Fall 10-2022

Final BPSOU Subdrain Pump Station Remedial Design (RD) Work Plan

Pioneer Technical Services, Inc.

Atlantic Richfield Company

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October 7, 2022

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RE: Final BPSOU Subdrain Pump Station Remedial Design (RD) Work Plan

Agency Representatives:

I am writing you on behalf of Atlantic Richfield Company to submit the *Final Butte Priority Soils Operable Unit (BPSOU) Subdrain Pump Station Remedial Design (RD) Work Plan* for your review and approval. This RD Work Plan also includes the following documents as Appendices and attachments:

- *Draft BPSOU Subdrain Pump Station Preliminary Design Investigation (PDI) Work Plan*
- *Draft Quality Assurance Project Plan (QAPP) for BPSOU Subdrain Pump Station*

This RD Work Plan outlines data collection and design components of the BPSOU Pump Station as related to construction of a new pump station building and wet well. The PDI Work Plan and QAPP summarize upcoming work planned to gather geotechnical information in support of the building and wet well design.

The report may be downloaded at the following link:

https://pioneertechnicalservices.sharepoint.com/:f:/s/submitted/Em8bw7V3fKlCo8obG-LYWsIB-N8QNi17A5fQCQKCGfEZXA

If you have any questions or comments, please call me at (406) 723-1834.

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Sincerely,

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An affiliate of **Atlantic Richfield Company**

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Response to Agency Comments for the
Draft Final BPSOU Subdrain Pump Station Remedial Design (RD) Work Plan
Prepared for Atlantic Richfield Company
By Pioneer Technical Services, Inc.
Dated: September 6, 2022

Atlantic Richfield Company (Atlantic Richfield) thanks the Agencies for their detailed comments on the RD Work Plan (WP) and associated documents (Pre-Design Investigation [PDI] Work Plan and Quality Assurance Project Plan [QAPP]). This Response to Agency Comments is intended to provide clarity on Atlantic Richfield's approach and the proposed work; due to the editorial nature of many of the comments, each specific comment will not be addressed. All editorial comments were incorporated where appropriate, and some comments may no longer apply due to slight changes in methods in the updated version of the documents. Several comments were also addressed, and the general approach of the work clarified in a meeting between Atlantic Richfield and the Agencies on Monday, October 3, 2022.

RDWP Comments:

EPA Specific Comments 3 and 4:

List of Figures:

- *Please consider adding a National Wetlands Inventory Figure.*
- *Please consider adding a FEMA Flood Insurance Rate Map panel figure (FIRMette)*

Atlantic Richfield Response:

These figures have been added to the RDWP figure set.

EPA Specific Comment 7:

Section 1.0, Introduction: The obligation, "description of any proposed treatability study (if required)" is not included under the included items in the RDWP. This is an obligatory work element. See Appendix D, Section 3.1 of the BPSOU Statement of Work. If it is not applicable to this RD, please state that here.

Atlantic Richfield Response:

This obligation is not applicable to this RD.

EPA Specific Comment 8:

Section 1.0, Introduction: The obligation, "description of plans for obtaining access in connection with the Work, such as property acquisition, property leases, and/or easements" is not included under the included items in the RDWP. This is an obligatory work element. See Appendix D, Section 3.1 of the BPSOU Statement of Work. If it is not applicable to this

RD, please state that here.

Atlantic Richfield Response:

This obligation is not applicable to this RD.

EPA Specific Comment 9:

Section 1.0, Introduction: The obligation, "appropriate reference to the following supporting deliverables described in ¶ 6.7 (Supporting Deliverables): Site-Wide Health and Safety Plan; Site-Wide Emergency Response Plan; and Site-Wide Quality Assurance Project Plans" is not included under the included items in the RDWP. This is an obligatory work element. See Appendix D, Section 3.1 of the BPSOU Statement of Work. Please include this work element.

Atlantic Richfield Response:

All work proposed here will be performed in accordance with Pioneer Technical Services, Inc. (Pioneer) internal Site-Specific Health and Safety Plan developed for the Butte Priority Soils Operable Unit (BPSOU) (noted in PDI WP Section 4.1.5). The QAPP is appended to PDI WP that is appended to this RDWP.

EPA Specific Comment 16:

Section 2.2, Treatability Study: Please list out related and/or supporting pre-design plans/efforts associated with this element of work. For example, items that may be included: construction SWPPP development, wetland delineation, PDI report, accompanying reports/plans, restoration/grading plans, waste management plan, basis of design/design criteria report, construction QA/QC plan, and O&M manuals/plans.

Atlantic Richfield Response:

Applicable elements are listed out in the document. Note that the treatability study obligation is in general not applicable to this RDWP, as previously noted in comment response above. Additionally, a Storm Water Pollution Prevention Plan will not be required as the project work disturbed area is less than 1 acre. Other elements beyond scope of this RD (restoration/grading, waste management), and will be addressed by others.

EPA Specific Comment 18:

Section 2.5, Access Plan: The text states that "If Atlantic Richfield needs access to adjacent private property to complete the RA-related activities, Atlantic Richfield will request that all private property owners grant access to their properties for all RA-related activities." What is the plan if private property owners do not grant the access?

Atlantic Richfield Response:

Access to adjacent private properties will not be required for project work, and the text has been revised accordingly.

EPA Specific Comment 21:

Section 3.0, Remedial Design Overview: Please consider discussing the RD objectives in this section (i.e., a summary of the elements of the remedy and how they fit in to the ROD specified RA).

Atlantic Richfield Response:

Clarification has been added to this section regarding the RD objectives and which elements of the Record of Decision specified remedial action apply. Specifically, clarification is added regarding how the work addresses certain limited requirements of the Ongoing Remedial Elements Statement of Work (Attachment B.1) System Performance Evaluation (2.2.2.1 – Requirements 3 and 4).

EPA Specific Comment 26:

Section 4.0, Project Organization: Please consider adding a hierarchy chart (hierarchy diagram) to portray the key organizations involved with developing/implementing the RD. This would help the reader to quickly visualize the top-down modular breakdown of the entire system.

Atlantic Richfield Response:

A hierarchy chart has been added to the document as Figure 2 of the QAPP: Project Roles and Responsibilities.

EPA Specific Comment 31:
Section 4.0, Project Organization: The text states that "The contractor will be responsible for attending weekly progress meetings, providing required status reports and two-week look-ahead schedules, and discussing any construction issues that occur or may occur." Who will be managing construction activities? Is it AR? Please clarify in the document.

Atlantic Richfield Response:

The document has been further clarified to indicate that Atlantic Richfield and/or their contractor will be managing construction activities.

EPA Specific Comment 32:

Section 4.0, Project Organization: The text states that "The Contract Laboratory will ensure that the laboratory QA personnel are familiar with the QAPP (Attachment 1) and are

available to perform the work as specified." Who is the laboratory contracted with? Is it AR? Please clarify in the document.

Atlantic Richfield Response:

Since the submission of the Draft Final documents, piezocone penetration testing (CPT) has been selected as the geotechnical borehole method for the investigation. The CPT is an *in-situ* method and will not require collection or analysis of soil samples by a laboratory. Comments concerning the contract laboratory or laboratory methods no longer apply.

EPA Specific Comment 34:

Section 4.0, Project Organization: The text states that "Mr. Gratson will interface with the Atlantic Richfield liability manager on company policies regarding quality and has the authority and responsibility to approve QA documents specific to the project." Will Mr. Gratson be approving other related BPSOU QA documents for AR or just this subdrain pump station project?

Atlantic Richfield Response:

Mr. Gratson will be the Quality Assurance Officer for BPSOU projects and will be approving all related documents.

EPA Specific Comment 49:

Section 5.1, Remedial Design Deliverables: The text states that "A complete set of construction drawings and specifications that are (1) certified by a registered professional engineer; (2) suitable for procurement; and (3) follow the current Construction Specifications Institute's Master Format." Who will be the registered professional engineer certifying the drawings??

Atlantic Richfield Response:

Per Section 4.2.5, the registered professional engineer certifying the drawings will be Andy Dare, P.E.

PDI WP Comments:

EPA Specific Comment 8:

Section 3.0, Background: Is there adequate soil sampling data to support waste management during construction?

Atlantic Richfield Response:

During construction, all waste will be handled per relevant Butte-Silver Bow ordinance (Title 8,

Chapter 28, and Ordinance No. 13-6). Due to the use of the CPT rig for the investigation, there will be no soil or potentially impacted soil brought to the surface during the pre-design investigation.

QAPP Comments:

EPA General Comment 3:

Please provide an EPA crosswalk with the revised QAPP.

Atlantic Richfield Response:

An Environmental Protection Agency (EPA) Crosswalk document has been prepared and is provided as part of the revised submittal.

EPA Specific Comment 4:

Section 1.1: Objectives of the Investigation: The text states that "The main objective of the Site investigation is to collect data regarding the physical properties of the soil within the Site to inform the designs of Site excavation, infrastructure, and buildings." Please add "The test pitting investigation will confirm the location of critical utilities."

Atlantic Richfield Response:

During the comment period, advancements in the proposed investigation methods and pre-design activities have eliminated the need for test pitting during the pre-design investigation. Test pitting is no longer part of the proposed work, and comments related to test pitting no longer apply.

EPA Specific Comment 6:

Section 3.1.3: Best Management Practices: The text states that "During Site work activities, standard BMPs will be followed/installed, as appropriate, to minimize off-Site sediment tracking and to prevent storm water runoff from transporting sediments and/or pollutants (e.g., construction related oils, fuels, and other materials) downgradient into Silver Bow Creek (SBC) and/or Blacktail Creek (BTC)." Please add "IDW" after "fuels".

Atlantic Richfield Response:

Due to the selection of CPT *in-situ* testing for the geotechnical borehole investigation, there will no longer be any soil sampling or any potential investigation derived waste. Comments related to Investigation Derived Waste and chemical characterization of soil no longer apply. The CPT does not involve borehole cuttings or bringing material to the surface, and therefore minimizes Best Management Practices (BMP) sediment concerns with the pre-design investigation. All other relevant BMPs will still apply for the pre-design investigation work.

EPA Specific Comment 31:

Table 2: DQOs: Step 4: Define the Boundaries of the Study. The text states that "Figure 3 shows the areas to be analyzed during the Site Investigation." Please replace "the areas" with "4 of 6 boring locations".

Atlantic Richfield Response:

Due to the high quality of the geotechnical data produced by the CPT sounding boreholes, the number of proposed boreholes has been reduced from up to six to up to four. The four proposed borehole locations are shown on the revised Figure 3 of the QAPP. The location of the building has shifted slightly to the east due to progression of the 30% Design during the comment period. The text and tables have been revised to indicate that up to four boreholes will be performed, and that final location and number of boreholes may be adjusted by the Field Team Leader in conjunction with the Quality Assurance Officer and Contractor Project Manager.

EPA Specific Comment 39:

Table 3: Sample Collection: Under Container Size, many of these are large sample volumes. It would be good to describe which samples will come from which locations/intervals.

Atlantic Richfield Response:

The use of *in-situ* CPT sounding boreholes eliminates the need for collection of geotechnical soil samples as previously indicated in the draft version of the document. Table 3 has been eliminated, and comments related to sampling and analysis are generally no longer applicable.

End of Comment Responses.

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

Final

BPSOU Subdrain Pump Station
Remedial Design (RD) Work Plan

Atlantic Richfield Company

October 2022

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

Final

BPSOU Subdrain Pump Station
Remedial Design (RD) Work Plan

Prepared for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Prepared by:

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

October 2022

APPROVAL PAGE

Silver Bow Creek/Butte Area NPL Site
BPSOU Subdrain Pump Station Remedial Design Work Plan

Approved: _____ Date: _____
Nikia Greene, Site Project Manager, EPA, Region 8

Approved: _____ Date: _____
Daryl Reed, Project Officer, Montana DEQ

Approved: _____ Date: _____
Josh Bryson, Liability Manager
Atlantic Richfield Company

Approved: _____ Date: _____
David Gratson, Quality Assurance Manager
Environmental Standards, Inc.

Plan is effective on date of approval.

DISTRIBUTION LIST

Silver Bow Creek/Butte Area NPL Site
BPSOU Subdrain Pump Station Remedial Design Work Plan

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LIST OF FIGURES

LIST OF ATTACHMENTS

DOCUMENT MODIFICATION SUMMARY

Modification No.	Author	Version	Description	Date
Rev 0	Andy Dare	Draft Final	Issued for Agency Review	June 2022
Rev 1	Andy Dare	Final	Issued to Agencies	October 2022

ACRONYMS

Term	Definition
ARAR	Applicable or Relevant and Appropriate Requirements
Atlantic Richfield	Atlantic Richfield Company
BPSOU	Butte Priority Soils Operable Unit
BRW	Butte Reduction Works
BSB	Butte-Silver Bow
BTC	Blacktail Creek
BTL	Butte Treatment Lagoons
CCR	Construction Completion Report
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CPT	Piezocone Penetration Testing
DEQ	Montana Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
HDPE	High-density polyethylene
HSSE	Health, Safety, Security, and Environment
LAO	Lower Area One
MSD	Metro Storm Drain
NPL	National Priorities List
OM&M	Operation, Maintenance, and Monitoring
ORESOW	Ongoing Remedial Elements Scope of Work
PDI	Pre-design Investigation
Pioneer	Pioneer Technical Services, Inc.
QA	Quality Assurance
QAM	Quality Assurance Manager
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
RACCR	Remedial Action Construction Completion Report
RAWP	Remedial Action Work Plan
RD	Remedial Design
RDWP	Remedial Design Work Plan
SBC	Silver Bow Creek
SBCCA	Silver Bow Creek Conservation Area
SD	Settling Defendants
SOW	Scope of Work
SSHASP	Site-Specific Health and Safety Plan
UAU	Upper Alluvial Unit

1.0 INTRODUCTION

This Site-specific Butte Priority Soils Operable Unit (BPSOU) Subdrain Pump Station (referred to herein as Site) Remedial Design (RD) Work Plan (RDWP) provides the framework for developing design documents for the proposed reconstruction of the Site to provide redundant capacity for post-remedy influent flow and eliminate unnecessary confined space. The location of the Site, and relevant remedy infrastructure in BPSOU, can be seen on Figure 1.

This RDWP has been developed consistent with applicable U.S. Environmental Protection Agency (EPA) guidance and decision documents, including the following:

- *Consent Decree* (CD) *for the BPSOU. Partial RD/Remedial Action* (RA) *and Operation and Maintenance* (referred to herein as BPSOU CD) (EPA, 2020).
- *RD/RA Handbook*, EPA 540/R- 95/059 (EPA, 1995).

This RDWP includes the following items applicable to the RD:

1. Descriptions of the areas requiring clarification and/or anticipated problems (e.g., data gaps) (Section 2.0).
2. Description of the proposed Pre-Design Investigation (PDI) (Section 2.0).
3. A PDI Work Plan (Section 2.1 and Attachment 1).
4. Descriptions of the applicable permitting requirements and other regulatory requirements (Section 2.4).
5. Plans for implementing all the RD activities identified in the remedial elements scope of work (SOW) that will be required to develop the RD (Section 3.0).
6. A description of the overall management strategy for performing the RD, including a proposal for phasing of design and construction, if applicable (Section 3.0).
7. A description of the proposed general approach to contracting, construction, operation, maintenance, and monitoring of the RA (Section 3.0).
8. A description of the responsibility and authority of all the organizations and key personnel involved with the development of the RD (Section 4.0).

1.1 Supporting Documents

This RDWP provides the overview of the RD work and is supported by the following documents:

- Site PDI Work Plan. *The PDI Work Plan evaluates existing data and addresses data gaps that are necessary for completing the RD* (Attachment 1).
- Quality Assurance Project Plan (QAPP) for the Site. The QAPP presents the quality assurance/quality control (QA/QC) protocols to be followed during field data collection efforts. The QAPP is appended to the PDI Work Plan (Attachment 1).

1.2 Site Description

The Silver Bow Creek (SBC)/Butte Area National Priorities List (NPL) area is located in the upper Clark Fork River watershed and includes portions of Butte and Walkerville, Montana. The United States EPA designated the original SBC area as a Superfund site in September 1983 under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In 1987 EPA expanded the SBC area to include the Butte Area. The NPL consists of seven active operable units including the BPSOU.

The Butte Treatment Lagoons (BTL) system, located in Lower Area One (LAO) of the BPSOU, was originally constructed as described in the *LAO Phase I Construction Report* (Anderson, 2002) and modified in 2001 to 2002 as described in the *Draft LAO Construction Completion Report (CCR) for the Field Scale Treatability Study Modifications* (Atlantic Richfield Company, 2002), and then upgraded again under the *LAO 2004 Colorado Tailings Lagoon Modifications* (Atlantic Richfield Company, 2004). Recent improvements to the LAO and BTL system were completed according to the *Draft Final Design Report/Work Plan for the Metro Storm Drain (MSD) and Butte Reduction Works (BRW) Upgrades* (Atlantic Richfield Company, 2008), the *Final 2010 BRW East End Grading Work Plan* (Atlantic Richfield Company, 2010a), the *Draft Final 2010 MSD Discharge Line Remote Monitoring Station Work Plan* (Atlantic Richfield Company, 2010b), the *Final BTL and West Camp Pump Station (WCP-1) Upgrades Design Report/Work Plan* (Atlantic Richfield Company, 2011), and the *Final MSD Pump Station Upgrade Work Plan* (Atlantic Richfield Company, 2014). The channel (originally referred to as the MSD) is now referred to as SBC above the confluence with Blacktail Creek (BTC) and the subdrain (originally referred to as the MSD Subdrain) is now referred to as the BPSOU subdrain (subdrain). The purpose of the subdrain and BTL is the protection of adjacent surface water (BTC and SBC) through capture and treatment of groundwater impacted with contaminants of concern.

The SBC above the confluence with BTC consists of 2 independently operating components: the creek channel and the subdrain system. The primary objective of the subdrain system is to intercept groundwater from the surrounding alluvial aquifer and separate it from wet weather surface water flow in the surface channel, which is lined with a geosynthetic clay liner. Intercepted groundwater flow collected in the subdrain is pumped by 2 centrifugal pumps from the Site (located at 1000 George Street, across from the Butte Chamber of Commerce) through 2, 8-inch diameter high-density polyethylene (HDPE) discharge lines to the BTL via the Hydraulic Control Channel (Figure 1). Although designed to operate at a maximum capacity of 680 gallons per minute, the actual flow rate transferred to BTL depends upon the seasonal conditions and is varied to maintain an operating elevation setpoint below the maximum operational water elevation within the concrete wet vault. A detailed discussion of the subdrain and base flow delivery system is available in the *Draft Horseshoe Bend Effluent Pipeline/MSD CCR* (Atlantic Richfield Company, 2006).

1.2.1 Climate

The Butte area climate is characterized by short, cool, dry summers and long, cold winters. The annual precipitation in Butte generally varies from 8 to 20 inches per year, with an average of 13 inches. The greatest amount of precipitation, approximately one-third, occurs during the months of May and June (obtained from the National Oceanic and Atmospheric Administration website at https://www.ncdc.noaa.gov/cdo-web/search for 1990 to 2019, excluding 2014 for which there was insufficient data) (NOAA, 2020).

1.2.2 Topography

The Site is located in the east-central portion of the BPSOU at approximately 5,459 feet above mean sea level. The general slope of the terrain is relatively flat and sloping north from George Street towards SBC above the confluence with BTC for the majority of the Site. The north boundary of the Site is the creek channel, and the south boundary is George Street.

1.2.3 Geology

The Butte area lies within the Summit Valley of southwest Montana and is characterized by Quaternary alluvium surrounded by the Butte Quartz Monzonite of the Cretaceous Boulder Batholith (MBMG, 2004). The Site is underlain by native alluvium (gravel, sand, silt, and clay) deposited through centuries of morphologic stream action. The alluvium and older alluvium deposits are of decomposed granite, quartz, feldspar, and biotite with rounded pebbles of aplite and quartz. The alluvium includes terrace and glacial deposits of the Pleistocene age. The older alluvium consists of light orange to tan coarse clay, sand, silt, and gravel, with interbedded light brown clay layers and infrequent occurrence of cobbles and boulders (MBMG, 2009).

1.2.4 Groundwater

The groundwater beneath the Site flows through an alluvial aquifer that is bounded at depth by bedrock. The alluvial aquifer is comprised of groundwater flowing through intermixed layers of clay, silt, sand, and gravel-sized alluvial material. Groundwater travels through the aquifer via the small, interconnected pore spaces between the alluvial material grains. Recent investigations of the alluvial groundwater system identified 3 general depths of conductive alluvium within the SBC above the confluence with BTC drainage basin: the Upper Alluvial Unit (UAU), the Middle Alluvial Unit, and Lower Alluvial Unit. Well logs in the area of the Site (e.g., BPS07-21C, BPS07-22C) reflect this general aquifer structure. The UAU is the alluvial unit of most relevance to this RDWP because it is nearest to the surface, ranging in depth from a few feet to approximately 35 feet below ground surface in the Site area. Groundwater in the UAU generally flows to the west and northwest through the Site and is predominantly captured within the subdrain.

1.2.5 Surface Water

The Site is bounded to the south by BTC and to the north by SBC above the confluence with BTC. The SBC above the confluence with BTC is an engineered channel with a primary purpose

as a storm water conveyance channel that receives storm water runoff from the East Buffalo Gulch, Warren Avenue, Anaconda Road, Butte Civic Center, and Texas Avenue areas, in addition to other sub-drainage inputs to the north and east of the channel. A National Wetlands Inventory map showing the Site location in relation to designated wetlands is included on Figure 2. A Federal Emergency Management Agency Flood Insurance Rate Map indicating the flood risk in the area of the Site is included on Figure 3.

1.2.6 Impacted Soils

Due to historic mining activity, the project area is located in an area where it is possible to encounter soil impacted with metal contaminants. The project investigation does not involve identification and removal of impacted soils. The use of *in-situ* geotechnical testing procedures means that no impacted soil will be removed as part of the PDI work.

1.3 Background

As described in Section 1.2, the Site is located at 1000 George Street within the BPSOU, Butte, Montana. The project is part of the final remedy for BPSOU that includes excavation and disposal of historic mine waste from the BTC and SBC riparian corridors; construction of storm water detention and retention basins; relocation and reconstruction of SBC; capping of waste left in place; optimization and expansion of the Groundwater Remedy; and construction of End Land Use additions and amenities. Known collectively as the SBC Conservation Area (SBCCA), work will also include completion of limited components of Ongoing Remedial Elements and select Further Remedial Elements as described within Attachment B.1 and Attachment C to Appendix D of the BPSOU CD. End Land Use additions will be constructed according to Addendum 1 to Attachment C of Appendix D of the BPSOU CD as generally depicted within the SBCCA Master Plan.

Construction for the original Site and pipeline began in October 2003 and was completed in September 2005. From April 2005 through mid-2008, the original wet vault had been configured as a lift station to pump water from the terminus of the subdrain to the BTL; however, it was determined that the existing pump system was undersized for the flow requirements and operating environment. The system was modified and upgraded in 2008. Upgrades included a revised pumping system located in a separate concrete dry vault, remote monitoring capabilities, increased accessibility, and system design elements to allow continuous operation in certain adverse conditions. In 2010, further upgrades were performed to optimize the pumps and associated discharge piping. Related Site upgrades were also included to address specific requests provided by the Agencies and Butte-Silver Bow (BSB) including security and parking (Atlantic Richfield Company, 2019). The second 8-inch diameter HDPE discharge line to BTL was installed in 2015 together with a pig launcher and discharge manifold located in a new below-grade concrete vault.

The Ongoing Remedial Elements Scope of Work (ORESOW) includes the requirement that the Atlantic Richfield Company (Atlantic Richfield) evaluate the performance, capacity, and opportunities for optimization of the existing groundwater collection and conveyance system. Among other work on the remedy system, this will include reconstruction of the Site to provide

redundant capacity for post-remedy influent flow and the elimination of unnecessary confined space to simplify Operations, Maintenance, and Monitoring (OM&M). Additional evaluations and work on the remedy system required in the ORESOW will be addressed separately with certain elements to follow implementation of the Further Remedial Elements Scope of Work, Attachment C of Appendix D of the BPSOU CD.

2.0 DESIGN SUPPORT ACTIVITIES

This section describes the pre-design activities including filling data gaps, evaluating treatability, outlining permitting requirements, outlining access plans (per EPA Guidance Items 1 through 6 [Section 1.0]).

2.1 Pre-Design Investigation

The Site has been characterized to some degree by the previous construction activity including 2007 and 2013 geotechnical characterization; however, more detail is needed to support the proposed RD. As part of the pre-design investigation, boreholes will be drilled to gather geotechnical information in the construction area. The geotechnical borehole work will help refine the extent and characterization of the existing subgrade materials to support construction.

Details of the PDI are included in the PDI Work Plan in Attachment 1, and specific details of the soil data from the prior geotechnical investigations are included. The PDI Work Plan identifies the general activities that will be completed to refine the geotechnical characterization of subgrade materials within the Site. Fieldwork is anticipated to begin in October 2022. The focus of the PDI is to complete a geotechnical investigation. During the pre-design investigation, a geotechnical engineer from Pioneer Technical Services, Inc. (Pioneer) will observe and record field geotechnical testing, anticipated to include piezocone penetration testing (CPT) boreholes. The CPT is an *in-situ* soil testing process and does not involve removing or sampling site soils; therefore, no soil samples or associated investigation derived waste will be created as part of the pre-design investigation.

2.2 Data Gaps

For the pre-investigation work, the design team reviewed existing data and documents with the objective of identifying the data needed to support the RD. The review found that additional data collection was needed to fill the following data gaps:

- The existing topographical survey data for the project area were gathered using Light Detection and Ranging. To ensure design accuracy and avoid potential datum conflicts, the design team proposes that a topographical survey be conducted at the Site. It is anticipated that the Real Time Kinematic method will be used with an expected 0.5-foot contour break.
- Inventory the locations and properties of utilities and infrastructure that might be on or adjacent to the Site that will need to be avoided, removed, or replaced during construction.

- Determine geotechnical parameters related to the removal and replacement of existing infrastructure, subgrade stability for construction of new infrastructure, and design of finished grade.

2.3 Treatability Study

A treatability study is not applicable to this RD. Additional data from a laboratory or field test are not needed to evaluate and support the proposed upgrade of previously implemented technology. As previously described, Atlantic Richfield currently operates the existing Site that conveys intercepted groundwater to BTL for treatment.

A geotechnical characterization of existing subgrade materials will be completed to accurately determine the engineering characteristics and suitability of Site soil for proposed construction activities.

2.4 Permitting/Regulatory Requirements

In accordance with CERCLA Section 121[e][1], Applicable or Relevant and Appropriate Requirements (ARARs) associated with administrative requirements, such as permitting, are not applicable to CERCLA on-Site activities. In general, the CERCLA permitting exemption will be extended to all remedial activities conducted in the BPSOU. The RD for the Site will incorporate the substantive environmental permitting and regulatory requirements; in particular, the action-specific ARARs identified in the Record of Decision (EPA, 2006) and the relevant requirements in the BSB *Municipal Storm Water Engineering Standards* (BSB, 2020). The exact requirements will be detailed in the forthcoming design documents (e.g., basis of design/design criteria report).

2.5 Access Plan

Atlantic Richfield owns the Site property. The RA-related activities will be performed within the Site and access to private property is not required.

3.0 REMEDIAL DESIGN OVERVIEW

The design will be detailed in the preliminary (30%), intermediate (60%) and pre-final (95%) documents. These design documents will be supported by the results of the PDI to fill data gaps. The design documents will include the design drawings and technical specifications. Because the RD construction design documents will be developed with input from EPA, Montana Department of Environmental Quality (DEQ), and BSB though an iterative process, only a high-level overview is provided in this RDWP. The RD will include at a minimum, the following elements, that will be continually updated through each progressive design phase:

1. Site Controls (plot plans, existing topography and survey control, construction fencing, temporary traffic control, construction staging and field office areas, construction storm water management, etc.).

2. Site Excavation (horizontal and vertical extents, salvage and stockpile, laybacks, shoring and sheet pile placement, dewatering, etc.).
3. Site Backfill and Grading (Site backfill and reconstruction, general fill and subbase placement, and rough grading).
4. Engineered Covers (placement, grading, and amendment).
5. Hydraulic Features (including concrete wet well and bypass structures, pumps, valves, piping, and appurtenances, etc.).
6. Architectural (building structure including mechanical, plumbing, and electrical).
7. Instrumentation and Controls (including piping and instrumentation, logic, controls, panels, etc.).
8. Civil Infrastructure (water, sanitary sewer, storm sewer, Site electrical and lighting, curb and gutter, parking lot and access road improvements, etc.).
9. Institutional Controls (signage, fencing, and agreements).

3.1 Management Strategy

This section describes the approach taken by Atlantic Richfield during the RD process, including the management strategy and approach to contracting. Detailed design documents are being developed with input from EPA, DEQ, and BSB; therefore, only a high-level overview is provided in this RDWP. The general management strategy is for Atlantic Richfield to manage the Site design using one design engineer and one contractor for the RD and implementation of the RA for the BPSOU Subdrain project. All design documents will be submitted, reviewed and approved by EPA and Montana DEQ. Atlantic Richfield will implement the Site RD and RA as outlined in the attached PDI WP and QAPP. Details on the organizational structure, roles, and responsibilities are provided in Section 4.0. Data management procedures are provided in the QAPP (Appendix A to Attachment 1).

4.0 PROJECT ORGANIZATION

This section provides descriptions of the responsibility and authority of key organizations and personnel involved with developing the RD (EPA Guidance Item 4 [Section 1.0]).

4.1 Key Organizations

The key organizations and their roles and responsibilities are listed below.

4.1.1 Environmental Protection Agency

In the SBC/Butte Area NPL area, EPA is the lead agency for RD/RA efforts by Settling Defendants (SDs) (Atlantic Richfield and BSB). Communications with Atlantic Richfield, Montana DEQ, and BSB will be led by EPA, then EPA will review and authorize this RDWP and the associated preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RA work plans (RAWP). During construction EPA may participate in pre-construction Site walks, and pre-final and final inspections. EPA will attend the weekly progress meetings and review daily construction reports provided by Atlantic Richfield via email and will communicate

any concerns or questions to Atlantic Richfield. EPA will also provide QA oversight to ensure the RD is being implemented as designed and approved. EPA will also review and approve the final project RACCR.

4.1.2 Montana Department of Environmental Quality

The Montana DEQ is the state Agency for review of RD/RA efforts by SDs in the SBC/Butte Area NPL area. The Montana DEQ will review and provide comments to EPA on the associated preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RAWPs. During construction, the Montana DEQ may participate in technical meetings, pre-construction Site walks, and pre-final and final inspections. The Montana DEQ will attend the weekly progress meetings and review daily construction reports provided by Atlantic Richfield via email and will communicate any concerns or questions to EPA.

4.1.3 Atlantic Richfield Company

Atlantic Richfield manages, funds, and performs the project RD and RA construction. Atlantic Richfield will administer the contract and monitor the overall progress of RD and RA activities conducted under the project and will be the primary authority regarding interpretation of the project contract requirements.

4.1.4 Butte-Silver Bow

The BSB City-County is the local agency for coordination and review of RD and RA efforts conducted in the SBC/Butte Area NPL area. A BSB representative will review and provide comments to Atlantic Richfield on the associated preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RAWPs.

4.1.5 Pioneer Technical Services, Inc.

Pioneer is the Atlantic Richfield engineer for investigation activities at the Site. Pioneer will be responsible for administering subcontracts for the necessary remaining professional services including, but not limited to, architectural design, instrumentation and control design, electrical design, and landscape architecture. Pioneer developed this RDWP and associated PDI Work Plan in Attachment 1. Pioneer will also develop the associated preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs, the RAWP, and bid documents.

4.1.6 Construction Contractor

The selected contractor will be responsible for executing the project in strict compliance with the RD, RAWP, and technical specifications. The contractor will have primary responsibility for project safety, construction activities, subcontractor management, daily project documentation, and reporting, and the construction QC measures associated with implementing the RA. Atlantic Richfield will select the contractor and inform EPA of its choice prior to starting the project. Pioneer will serve as QA contractor on behalf of Atlantic Richfield to oversee construction activities.

The contractor will be responsible for attending weekly progress meetings, providing required status reports and two-week look-ahead schedules, and discussing any construction issues that occur or may occur.

4.1.7 Contract Laboratory

No laboratory work will be required as part of the PDI field work.

4.2 Key Personnel

Key personnel and their roles and responsibilities for the site are listed below. During construction activities, EPA, Montana DEQ, Atlantic Richfield, and the contractor(s) will be coordinating or attending (as necessary) technical meetings, pre-construction Site walks, weekly progress meetings, and pre-final and final inspections. An organizational hierarchy chart showing the relationship between key project personnel is shown on Figure 4.

4.2.1 EPA Project Manager

Mr. Nikia Greene is EPA remedial project manager for this work. Mr. Greene is based in EPA Region 8 office in Helena, Montana. He will be the primary contact for EPA and ensure that RDs and RAs comply with the Agency RD/RA SOW. Mr. Greene will be responsible for review and approval of this RDWP and the preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RAWP. During construction Mr. Greene will be responsible for providing construction oversight on behalf of EPA.

4.2.2 DEQ Project Manager

Mr. Daryl Reed is the Montana DEQ project officer for this work. Mr. Reed is based in the Montana DEQ Remediation Division office located in Helena, Montana. He will be the primary contact for Montana DEQ and ensure that RDs and RAs comply with the Agency RD/RA SOW. Mr. Reed will be responsible for review and approval of this RDWP and the preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RAWP on behalf of the Montana DEQ.

4.2.3 Atlantic Richfield Project Manager

The Atlantic Richfield liability manager is Mr. Josh Bryson. Mr. Bryson is responsible for overall programmatic planning for technical and administrative components of RD and RA work completed by Atlantic Richfield. Mr. Bryson will be the primary technical point of contact for EPA, Montana DEQ, BSB, and the project engineer and contractor.

4.2.4 Atlantic Richfield Quality Assurance Manager

The Atlantic Richfield QA Manager (QAM) for the project is Mr. David Gratson. Mr. Gratson will interface with the Atlantic Richfield liability manager on company policies regarding quality and has the authority and responsibility to approve QA documents specific to the project.

4.2.5 Pioneer Project Manager

Atlantic Richfield will contract directly with Pioneer who will serve as the Atlantic Richfield Representative for the investigation, pre-design, and remedial design phases of the project. Pioneer's project manager for Atlantic Richfield is Mr. Andy Dare, P.E. Mr. Dare will be responsible for ensuring the PDI Work Plan (Attachment 1) is implemented and coordinate all project-specific assignments and provide overall project direction to the Pioneer team. Mr. Dare will be the primary contact for Atlantic Richfield. Responsible for developing this RDWP, he will also be responsible for the preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RDs and RAWP.

4.2.6 Field Team Leader

The Field Team Leader for the geotechnical investigation will be Mr. Caleb Gillis. Mr. Gillis will ensure that all members of the field team review and follow the project QAPP (Attachment 1) when implementing field activities. The Field Team Leader will also be responsible for maintaining the QAPP. The Field Team Leader will conduct daily safety meetings, assist in field activities, and document activities in the logbook. The Field Team Leader will be responsible for equipment coordination, problem solving, and decision making in the field for technical aspects of the project. Additionally, the Field Team Leader will provide "on-the-ground" overviews of project implementation by observing Site activities to ensure compliance with technical project requirements; Health, Safety, Security, and Environment (HSSE) requirements; and the Site-Specific Health and Safety Plan (SSHASP). Finally, the Field Team Leader will identify potential integrity management issues, as appropriate, and prepare required project documentation.

4.2.7 Quality Assurance Officer

The QA Officer (QAO), Mr. Mike Browne, P.E., from Pioneer, will be responsible for reviewing field testing data and evaluating data quality during investigation and pre-design activities. He will also conduct on-Site reviews and prepare Site review reports for the QAM.

4.2.8 Project Safety and Health Manager

The Safety and Health Manager, Ms. Tara Schleeman from Pioneer, will conduct the initial safety meeting prior to starting investigation fieldwork. Ms. Schleeman will ensure that work crews comply with all health and safety requirements and revise the project SSHASP, if necessary. In addition, she will be responsible for safety and health reviews during the preliminary (30%) and intermediate (60%) RD process to identify any potential safety concerns

associated with implementation and assure that HSSE requirements are met during the design process.

5.0 SCHEDULE

The proposed schedule for deliverables outlined in this RDWP is specified in Attachment 2.With Agency approval, the PDI field efforts are scheduled to begin in October 2022. Effective, open communications will be critical to achieving timely completion of the project. As such, periodic meetings between EPA and Atlantic Richfield will be scheduled to discuss the status of ongoing efforts, upcoming events, and deliverables and to resolve any issues that may arise. Because of the uncertainty associated with the schedule for several tasks that are out of Atlantic Richfield's control (e.g., seasonal constraints, EPA review periods, the need to fill data gaps, etc.), the schedule lists important deliverables and design activities relative to key milestones and other conditions.

A preliminary (30%) RD document is in development by Pioneer and will be submitted for review in 2022. Meetings and discussions of the 30% design will be completed as needed until agreement is reached on the conceptual design. Once agreement is reached on the preliminary 30% design, intermediate (60%) and pre-final (95%) design documents will be completed and subsequently submitted for Agency review and approval. This iterative approach fosters collaboration between all parties involved. The proposed schedule has a goal of beginning the remediation work in summer 2024 and finishing in 2025. A final Remedial Action Construction Completion Report (RACCR) will be submitted to the Agencies within 60 days of the final inspection.

6.0 REPORTING

This section describes the reporting practices and associated deliverables for the RD and RA construction. Remedial design will progress in five main stages, as described below.

6.1 Remedial Design Documentation

Atlantic Richfield will submit a preliminary (30%), intermediate (60%), pre-final (95%), and final (100%) RD for EPA's comment, in consultation with Montana DEQ. Each RD document will contain the components listed in the BPSOU CD. The following sections detail what each of the RD documents will contain.

Preliminary (30%) RD. The preliminary RD will include the following:

1. The RD design report with design criteria and basis of design included, as described in the RD/RA Handbook, EPA 540/R-95/059 (EPA, 1995). The RD report will include, but not be limited to, the following:
    a. Project description.
    b. Evaluation of how ARARs will be met.
    c. Design requirements including, but not limited to, BPSOU Statement of Work requirements (BPSOU CD), RA Objectives, and RA Levels.

d. Design assumptions including, but not limited to, pump selection, building and wet well siting, intake and discharge piping construction, dewatering design, site grading, and immediately adjacent civil infrastructure (exterior lighting, curb and gutter, and parking lot).
e. Design approach including, but not limited to, pump system design, building and wet well design, backfill and Site grading, cap and re-vegetation, and immediately adjacent landscape design.
f. Description of permit requirements, if applicable, and plans to address substantial requirements of permits.
g. Description of monitoring and control measures to protect human health and the environment during the RA.
h. Description of how the RA will be implemented in a manner that minimizes environmental impacts in accordance with *EPA's Principals for Greener Cleanups* (EPA, 2009).

2. Preliminary drawings (based on PDI), including but not limited to the following:
    a. Pump Station building and wet well location in plan and cross-section view.
    b. Pump system design including intake and discharge piping design.
    c. Backfill and regrading design in plan and cross-section view.
    d. Plan view of other construction elements: existing conditions map, Site utilities, ownership, Site plan, etc.
3. Any proposed revisions to the RA schedule.
4. Updates of all supporting deliverables required to accompany the RDWP.

Intermediate (60%) RD. The intermediate RD is a continuation and expansion of the preliminary (30%) RD and will include the following:

1. Revised RD Report/Design report that will include revisions from EPA/State/Stakeholder comments to the preliminary (30%) RD and updates to components where additional data have been collected as part of the Site investigations.
2. Intermediate drawings, including, but not limited to the following:
    a. Updated and revised drawings from the preliminary (30%) RD based on EPA/State/Stakeholder comments and updates to components where additional data have been collected as part of the Site investigations.
    b. Additional Site-wide plans including, but not limited to, building architectural, traffic control, temporary fencing, staging and stockpile management, demolition, erosion control, utility plan and profiles, hardscape, instrumentation and control, site lighting, planting, and irrigation.
    c. Technical specifications as available.
    d. Draft or schematic details, where applicable. Structure detailing to be submitted with the pre-final (95%) RD.

3. Any proposed revisions to the RA schedule.
4. Updates of all supporting deliverables required to accompany the RDWP.

Pre-Final (95%) RD. The pre-final RD must be a continuation and expansion of the previous design submittal and address EPA's comments regarding the intermediate (60%) RD. The pre-final RD will serve as the approved final (100%) RD, if EPA approves it without comments. The pre-final RD must include a continuation of deliverables identified above for the intermediate (60%) RD in addition to the following:

1. A complete set of construction drawings and specifications that are (1) certified by a registered professional engineer; (2) suitable for procurement; and (3) follow the current Construction Specifications Institute's Master Format.
2. Additional Site-wide plans including, but not limited to, instrumentation and controls, performance monitoring, and electrical.
3. Additional detail including, but not limited to, architectural, structural, mechanical, electrical, Site lighting, planting, and irrigation.
4. Any proposed revisions to the RA schedule.
5. Updates of all supporting deliverables required to accompany the RDWP.

Final (100%) RD. Atlantic Richfield will submit the final (100%) RD for EPA approval, in consultation with Montana DEQ. The final RD must address EPA and Montana DEQ comments on the pre-final RD and must include final versions of all pre-final RD deliverables finalized for construction.

RAWP. Atlantic Richfield currently anticipates submittal of a RAWP specific to the Site. The following elements will be included in the RAWP:

1. Project Background.
2. Summary of Data Collected.
3. Team Organization.
4. Pre-Construction Activities.
5. Design Summary.
6. Construction Meeting Description and Procedures.
7. Design and Field Change Procedures.
8. Post Construction Activities Procedures.
9. Construction QA.
10. Construction Monitoring and Associated QAPPs.
11. Construction Records and Reporting.

12. Health and Safety Requirements.
13. Construction Plans.
14. Specifications.
15. OM&M Plan Revisions.

Atlantic Richfield will submit the draft RAWP near the intermediate (60%) design.

6.2 Construction Documentation and Records

6.2.1 Daily Contractor Quality Control Reports

The contractor will prepare daily contractor QC reports. The reports will list a description of the trades working on the project, the number of personnel working, weather conditions encountered, and any delays encountered. The reports will cover both conforming and deficient features and will include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The daily reports will include copies of test reports. The contractor must also take photographs documenting the day's major work activities and incorporate them into the reports. The Construction QC Manager must sign and date the reports.

The contractor will provide the reports to the independent QA contractor daily within 24 hours after the date covered by the report, with one exception: reports need not be submitted for days on which no work is performed.

6.2.2 Daily Construction Activity Report

An independent QA contractor will complete a daily construction activity report and submit it daily to Atlantic Richfield. The report will summarize the activities at the Site based on daily field notes. The report will address weather, contractor/subcontractor personnel that are at the Site, equipment used, construction activities performed, field test results, and any issues encountered.

6.2.3 Material Receipt Inspections

All materials, equipment, and/or supplies that arrive at the Site will be inspected by the independent QA contractor to ensure that the products are as ordered or as specified; any deviations will be relayed to the contractor and Atlantic Richfield immediately. Receiving checklists for critical materials will be completed and recorded in a suitable location on the Site. These checklists will be included with other inspection documentation as part of the final CCR.

6.2.4 Inspections and Testing Records

All observations and field test results performed on the Site or off the Site will be recorded in a suitable manner. Recorded observations may take the form of notes, charts, sketches, photographs, or any combination of these. At a minimum, the inspection documentation will include the following information:

- Description or title of the inspection activity with the date activity was inspected.
- Location of the inspection activity or location from which the measurement was obtained.
- Type of inspection activity and procedure used.
- Recorded observation or test data.
- Results of the inspection activity (e.g., pass/fail).
- Comparison with specification requirements.
- Personnel involved in the inspection besides the individual preparing the data sheet.
- Signature of the QAO accompanied by the date.

6.2.5 Photo Documentation

Pioneer will take and obtain digital photographs that document existing Site conditions, progress activities, and completion conditions.

6.2.6 Record Field Data

The contractor will keep at the Site two complete sets of as-built field data, one for the contractor's use and one for Atlantic Richfield construction oversight personnel. The as-built field data will consist of full size, blackline prints of the Construction Drawings marked by the contractor to show all deviations in actual construction from the original Construction Drawings. These working-as-built drawings will be updated weekly.

6.2.7 Record Drawings

Pioneer will document the final Site construction through as-built record drawings. The record drawings will be incorporated into the final RACCR (Section 6.4).

6.3 Record Maintenance

The contractor will store and manage all project records and back up documents during construction activities. The contractor will maintain all current records and always make those documents available for inspection by the QA contractor, Pioneer. The contractor will submit all the deliverables to Pioneer. Pioneer will include these materials in the final RACCR (Section 6.4).

6.4 Final Reporting

6.4.1 Remedial Action Construction Completion Report

Atlantic Richfield expects to provide a RACCR to EPA within 60 days of the successful completion of the final inspection. The RACCR will contain all construction-related information and documented aspects of QA associated with the project. The RACCR will include a summary of the project activities and document all aspects of the QA program performed during the project. In addition, revisions to the BPSOU Subdrain Collection System OM&M Plan (Atlantic Richfield, 2019) will be submitted to reflect any issues that may have been encountered during construction. In the report, Pioneer's Design Engineer of Record registered in the State of Montana will state that the project has been constructed consistent with the project Construction Drawings and Technical Specifications and that the discrete RD elements are complete.

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FIGURES

MONTANA AVENUE
MAIN STREET
FRONT STREET
MH-MSD116
AT STA 55+00
BPSOU SUBDRAIN
PERFORATED 10" PVC
MH-MSD113
42+50
BRW-00
SLAG CANYON
NORTHSIDE
TAILINGS
KAW AVENUE
BRW-01 EAST
BRW
MH-MSD110
STA 28+53
BUFFALO
GULCH
BPSOU SUBDRAIN
VAULT PUMPING SYSTEM
SUBDRAIN DISCHARGE
TO HCC
MH-MSD108
STA 17+50
MH-MSD106
STA 8+70
DIGGINGS
EAST
BPSOU SUBDRAIN
8" HDPE DISCHARGE LINES
SUBDRAIN
CONTROL BUILDING
BLACKTAIL CREEK

LEGEND:

- BPSOU SUBDRAIN
- BPSOU SUBDRAIN DISCHARGE LINE

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANE
DATUM: NAD 83
UNITS: FEET
SOURCE: 2020 QSI

SCALE IN FEET
0 250 500

FIGURE 1

BPSOU SUBDRAIN
SITE LOCATION
MAP

PIONEER
TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 4/2022

4/29/2022 8:52:08 AM Z:\SHARED\ACTIVE PROJECTS\ARCO\BPSOU\DENST\CADD\FIGURES\DE-NST-FG-PLN-066-22.DWG

U.S. Fish and Wildlife Service
National Wetlands Inventory

BPSOU Subdrain Pump Station

October 3, 2022

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

N

DISPLAYED AS:
PROJECTION/ZONE:
DATUM:
UNITS:
SOURCE:

N.T.S

FIGURE 2

NATIONAL WETLANDS INVENTORY MAP

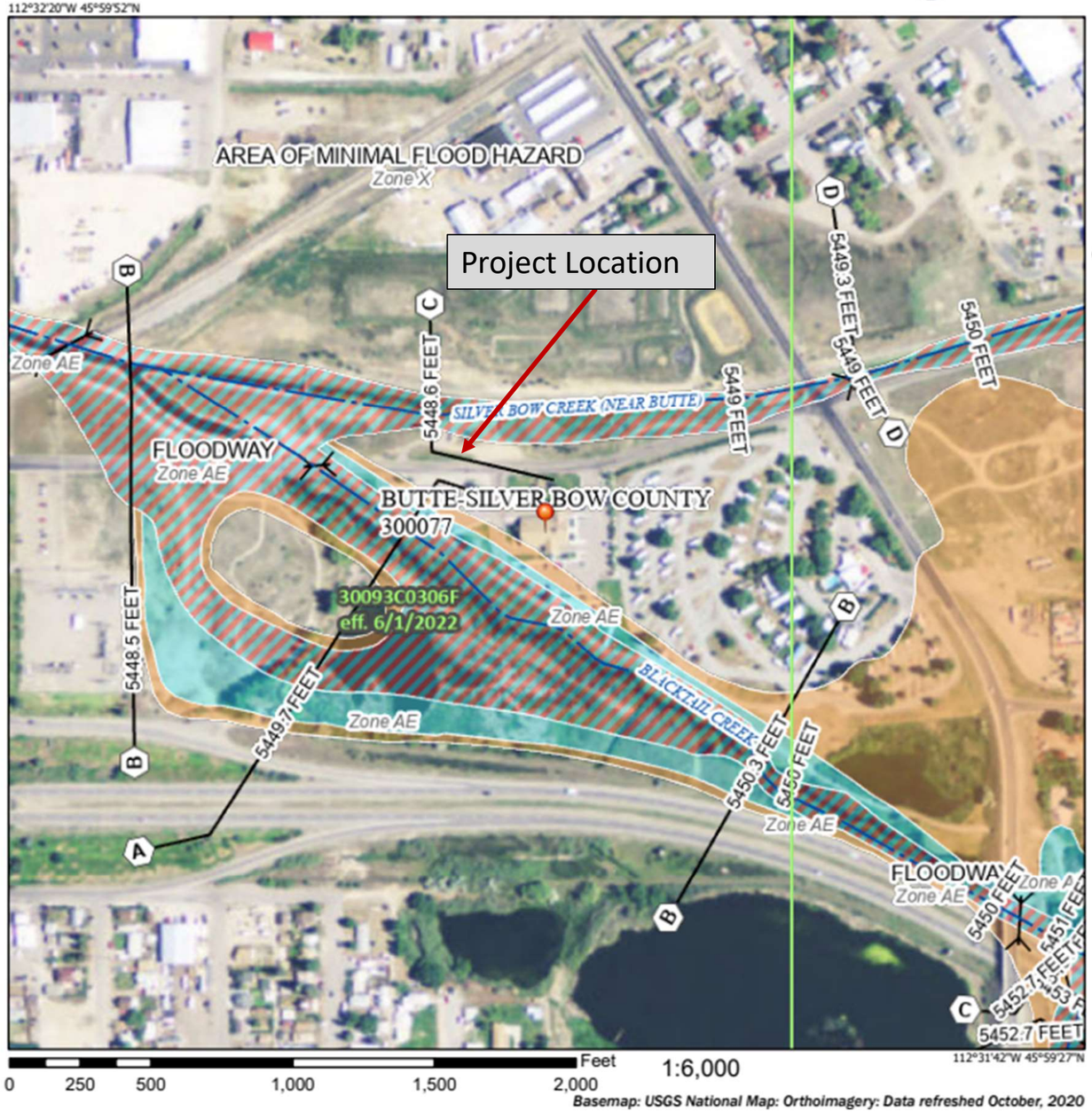
PIONEER TECHNICAL SERVICES, INC.

DATE: 10/6/2022

Path: Z:\Shared\Active Projects\

National Flood Hazard Layer FIRMette

112°32'20"W 45°59'52"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

112°31'42"W 45°59'27"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/30/2022 at 2:49 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

N

DISPLAYED AS:
PROJECTION/ZONE:
DATUM:
UNITS:
SOURCE:

N.T.S

FIGURE 3 FEMA FLOOD INSURANCE RATE MAP

PIONEER TECHNICAL SERVICES, INC.

DATE: 10/6/2022

Path: Z:\Shared\Active Projects\

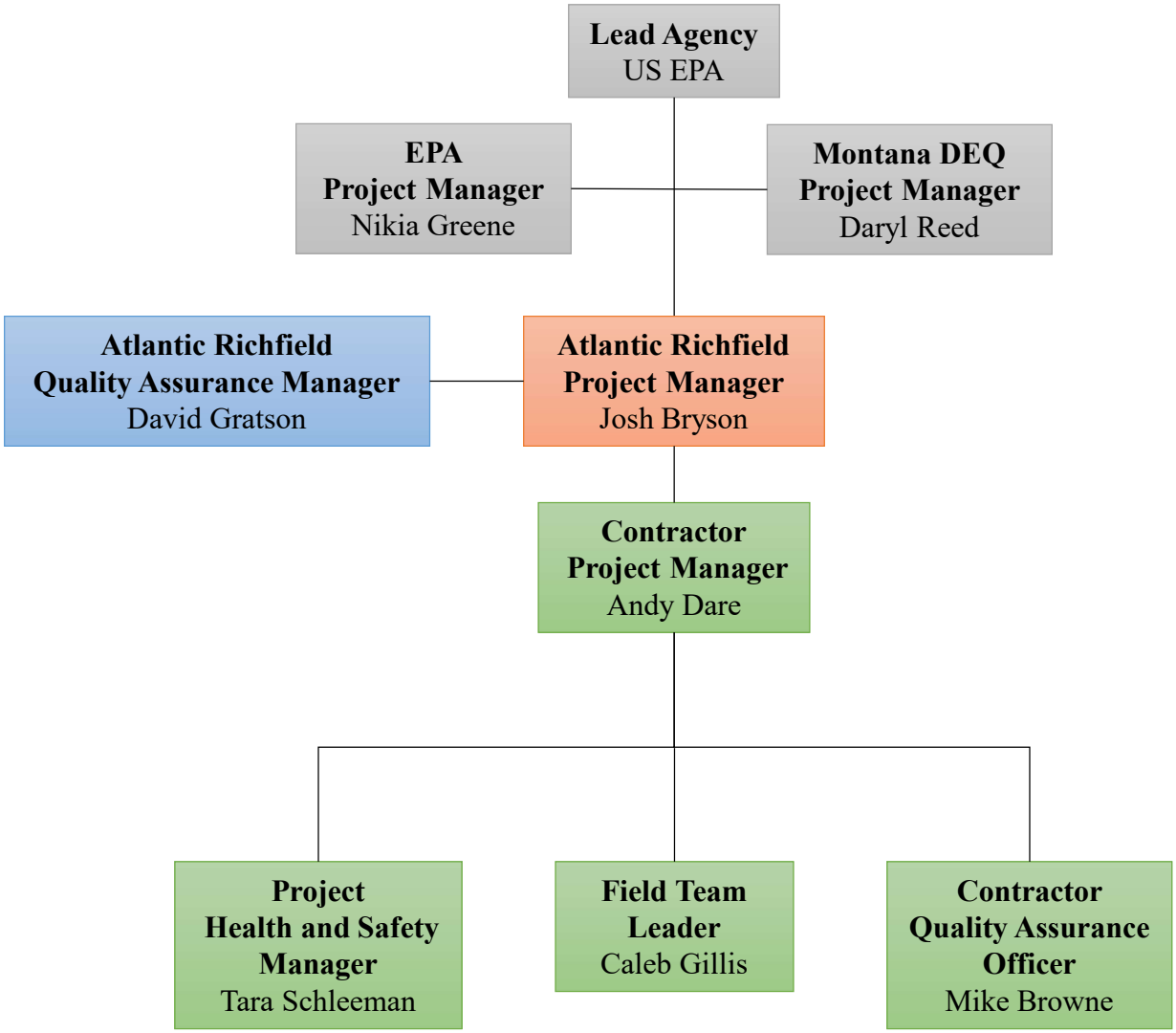


Figure 4. Project Roles and Responsibilities

Attachment 1
BPSOU Subdrain Pump Station Pre-Design Investigation (PDI) Work Plan

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

Final

BPSOU Subdrain Pump Station Pre-Design Investigation (PDI) Work Plan

Atlantic Richfield Company

October 2022

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

Final

BPSOU Subdrain Pump Station Pre-Design Investigation (PDI) Work Plan

Prepared for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Prepared by:

Pioneer Technical Services, Inc.
1101 S. Montana St
Butte, Montana 59701

October 2022

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DOCUMENT MODIFICATION SUMMARY

Modification No.	Author	Version	Description	Date
Rev 0	Ross Monasmith	Draft Final	Issued for Agency Review	June 2022
Rev 1	Ross Monasmith	Final	Issued to Agencies	October 2022

ACRONYMS

Acronym	Definition
Atlantic Richfield	Atlantic Richfield Company
BPSOU	Butte Priority Soils Operable Unit
BTL	Butte Treatment Lagoons
CD	Consent Decree
CPT	Piezocone Penetration Testing
EPA	U.S. Environmental Protection Agency
HSEE	Health, Safety, Security, and Environment
LAO	Lower Area One
MSD	Metro Storm Drain
OSHA	Occupational Safety and Health Administration
PDI	Pre-design Investigation
Pioneer	Pioneer Technical Services, Inc.
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDWP	Remedial Design Work Plan
RM	Remediation Management
SSHASP	Site-Specific Health and Safety Plan

1.0 INTRODUCTION

This Pre-Design Investigation (PDI) Work Plan (PDI Work Plan) has been developed consistent with the applicable U.S. Environmental Protection Agency (EPA) guidance and decision documents, including the following:

- *Consent Decree (CD) for the Butte Priority Soils Operable Unit* (BPSOU). *Partial Remedial Design/Remedial Action and Operation and Maintenance* (EPA, 2020), referred to herein as BPSOU CD.
- *Remedial Design/Remedial Action Handbook, EPA 540/R- 95/059* (EPA, 1995).

The investigation at the BPSOU Subdrain Pump Station project Site (Site) is necessary to support the redesign of the existing pump station infrastructure to provide redundant capacity for post-remedy influent flow and eliminate confined space. This PDI Work Plan includes the following items:

- General information and site background regarding the pump station (Section 2.0).
- Existing data summary (Section 3.0).
- A summary of the PDI work activities (Section 4.0).
- Project Quality Control (QC) and the Quality Assurance Procedure Plan (QAPP) outlining the procedures and protocols necessary for conducting a geotechnical investigation (Section 5.0 and Appendix A).
- The proposed Geotechnical Investigation Evaluation Report format (Section 6.0).

Data gaps relevant to the design of the Site, project organization, regulatory requirements, project schedule, and other key information is included in the *BPSOU Subdrain Pump Station Remedial Design Work Plan* (RDWP) to which this document is attached.

2.0 BACKGROUND

The Site is located at 1000 George Street within the BPSOU in Butte, Montana (Figure 1). Originally constructed between 2003 and 2005, the primary objective of the subdrain system is to intercept groundwater from the surrounding alluvial aquifer and pump it to the Butte Treatment Lagoons (BTL) system for treatment. Site infrastructure was upgraded in 2008, 2010, and 2014 to optimize performance and provide redundancy. Currently, the Site is comprised of 3 below-grade concrete vault structures and a precast concrete aboveground control building. The Ongoing Remedial Elements Statement of Work requires the Atlantic Richfield Company (Atlantic Richfield) to evaluate the performance, capacity, and opportunities for optimization of the existing groundwater collection and treatment system. As a result, Atlantic Richfield will reconstruct the Site to provide additional redundant capacity for post-remedy influent flow and eliminate unnecessary confined space. The proposed Site pre-design investigation is aided by previous work performed since 2003, including data from initial construction and the various upgrades. As such, this PDI Work Plan simply includes a focused geotechnical investigation to address the few remaining data gaps necessary to complete the design of a new concrete wet well and new control building structure.

Additional description of the Site and relevant Site features is included in Section 1.2 of the RDWP. Background information relating the history of the remedy, the construction of the BPSOU Subdrain Pump Station, and proposed additional work can be found in Section 1.3 of the RDWP. Additional details regarding the purpose of the Site PDI work are included in the QAPP, and background context relevant to the investigation work items will be provided as necessary.

3.0 EXISTING DATA SUMMARY

Several documents related to previous work and investigations performed at the BPSOU Subdrain Pump Station contain information relevant to the current design. Construction for the original BPSOU Subdrain Pump Station was completed in 2005 and major upgrades were performed in 2008 and 2014. As part of this prior work, extensive excavation has been performed at the Site, including excavation below the water table with requisite dewatering activities. The building Site can be considered well characterized given the previous work; however, this PDI Work Plan and appended QAPP address the remaining geotechnical data gaps left for Site design efforts. The following sections include information on some of the key related documents and a brief summary of the existing relevant data they contain. This information is not meant to be comprehensive but to give a brief overview of the work activities performed at the Site in previous years. Focused information related to existing geotechnical data collected in previous Site work will be compiled and included in the Geotechnical Evaluation Report, and is not summarized explicitly here.

3.1 2006 Draft Final Horseshoe Bend Effluent Pipeline/Metro Storm Drain Construction Completion Report

This document summarizes the installation of the Metro Storm Drain (MSD) subdrain, now referred to as the BPSOU subdrain, among other work performed in the area at that time. This work included the construction of the original BPSOU Subdrain Pump Station system and conveyance infrastructure to the BTL. The construction completion report included as-built drawings of the original pumping system and infrastructure, which were substantially replaced shortly thereafter.

3.2 2007 Final Butte Metro Storm Drain Vault Design Report/Work Plan

This document outlines the upgrades performed to the BPSOU Subdrain Pump Station soon after the initial construction was completed. Captured groundwater chemistry data and flow data gathered during initial operation of the BPSOU Subdrain Pump Station informed upgrades to the pumps, which were undersized and exhibiting rapid corrosion. The work outlined in this effort included the installation of new pumps located in an adjacent dry vault, a bypass line, and numerous other operational equipment upgrades.

3.3 2011 Final Butte Treatment Lagoons and Metro Storm Drain Geotechnical Investigation Work Plan

As part of work performed to investigate subsurface conditions in areas of Lower Area One (LAO) and the SBC above BTC corridor, geotechnical data was gathered to support the planning and design of a potential contingency overflow pond in the BPSOU subdrain area. Data collected included geotechnical boreholes drilled across the BPSOU subdrain in the former wetlands demonstration program area (Buffalo Gulch Storm water Basin Area), providing some regional lithology data nearby the Site.

3.4 2014 Final Metro Storm Drain Pump Station Upgrade Work Plan

The most recent Site investigation involved installation of an alternate discharge line from the wet vault to the BTL at LAO via directional drilling techniques. The work also included installation of additional piping configurations, pig launcher, and modifications to the dry vault. Surveyed Site infrastructure, existing utilities, and construction drawings from these activities inform the current investigation and design of the BPSOU Subdrain Pump Station.

4.0 BPSOU SUBDRAIN PUMP STATION INVESTIGATION

It is anticipated that additional capture flow will result from the remedial action outlined in the BPSOU CD, indicating the need for additional capacity in the BPSOU Subdrain Pump Station. Additional wet well volume, increased pump capacity, and improved maintenance access will all be part of the BPSOU Subdrain Pump Station work. Available data from previous investigations and work performed at the Site include general subsurface conditions, groundwater elevations, and infrastructure. Data collected from other analyses related to anticipated future flows and flow increases (resulting from Groundwater Remedy Optimization and hydraulic control installed as part of work at the Blacktail Creek Remediation and Contaminated Groundwater Hydraulic Control) will be incorporated and included in the BPSOU Subdrain Pump Station future design documents. However, additional geotechnical data are needed to confirm the subsurface conditions in the area proposed for construction of the new wet well and BPSOU Subdrain Pump Station building structure, which is the focus of this QAPP.

4.1 Geotechnical Investigation

The geotechnical investigation is being performed to define underlying soil characteristics within the boundaries of the Site. The data and recommendations obtained from the investigation will be used to support future Site design. Data collected during previous work and investigations includes general subsurface conditions, groundwater elevations and dewatering volumes, previous boring logs, plot plans of Site infrastructure, and other information. The geotechnical investigation is therefore a focused investigation into the particular subsurface conditions in the location proposed for excavation and construction of the new BPSOU Subdrain Pump Station building structure and wet well. Collection of field-testing data as part of the geotechnical investigation is described in the QAPP (Appendix A).

Geotechnical analysis of Site conditions and Site soil encountered during the investigation will be performed following the geotechnical investigation and receipt of field testing results. The geotechnical analysis will be consolidated in the form of a pre-design investigation geotechnical report and will include construction recommendations for storm water management infrastructure, seismic considerations, groundwater table information, shrink/swell characteristics, and other native soil properties. A detailed discussion of the geotechnical investigation is provided in the QAPP (Appendix A).

4.1.1 Borehole Investigation

The geotechnical investigation will include up to four piezocone penetration testing (CPT) boreholes in the locations proposed for construction of the BPSOU Subdrain Pump Station building and the wet well (Figure 2). The CPT sounding logs will be collected under the supervision of the geotechnical engineer to gain information about subsurface in the areas proposed for construction of the pump building and wet well. Additional information about the borehole investigation, including data quality objectives, equipment, proposed depth, and more is included in the attached QAPP (Appendix A).

4.1.2 Equipment List

Drilling equipment that may be used to complete the geotechnical investigation at the Site are described in the QAPP (Appendix A). The investigation construction contractor's roles and responsibilities are described in Section 4.1.6 of the RDWP. All contractors performing borehole activities will follow safety procedures and protocols of the BPSOU Site-Specific Health and Safety Plans (SSHASP), as discussed in Section 4.1.5 below.

4.1.3 Security

The area will be secured with 6-foot chain link fencing around the entire perimeter prior to any work starting. This fencing will be posted with warning signs not to enter the area and the access gate will be secured during operation and overnight hours to prevent unauthorized access.

4.1.4 Health and Safety

All work associated with the pre-design geotechnical investigation will follow applicable Remediation Management (RM) Health, Safety, Security, and Environment (HSSE) Management System defined practices and applicable Occupational Safety and Health Administration (OSHA) regulations. Pioneer Technical Services, Inc. (Pioneer) will be responsible for preparing and updating SSHASPs, risk assessments, and applying functional standards to protect the safety of the workforce through prescriptive practices and processes that meet or exceed applicable RM HSSE Defined Practices and OSHA regulations. Required personal protective equipment will include appropriate gloves, long-sleeved shirt, high visibility clothing, hard hat, safety glasses with side shields, safety-toed boots, and hearing protection when working around or operating equipment.

All work completed by Pioneer during the execution of this work will be performed in accordance with all procedures outlined in Pioneer's internal Health and Safety Plan developed for the BPSOU.

4.2 Property Access Agreements

Investigation activities planned for the BPSOU Subdrain Pump Station design will occur on Atlantic Richfield property, and no necessary additional property access agreements are anticipated at this time.

4.3 Utility Locates

There is a possibility that investigation points could shift once underground utilities are located throughout the Site. Utility locates will be performed prior to any fieldwork and will follow BP Remediation Management Defined Procedures for ground disturbance in addition to applicable control measures addressed in the SSHASP. Final utility locates for the work area will be completed prior to any ground disturbance activities.

5.0 QUALITY CONTROL

The QAPP for this project is provided in Appendix A and contains additional information on the following:

- Data collection process and study design
- Quality assurance and QC.
- Instrument/equipment testing, inspection, maintenance, and calibrations.
- Data management.
- Assessment and oversight.
- Data usability.

Atlantic Richfield will provide the personnel to oversee all field testing and borehole abandonment activities. If third parties want a representative on-Site, they will be required to check-in and check-out with the Field Team Leader daily. The Atlantic Richfield representative will be responsible for collecting the appropriate field-testing data and managing on-Site activities.

6.0 GEOTECHNICAL EVALUATION REPORT

A Geotechnical Investigation Evaluation Report will be developed and submitted upon completing the pre-design geotechnical investigation and criteria evaluation. The Geotechnical Investigation Evaluation Report will provide the following information:

1. Investigation summary.
2. Investigation results.

3. Investigation documentation (field logs, photographs, etc.).
4. Data interpretation and analyses.
5. Conclusions and remedial design recommendations.

The Geotechnical Investigation Evaluation Report will be submitted to the Agencies as an attachment to the Intermediate (60%) BPSOU Subdrain Pump Station Design Report.

7.0 REFERENCES

Atlantic Richfield Company, 2014. Silver Bow Creek/Butte Area NPL Site, Butte Priority Soils Operable Unit, Final Metro Storm Drain (MSD) Pump Station Upgrade Work Plan. Prepared by Pioneer Technical Services, April 3, 2014.

Atlantic Richfield Company, 2011. Silver Bow Creek/Butte Area NPL Site, Butte Priority Soils Operable Unit, Final Butte Treatment Lagoons (BTL) and Metro Storm Drain (MSD) Geotechnical Investigation Work Plan. Prepared by Pioneer Technical Services, December 19, 2011.

Atlantic Richfield Company, 2007. Silver Bow Creek/Butte Area NPL Site, Butte Priority Soils Operable Unit, Final Butte Metro Storm Drain (MSD) Vault Design Report/Work Plan Revision 1. Prepared by Pioneer Technical Services, July 20, 2007.

Atlantic Richfield Company, 2006. Silver Bow Creek/Butte Area NPL Site, Mine Flooding Operable Unit Butte Priority Soils Operable Unit, Draft Final Horseshoe Bend Effluent Pipeline/Metro Storm Drain (HBEL/MSD) Construction Completion Report (CCR). Prepared by Pioneer Technical Services, April 18, 2006.

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.

EPA, 1995. Remedial Design/Remedial Action Handbook, EPA 540/R-95/059. U.S. Environmental Protection Agency June 1995.

LIST OF FIGURES

MONTANA AVENUE
MAIN STREET
FRONT STREET
MH-MSD116
AT STA 55+00
BPSOU SUBDRAIN
PERFORATED 10" PVC
MH-MSD113
42+50
BRW-00
SLAG CANYON
NORTHSIDE
TAILINGS
KAW AVENUE
BRW-01 EAST
BRW
MH-MSD110
STA 28+53
BUFFALO
GULCH
BPSOU SUBDRAIN
VAULT PUMPING SYSTEM
SUBDRAIN DISCHARGE
TO HCC
MH-MSD108
STA 17+50
MH-MSD106
STA 8+70
DIGGINGS
EAST
BPSOU SUBDRAIN
8" HDPE DISCHARGE LINES
SUBDRAIN
CONTROL BUILDING
BLACKTAIL CREEK

LEGEND:

- BPSOU SUBDRAIN
- BPSOU SUBDRAIN DISCHARGE LINE

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANE
DATUM: NAD 83
UNITS: FEET
SOURCE: 2020 QSI

SCALE IN FEET
0 250 500

FIGURE 1

BPSOU SUBDRAIN
SITE LOCATION
MAP

PIONEER
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DATE: 4/2022

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LEGEND:

◉ **PROPOSED BOREHOLE LOCATIONS**

N

DISPLAYED AS:
COORD SYS/ZONE: MSP83
DATUM: NAVD88
UNITS: IF
SOURCE: QSI 2020/PTS

SCALE IN FEET
0 10 20

FIGURE 2

PIONEER TECHNICAL SERVICES, INC.
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(406) 782-5177

PROPOSED GEOTECHNICAL INVESTIGATION LOCATIONS

DATE: 10/2022

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Appendix A
BPSOU Subdrain Pump Station QAPP

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

2022

Final

BPSOU Subdrain Pump Station
Quality Assurance Project Plan (QAPP)

Atlantic Richfield Company

October 2022

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

2022

Final

BPSOU Subdrain Pump Station
Quality Assurance Project Plan (QAPP)

Prepared for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Prepared by:

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

October 2022

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ACRONYMS

Acronym	Definition	Acronym	Definition
Atlantic Richfield	Atlantic Richfield Company	**Pioneer**	Pioneer Technical Services, Inc.
BMP	Best Management Practices	**QAO**	Quality Assurance Officer
BPSOU	Butte Priority Soils Operable Unit	**QAPP**	Quality Assurance Project Plan
BTC	Blacktail Creek	**RD**	Remedial Design
CAR	Corrective Action Report	**RDWP**	Remedial Design Work Plan
CPM	Contractor Project Manager	**RFC**	Request for Change
CPT	Cone Penetration Testing	**SBC**	Silver Bow Creek
DQO	Data Quality Objective	**SOP**	Standard Operating Procedure
EPA	Environmental Protection Agency	**SQL**	Structured Query Language
PDI	Pre-Design Investigation	**SSHASP**	Site-Specific Health and Safety Plan

1.0 INTRODUCTION

This Site-specific Butte Priority Soils Operable Unit (BPSOU) Subdrain Pump Station Quality Assurance Project Plan (QAPP) provides the procedures and protocols necessary to conduct a Site investigation as a part of the necessary data collection to support the design and reconstruction of the BPSOU Subdrain Pump Station (Site) infrastructure. The Site pre-design investigation will include a geotechnical investigation to summarize subsurface soil and provide foundation recommendations. The BPSOU Subdrain Pump Station and associated infrastructure is part of existing remedy infrastructure within the BPSOU (Figure 1).

This QAPP includes Data Quality Objectives (DQOs) specific to the pre-design investigation of the subsurface in the area of the proposed reconstruction of the BPSOU Pump Station infrastructure. The DQOs were identified according to U.S. Environmental Protection Agency (EPA) *Guidance on Systematic Planning Using the Data Quality Objectives Process* (EPA, 2006). The DQOs detailed in this QAPP cover the geotechnical investigation activities planned to support advancement of the Site design effort.

1.1 Purpose of the Site Investigation

The Site pre-design investigation will fill in data gaps in order to advance the design of the BPSOU Subdrain Pump Station system and meet the requirements of the Ongoing Remedial Elements Scope of Work (EPA, 2020). Due to performance of previous work in the area, the remaining design-related data gaps for this pre-design investigation are focused on the geotechnical considerations related to the preliminary design. The geotechnical investigation will characterize the geotechnical properties of subsurface materials to confirm the location and design of Site infrastructure.

To support the Site investigation, this document includes the following information:

1. DQOs (Section 2.0).
2. Sampling Process and Design (Section 3.0).
3. Assessment and Oversight (Section 4.0).
4. Health and Safety (Section 5.0).
5. Data Validation and Usability (Section 6.0).

This document references Pioneer Technical Services, Inc. (Pioneer) Standard Operating Procedures (SOPs) for activities that outline specific procedures to safely complete tasks included in the Site investigation. Table 1 lists the applicable SOPs.

1.2 Objectives of the Investigation

The main objective of the Site pre-design investigation is to collect data regarding the physical properties of the soil within the Site to inform the designs of Site excavation, infrastructure, and buildings. Existing Site infrastructure are illustrated on Figure 2. To meet the objectives in Table 2, a geotechnical analysis of Site conditions and soil will be completed to identify

subsurface soil conditions that will be encountered during construction activities. The data obtained will support the excavation design and future Site design, which will include construction of a new concrete wet well and aboveground pump and control building. Work activities will include piezocone penetration testing (CPT) at locations identified based on the preliminary building and vault location.

The CPT will be performed by ConeTec, LLC out of Salt Lake City, Utah. The geotechnical soil testing activities at the BPSOU Pump Station Site will be performed in concert with additional sitewide geotechnical efforts, specifically:

- Further pre-design investigation work at the Diggings East and Northside Tailings project areas to fill data gaps as outlined in the Request for Change (RFC) RFC-2020-01 (Atlantic Richfield Company, 2020) to the Agency-approved *Final Northside Tailings/East Buffalo Gulch Area and Diggings East Stormwater Basin Area Fill Characterization and Geotechnical Investigation Sampling and Analysis Plan* (Atlantic Richfield Company, 2018). This RFC was approved by the Agencies on March 26, 2020.
- Geotechnical soil testing to support structural design elements at the Buffalo Gulch project area (*Final BPSOU Buffalo Gulch and Grove Gulch Soils Characterization Sampling and Analysis Plan*, Atlantic Richfield Company, 2018).

2.0 DATA QUALITY OBJECTIVES

The DQOs are statements that define the type, quality, quantity, purpose, and use of data to be collected. EPA developed a seven-step process for establishing DQOs to help ensure that data collected during a field sampling program will be adequate to support reliable Site-specific decision making or estimation, whichever is appropriate (EPA, 2006). The DQOs for the geotechnical investigation at the Site were developed for the Site investigation according to the EPA process and are provided in Table 2.

3.0 DATA COLLECTION PROCESS AND STUDY DESIGN

The Site investigation will include obtaining geotechnical data to support remaining data gaps in the design of the pump station. The following subsections provide the procedures and protocols necessary to complete these tasks.

3.1 Preparation for Fieldwork

The following tasks will be completed prior to conducting field activities.

3.1.1 Training

All field personnel will have a current certification for the 40-hour Occupational Safety and Health Administration Hazardous Waste Site and Emergency Response Training. Current

certification records will be maintained at Pioneer's headquarters at 1101 S. Montana Street in Butte, Montana.

In a project meeting held prior to fieldwork, all field personnel will review this QAPP and receive any specified training. Field personnel will review sampling and monitoring procedures and requirements prior to field activities to ensure collecting and handling methods are completed according to the QAPP requirements. Field personnel will be trained on how to properly use field equipment and complete activities according to field data collection SOPs in Appendix A.

The Field Team Leader will review the internal BPSOU Site-Specific Health and Safety Plan (SSHASP) with all field personnel prior to fieldwork to assess the Site's specific hazards and the control measurements put in place to mitigate these hazards. The SSHASP review will cover all other safety aspects related to the Site including personnel responsibilities and contact information, additional safety requirements and procedures, and the emergency response plan.

Personnel will perform hazard identification/task risk assessments prior to performing specific tasks related to the Site investigation. One hard copy of the current approved version of the QAPP will be maintained for reference purposes in the field vehicle and/or field office. All field team personnel will have access to electronic PDF format files of all documents pertaining to fieldwork.

3.1.2 Best Management Practices

Although a Joint Application for Proposed Work in Montana's Streams, Wetlands, Floodplains, and other Water Bodies (Joint Application) is not required for Superfund related activities, Atlantic Richfield Company (Atlantic Richfield) has identified measures that will be taken to ensure that the substantive requirements of the Joint Application and applicable requirements are met during the field activities. Protection of the environment during field activities will be addressed through implementation of short-term construction Best Management Practices (BMPs). General descriptions of the BMPs to be implemented to minimize the project impacts to the riparian area adjacent the Site are provided in the sections below.

During Site work activities, standard BMPs will be followed/installed, as appropriate, to minimize off-Site sediment tracking and to prevent storm water runoff from transporting sediments and/or pollutants (e.g., construction related oils, fuels, and other materials) downgradient into Silver Bow Creek (SBC) and/or Blacktail Creek (BTC). Due to the nature of the CPT, there will be no investigation derived waste or material removed from the borehole, minimizing the potential for disturbance. Typical BMPs may include, but are not limited to, the following:

- A vegetative buffer of native soil/vegetation will help attenuate any sediments and/or pollutants in storm water flowing from the investigation area into SBC/BTC.

- Spillguard® secondary containment systems (or equivalent) will be used, as necessary, to contain any inadvertent spills or leaks. The pre-design construction contractor will have a spill kit on-site for fueled equipment.
- CPT boreholes will be backfilled with cement-bentonite grout after testing.
- General good housekeeping practices (e.g., equipment maintenance, etc.)

The Field Team Leader will be responsible for ensuring BMPs are installed properly at appropriate locations. Additionally, the Field Team Leader will be responsible for initiating corrective actions, as necessary.

3.2 Geotechnical Characterization

Up to four CPT boreholes will be performed as part of the geotechnical investigation (Figure 3). The CPT functions by continuously inserting an instrumented cone (rod) into the underlying strata and measuring tip resistance, dynamic pore pressure, sleeve friction, and seismic wave velocity. These data are used to develop a continuous soil profile and design parameters. Specifically, the CPT will provide continuous, high-quality data for liquefaction analysis.

The number and location of the boreholes may be modified as determined by the Field Team Leader and/or Contractor Project Manager (CPM) in consultation with the Contractor Quality Assurance Officer (QAO). Due to the anticipated high quality of the CPT dataset for purposes of design, the project team may determine less than all four proposed locations will be necessary to obtain sufficient data. The CPT will be conducted as per all relevant and applicable SOPs in Appendix A, and to the best practices of the drilling contractor.

3.2.1 Scope of Work

To meet the objectives in Table 2, the proposed scope of work to be completed under this Work Plan consists of the following tasks:

- Perform updated survey of Site, including Site surface topography and relevant Site features.
- Conduct geotechnical testing at the proposed locations (Figure 3).
- Provide geotechnical recommendations for the forthcoming BPSOU Subdrain Pump Station, compiled into the Geotechnical Investigation Evaluation Report, as outlined in the Pre-Design Investigation (PDI) Work Plan.

3.2.2 Proposed Location Staking and Survey

Prior to any ground disturbance, the proposed borehole locations identified on Figure 3 will be surveyed and staked. These locations will be reviewed for accessibility and safety concerns by Atlantic Richfield and/or their representatives and modified accordingly. As described in the Remedial Design Work Plan (RDWP), an updated site-survey will be performed to update the existing light detection and ranging survey with a topographical and utility location survey suitable for design.

3.2.3 Drilling Equipment

Based on field conditions and recommendations from the geotechnical engineer, the drilling methods available and selected for the boreholes proposed at the Site (Figure 3) include the CPT rig. The continuous, high-quality geotechnical data produced by the CPT rig offers an excellent dataset to understand the geotechnical properties of Site soils. In combination with historical drilling, dewatering, and construction data from previous efforts, the CPT boreholes will be sufficient to make geotechnical recommendations for design of Site infrastructure.

3.2.4 General Procedures

Unlike traditional drilling and sampling methods (e.g., Geoprobe or sonic drilling), the CPT rig does not involve removal of sampling, but rather *in-situ* analysis of Site soils by insertion of an instrumented rod or probe. Once mobilized to the locations shown on Figure 3, the CPT will be inserted to the depths indicated in Table 3. The CPT soundings will be recorded and logged by the drilling contractor, and will include:

- Tip resistance
- Dynamic pore pressure
- Sleeve friction
- Seismic wave velocity
- Groundwater level

When taken together, these measurements provide a continuous picture of the properties of soils in the proposed building and wet well location. After completion of the testing, the holes will be backfilled with cement-bentonite grout. The data will be compiled into a report and provided to the project team by the drilling contractor. The general depth of each borehole is specified in Table 3 and may be limited or increased based on field personnel observations or potential refusal of the CPT rig.

3.3 Standard Operating Procedures

This QAPP includes SOPs that apply to particular field activities, and the SOPs are referenced in the appropriate sections throughout this report and are included in Appendix A. Depending on circumstances and needs, it may not be possible or appropriate to follow the SOPs exactly in all situations due to Site conditions, equipment limitations, and limitations of the standard procedures. When necessary to perform an activity that does not have a specific SOP, or when the SOP cannot be followed, existing SOPs may be used as a general guidance or similar SOPs (not listed in this report) may be adopted if they meet the project DQOs. All modifications or adoptions will be approved by the Field Team Leader, CPM, and Contractor QAO and documented in the field logbook and/or the final project report, as appropriate.

3.4 Documents and Records

Due to the nature of the CPT *in-situ* testing, no soil samples will be produced or analyzed as part of the investigation. Boreholes will be named following the convention indicated on Figure 3 and

will correlate between topographical survey and CPT data. The geotechnical engineer and Field Team Leader will be onsite to observe and record notes on the CPT testing.

3.4.1 Field Documentation

The following sections outline the required procedures and protocols for documentation of field activities, including record taking using the field logbook and field photography.

3.4.1.1 Field Logbook

To provide a permanent record of all field activities, field personnel will document all activities in a bound field logbook (refer to field SOPs in Appendix A). This will include a description of conditions during sampling activities. When field logbooks are used, each logbook will have a unique document control number, be bound, and have consecutively numbered pages. All entries will be in waterproof ink, and any mistakes will be lined out with a single line and initialed by the person making the correction. Whenever a sample is collected or a measurement is made, a detailed description of the sample location and any additional observations will be recorded. The global positioning system coordinates will be recorded when appropriate. Individual field team members may be responsible for required documentation based on specific tasks assigned by the Field Team Leader or CPM.

All significant observations, measurements, relevant data, and results will be clearly documented in the data log or the field logbook. At a minimum, the following will be recorded:

- A description of the field task.
- Time and date fieldwork started.
- Location and description of the work area including sketches, if possible, map references, and references to photographs collected.
- Names and titles of field personnel.
- Name, address, and phone number of any field contacts or site visitors (e.g., Agency representatives, auditors, etc.).
- Meteorological conditions at the beginning of fieldwork and any ensuing changes in the weather conditions.
- Details of the fieldwork performed, and the field data sheets used.
- All field measurements made.
- Any field analysis results.
- Personnel and equipment decontamination procedures.
- Deviations from the QAPP or applicable field SOPs (Appendix A).

For CPT boreholes the following entries will be made:

- Photograph or video of each boring with a staff gage or tape measure for scale to document existing conditions. Include site name identification in photograph using a white board or note pad.

- Abnormal occurrences or materials, deviations from the QAPP, or other relevant observations.

3.4.1.2 Field Photographs

Photographs will be taken of field activities. When practical, photographs should include a scale in the picture as well as a white board with relevant information (e.g., time, date, location, etc.). Additional photographs documenting Site conditions will be taken, as necessary. Documentation of all photographs taken during sampling activities will be recorded in the bound field logbook or appropriate field data sheets (refer to field SOPs in Appendix A), and will specifically include the following for each photograph taken:

- Time, date, and location.
- Photograph or video number from the camera or video recorder.
- The identity of the person taking the photograph or video.
- Direction that the photograph was taken, and description of the subject photographed.

The digital files will be placed with the electronic project files with copies of supporting documentation from the bound field logbooks.

3.4.2 Sample Handling, Documentation, and Shipping

Collection of geotechnical data using the CPT method will not involve any sample collection, handling, documentation, or shipping. No chain of custody procedures are therefore described in this QAPP. The data will be collected *in-situ* in real time at the Site.

3.5 Instrument/Equipment Testing, Inspection, Maintenance and Calibration

To ensure continual quality performance of all instruments and equipment, testing, inspection, and maintenance will be performed and recorded as described in this section. All field and laboratory equipment will be operated, maintained, calibrated, and standardized in accordance with all EPA and manufacturer's recommended procedures.

3.5.1 Field Equipment

Field equipment will be examined to verify that it is in proper operating order prior to its first use. Equipment, instruments, tools, gages, and other items requiring preventative maintenance will be serviced and/or calibrated in accordance with the manufacturer's specified recommendations, as necessary. Field equipment will be cleaned (decontaminated) and safely stored between each use. Any routine maintenance recommended by the equipment manufacturer will also be performed and documented in field logbooks. Calibration of field equipment will be completed in the field at the beginning of each day and recorded in the field logbooks. Any equipment deficiencies or malfunctions during fieldwork will be recorded as appropriate in the field logbooks. The SOPs for the field equipment are in Appendix A.

3.6 Inspection/Acceptance of Supplies and Consumables

All supplies and consumables received for the project (e.g., sampling equipment, calibration standards, etc.) will be checked to ensure their condition is satisfactory, such as free of defects that would affect performance. The types of equipment needed to complete sampling activities are described in the relevant field SOPs (Appendix A). Inspections of field supplies will be performed by the Field Team Leader or field team members.

3.7 Data Management Procedures

This section describes how the data for the project will be managed, including field and laboratory data. Data will be managed in accordance with the BPSOU *Draft Final 2022 Data Management Plan* (Atlantic Richfield Company, 2022).

The QAPP quality records will be maintained by Atlantic Richfield. These records, in either electronic or hard copy form, may include the following:

- Project work plans with any approved modifications, updates, and addenda.
- Project QAPP with any approved modifications, updates, addenda, and any approved corrective or preventative actions.
- Field documentation (including logbooks, data sheets, and photographs) in accordance with SOP-SA-05 in Appendix A.
- CPT field testing results.
- RDWP report.

Hard copy field records will be maintained in the project's central data file, where original field documents are filed chronologically for future reference. These records will also be scanned to produce electronic copies. The electronic versions of these records will be maintained on a central Microsoft structured query language (SQL) server system that is backed up regularly. The data will be stored on the SQL server and a Microsoft Access database will be set up to access the data, which can then be exported to Excel, if necessary, for further graphing and interpretive analysis. Using a Microsoft-based software configuration is widely accepted with support from Microsoft and allows for easy data sharing with most hardware configurations.

All field-testing data and supporting documentation will be subject to appropriate review to ensure the accuracy and completeness of original data records prior to uploading into the project database. Field data that have been reviewed and approved in a hard copy format will be entered into an electronic system to be uploaded to the project database. Following these review steps, field testing electronic data files will be imported to the project database.

Standardized data import formats and procedures will be used to upload field testing data into the electronic database. Standardized parameter names, numerical formats, and units of measure will be applied to the original information to facilitate comparability across all data sets and within the database. Using these standardized formats will allow for quick and easy querying to retrieve

data. Data can be retrieved by exporting into an Excel file and, because the data will be formatted with parameter names, easily made into a pivot table for data processing.

4.0 ASSESSMENT AND OVERSIGHT

Assessment and oversight of data collection and reporting activities are designed to verify that testing is performed in accordance with the procedures established in this QAPP. The audits of field-testing activities include two independent parts: internal and external audits. Internal audits will be performed by Atlantic Richfield, their contractor, or a contracted laboratory consultant, as necessary. External audits will be performed by EPA, as necessary. Performance and systems audits of field data collection and reporting procedures are described in this section.

4.1 Field Activities Oversight

Oversight personnel will have the ability to view field testing and determine the appropriateness of the recorded data and ensure that the appropriate data are recorded. Any deviations from this QAPP will be brought to the attention of oversight personnel. If the deviation is first determined by oversight personnel, Atlantic Richfield and/or field representatives will be immediately notified. Reasons for such deviations will be recorded in the field logbook along with corrective actions to be implemented, if required. If oversight personnel request a deviation from the QAPP, the deviation and the reasons for the deviation will be noted and then signed by the agency personnel.

4.2 Corrective Action Procedures

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out-of-quality control performance, which can affect data quality. Corrective action can occur during field activities, laboratory analyses, and data assessment.

Non-conforming equipment, items, activities, conditions, and unusual incidents that could affect data quality and attainment of the project's quality objectives will be identified, controlled, and reported in a timely manner. A non-conformance is defined as a malfunction, failure, deficiency, or deviation that renders the quality of an item unacceptable or indeterminate in meeting the project's quality objectives. Corrective actions implemented by field personnel will follow appropriate field SOPs (Appendix A), as necessary. Corrective actions to address non-conformance conditions will be taken in consultation with the CPM and reported on a Corrective Action Report (CAR) form included in Appendix B, as necessary. In the event that corrective action requests are not in complete accordance with approved project planning documents, EPA will be consulted and concurrence will be obtained before the change is implemented.

Completion of any corrective action should be evidenced by data falling within the project's performance criteria for the field-testing data. If this is not the case, and a data collection error or faulty procedure cannot be found, the results will be reviewed by the CPM and Field Team Leader in consultation with the Contractor QAO to assess whether re-testing is required.

All corrective actions taken will be documented and reported to the Field Team Leader and CPM. In the event that corrective action requests are not in complete accordance with approved project planning documents, EPA will be consulted and concurrence will be obtained before the change is implemented. All corrective action records will be included with the QAPP records.

4.3 Corrective Action During Data Assessment

During data assessment, the Contractor QAO could identify the need for corrective action. Potential types of corrective action may include re-testing by the field team. The appropriate and feasible corrective actions will depend on the ability to mobilize the field team and whether the data to be collected are necessary to meet the required Quality Assurance objectives. If corrective action requests are not in complete accordance with approved project planning documents, EPA will be consulted and concurrence will be obtained before the change is implemented. Corrective actions of this type will be documented by the Contractor QAO on a CAR and will be included in any subsequent reports.

4.4 Quality Assurance Reports to Management

After the investigation is complete, the Atlantic Richfield contractor (Pioneer) will incorporate the results into the Geotechnical Investigation Evaluation Report summarizing and interpreting the testing activities. The report will include the following:

- Summary of the investigations performed.
- Summary of investigation results.
- Summary of collected data (i.e., tables and graphics).
- Testing data reports.
- Narrative interpretation of data and results.
- Photographs documenting the work conducted.
- Conclusions and recommendations for Remedial Design (RD), including design parameters and criteria.
- Recommendations for an additional phase(s) (if necessary).

The CPM and Contractor QAO are responsible for preparing the PDI Evaluation Report, including the Geotechnical Investigation Evaluation Report. All Site investigations will be incorporated into the report as the design progresses, and the report will be submitted in draft final form to EPA and Montana Department of Environmental Quality for review approximately 30 days prior to the Intermediate 60% RD Report for the Site.

5.0 HEALTH AND SAFETY

All work completed by Pioneer and its subcontractor during execution of the investigation will be performed in accordance with all procedures outlined in the BPSOU SSHASP. The BPSOU SSHASP may be updated to include unique hazards that materialize during field activities for the

investigation, including identifying necessary Task Risk Assessments to perform prior to field work.

6.0 DATA VALIDATION AND USABILITY

This section addresses the final project checks conducted after the data collection phase of the project is completed to confirm that the data obtained meet the project objectives and to estimate the effect of any deviations on data usability for the express purposes of achieving the stated DQOs (Section 2.0). For the estimation of geotechnical properties, no formal data validation will be required to answer the primary study questions (e.g., Stage 2B Validation Manual). Data collected in the field will be sufficient to make appropriate estimations of geotechnical characteristics necessary for the BPSOU Pump Station design.

Data reported by the drilling contractor will be reviewed by the CPM and QAO to ensure the data meets sufficient quality standards for the purposes of answering the estimation statement. Field logbook documentation will be verified against the reported test data results to verify there are no discrepancies between reported testing and that outlined in this QAPP and recorded in the field by the geotechnical engineer. Types of information collected in the field logbook that will be checked by the CPM and/or QAO include:

- Date.
- Field team and/or leader.
- Physical description of sample location.
- CPT sounding depth
- CPT sounding begin and end time
- CPT location name and number
- Field notebook(s) in secure location.
- Complete field forms (as required)

Basic data verification checks performed by the CPM and/or QAO will include an evaluation of the following, as applicable for each analytical method:

- Completeness of data package.
- Requested CPT data performed.
- Instrument calibration (as required).
- Internal standards.

7.0 REFERENCES

Atlantic Richfield Company, 2022. Butte Area NPL Site Butte Priority Soils Operable Unit Draft Final Draft Data Management Plan. Prepared by TREC Inc. February, 2022.

Atlantic Richfield Company, 2020. BPSOU Final Northside Tailings/East Buffalo Gulch Area (NST) and Diggings East Stormwater Basin Area (DE) Fill Characterization and Geotechnical Investigation Sampling and Analysis Plan (SAP) Request for Change (RFC) 2020-01.

Atlantic Richfield Company, 2018. Final BPSOU Buffalo Gulch and Grove Gulch Soils Characterization Sampling and Analysis Plan. Prepared by TREC Inc. October, 2018.

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.

EPA, 2006. Guidance on Systematic Planning Using the Data Quality Objectives Process (QA/G-4). Washington DC: EPA, Office of Environmental Information. EPA/240/B-06/001. Available at *http://www.epa.gov/quality/qs-docs/g4-final.pdf*.

FIGURES

MONTANA AVENUE
MAIN STREET
FRONT STREET
MH-MSD116
AT STA 55+00
BPSOU SUBDRAIN
PERFORATED 10" PVC
MH-MSD113
42+50
BRW-00
SLAG CANYON
NORTHSIDE
TAILINGS
KAW AVENUE
BRW-01 EAST
BRW
MH-MSD110
STA 28+53
BUFFALO
GULCH
BPSOU SUBDRAIN
VAULT PUMPING SYSTEM
SUBDRAIN DISCHARGE
TO HCC
MH-MSD108
STA 17+50
MH-MSD106
STA 8+70
DIGGINGS
EAST
BPSOU SUBDRAIN
8" HDPE DISCHARGE LINES
SUBDRAIN
CONTROL BUILDING
BLACKTAIL CREEK

LEGEND:

- BPSOU SUBDRAIN
- BPSOU SUBDRAIN DISCHARGE LINE

N

DISPLAYED AS:
COORD SYS/ZONE: MONTANA STATE PLANE
DATUM: NAD 83
UNITS: FEET
SOURCE: 2020 QSI

SCALE IN FEET
0 250 500

FIGURE 1

BPSOU SUBDRAIN
SITE LOCATION
MAP

PIONEER
TECHNICAL SERVICES, INC.
www.pioneer-technical.com
(406) 782-5177

DATE: 4/2022

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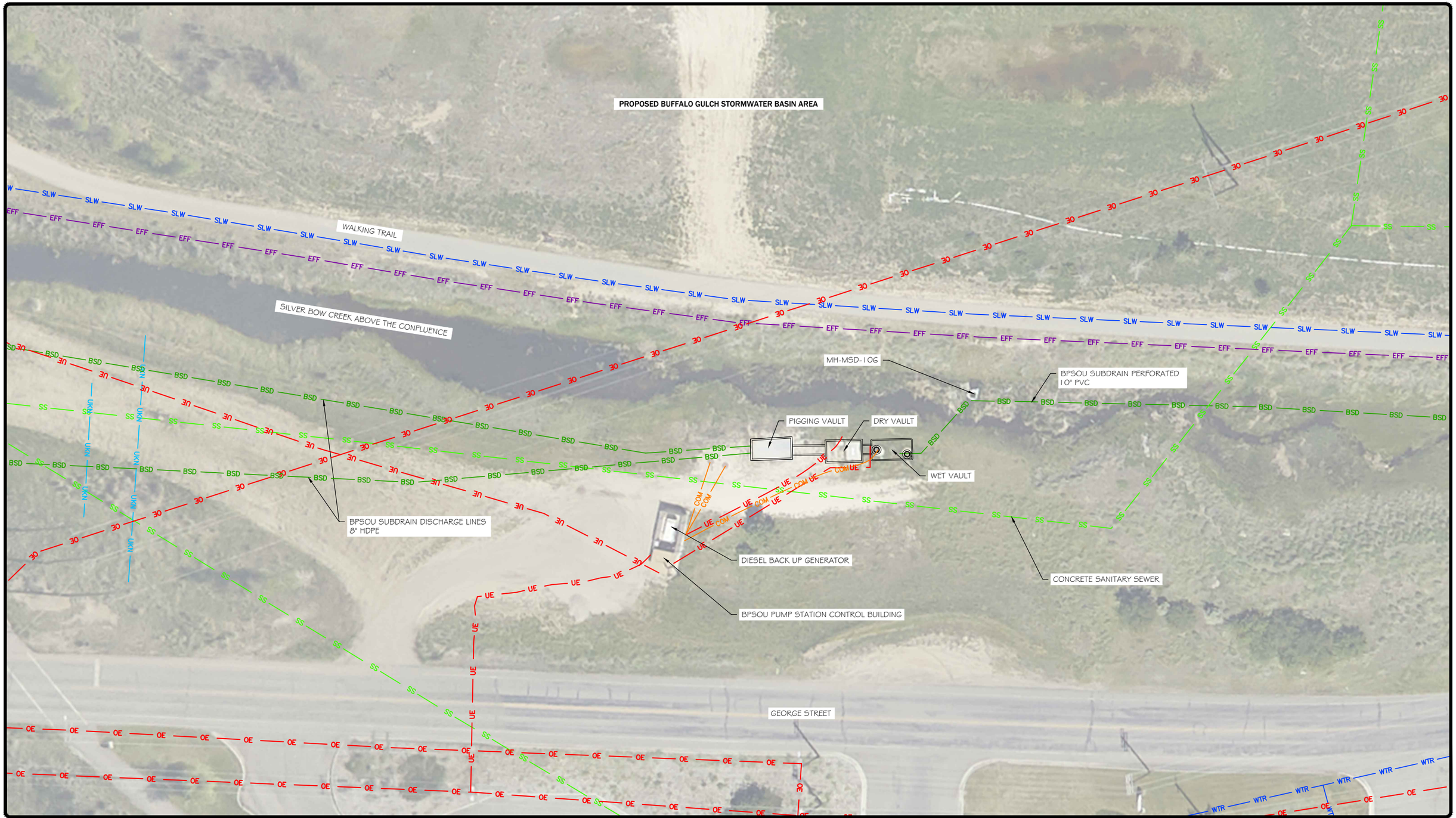

LEGEND:

SLW	SILVER LAKE WATER LINE	WTR	WATER LINE
EFF	HORSESHOE BEND EFFLUENT LINE	COM	COMMUNICATION LINE
SS	SANITARY SEWER LINE	UKN	UNKNOWN LINE
BSD	BPSOU SUBDRAIN		
UE	UNDERGROUND ELECTRICAL LINE		
OE	OVERHEAD ELECTRICAL LINE		

N

DISPLAYED AS:
COORD SYS/ZONE: MSP83
DATUM: NAVD88
UNITS: IF
SOURCE: QSI 2020/PTS

SCALE IN FEET
0 20 40

FIGURE 2

PIONEER TECHNICAL SERVICES, INC.
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(406) 782-5177

BPSOU SUBDRAIN PUMP STATION EXISTING INFRASTRUCTURE

DATE: 4/2022

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LEGEND:

◉ **PROPOSED BOREHOLE LOCATIONS**

N

DISPLAYED AS:
COORD SYS/ZONE: MSP83
DATUM: NAVD88
UNITS: IF
SOURCE: QSI 2020/PTS

SCALE IN FEET
0 10 20

FIGURE 3

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PROPOSED GEOTECHNICAL INVESTIGATION LOCATIONS

DATE: 10/2022

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TABLES

Table 1. Applicable and Relevant Standard Operating Procedures

SOP Number	Title	Version
PIONEER TECHNICAL SERVICES, INC. STANDARD OPERATING PROCEDURES		
SOP-DE-01	PERSONAL DECONTAMINATION PROCEDURES	03/30/2022
SOP-DE-02	EQUIPMENT DECONTAMINATION	09/08/2020
SOP-SA-05	PROJECT DOCUMENTATION	4/14/2022
SOP-SURVEY-01	STAKING AND SURVEYING	10/24/2016

Table 2. Data Quality Objectives

This table lists the data quality objectives (DQOs) for the BPSOU Pump Station Investigation (Site Investigation). The Site Investigation is detailed in the BPSOU Pump Station Remedial Design Work Plan (RDWP), Pre-Design Investigation Work Plan (PDI WP), and BPSOU Pump Station Quality Assurance Project Plan (QAPP). The tables, figures, and sections referenced in this table are part of the QAPP. The DQOs address how the investigation activities will meet the data gaps discussed in the RDWP.

Step 1: State the Problem: *The purpose of this step is to describe the problem to be studied so that the focus of the investigation will not be ambiguous.*

Problem: The BPSOU Pump Station will involve construction of a subgrade wet vault and a new pump house building, and connection of the existing subdrain/discharge piping to the new wet well and pump house. Subsurface geotechnical information will be required to inform the excavation and construction of these Site features prior to advancing the design. Investigating the geotechnical properties of Site soils will ensure adequate soil stability around existing structures/utilities as well as in areas of proposed structural features. Past investigations have collected data related to the soil lithologies within the Site; however, a geotechnical investigation focused on evaluating the physical properties of the soil in the area of the additional construction has not been completed. This information is needed to properly design the excavation surface, and any structural features such as foundations, parking lots, etc. that may be part of the design for the Site. The RDWP contains detailed description of the Site history, previous investigations, and the pre-design work plan.

Available Resources and Schedule: Pioneer Technical Services Inc. (Pioneer) is the contractor responsible for conducting the elements of the Site Investigation under the direction of Atlantic Richfield Company. All personnel completing field work will be properly trained in how to perform their tasks. The Site Investigation work will be completed in fall 2022 to meet the current required design schedule for the RA.

Planning Team: The RDWP includes a detailed description on the project organization and responsibilities (Section 4.0).

Step 2: Identify the Goals of the Study*: This step identifies the principal questions that the study will attempt to resolve and what actions may result.*

Principal Study Questions:

- What are the geotechnical properties of the subsurface material that will be encountered during construction?
- How will the physical characteristics (dynamic pore pressure, resistance, etc.) of the soil impact the design of the excavation surface and infrastructure such as parking lots, walking trails, structural foundations, etc.?

Estimation Statement: A geotechnical investigation will address the principal study questions. Analysis of results will inform quantitative and qualitative estimates for design elements and material needed to achieve proper soil stability.

Step 3: Identify Information Inputs*: The purpose of this step is to identify the informational variables that will be required to answer the principal study questions and determine which variables require environmental measurements.*

Types of Information that are Needed:

- Cone penetration test sounding logs measuring tip resistance, dynamic pore pressure, sleeve friction, and seismic wave velocity.
- Survey-grade GPS location coordinates for additional boreholes.

Source of Additional Information:

- BPSOU Pump Station RDWP
- BPSOU Pump Station Pre-Design Investigation Work Plan (PDI Work Plan)
- Results from any other investigation activities where borehole and/or test pit data were collected from the Site and surrounding area (if data meet applicable performance or acceptance criteria).

Applicable Limits/Thresholds:

- This is a preliminary investigation to gather information.

Appropriate Sampling and Analysis Methods:

Cone penetration testing is an appropriate *in situ* soil characterization technique and sounding logs will be collected to the depths indicated in Table 3.

Table 2. Data Quality Objectives

Step 4: Define the Boundaries of the Study*: The purpose of this step is to define the spatial and temporal boundaries of the study.*

Target Population: Figure 3 shows the areas to be analyzed during the Site Investigation.

Specific Spatial Boundaries, Temporal Boundaries, and Other Practical Constraints: Personnel will coordinate with ongoing subdrain/pumping and other remedy operations during drilling. Actual placement and/or completion of the borehole locations in the field will be subject to change based on field conditions (including existing infrastructure and land use in the area), changes to the design (including potential changes to the pumphouse building or wet well locations), or as deemed necessary by Field Team Leader and/or CPM in consultation with the Contractor QAO.

Scale of Estimates to be Made: Geotechnical evaluation from soil data will inform the design and implementation/work practices of excavation and construction of the wet well and pumphouse building.

General Spatial Boundaries, Temporal Boundaries, and Other Practical Constraints: Fieldwork will begin once Agency approval has been received. A proposed schedule is provided in the RDWP. Work will be performed as weather conditions permit. Contractor will coordinate with the operations team to minimize any potential disruption to remedy operation. Potential constraints that could delay fieldwork include adverse weather conditions, contractor availability, challenges with drilling caused by Site conditions, or other unforeseen issues. Major project delays resulting from these constraints will be recorded in the field logbooks and reported to the Agencies.

Step 5: Develop the Analytical Approach*: The purpose of this step is to specify the appropriate population parameters for making estimates.*

Population Parameters:

- General description of soil properties and characteristics.
- Groundwater levels and dynamic pore pressure.
- Sleeve friction and tip resistance.
- Seismic wave velocity.
- General geotechnical modeling and calculations.
- Liquefaction analysis (if warranted).

Specification of the Estimator: A geotechnical analysis will yield quantitative and qualitative results needed to inform the excavation and construction design and implementation/work practices.

Step 6: Specify Performance or Acceptance Criteria*: The purpose of this step is to define the performance or acceptance criteria that the collected data will need to achieve.*

Specify Acceptable Limits on Estimation Uncertainty: While some uncertainty in the estimate is inevitable and a minimum level of uncertainty is preferred, traditional statistics do not apply to the qualitative aspects of the Site Investigation. Therefore, non-statistical (expert judgement) methods will be used primarily as the basis for geotechnical evaluation.

Table 2. Data Quality Objectives

General Performance or Acceptance Criteria: For estimation problems (Step 6B of EPA guidance), the collected data will be used to estimate unknown parameters, together with some reported measure of uncertainty in the estimate. Errors occur when data mislead the Site managers into choosing an inappropriate response. The potential for errors exists because all field and analytical measurements inherently contain sampling error and/or measurement errors.

- ***Sampling/Testing Error:*** Sampling and/or field testing design errors occur when the data collection scheme does not adequately address the inherent variability of the matrix being tested. Testing design errors will be minimized by following the procedures outlined in the QAPP, and allow for additional borings to close data gaps based on observations in the initial 4 borehole locations, as needed.
- ***Measurement Error:*** Measurement errors occur from the inherent variability in taking field measurements and/or collecting, preparing, and analyzing an environmental sample. Field measurement errors will be minimized by using experienced environmental/geotechnical staff and following the relevant Standard Operating Procedures (SOPs).

All field testing data gathered during the Site Investigation will be reviewed by the CPM and QAO to ensure that the data are suitable for their intended purpose. Types of data review processes that will be followed to ensure testing results meet project objectives are detailed in Section 6.0. If significant issues with the data are found, results will be discussed with the EPA.

Step 7: Develop the Plan for Obtaining the Data*: This step identifies a resource-effective data collection design for generating data expected to satisfy the DQOs.*
Summaries of the data collection design are listed here. A more detailed description is listed in the QAPP and RDWP.

Sampling/Testing Design: Perform 4 continuous CPT sounding logs at the locations indicated in Figure 3. Compile and analyze the results of the *in situ* CPT testing. Details are discussed in Section 3.2.

Evaluating Key Assumptions: The focus of this objective for the Site Investigation is to collect additional useable data for a Site Investigation. The data review procedures (Section 6.0) will ensure the data collected is useable for this intended purpose. If design criteria are not met, if design criteria change, or if more information is needed, additional geotechnical boreholes may be installed. Any additional work will be proposed in an RFC for Agencies' review and approval.

References:

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. Sections referenced in this text include Table 1 of Appendix 1 of Attachment C to Appendix D and Table 2-1 of Attachment A to Appendix D.

Table 3. Sample Proposed Locations, Type and Depth

Location Name	Northing[1] (Approximate)	Easting[1] (Approximate)	Target Depth[1] (ft)	Installation Method
Proposed Geotechnical Boreholes				
PS22-BH01	651123.0	1197850.4	>20 feet	CPT
PS22-BH02	651128.9	1197798.4	>20 feet	CPT
PS22-BH03	651123.3	1197809.4	>20 feet	CPT
PS22-BH04	651151.9	1197853.7	>40 feet	CPT

[1]The final location and installation depth of the proposed boreholes may be modified by the geotechnical engineer in the field, in consultation with the CPM and QAO. CPT- Cone Penetration Testing

Appendix A
Standard Operating Procedures

PURPOSE	To provide standard instructions for operating survey equipment, staking, flagging and painting survey marks, and recording of field work performed.
SCOPE	This practice has been prepared for the Pioneer Technical Services, Inc. (Pioneer) workforce and applies to work carried out by and on behalf of Pioneer. All members of the Pioneer workforce who conduct the work will be trained and competent in the risk-assessed work described below.

WORK INSTRUCTIONS

The following instructions are intended to provide sufficient guidance to perform the task in a safe, accurate, and reliable manner. Should these instructions present information that is inaccurate or unsafe, operations personnel must bring the issue to the attention of the Project Manager and the appropriate revisions made. All work performed under this SOP will be consistent with procedures and policies described in the appropriate Operation, Maintenance, and Monitoring (O&M) Plan (where applicable), appropriate Site-Specific Health and Safety Plan (SSHASP), and Pioneer Corporate Health and Safety Plan (HASP).

TASK	INSTRUCTIONS
1. Storing survey equipment.	Store survey equipment in a secure, climate-controlled weatherproof area when not in use.
2. Charging Global Positioning System (GPS), robot, and data collector batteries.	Charge batteries used in survey equipment in a climate-controlled weatherproof area. The use of a surge protector (power strip) to supply power to the battery chargers is recommended. Only use manufacturer's approved batteries and chargers.
3. Transporting survey equipment in vehicles.	Transport survey equipment in a weatherproof area of a vehicle to prevent unnecessary exposure to elements that could adversely affect the calibration of various survey instruments and their accessories. Secure equipment in the vehicle during transportation so that it does not become a projectile in the case of an accident or other sudden maneuver.
4. Setting stakes/lath and hubs.	Setting of survey stakes and hubs often requires the use of a 3-to 4-pound engineer or drilling hammer (hand held) (refer to Figure 1) or a 8- to 12-pound sledgehammer, and a gad (frost pin) (refer to Figure 2) manufactured and/or distributed by Red Top or Lo-Ink, designed to mushroom and not splinter when struck, to create a pilot hole in various soil surfaces in order to set the stake or hub.

Figure 1 – Drilling Hammer

Figure 2 – Gad (Frost Pin)

The gad (frost pin) will be from an authorized survey supply company. Any type of gad (frost pin) that is made of a material that can create shrapnel (i.e., jack hammer bits) or from an unauthorized survey supply company will not be used. When hammering stakes/hubs into surface, care will be taken to avoid splintering of stake/hub.

Set the hubs and stakes/lath in the following manner:

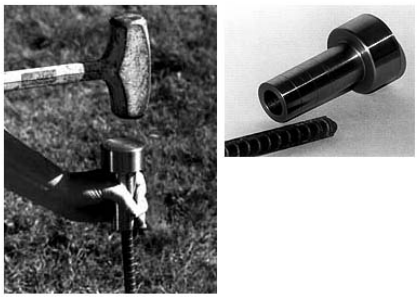
- After determining the position of the hub/stake/lath, determine the soil condition.
- If soil is loose or non-compacted, simply drive the hub/stake/lath into the ground until the hub/stake/lath is stable.

If soil is hard packed or compacted, use the following steps:

- Make a pilot hole using a gad.
- Grip the gad in your non-dominant hand halfway up the length of the gad and place the point of the gad at the desired position of the survey point.
- Using the drilling hammer in your dominant hand, strike the top of the gad a sufficient number of times to make a pilot hole of the desired depth.
- To remove the gad from the pilot hole, strike the sides of the gad with the drilling hammer in opposing horizontal directions to loosen the gad.
- Remove the gad from the pilot hole and insert the hub/stake/lath into the ground until the hub/stake/lath is stable.

5. Setting rebar.

Setting of rebar is necessary to establish control points and property corners. The use of a rebar driver (refer to Figure 3) manufactured and/or distributed by Surv-Kap or Lo-Ink, designed to mushroom and not splinter when struck, will be utilized to prevent mushrooming of the rebar and to allow for a larger striking surface. The proper sized driver for the proper sized rebar will be used (i.e., ½ inch for #4 rebar, 5/8 inch for #5 rebar, etc.).

	 Figure 3 – Rebar Driver Set rebar in the following manner: • After determining the desired position of the property corner or control point, select a section of 5/8-inch rebar (12-inch length for control points, 24-inch length for property corners). • Inspect the section of rebar and ensure that it is straight and free of burrs at the ends. • Place one end of the rebar at the desired position and hold it with your non-dominant hand. • Place the rebar driver over the end of the rebar. Using the drilling hammer (held in your dominant hand), strike the rebar driver until the bottom of the rebar driver contacts the surface that the rebar is being driven into. This will leave the rebar exposed approximately 2½ inches, allowing either a plastic or aluminum survey cap to be placed on the exposed end of the rebar. • Drive the rebar and cap flush with the surface by placing a "cap driver" (sold by Surv-Kap) over the cap and striking the "cap driver" to set the cap flush to the surface. • In the event that a control point or property corner needs to be set in a paved surface, a pilot hole will be drilled first with a hammer drill and the correct sized bit.
6. Checking points daily.	Check points will be performed daily (per job) to verify the following: • Base point and height of base are correct. • Survey coordinate system and datum are correct. • Control remains within project specifications.
7. Using point ranges.	The following point ranges will be used on all jobs: • 1-299 Project Control (found or set). • 300-499 Found Monuments. • 500-999 Calculated Monuments. • 1000-2999 Calculated Design. • 3000-Infinity Topo and staking store points.

8. Booking of survey activities.	Record surveying activities on a daily basis (per job) in a field book to facilitate the ease of record keeping and the ability at a later date to recall the activity performed. The following will be the minimum data recorded in the field book:
	
	• Job name, location, coordinate system, and vertical datum used (header page) along with a brief description of the survey activities performed.
	• Date of field work and initials of all crew members.
	• Base point used along with height and type of measure up (fixed height, slant height, center bumper height, bottom of antenna mount, etc.).
	• Check point(s) used with Δ Northing, Δ Easting, and Δ Elevation differences written along with "Stored As" point (i.e., CK7-5 would be the 5th check point on CP7).
	• Any new control points or bench marks set (or found) along with their description.
	• Description of property corners set or found (e.g., type of rebar/cap, found stone, pipe, etc.) along with ties to any accessories (e.g., fence corners, bearing trees, road intersections, etc.).
	• Point ranges stored and a brief description (e.g., 3001-4063 – topo of road and ditches from xxx intersection to xxx intersection).
	• Type of alignments staked and the point range that staked points were stored in.
	• Occupy and backsight points for conventional survey work (gun work) along with backsight check and points staked – per set up.
	• Any changes in rod height and the associated point ranges.
	• Leveling bench marks, foresights, backsights, and side shots will be recorded (when leveling is performed).
	• Any pertinent sketches deemed necessary.
	• Any issues with equipment, land owners, contractors, etc. that arise.
	• Any other information deemed pertinent by the individual performing the survey.
	
	Field books will be numbered in the following manner:
	
	• Volume by county using the Montana County numbers (i.e., Silver Bow is 1, Deer Lodge is 30, Lewis and Clark is 5, etc.).
	• Book by series (e.g., B1, B2, B3, etc.).
	• County name.
	• All of the above will be marked on the front outside cover and the side binding of the field book.
	• The title page at the beginning of the book will be filled out with the office information/address that the surveyor performing the work is based out of.
	  o An example of field book number is: V1-B4 Silver Bow (i.e., Volume 1 – Book 4 of Silver Bow County).
	  o Each individual page will be numbered as such (i.e., V1-B4-1, V1-B4-2, etc.) in the upper right hand corner of each page. One page is considered to be both the left and right page of any given field book when in an open position.

	o Once a field book is filled, the index at the front of the book will be filled in to aid in future tracking of field work already performed. The preferred type of field book is a Rite in the Rain All-Weather Transit No.300 series. **Note: all of the above is necessary to provide for an accurate means of recalling activities performed.**
9. Painting and flagging of survey marks.	 Figure 4 – Spray Paint Use the following steps when painting and flagging survey marks: • Stand upwind of survey marks to be painted. • Invert spray can, aim nozzle at survey mark, and depress nozzle spraying paint in a sweeping motion. • After desired amount of paint has been dispensed, point nozzle straight up and depress nozzle on quick time to prevent clogging. • Flagging will be tied securely to the mark or stake as necessary. **Note: per the Mine Safety and Health Administration regulations, spray paint will not to be stored in the cab of any vehicle. If it is necessary to warm cold paint cans up, do not leave cans unattended in the vehicle, and do not place them directly over heat vents.**
10. Placing control points.	Locations of control points, especially those that may be used for a GPS base point or Total Station, will be placed in a safe location away from overhead and underground utilities and out of the lanes of traffic. The GPS control will be in an area that is obstruction free in order to have the best view of satellites in the sky. A minimum of three control points per project will be established, preferably intervisible. The preferred primary control type is a #5 rebar (12 inches long) with a 2 inch aluminum control cap marked with the Control Point Number and the year it was set stamped into it. Secondary control (i.e., any control that will not be used for longer than one month) can be a 60D nail and flagging, RR spike, hub and tack, or other acceptable “temporary” style of control.

HSSE CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.				
SOURCE	***HAZARDS***	***WHERE***	***HOW, WHEN, RESULT***	***CONTROLS***
CHEMICAL	Potential contact with contaminated soils and dust.	Reclamation sites.	Adverse health effects could result from ingesting and/or inhaling contaminated soils/dust.	Personnel will practice proper personal hygiene: wash hands prior to eating/drinking and when leaving the site. Work will be suspended during high wind conditions that may produce large amounts of visible dust. Personnel will wear nitrile gloves, if contact with contaminated soil is possible.
	Fumes from marking paint.	Survey marks.	Inhalation of paint fumes when placing survey marks could result in adverse health effects such as headaches/ dizziness.	Personnel will stay upwind from the paint being sprayed.
NOISE	Not applicable.			
ELECTRICAL	Equipment contact with overhead utilities.	Sites with overhead utilities.	Injury, death or property damage could occur from survey equipment (i.e., survey rod) contact with overhead utilities.	Personnel will follow the procedures outlined in the Pioneer Overhead Utilities Program. When possible, personnel will avoid areas with overhead utility hazards.
	Equipment contact with underground utilities.	Sites.	Injury, death or property damage could occur from survey equipment (i.e., gad, stake, and rebar) contact with underground utilities.	Personnel will follow the procedures outlined in the Pioneer Trenching, Excavation, and Ground Disturbance Program.

BODY MECHANICS	Repetitive motion.	Body.	Repetitive motion when reaching and positioning while using tools and survey equipment could result in injuries such as muscle strains.	Personnel will maintain a balanced position when reaching and positioning survey equipment. They will bend at knees while keeping back straight and upright to paint, place or pound in survey markers. Personnel should also stretch before starting work and will take breaks when necessary.
	Lifting and carrying tools and equipment.	Sites.	Improper lifting and carrying tools and equipment could result in back injuries and muscle/back strains.	Personnel will use proper lifting techniques: get a good grip, keep the load close to your body, lift with legs and not with back, and avoid lifting loads above shoulder height. Two people will lift heavy objects, if necessary.
GRAVITY	Uneven terrain, slick surfaces, and steep slopes.	Sites.	Walking/working on slick/muddy/wet and uneven terrain could cause slips and trips resulting in falls and injuries.	Personnel will wear work boots with good traction and ankle support, be aware of working/walking surfaces and choose a path to avoid hazards, keep work areas as dry as possible, and wear muck boots as necessary.
WEATHER	Cold/hot temperatures.	Outdoor sites.	Exposure to cold climates may result in cold burns, frostbite, and hypothermia. Exposure to high temperatures may result in heat cramps, heat exhaustion, or heat stroke.	Training on signs and symptoms of cold/heat stress is required. Personnel will wear appropriate clothing when working outdoors (e.g., layers and loose clothing), remain hydrated, and have sufficient caloric intakes during the day. Personnel will use their field vehicle to take breaks, when needed. Personnel will also follow the procedures outlined in the Pioneer Heat/Cold Stress Program.

WEATHER (cont.)	Lightning.	Outdoor sites.	Electrocution, injury, death or equipment damage could be caused by lightning strike.	Personnel will follow the 30/30 rule during lightning storms.
RADIATION	Ultraviolet (UV) radiation.	Outdoor sites.	Exposure to UV radiation during summer months can cause sun burns, skin damage, and eye damage.	Personnel will wear safety glasses with tinted lenses, long-sleeve work shirts, and long pants. Personnel should wear sunscreen, if necessary.
BIOLOGICAL	Plants, insects, and animals.	Outdoor sites.	Exposure to plants, insects, and animals may cause rashes, blisters, redness, swelling, and other injuries.	Training on the signs and symptoms of exposure to plants, insects, and animals is required. Personnel will avoid contact with plants, insects, and animals. First aid kits will be available on the site. Personnel with allergies will notify their supervisor.
MECHANICAL	Driving.	Sites.	Interaction with light and heavy equipment could result in vehicle incidents. Driving on uneven/muddy/ slick terrain could also result in vehicle incidents.	Personnel will maintain communication with equipment operators and other site personnel, yield to haul traffic, and use defensive driving techniques. Personnel will not approach active heavy equipment with vehicle. If site conditions are not safe, postpone work or access the site using another means or route.
	Unsecured equipment.	Vehicle.	Injury could result from being struck by an unsecured piece of equipment while driving.	Personnel will secure equipment to vehicle.

MECHANICAL (cont.)	Contact with engineer or drilling hammer.	Setting survey stakes and hubs.	Injuries to hands, foot, and knees could result when using an engineer or drilling hammer to set survey stakes and hubs.	Personnel will wear work gloves and steel-toed boots. Personnel will also keep knees away from the survey gad while creating a pilot hole. Be aware of finger/hand placement and do not put fingers/hands between objects. Inspect tools prior to each use.
	Flying debris.	Setting survey stakes, hubs, and rebar.	Survey gad, stakes, hubs, and rebar could splinter and/or break while being struck with hammer and flying pieces could cause eye injuries.	Personnel will wear safety glasses. Personnel will use survey gad designed to mushroom and not splinter when struck. When establishing control points/property corners, personnel will use a rebar driver to set up rebar. Personnel will also inspect survey gad, stakes, hubs, and rebar prior to installing them.
	Pinch points.	Hand tools and equipment.	Exposure to pinch points when using hand tools and equipment could result in personal injuries.	Personnel will wear work gloves to protect against pinch-point injuries. Inspect all tool and equipment prior to each use.
PRESSURE	Not applicable.			
THERMAL	Not applicable.			
HUMAN FACTORS	Inexperienced and improperly trained personnel.	Sites.	Inexperienced personnel and improper training could cause incidents resulting in injuries and/or property damage.	Personnel will be trained in this procedure and other applicable procedures. Personnel will implement stop work procedures, if necessary.
SIMOPS	Not applicable.			

ADDITIONAL HSSE CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.	
REQUIRED PPE	Long-sleeved work shirt, high-visibility vest/outwear, long pants, safety glasses, hard hat, work globes, and steel-toed boots.
APPLICABLE SDS	Survey Marking Paint. Additional Safety Data Sheets (SDSs) will be maintained based on site characterization and contaminants.
REQUIRED PERMITS/FORMS	Per site/project requirements.
ADDITIONAL TRAINING	Per site/project requirements.

DRAWINGS, DOCUMENTS, AND TOOLS/EQUIPMENT The following documents should be referenced to assist in completing the associated task.	
P&IDS	
DRAWINGS	
RELATED SOPs/PROCEDURES/ WORK PLANS	
TOOLS	Hand-held GPS, survey rod, engineer or drilling hammer, sledgehammer, survey gad, stakes, lath, rebar, rebar driver, survey cap, cap driver, paint cans, and field book.
FORMS/CHECKLIST	

APPROVALS/CONCURRENCE By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.	
SOP TECHNICAL AUTHOR	**DATE**
Mike Newhouse	**08/16/2016**
SAFETY AND HEALTH MANAGER	**DATE**
Tara Schleeman	**10/24/2016**

APPROVALS/CONCURRENCE

By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.

Revisions:

Revision	Description	Date

PURPOSE	This Standard Operating Procedure (SOP) establishes the requirements for documenting and maintaining field logbooks and photographs. These procedures shall apply to all types of air, soil, water, sediment, biological, and/or core samples collected in environmental investigation by Pioneer Technical Services, Inc. (Pioneer). These procedures apply from the time field work begins until site activities are completed.
SCOPE	Pioneer prepared this practice for the workforce and this SOP applies to all work performed by and on behalf of Pioneer. All members of the Pioneer workforce who conduct the work shall be trained and competent (as defined by OSHA) in the risk-assessed procedure described below before performing the work.
NOTES	Please be very aware that logbooks are a **LEGAL** document. As such, they can and most likely will be placed into the public domain with any final reports to clients. They can also be used as evidence for a trial or lawsuit. They can be used to ask questions and to respond in a deposition. They will be used by other Pioneer personnel for data validation, report writing, and for referencing project- or sample-specific information. Beyond being used and reviewed by the client and agencies, they also might be shared with other consulting firms. Be very careful in what and how any information is written. The language used in the logbook should be factual and objective. Logbooks will contain a complete description of field activities, so that the event can be recreated without having to rely on field team memories. Decision making parameters and consultation with clients, subcontractors, or agency personnel should always be recorded. Any deviations from a Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP)/Work Plan (WP) or contract requested by agencies, client, subcontractors, property owners, or any stake holder should always be recorded in detail. Any deviation from the SAP/QAPP/WP or contract due to a decision of field personal should also be recorded. If any deviation will result in a change of scope, require additional compensation, or affect the quality of the samples or information to be collected the Project Manager should be notified. The conversation and decision by the Project Manager will also need to be recorded in the logbook. **Refer to the PowerPoint presentation available on the Pioneer SharePoint Field Sampling site, *Logbook and Decontamination Requirements Review Presentation* 20XX – where XX is the most recent year).** The presentation details the logbook and field data sheet requirements and includes checklists of required elements to ensure collection of proper field information.

WORK INSTRUCTIONS

The following instructions provide guidance to perform the task in a safe, accurate, and reliable manner. If these instructions present information that is inaccurate or unsafe, personnel must notify the Project Manager, Safety Manager, and the SOP Technical Author to initiate appropriate revisions. Personnel will perform all work under this SOP in a manner that is consistent with procedures and policies described in the appropriate Operation, Maintenance, and Monitoring (O&M) Plan (where applicable), appropriate Site-Specific Health and Safety Plans (SSHASP), and Pioneer Corporate Health and Safety Plan (HASP).

TASK	INSTRUCTIONS
1. Logbooks.	A designated field logbook will be used for each field project. The logbooks will be bound and have consecutively numbered pages. If requested by the Project Manager, use a separate field logbook for each field task within a larger project. Label each logbook cover with the project name, dates that it covers, and logbook number. Use a waterproof marker, such as a Sharpie©, to write down the information. Write relevant project personnel names and phone numbers, such as the Project Manager, Pioneer safety personnel, client representative, field team leaders, agency contacts, and subcontractor names on the first page of the logbook, so they can be easily referenced. The information recorded in these logbooks must be written **legibly** in **black** indelible ink. Begin a new page for each day's notes. Write on every line of the logbook. If a blank space is necessary for clarity, such as a change of subject, skip one line before beginning the new subject. Do not skip any pages or parts of pages unless a day's activity ends in the middle of a page. Draw a diagonal line through any blank spaces of three lines or more and add your initial and the date to prevent unauthorized entries. All corrections will consist of a single strike-out in ink, followed by the author's initials and the date. Information not related to the project should not be entered in the logbook. The language used in the logbook should always be factual and objective. Add the following entries into the project logbook for each field day: 1. On the logbook cover: project name, dates that logbook covers, and logbook number. 2. On the first page: relevant project personnel names and phone numbers, such as the Project Manager, Pioneer safety personnel, client representative, field team leaders, agency contacts, and subcontractor names. 3. A description of the field task (i.e., monthly groundwater level monitoring). 4. Time and date fieldwork started. 5. Location and/or a description of the work areas including sketches, if needed, any maps or references needed to identify locations, and sketches of construction activities. If the location has been documented in the logbook during/prior visits, only changes in conditions should be noted. 6. Names and company affiliations of field personnel.

7. Name, company affiliation or address, and phone number of any field contacts or official site visitors.

8. Meteorological conditions at the beginning of fieldwork and any ensuing changes in these conditions.

9. Details of the fieldwork performed and reference to field data sheets, if used.

10. Deviations from the task-specific SAP, WP, or SOP.

11. All field measurements performed. If field data sheets are used to record field measurements or observations (logging of drill core, blow counts, water quality parameters) the specific field data sheet needs to be referenced in the logbook. If associated with a specific sample, for example groundwater collected from a well, the final water quality stabilization parameters should be listed with the sample information in the logbook.

12. Any field analytical results (such as X-ray fluorescence [XRF] or field iron tests) should be recorded in the logbook. If this information is recorded on field data sheets or maps, those sheets or maps should be referenced. If information from one of these documents is used for decision making (i.e., to stop boring), the result and decision should be recorded in the logbook.

13. Personnel and equipment decontamination procedures, if appropriate.

For field samples, the following entries will be made for **every sample collected**, whether or not the sample is submitted to a laboratory:

1. Sample location and field sample identification number for every sample collected.

2. The number and type of sample containers collected for the sample (1 - 1L Poly, etc.).

3. Type of sample preservation and or preparation (i.e., raw, filtered, sieved) for each sample container.

4. Analytes or analytical method associated with each sample container.

5. If the analytical laboratory requests additional containers from a natural sample to complete their quality assurance and control (record this with the sample container). A laboratory will often ask for additional volume for their matrix spike or duplicate analysis.

6. Date and time of sample collection; the start time for the collection of each sample should be recorded. This start time will also be recorded on the sample containers and the chain of custody form for the laboratory. The start time for collection of the sample starts the clock on the analytical holding time. If a sample takes a long time to collect due to the number of sample containers or the sample collection procedure, the sample completion time should also be recorded.

7. If the sample is a composite sample, the start and end time of sample collection should be recorded.

   Information about the number of aliquots included in the sample should also be recorded (i.e., samples from 8 holes from 0-6 inches were collected or 4 locations along 10 feet of stream were sampled and mixed).

8. Field quality control sample identification (i.e., field duplicate of [associated field sample number], field blank, or equipment rinsate blank). For equipment rinsate blank, the equipment "rinsed" for the blank should be identified. The method of collection for this sample also needs to be described. For example:

   a. For a field blank: deionized (DI) water poured directly into sample bottles (bottle code from DI water container should be recorded).
   b. For a duplicate sample: fill sample bottles immediately following natural sample or collect sample from the same sample hole immediately following collection of natural sample into separate pan; mix each and place in appropriate bottles.
   c. For an equipment rinsate: DI water (record DI water container code) poured or ran through [identify which piece of equipment] into appropriate sample containers.

   Information on preparing field quality control samples is discussed in Pioneer SOP-SA-03A Field Quality Control Samples for Water Sampling and SOP-SA-03B Preparation of Equipment Rinsate Blanks for Submersible Pumps.

9. Split samples taken by other parties. Note the type of sample, sample location, time/date, name of individual for whom the split was collected, that individual's company, and any other pertinent information. How the split sample was collected should also be recorded. Was it collected as a duplicate sample (separate collection) or as a replicate sample (all material collected and then mixed and divided into individual containers)? Replicate soil and surface water samples are more appropriate for this type of sample.

10. Sampling method, particularly any deviations from the SAP and SOP. A generalized description of the sampling procedure can be described at the beginning of the project logbook and then the page can be referenced for succeeding sampling days, if sampling protocol will be the same for every sample. If referencing a description, make sure that any deviations associated with the individual sample are recorded, such as refusal in hole 2 and 4 at 5 inches.

11. Documentation or reference of preparation procedures for reagents or supplies that will become an integral part of the sample, if available. This information may not be available for water or soil sampling bottles that come preserved from the laboratory or for preservatives provided by the laboratory. Bottle blanks will need to be used to evaluate the provided reagents.

12. The laboratory where the samples will be sent. Note that this might be container specific (i.e., organic sample containers may be going to one laboratory and inorganic

	samples may be shipped to a different laboratory). If this is the case, the laboratory performing analysis should be listed with the analytical method/analyte descriptions as discussed above. 13. Chain of Custody Form: Information on sample submittal to laboratories needs to be recorded in the logbook to maintain chain of custody for the samples. This information will include the following: a. The samples shipped to each laboratory: the samples can be listed individually or listed as a general description of the samples shipped (i.e., all EPH, TPH samples collected on specific dates). b. The method shipped (i.e., FedEx Overnight, UPS ground, or hand delivered). c. Any tracking numbers associated with the shipment. d. Number of shipping containers shipped or delivered. e. Date and time sample containers were relinquished. Any documentation from the transport company (receipts or tracking numbers) and copies of chain of custody forms included in the shipping containers will be placed in the project record file and retained to prove chain of custody was maintained. Further information on preparing samples for shipping is detailed in Pioneer SOP-SA-01 Soil and Water Sample Packaging and Shipping and SOP-SA-04 Chain of Custody Forms for Environmental Samples. No bound field logbooks will be destroyed or thrown away even if they are illegible or contain inaccuracies that require a replacement document. If the logbook is replaced, write REPLACED on the cover of the logbook and reference the new logbook and number. The original logbook should be referenced at the beginning of the replacement logbook along with the reason the original was replaced. Keep in mind that any information not recorded in a logbook or on a field data sheet or comparable document is not part of the project documentation and **cannot be used**. If a sample is not recorded in the logbook or associated documentation it **does not exist** and cannot be used for decision making purposes.
2. Photographs.	Take photographs of field activities using a digital camera. Photographs should include a scale in the picture when practical. Telephoto or wide-angle shots are not recommended; if you take these types of photographs, they should be identified as such. The following items will be recorded in the bound field logbook or on a field data sheet for each photograph taken: 1. The photographer's name, the date and time of the photograph, and the general direction faced. 2. A brief description of the subject and the fieldwork portrayed in the picture. 3. Sequential number of the photograph.

	An electronic copy and/or a hard copy of the photographs will be placed in task files in the field office after each day of field activities. Supporting documentation from the bound field logbooks or field data sheets will be photocopied and placed in the task files to accompany the photographs once the field activities are complete.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS

This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	*HAZARDS*	*WHERE*	*HOW, WHEN, RESULT*	*CONTROLS*
CHEMICAL	Not applicable.			
NOISE	Not applicable.			
ELECTRICAL	Not applicable.			
BODY MECHANICS	Not applicable.			
GRAVITY	Not applicable.			
WEATHER	Not applicable.			
RADIATION	Not applicable.			
BIOLOGICAL	Not applicable.			
MECHANICAL	Not applicable.			
PRESSURE	Not applicable.			
THERMAL	Not applicable.			
HUMAN FACTORS	Not applicable.			
SIMOPS (Simultaneous Operations)	Not applicable.			

ADDITIONAL HSSE CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.	
REQUIRED PPE	**Personal Protection Equipment** (PPE): None Required
APPLICABLE SDSs	**Safety Data Sheets (**SDSs) will be maintained based on site characterization and contaminants. Safety Data Sheets are available to Pioneer personnel on the internal website under Safety.
REQUIRED PERMITS/ FORMS	Per site/project requirements.
ADDITIONAL TRAINING	Per site/project requirements.

DRAWINGS, DOCUMENTS, AND TOOLS/EQUIPMENT The following documents should be referenced to assist in completing the associated task.	
DRAWINGS	
RELATED SOPs/ PROCEDURES/ WORK PLANS	SOP-SA-01 Soil and Water Sample Packaging and Shipping SOP-SA-03A Field Quality Control Samples for Water Sampling SOP-SA-03B Preparation of Equipment Rinsate Blanks for Submersible Pumps SOP-SA-04 Chain of Custody Forms for Environmental Samples
TOOLS/ EQUIPMENT	Field logbook, Sharpie©, black pen, and digital camera.
FORMS/ CHECKLIST	Field data sheets.

APPROVALS/CONCURRENCE

By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.

SOP TECHNICAL AUTHOR	DATE
Patricia Olson **Patricia Olson**	**04/14/2022**
SAFETY AND HEALTH MANAGER	**DATE**
Tara Schleeman **Tara Schleeman**	**04/14/2022**

PURPOSE	To provide standard instructions for equipment decontamination.
SCOPE	Pioneer Technical Services, Inc. (Pioneer) prepared this practice for the workforce and this Standard Operating Procedure (SOP) applies to all work performed by and on behalf of Pioneer. All members of the Pioneer workforce who conduct the work shall be trained and competent (as defined by OSHA) in the risk-assessed procedure described below before performing the work.
NOTES	All equipment leaving the contaminated area of a site must be decontaminated. Decontamination methods include removal of contaminants through physical, chemical, or a combination of both methods. Decontamination procedures are to be performed at the same level of protection used in the contaminated area of a site. In some cases, decontamination personnel may be sufficiently protected by wearing one level lower protection. The information for site-specific equipment decontamination and personnel protection levels, as detailed in the Sampling and Analysis Plan (SAP), work plan (WP), and Site-Specific Health and Safety Plan (SSHASP), should be followed. The following decontamination procedures are for typical uncontrolled hazardous waste sites. For a specific or unusual contaminant, such as dioxins, see the SSHASP and consult with the Safety and Health Manager. Decontamination procedures should be used in conjunction with methods to prevent contamination of sampling and monitoring equipment. If practical, particularly with organic contaminants, one-time-use equipment should be used and disposed of in accordance with the SAP, WP, and SSHASP. This SOP covers all equipment decontamination EXCEPT for submersible pumps. Decontamination of pumps is detailed in SOP-DE-02A – Equipment Decontamination - Pumps for Well Sampling.

WORK INSTRUCTIONS

The following instructions provide guidance to perform the task in a safe, accurate, and reliable manner. If these instructions present information that is inaccurate or unsafe, personnel must notify the Project Manager, Safety Manager, and the SOP Technical Author to initiate appropriate revisions. Personnel will perform all work under this SOP in a manner that is consistent with procedures and policies described in the appropriate Operation, Maintenance, and Monitoring (O&M) Plan (where applicable), appropriate Site-Specific Health and Safety Plans (SSHASP), and Pioneer Corporate Health and Safety Plan (HASP).

TASK	INSTRUCTIONS
1. Set up decontamination station.	a. Review the SAP or WP and determine if decontamination fluids need to be contained and the need for special decontamination requirements (i.e., chemical rinse). b. If the fluids require containment, set up the decontamination station so that it is located within a small plastic swimming pool or on plastic sheeting with turned up edges to contain water that may slop over during the decontamination process.

	c. If pressurized or gravity flow water is available, attach a hose or piping to reach the decontamination area. If no water is available, bring 5-gallon containers of tap and deionized water (DI) to the decontamination area to clean the equipment. d. Label empty 5-gallon buckets: *gross wash, soap wash, DI rinse, final rinse, and chemical rinse* (if required). e. Lay out clean plastic or foil to place cleaned equipment on to allow for air drying. f. If a chemical rinse is required, fill a spray bottle with the appropriate chemical and label the spray bottle with the chemical's name. g. Pour approximately 2.5 to 3 gallons of tap water into the buckets labeled: *gross wash* and *soap wash*. h. Add a **few drops** (1-3 drops) of Liquinox© soap to the bucket marked *soap wash*. i. Pour 2.5-3 gallons of DI water into the buckets labeled: *DI rinse* and *final rinse.* If a chemical rinse is required, pour DI water into the bucket labeled: *chemical rinse.*
2. Remove gross contamination.	Remove gross contamination using pressurized or gravity flow tap water, if available. If not, manually scrub the equipment using the 5-gallon bucket of water marked *gross wash* and a stiff brush (dedicated to the gross wash step).
3. Wash equipment.	Move the equipment to the 5-gallon bucket marked *soap wash*. Wash equipment with a stiff brush (dedicated to the soap wash step).
4. Triple rinse equipment.	In the bucket marked *DI rinse*, triple rinse the equipment with DI water to remove any soap residue.
5. Second rinse with deionized water.	Using DI water, triple rinse the equipment again in the bucket marked *final rinse* if a chemical rinse is not required.
6. Rinse equipment with chemicals.	In many cases, the tap water and DI water rinses will be sufficient. However, if specified in the SAP, WP, or SSHASP, chemical rinses of the equipment may be required. For inorganic contaminants, a mixture of 10:1 nitric acid in distilled water (10 parts water to 1 part nitric acid) may be specified. A methanol rinse may be required for some organic contaminants, such as hydrocarbons. Spray bottles, clearly marked with the appropriate chemical name, are an acceptable means of rinsing most equipment. **To perform the chemical rinse:** a. Hold the equipment over a collection container (5-gallon bucket or bowl). b. Make sure that all personnel and vehicles are upwind of the spray. c. Spray the piece of equipment inside and out starting at the top and working down to the bottom. d. Dispose of the contained chemicals as described in the SAP, WP or SSHASP. The Safety and Health Manager and/or Project Manager must approve the disposal method used.

7. Rinse equipment with deionized water.	After a required chemical rinse, rinse the equipment again with the DI water in the bucket marked *chemical rinse.* This DI water will need to be retained (i.e., do not dispose of this water on the site), tested, and disposed of according to federal and state requirements for the chemical used. The Safety and Health Manager and/or Project Manager must approve the disposal method used. After the rinse in the *chemical rinse* bucket, triple rinse the equipment again in the bucket marked *final rinse.*
8. Air dry equipment.	Place equipment on plastic sheeting or foil to air dry.
9. Transport/ store equipment.	Wrap equipment in foil or plastic wrap to transport or store.
10. Clean decontamination equipment.	a. Triple rinse equipment from the *gross wash* and *soap wash* (brushes and buckets) with clean tap water, preferably with pressurized water. Soap can be used on particularly dirty equipment. b. Triple rinse all decontamination equipment with DI water, including *DI rinse* and *final rinse* buckets. c. Store decontamination equipment, labeled and in a clean location so they are used only for decontamination purposes.
11. Dispose of decontamination solutions.	Storage of contained decontamination fluids as required by the SAP, QAPP, or WP or of residue from a chemical rinse should have been arranged on site prior to sampling. Once the sampling and associated decontamination is complete, sampling of the stored fluids for hazardous waste criteria will be required. If the fluids are determined to be hazardous (e.g., meet the characteristics of a hazardous waste [ignitability, corrosivity, reactivity, or toxicity] or contain listed wastes from title 40 of the Code of Federal Regulations [CFR] in part 261.4), dispose of them according to federal and state requirements. The Safety and Health Manager and/or Project Manager must approve the disposal method used. Note: when using other than the above-mentioned solutions, check with the Safety and Health Manager and the Project Manager.
12. Measure effectiveness of procedures.	Measure the effectiveness of the decontamination procedures using field equipment rinsate blanks as discussed in the SAP, QAPP, or WP.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS
This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	*HAZARDS*	*WHERE*	*HOW, WHEN, RESULT*	*CONTROLS*
CHEMICAL	Potential contact with contaminated items and resulting water from decontamination procedures.	Sites.	Inadvertent exposure to contaminated items and water resulting from decontamination procedures could lead to adverse health effects.	Personnel will practice proper personal hygiene (wash hands prior to eating/drinking and when leaving the site); follow decontamination procedures as described above; and wear nitrile gloves and safety glasses when handling contaminated items.
	Chemical rinse (e.g., dilute nitric acid, methanol, and hexane).	Sites.	Personnel could be exposed to chemicals via ingestion and skin/eye contact when decontaminating equipment. Exposure could cause irritation of skin/eye and adverse health effects.	Personnel will check and follow safety procedures as outlined in the chemical-specific Safety Data Sheets. Personnel will prevent skin/eye contact with chemicals and they will wear nitrile gloves and eye protection when handling chemicals. Personnel will practice proper personal hygiene (wash hands prior to eating/drinking, after decontaminating equipment, and when leaving the site). All personnel and vehicles will stand upwind when spraying equipment with chemicals. Refer to the Chemical Flushing Guidelines available inside any Pioneer vehicle's first aid kit for first-aid procedures in case of contact with chemicals.
NOISE	Not applicable.			
ELECTRICAL	Not applicable.			

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS
This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	*HAZARDS*	*WHERE*	*HOW, WHEN, RESULT*	*CONTROLS*
BODY MECHANICS	Improper lifting.	Sites.	Back injuries and muscle/back strains could result when using improper techniques to lift and carry 5-gallon containers.	Personnel will use proper lifting techniques: get a good grip, keep the load close to the body, lift with legs and not with back, and avoid lifting loads above shoulder's height. Two people will lift awkward/heavy tools and equipment.
GRAVITY	Falls from slips and trips.	Areas designated for decontamin-ation procedures.	Slips and falls could occur while performing decontamination procedures due to slippery surfaces resulting in bruises, scrapes, or broken bones.	Personnel will wear work boots with good traction and ankle support. Personnel will also be aware of working/ walking surfaces and choose a path to avoid hazards, keep work areas as dry as possible, and wear muck boots as necessary.
WEATHER	Cold/heat stress.	Sites.	Exposure to cold climates may result in cold burns, frostbites, and hypothermia. Exposure to high temperatures may result in heat cramps, heat exhaustion, or heat stroke.	Training on signs and symptoms of cold/heat stress is required. Personnel will wear appropriate clothing when working outdoors, remain hydrated, and have sufficient caloric intakes during the day. Personnel will also follow procedures outlined in applicable SSHASP and/or Pioneer corporate HASP.
	Hypothermia/ frostbite.	Sites where air temperature is 35.6 °F (2 °C) or less.	Personnel whose clothing becomes wet during decontamination procedures may be exposed to hypothermia and/or frostbite.	Personnel will change clothing if it becomes wet.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS
This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	*HAZARDS*	*WHERE*	*HOW, WHEN, RESULT*	*CONTROLS*
	Lightning.	Outdoor sites.	Electrocution, injury, death, or equipment damage could be caused by lightning strike.	Personnel will follow the 30/30 rule during lightning storms.
RADIATION	Ultraviolet (UV) radiation.	Outdoors.	Personnel could be exposed to UV radiation during summer months causing sun burns, skin damage, and eye damage.	Personnel will wear safety glasses with tinted lenses, long-sleeve work shirts, and long pants. Personnel should wear sunscreen, if necessary.
BIOLOGICAL	Plants, insects, and animals.	Sites.	Exposure to plants, insects, and/or animals may cause rashes, blisters, redness, and swelling.	Training on the signs and symptoms of exposure to plants, insects, and animals is required. Personnel will avoid contact with plants, insects, and animals. First-aid kits will be available on the site. Personnel with allergies will notify their supervisor.
MECHANICAL	Not applicable.			
PRESSURE	Not applicable.			
THERMAL	Contact with hot surfaces.	Foil and decontamination equipment.	If foil and decontamination equipment are placed directly in the sun, they could get hot. Contact with hot surfaces could result in personal injury.	Personnel will not set decontamination stations directly in the sun.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.				
SOURCE	***HAZARDS***	***WHERE***	***HOW, WHEN, RESULT***	***CONTROLS***
HUMAN FACTORS	Inexperienced and improperly trained personnel.	Sites.	Inexperienced personnel and improper training could cause incidents resulting in injuries and/or property damage.	Personnel will be properly trained in this procedure and other applicable procedures. Personnel will implement stop work procedures, if necessary.
SIMOPS (Simultaneous Operations)	Not applicable.			

ADDITIONAL HSSE CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.	
REQUIRED PPE	**Personnel Protection Equipment** (PPE)**:** Safety glasses, high-visibility work shirt or vest, long pants, work boots, and nitrile gloves.
APPLICABLE SDSs	**Safety Data Sheets** (SDSs) for corresponding chemicals used during chemical rinse will be maintained based on the site characterization and contaminants. Safety Data Sheets are available to Pioneer personnel on the internal website under Safety.
REQUIRED PERMITS/ FORMS	Per site/project requirements.
ADDITIONAL TRAINING	Per site/project requirements.

DRAWINGS, DOCUMENTS, AND TOOLS/EQUIPMENT The following documents should be referenced to assist in completing the associated task.	
DRAWINGS	
RELATED SOPs/ PROCEDURES/ WORK PLANS	

TOOLS/ EQUIPMENT	Five empty 5-gallon buckets, tap water, stiff brushes, Liquinox soap, four 5-gallon containers of DI (or distilled water if DI water is not available), chemicals for chemical rinse (if required), small plastic swimming pool/plastic sheeting or foil, tarps, and sprayers (if available). If additional items for decontamination are needed, they will be listed on the SAP.
FORMS/ CHECKLIST	

APPROVALS/CONCURRENCE

By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.

SOP TECHNICAL AUTHOR	**DATE**
Julie Flammang **Julie Flammang**	**09/08/2020**
SAFETY AND HEALTH MANAGER	**DATE**
Tara Schleeman **Tara Schleeman**	**09/08/2020**

PURPOSE	To provide standard instructions for decontamination of all personnel leaving a contaminated area.
SCOPE	Pioneer Technical Services, Inc. (Pioneer) prepared this practice for the workforce and this Standard Operating Procedure (SOP) applies to all work performed by and on behalf of Pioneer. All members of the Pioneer workforce who conduct the work shall be trained and competent (as defined by OSHA) in the risk-assessed procedure described below before performing the work.

WORK INSTRUCTIONS

The following instructions provide guidance to perform the task in a safe, accurate, and reliable manner. If these instructions present information that is inaccurate or unsafe, personnel must notify the Project Manager, Safety Manager, and the SOP Technical Author to initiate appropriate revisions. Personnel will perform all work under this SOP in a manner that is consistent with procedures and policies described in the appropriate Operation, Maintenance, and Monitoring (O&M) Plan (where applicable), appropriate Site-Specific Health and Safety Plans (SSHASP), and Pioneer Corporate Health and Safety Plan (HASP).

TASK	INSTRUCTIONS
1. Wash/ remove outer contaminated items.	**If wearing two layers of gloves, remove outer contaminated items. If task requires only one pair of gloves, skip to Step 2:** a. Remove nitrile or latex gloves by grasping the outside of the opposite glove near the wrist. b. Pull and peel the glove away from the hand, turning the glove inside out with the contaminated side now on the inside. c. Hold the removed glove in the opposite gloved hand. d. Slide one or two fingers of the ungloved hand under the wrist of the remaining glove. e. Peel off the glove from the inside, creating a bag for both gloves. **If wearing protective coveralls such as Tyvek suites**: a. Keep inner layer of nitrile or latex gloves on while decontamination process occurs. b. If in a designated decontamination zone*, brush built-up material off the suit. c. Unzip the coverall and begin rolling it outwards, rolling it down over your shoulders. d. Place both hands behind your back and pull down the sleeve of each arm until the arms are completely out of the sleeves. e. Sit down and remove each shoe. f. Roll the coveralls down (ensuring the contaminated side is not touched or does not come into contact with clothing) over your knees until completely removed. g. Place the coveralls into a designated bag for storage/transportation to proper disposal area. h. With soap (non-phosphate) and tap water, wash the outer, more heavily contaminated items, such as boots (if in a designated decontamination zone, there may be a specific place to rinse off boots). i. Rinse the outer items in tap water.

	*If there is not a designated decontamination zone, remove personal protective equipment (PPE) carefully to contain material and place it in the appropriate disposal container. For instructions to remove additional PPE not described in this document, refer to the project's SSHASP.
2. Wash/remove inner contaminated items.	Remove the inner layer of nitrile or latex gloves following the procedure in Step 1. If necessary, wash with soap (non-phosphate) and tap water the inner, less contaminated items. Rinse the items in tap water.
3. Store/ transport items.	Store/transport contaminated items in a separate designated area to prevent cross contamination prior to disposal.
4. Dispose of contaminated items.	Dispose of contaminated clothing and equipment in accordance with site/project and/or federal and state requirements.
5. Contact the Safety and Health Manager.	For contaminants other than those found typically at uncontrolled hazardous waste sites, such as asbestos, polychlorinated biphenyls (PCB), perchloroethylene (PCE), etc., contact the Safety and Health Manager.
Information about Emergency Decontamination	
1. During life-saving process.	If the decontamination procedure is essential to the life-saving process (i.e., the contamination/exposure is the cause of needing medical treatment), decontamination must be performed immediately before medical treatment can be administered.
2. During heat-related illness.	If heat-related illness develops, protective clothing should be removed as soon as possible. Wash, rinse, and/or cut off protective clothing/equipment.
3. When medical treatment is needed.	If medical treatment is required to save a life (i.e., the reason for medical treatment is not related to the contamination/exposure), decontamination should be delayed until the victim is stabilized. Wrap the victim to reduce contamination of others. Alert medical personnel to the emergency and instruct them about potential contamination. Instruct medical personnel about specific decontamination procedures. Once the victim is medically stable, decontamination should be performed as soon as possible for the victim and any affected medical personnel.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS

This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	HAZARDS	WHERE	HOW, WHEN, RESULT	CONTROLS
CHEMICAL	Potential contact with contaminated items and resulting water from decontamination procedures.	Sites.	Inadvertent exposure to contaminated items and water resulting from decontamination procedures could lead to adverse health effects.	Personnel will practice proper personal hygiene – wash hands prior to eating/drinking and when leaving the site; follow decontamination procedures as described in the SSHASP; and wear nitrile gloves and safety glasses when handling contaminated items.
NOISE	Not applicable.			
ELECTRICAL	Not applicable.			
BODY MECHANICS	Potential awkward, repetitive postures when performing decontamination tasks.	Sites.	Exposure to repeated postures, awkward postures when completing decontamination.	Stretch prior to completing task and break up tasks as necessary to reduce awkward and repetitive postures.
GRAVITY	Slips and falls.	Areas designated for decontamination procedures.	Slips and falls could occur while performing decontamination procedures due to slippery surfaces resulting in bruises, scrapes, or broken bones.	Personnel will wear work boots with good traction and ankle support. Personnel will also be aware of working/walking surfaces and choose a path to avoid hazards, keep work area as dry as possible, and wear muck boots as necessary.
WEATHER	Cold/heat stress.	Sites.	Exposure to cold temperatures may result in cold burns, frostbite, and hypothermia. Exposure to high temperatures may result in heat cramps, heat exhaustion, or heat stroke.	Training on signs and symptoms of cold/heat stress is required. Personnel will wear appropriate clothing when working outdoors, remain hydrated, and have sufficient caloric intakes during the day. Personnel will follow procedures outlined in applicable SSHASP and/or Pioneer Corporate HASP.

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS
This section to be completed with concurrence from the Safety and Health Manager.

SOURCE	HAZARDS	WHERE	HOW, WHEN, RESULT	CONTROLS
	Hypothermia/ frostbite.	Sites where air temperature is 35.6 °F (2°C) or less.	Personnel whose clothing becomes wet during decontamination procedures may be exposed to hypothermia and/or frostbite.	If it becomes wet, personnel will change clothing.
	Lightning.	Outdoor sites.	Electrocution, injury, death, or equipment damage could result from lightning strike.	Personnel will follow the 30/30 rule during lightning storms.
RADIATION	Ultraviolet (UV) radiation.	Outdoors.	Personnel could be exposed to UV radiation during summer months causing sun burns, skin damage, and eye damage.	Personnel will wear safety glasses with tinted lenses, long-sleeve work shirts, and long pants. Personnel should wear sunscreen, if necessary.
BIOLOGICAL	Plants, insects, and animals.	Sites.	Exposure to plants, insects, and/or animals may cause rashes, blisters, redness, and swelling.	Training on the signs and symptoms of exposure to plants, insects, and animals is required. Personnel will avoid contact with plants, insects, and animals. First-aid kits will be available on the site. Personnel with allergies will notify their supervisor.
MECHANICAL	Not applicable.			
PRESSURE	Not applicable.			
THERMAL	Not applicable.			

HEALTH SAFETY SECURITY ENVIRONMENT (HSSE) CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.				
SOURCE	**HAZARDS**	**WHERE**	**HOW, WHEN, RESULT**	**CONTROLS**
HUMAN FACTORS	Inexperienced and improperly trained personnel.	Sites.	Inexperienced personnel and improper training could cause incidents resulting in injuries and/or property damage.	Personnel will be properly trained in this procedure and other applicable procedures. Personnel will implement stop work procedures, if necessary.
SIMOPS (Simultaneous Operations)	Not applicable.			

ADDITIONAL HSSE CONSIDERATIONS This section to be completed with concurrence from the Safety and Health Manager.	
REQUIRED PPE	**Personnel Protection Equipment** (PPE)**:** Safety glasses, high-visibility work shirt or vest, long pants, work boots, and nitrile or latex gloves.
APPLICABLE SDSs	**Safety Data Sheets** (SDSs) are available to Pioneer personnel on the internal website under Safety.
REQUIRED PERMITS/ FORMS	Per site/project requirements.
ADDITIONAL TRAINING	Per site/project requirements.

DRAWINGS, DOCUMENTS, AND TOOLS/EQUIPMENT The following documents should be referenced to assist in completing the associated task.	
DRAWINGS	
RELATED SOPs/ PROCEDURES/ WORK PLANS	
TOOLS/ EQUIPMENT	In general, the following items will be needed: soap, tap water, tarps, decontamination tubs, brushes, and sprayers. The Sampling and Analysis Plan (SAP) or Quality Assurance Project Plan (QAPP) will describe additional items needed for decontamination.
FORMS/ CHECKLIST	

APPROVALS/CONCURRENCE By signing this document, all parties acknowledge the completeness and applicability of this SOP for its intended purpose. Also, by signing this document, it serves as acknowledgement that I have received training on the procedure and associated competency testing.	
SOP TECHNICAL AUTHOR	**DATE**
Kendra Overley **Kendra Overley**	**03/30/2022**
SAFETY AND HEALTH MANAGER	**DATE**
Tara Schleeman **Tara Schleeman**	**03/30/2022**

Appendix B
Corrective Action Report

Corrective Action Report/ Corrective Action Plan

Project ID	Project Name	Document ID

Preparer's Signature/Submit Date	Submitted to:

Description of the requirement or specification	
Reason for the Corrective Action	
Location, affected sample, affected equipment, etc. requiring corrective action	
Suggested Corrective Action	(Continue on Back)
Corrective Action Plan	(Continue on Back) ☐ Approval signature/date:_____
	Approval of corrective actions required by EPA? ☐ Yes ☐ No ☐ EPA approval name/date:_____ ☐ Corrective actions completed name/date:_____
Preventative Action Plan	(Continue on Back) ☐ Preventative actions completed name/date:_____

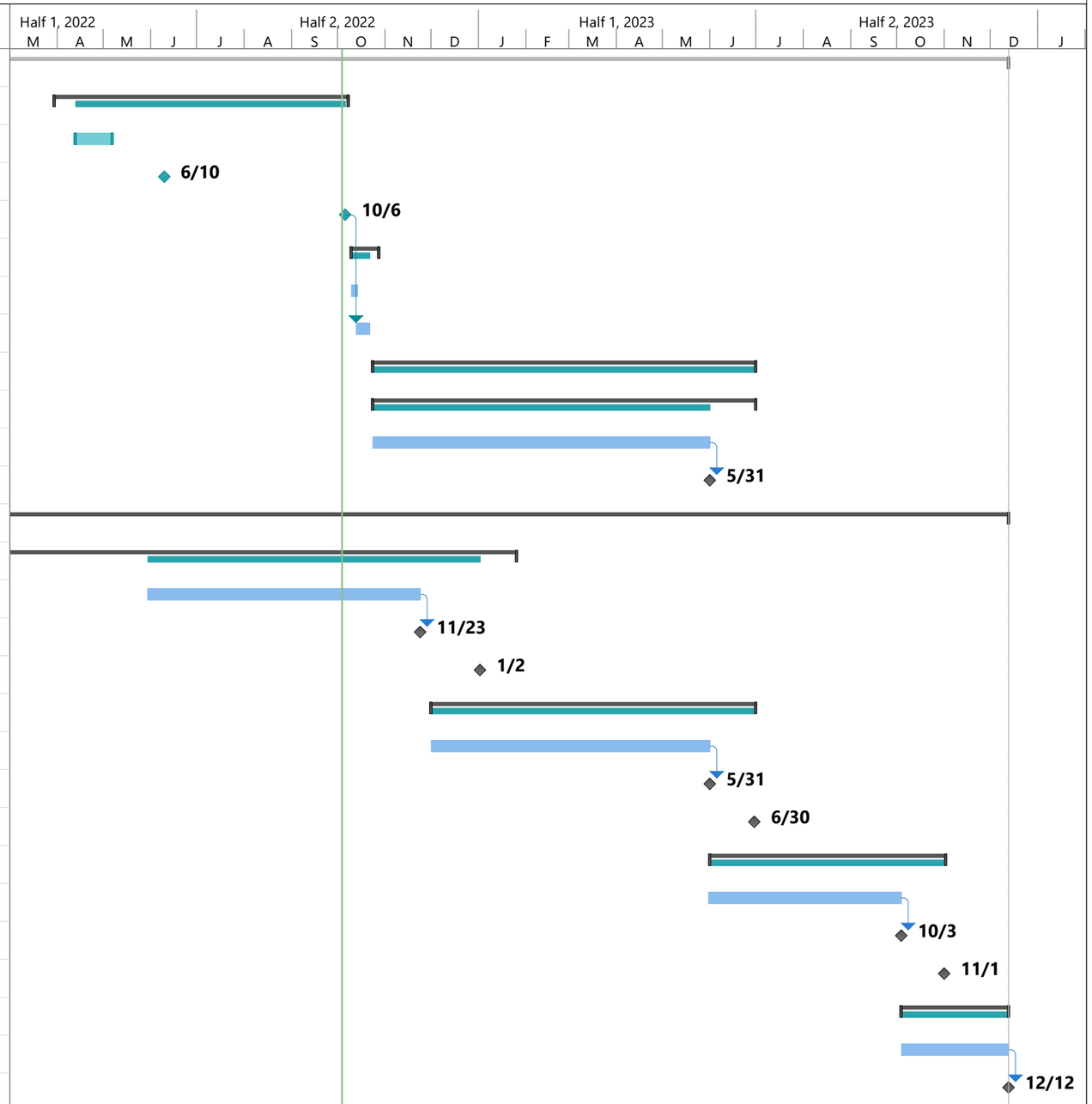
Corrective Action Report/
Corrective Action Plan

Suggested Corrective Action (Continued)	
Corrective Action Plan (Continued)	
Preventative Action Plan (Continued)	

Attachment 2
Draft BPSOU Subdrain Pump Station Project Schedule

Attachment 2
DRAFT BPSOU SUBDRAIN PUMP STATION DESIGN PROJECT SCHEDULE

ID	Task Name	Duration	Start	Finish
0	**BPSOU Pump Station Design Schedule**	**507 days**	**Mon 1/3/22**	**Tue 12/12/23**
1	**Pre-Design Subdrain Pump Station Documentation**	**138 days**	**Wed 3/30/22**	**Fri 10/7/22**
2	Draft RDWP, PDI WP, and QAPP	18 days	Wed 4/13/22	Fri 5/6/22
3	Submit Draft RDWP, PDI WP and QAPP to Agencies	0 days	Fri 6/10/22	Fri 6/10/22
4	Submit Final RDWP, PDI WP, and QAPP	0 days	Thu 10/6/22	Thu 10/6/22
5	**Field Investigation**	**14 days**	**Mon 10/10/22**	**Thu 10/27/22**
6	Preliminary Safety Review	4 days	Mon 10/10/22	Thu 10/13/22
7	Geotechnical Investigation	7 days	Thu 10/13/22	Fri 10/21/22
8	**Reporting**	**180 days**	**Mon 10/24/22**	**Fri 6/30/23**
9	**PDI Evaluation Report**	**180 days**	**Mon 10/24/22**	**Fri 6/30/23**
10	Prepare Draft	158 days	Mon 10/24/22	Wed 5/31/23
11	Submit Draft Final to Agencies	0 days	Wed 5/31/23	Wed 5/31/23
12	**Design Activities**	**507 days**	**Mon 1/3/22**	**Tue 12/12/23**
13	**Preliminary (30%) Design Report**	**278 days**	**Mon 1/3/22**	**Wed 1/25/23**
14	Draft 30% Design Documents	128 days	Mon 5/30/22	Wed 11/23/22
15	Submit Draft Final to Agencies	0 days	Wed 11/23/22	Wed 11/23/22
16	Submit Comment Response to Agencies	0 days	Mon 1/2/23	Mon 1/2/23
17	**Intermediate (60%) Design Report**	**152 days**	**Thu 12/1/22**	**Fri 6/30/23**
18	Draft 60% Design	130 days	Thu 12/1/22	Wed 5/31/23
19	Submit Draft Final to Agencies	0 days	Wed 5/31/23	Wed 5/31/23
20	Submit Comment Response to Agencies	0 days	Fri 6/30/23	Fri 6/30/23
21	**Pre-Final (95%) Design Report**	**110 days**	**Thu 6/1/23**	**Wed 11/1/23**
22	Draft 95% Design	90 days	Wed 5/31/23	Tue 10/3/23
23	Submit Draft Final to Agencies	0 days	Tue 10/3/23	Tue 10/3/23
24	Submit Comment Response to Agencies	0 days	Wed 11/1/23	Wed 11/1/23
25	**Final (100%) Design Report**	**50 days**	**Wed 10/4/23**	**Tue 12/12/23**
26	Draft Final Design	50 days	Wed 10/4/23	Tue 12/12/23
27	Submit Final to Agencies	0 days	Tue 12/12/23	Tue 12/12/23



Project: BPSOU Pump Station Design Schedule
Date: Tue 10/4/22

Summary Progress	Summary	Inactive Summary	Manual Summary	External Milestone	
Task	Project Summary	Manual Task	Start-only	Deadline	
Split	Inactive Task	Duration-only	Finish-only	Progress	
Milestone	Inactive Milestone	Manual Summary Rollup	External Tasks	Manual Progress	