	7440-50-8	
Lead	<b>152</b>	mg/kg	0.50	0.10	1	09/10/21 10:15	09/16/21 10:17	7439-92-1	
Zinc	<b>847</b>	mg/kg	2.0	0.22	1	09/10/21 10:15	09/16/21 10:17	7440-66-6	
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.12</b>	mg/kg	0.019	0.0084	1	09/10/21 11:35	09/17/21 15:14	7439-97-6	
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>3.5</b>	%	0.10	0.10	1		09/10/21 14:16		N2

### REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24SS03-090121-  
2 **Lab ID:** 10577877003 Collected: 09/01/21 09:50 Received: 09/08/21 10:15 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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>104</b>	mg/kg	1.1	0.16	1	09/10/21 10:15	09/16/21 10:18	7440-38-2	
Cadmium	<b>2.7</b>	mg/kg	0.16	0.036	1	09/10/21 10:15	09/16/21 10:18	7440-43-9	
Copper	<b>167</b>	mg/kg	0.53	0.077	1	09/10/21 10:15	09/16/21 10:18	7440-50-8	
Lead	<b>194</b>	mg/kg	0.53	0.11	1	09/10/21 10:15	09/16/21 10:18	7439-92-1	
Zinc	<b>1070</b>	mg/kg	2.1	0.24	1	09/10/21 10:15	09/16/21 10:18	7440-66-6	
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.17</b>	mg/kg	0.020	0.0086	1	09/10/21 11:35	09/17/21 15:16	7439-97-6	
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>8.1</b>	%	0.10	0.10	1		09/10/21 14:16		N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24SS03-090121-  
3 **Lab ID:** 10577877004 Collected: 09/01/21 09:45 Received: 09/08/21 10:15 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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>269</b>	mg/kg	1.1	0.16	1	09/10/21 10:15	09/16/21 10:20	7440-38-2	
Cadmium	<b>4.2</b>	mg/kg	0.16	0.036	1	09/10/21 10:15	09/16/21 10:20	7440-43-9	
Copper	<b>258</b>	mg/kg	0.53	0.078	1	09/10/21 10:15	09/16/21 10:20	7440-50-8	
Lead	<b>512</b>	mg/kg	0.53	0.11	1	09/10/21 10:15	09/16/21 10:20	7439-92-1	
Zinc	<b>1620</b>	mg/kg	2.1	0.24	1	09/10/21 10:15	09/16/21 10:20	7440-66-6	
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.23</b>	mg/kg	0.019	0.0082	1	09/10/21 11:35	09/17/21 15:17	7439-97-6	
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>9.5</b>	%	0.10	0.10	1		09/10/21 14:16		N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24SS03-090121-3-FD    **Lab ID:** 10577877005    Collected: 09/01/21 09:40    Received: 09/08/21 10:15    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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D    Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>251</b>	mg/kg	1.1	0.16	1	09/10/21 10:15	09/16/21 10:27	7440-38-2	
Cadmium	<b>4.1</b>	mg/kg	0.16	0.037	1	09/10/21 10:15	09/16/21 10:27	7440-43-9	
Copper	<b>230</b>	mg/kg	0.54	0.079	1	09/10/21 10:15	09/16/21 10:27	7440-50-8	
Lead	<b>475</b>	mg/kg	0.54	0.11	1	09/10/21 10:15	09/16/21 10:27	7439-92-1	
Zinc	<b>1420</b>	mg/kg	2.2	0.24	1	09/10/21 10:15	09/16/21 10:27	7440-66-6	
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B    Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.31</b>	mg/kg	0.021	0.0092	1	09/10/21 11:35	09/17/21 15:19	7439-97-6	
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>9.0</b>	%	0.10	0.10	1		09/10/21 14:16		N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

## ANALYTICAL RESULTS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

**Sample:** BPSOU-UR24OP01-090121-2      **Lab ID:** 10577877006      Collected: 09/01/21 10:15      Received: 09/08/21 10:15      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
<b>6010D MET ICP</b>									
Analytical Method: EPA 6010D    Preparation Method: EPA 3050B									
Pace Analytical Services - Minneapolis									
Arsenic	<b>102</b>	mg/kg	1.0	0.16	1	09/10/21 10:15	09/16/21 10:29	7440-38-2	
Cadmium	<b>1.4</b>	mg/kg	0.15	0.035	1	09/10/21 10:15	09/16/21 10:29	7440-43-9	
Copper	<b>64.7</b>	mg/kg	0.51	0.075	1	09/10/21 10:15	09/16/21 10:29	7440-50-8	
Lead	<b>169</b>	mg/kg	0.51	0.11	1	09/10/21 10:15	09/16/21 10:29	7439-92-1	
Zinc	<b>502</b>	mg/kg	2.1	0.23	1	09/10/21 10:15	09/16/21 10:29	7440-66-6	
<b>7471B Mercury</b>									
Analytical Method: EPA 7471B    Preparation Method: EPA 7471B									
Pace Analytical Services - Minneapolis									
Mercury	<b>0.075</b>	mg/kg	0.019	0.0085	1	09/10/21 11:35	09/17/21 15:21	7439-97-6	
<b>Dry Weight / %M by ASTM D2974</b>									
Analytical Method: ASTM D2974									
Pace Analytical Services - Minneapolis									
Percent Moisture	<b>3.7</b>	%	0.10	0.10	1		09/10/21 14:16		N2

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

### QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling  
Pace Project No.: 10577877

QC Batch: 769097 Analysis Method: EPA 7471B  
QC Batch Method: EPA 7471B Analysis Description: 7471B Mercury Solids  
Laboratory: Pace Analytical Services - Minneapolis  
Associated Lab Samples: 10577877001, 10577877002, 10577877003, 10577877004, 10577877005, 10577877006

METHOD BLANK: 4098147 Matrix: Solid  
Associated Lab Samples: 10577877001, 10577877002, 10577877003, 10577877004, 10577877005, 10577877006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	<0.0077	0.018	0.0077	09/17/21 15:06	

LABORATORY CONTROL SAMPLE: 4098148

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.45	0.44	96	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4098149 4098150

Parameter	Units	4098149		4098150		MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result						
Mercury	mg/kg	0.065	0.49	0.35	0.48	58	60	80-120	0	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

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

**QUALITY CONTROL DATA**

Project: BPSOU Unreclaimed Sampling  
Pace Project No.: 10577877

QC Batch: 769094 Analysis Method: EPA 6010D  
QC Batch Method: EPA 3050B Analysis Description: 6010D Solids  
Laboratory: Pace Analytical Services - Minneapolis  
Associated Lab Samples: 10577877001, 10577877002, 10577877003, 10577877004, 10577877005, 10577877006

METHOD BLANK: 4098139 Matrix: Solid  
Associated Lab Samples: 10577877001, 10577877002, 10577877003, 10577877004, 10577877005, 10577877006

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/kg	<0.15	0.96	0.15	09/16/21 10:05	
Cadmium	mg/kg	<0.033	0.14	0.033	09/16/21 10:05	
Copper	mg/kg	<0.070	0.48	0.070	09/16/21 10:05	
Lead	mg/kg	<0.099	0.48	0.099	09/16/21 10:05	
Zinc	mg/kg	<0.21	1.9	0.21	09/16/21 10:05	

LABORATORY CONTROL SAMPLE: 4098140

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	47.2	45.3	96	80-120	
Cadmium	mg/kg	47.2	47.5	101	80-120	
Copper	mg/kg	47.2	47.8	101	80-120	
Lead	mg/kg	47.2	47.2	100	80-120	
Zinc	mg/kg	47.2	47.1	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 4098141 4098142

Parameter	Units	MS		MSD		MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
		10577877001 Result	Spike Conc.	Spike Conc.	Conc.								
Arsenic	mg/kg	72.5	52.2	52.7	136	132	121	113	75-125	3	20		
Cadmium	mg/kg	0.70	52.2	52.7	48.5	48.6	91	91	75-125	0	20		
Copper	mg/kg	55.0	52.2	52.7	118	118	120	119	75-125	0	20		
Lead	mg/kg	158	52.2	52.7	250	228	176	131	75-125	10	20 M1		
Zinc	mg/kg	207	52.2	52.7	257	282	96	141	75-125	9	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**

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

### QUALITY CONTROL DATA

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

---

QC Batch:	769382	Analysis Method:	ASTM D2974
QC Batch Method:	ASTM D2974	Analysis Description:	Dry Weight / %M by ASTM D2974
		Laboratory:	Pace Analytical Services - Minneapolis

Associated Lab Samples: 10577877001, 10577877002, 10577877003, 10577877004, 10577877005, 10577877006

---

SAMPLE DUPLICATE: 4099678

Parameter	Units	10577877006 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	3.7	3.7	1	30	N2

---

SAMPLE DUPLICATE: 4099927

Parameter	Units	10577874010 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	1.7	1.6	4	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

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.



## QUALIFIERS

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

---

### 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.

## REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.

### QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: BPSOU Unreclaimed Sampling

Pace Project No.: 10577877

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10577877001	BPSOU-UR24SS01-090121-2	EPA 3050B	769094	EPA 6010D	769454
10577877002	BPSOU-UR24SS03-090121-1	EPA 3050B	769094	EPA 6010D	769454
10577877003	BPSOU-UR24SS03-090121-2	EPA 3050B	769094	EPA 6010D	769454
10577877004	BPSOU-UR24SS03-090121-3	EPA 3050B	769094	EPA 6010D	769454
10577877005	BPSOU-UR24SS03-090121-3-FD	EPA 3050B	769094	EPA 6010D	769454
10577877006	BPSOU-UR24OP01-090121-2	EPA 3050B	769094	EPA 6010D	769454
10577877001	BPSOU-UR24SS01-090121-2	EPA 7471B	769097	EPA 7471B	770004
10577877002	BPSOU-UR24SS03-090121-1	EPA 7471B	769097	EPA 7471B	770004
10577877003	BPSOU-UR24SS03-090121-2	EPA 7471B	769097	EPA 7471B	770004
10577877004	BPSOU-UR24SS03-090121-3	EPA 7471B	769097	EPA 7471B	770004
10577877005	BPSOU-UR24SS03-090121-3-FD	EPA 7471B	769097	EPA 7471B	770004
10577877006	BPSOU-UR24OP01-090121-2	EPA 7471B	769097	EPA 7471B	770004
10577877001	BPSOU-UR24SS01-090121-2	ASTM D2974	769382		
10577877002	BPSOU-UR24SS03-090121-1	ASTM D2974	769382		
10577877003	BPSOU-UR24SS03-090121-2	ASTM D2974	769382		
10577877004	BPSOU-UR24SS03-090121-3	ASTM D2974	769382		
10577877005	BPSOU-UR24SS03-090121-3-FD	ASTM D2974	769382		
10577877006	BPSOU-UR24OP01-090121-2	ASTM D2974	769382		

### REPORT OF LABORATORY ANALYSIS


This report shall not be reproduced, except in full,  
without the written consent of Pace Analytical Services, LLC.



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

Page 1 of 1

BP Site Node Path: \_\_\_\_\_ Req Due Date (mm/dd/yy): 09/22/21 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 Acct:		Enfos Proposal No:		Phone: 406-697-0946 Email: <a href="mailto:ssampson@pioneer-technical.com">ssampson@pioneer-technical.com</a>								
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		<b>Requested Analyses</b>				<b>Report Type &amp; QC Level</b>						
PM Phone: 406-723-1822		Filtered (Y/N)				Limited (Standard) Package _____						
PM Email: <a href="mailto:mcanumc@bp.com">mcanumc@bp.com</a>		Preservation				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	<div style="font-size: 2em; font-weight: bold;">WO#: 10577877</div>  <div style="font-weight: bold;">10577877</div>		
	BPSOU-UR24SS01-090121-2	9:15	in	c	1	soil		x	x			
	BPSOU-UR24SS03-090121-1	9:55	in	c	1	soil		x	x			
	BPSOU-UR24SS03-090121-2	9:50	in	c	1	soil		x	x			
	BPSOU-UR24SS03-090121-3	9:45	in	c	1	soil		x	x			
	BPSOU-UR24SS03-090121-3-FD	9:40	in	c	1	soil		x	x			
	BPSOU-UR24OP01-090121-2	10:15	in	c	1	soil		x	x			
Sampler's Name: Cole Dallaserra		Relinquished By / Affiliation			Date	Time	Accepted By / Affiliation			Date	Time	
Sampler's Company: Pioneer Technical Services		<i>Cole Dallaserra PPS</i>			<i>09/21</i>	<i>1600</i>	<i>Scott Sampson</i>			<i>9/8/21</i>	<i>1225</i>	
Ship Method: FedEx Overnight												
Shipment Tracking No: 4278 9935 1714												
Special Instructions: *Maximum 14 day TAT												
THIS LINE - LAB USE ONLY: Custody Seals In Place <input checked="" type="checkbox"/> Yes / No   Temp Blank <input checked="" type="checkbox"/> Yes / No   Cooler Temp on Receipt: <u>2.4</u> °F <input checked="" type="checkbox"/>   Trip Blank Yes / <input checked="" type="checkbox"/> No   MSMSD Sample Submitted: Yes / <input checked="" type="checkbox"/> No												

*u1*  
*u2*  
*u3*  
*u4*  
*u5*  
*u6*

*u3 9/8/21*  
*(1015)*



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:

Project #:

WO#: 10577877

BP - Pioneer

PM: JMA

Due Date: 09/21/21

CLIENT: BP-PIONEER

Courier:  Fed Ex  UPS  USPS  Client  
 Pace  SpeeDee  Commercial

Tracking Number: 4278 9935 1714

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) Type of Ice:  Wet  Blue  None  Dry  Melted  
 T4(0254)  T5(0489)

Temp should be above freezing to 6°C	Cooler Temp Read w/temp blank: 2.5 °C	Average Corrected Temp (no temp blank only): °C	<input type="checkbox"/> See Exceptions ENV-FRM-MIN4-0142 <input type="checkbox"/> 1 Container
Correction Factor: -0.1	Cooler Temp Corrected w/temp blank: 2.4 °C		

USDA Regulated Soil: (  N/A, water sample/Other: )

Date/Initials of Person Examining Contents: UB 9/8/21

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? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	1.
Chain of Custody Relinquished? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	2.
Sampler Name and/or Signature on COC? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Samples Arrived within Hold Time? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	4.
Short Hold Time Analysis (<72 hr)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	5. <input type="checkbox"/> Fecal Coliform <input type="checkbox"/> HPC <input type="checkbox"/> Total Coliform/E coli <input type="checkbox"/> BOD/cBOD <input type="checkbox"/> Hex Chrome <input type="checkbox"/> Turbidity <input type="checkbox"/> Nitrate <input type="checkbox"/> Nitrite <input type="checkbox"/> Orthophos
Rush Turn Around Time Requested? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6. 14 day
Sufficient Sample Volume? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	7.
Triple Volume Provided for MS/MSD (if more than 10 samples)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Correct Containers Used? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	8.
-Pace Containers Used? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Containers Intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
Field Filtered Volume Received for Dissolved Tests? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	10. Is sediment visible in the dissolved container? <input type="checkbox"/> Yes <input type="checkbox"/> No
Is sufficient information available to reconcile the samples to the COC <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	11. If no, write ID/ Date/Time on Container Below: <input type="checkbox"/> See Exception ENV-FRM-MIN4-0142
Matrix: <input type="checkbox"/> Water <input checked="" type="checkbox"/> Soil <input type="checkbox"/> Oil <input type="checkbox"/> Other	12. Sample #  <input type="checkbox"/> NaOH <input type="checkbox"/> HNO <sub>3</sub> <input type="checkbox"/> H <sub>2</sub> SO <sub>4</sub> <input type="checkbox"/> Zinc Acetate  Positive for Res. <input type="checkbox"/> Yes <input type="checkbox"/> No Chlorine? <input type="checkbox"/> No pH Paper Lot# Res. Chlorine    0-6 Roll    0-6 Strip    0-14 Strip
All containers needing acid/base preservation have been checked? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO <sub>3</sub> , H <sub>2</sub> SO <sub>4</sub> , <2pH, NaOH >9 Sulfide, NaOH >10 Cyanide) <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> 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) <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13. <input type="checkbox"/> See Exception ENV-FRM-MIN4-0140
Extra labels present on soil VOA or WIDRO containers? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	14. Pace Trip Blank Lot # (if purchased):
Headspace in VOA Vials (greater than 6mm)? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
3 Trip Blanks Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Trip Blank Custody Seals Present? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	

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

Opened Time: 1445	Temp: 2.5	Corrected Temp: 2.4
Time: put in cooler		
Time: 1458	Temp: 3.1	Corrected Temp: 3.0

CLIENT NOTIFICATION/RESOLUTION

Field Data Required?  Yes  No

Person Contacted:

Date/Time:

Comments/Resolution:

Project Manager Review:

Date: 09/09/2021

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:

HB 19 of 19

# **Attachment D**

## **Electronic Data Deliverable File**

Included separately

# **Appendix B**

## **Site Photographs**



**Atlantic Richfield Company**

PhotoNumber: UR24-1	Photographer: CJD
Date: 09/02/2021 08:40	Photo Direction: South
Description: View of SS-01	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	



**Atlantic Richfield Company**

PhotoNumber: UR24-2	Photographer: CJD
Date: 09/02/2021 08:49	Photo Direction: South West
Description: View of SS-02	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	





**Atlantic Richfield Company**

PhotoNumber: UR24-3	Photographer: CJD
Date: 09/02/2021 08:58	Photo Direction: Southwest
Description: View of SS-03	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	



**Atlantic Richfield Company**

PhotoNumber: UR24-4	Photographer: CJD
Date: 09/02/2021 08:59	Photo Direction: North West
Description: View of SS-04	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	





**Atlantic Richfield Company**

PhotoNumber: UR24-5	Photographer: CJD
Date: 09/02/2021 09:01	Photo Direction: West
Description: View of SS-05	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	



**Atlantic Richfield Company**

PhotoNumber: UR24-6	Photographer: CJD
Date: 09/02/2021 09:01	Photo Direction: North
Description: View of OP01	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	



**Atlantic Richfield Company**

PhotoNumber: UR24-7	Photographer: CJD
Date: 09/02/2021 09:10	Photo Direction: South West
Description: General view of site UR-24	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	



**Atlantic Richfield Company**

PhotoNumber: UR24-8	Photographer: CJD
Date: 09/02/2021 09:10	Photo Direction: South West
Description: General view of site UR-24	
Project: BPSOU Unreclaimed and Insufficiently Reclaimed Sites 2021	