FIFTH FIVE-YEAR REVIEW REPORT FOR SILVER BOW CREEK/BUTTE AREA SUPERFUND SITE SILVER BOW AND DEER LODGE COUNTIES, MONTANA

Prepared by

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LIST OF ABBREVIATIONS AND ACRONYMS

ALM	Adult Lead Methodology
amsl	Above Mean Sea Level
ARAR	Applicable or Relevant and Appropriate Requirement
BLM	Biotic Ligand Model
BMFOU	Berkeley Pit/Mine Flooding Operable Unit
BMP	Best Management Practice
BPSOU	Butte Priority Soils Operable Unit
BRES	Butte Reclamation Evaluation System
BSB	The City and County of Butte-Silver Bow
BTL	Butte Treatment Lagoons
$CaCO_3$	Calcium Carbonate
CCC	Criterion Continuous Concentration
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cf	Conversion Factor
CFR	Code of Federal Regulations
CFS	Cubic Feet Per Second
CIP	Community Involvement Plan
CMC	Criterion Maximum Concentration
COC	Contaminant of Concern
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CTEC	Citizens' Technical Environmental Committee
CWL	Critical Water Level
cy	Cubic Yard
days/yr	Days Per Year
DNRC	Department of Natural Resources and Conservation
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FYR	Five-Year Review
g/day	Grams Per Day
gpm	Gallons Per Minute
HEPA	High Efficiency Particulate Air
HHRA	Human Health Risk Assessment
HsBWTP	Horseshoe Bend Water Treatment Plant
IC	Institutional Control
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IUR	Inhalation Unit Risk
LAO	Lower Area One
LOD	Level of Detection
MBMG	Montana Bureau of Mines and Geology
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDEQ	Montana Department of Environmental Quality
µg/dL	Micrograms Per Deciliter
µg/L	Micrograms Per Liter
$\mu g/m^3$	Micrograms Per Cubic Meter
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
MGD	Million Gallons Per Day

MS4	Municipal Separate Storm Sewer System
MSD	Metro Storm Drain
MWRR	Mine Waste Relocation Repository
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NHANES	National Health and Nutrition Examination Survey
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
POC	Point of Compliance
PRP	Potentially Responsible Party
PWL	Protective Water Level
QAPP	Quality Assurance Project Plan
RAAR	Remedial Action Adequacy Review
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RMAP	Residential Metals Abatement Program
ROD	Record of Decision
RPM	Remedial Project Manager
SMCL	Secondary Maximum Contaminant Level
SSTOU	Streamside Tailings Operable Unit
SSWS	Superfund Stormwater Structures
STARS	Streambank Tailings and Revegetation Study
SU	Standard Unit
TI	Technical Impracticability
T/IS	Tailings/Impacted Soils
TSS	Total Suspended Solids
UAO	Unilateral Administrative Order
UU/UE	Unlimited Use and Unrestricted Exposure
VI	Vapor Intrusion
WSP	Warm Springs Ponds
YDTI	Yankee Doodle Tailings Impoundment

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the fifth FYR for the Silver Bow Creek/Butte Area Superfund site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of seven operable units (OUs).[1] This FYR Report addresses six of these OUs (Table 1-1).[2] The remedy for OU13 (West Side Soils OU) is not assessed in this FYR because the EPA has not selected a remedy for it yet. A remedial investigation is ongoing at the West Side Soils OU, and a feasibility study which will analyze potential remedial actions at the site is planned to begin in mid to late 2021.

Table 1-1: Site OUs

OU Number	OU Name	Included in FYR?	Notes
1	Streamside Tailings OU (SSTOU)	Yes	None
3	Berkeley Pit/Mine Flooding OU (BMFOU)	Yes	None
4 12	Warm Springs Ponds Active OU Warm Springs Ponds Inactive OU (WSPOUs)	Yes	Combined for FYR purposes
7	Rocker Timber Framing and Treating Plant OU (Rocker OU)	Yes	None
8	Butte Priority Soils OU (BPSOU)	Yes	Includes previously separate OUs 2, 5, 6, 10 and 11
13	West Side Soils OU	No	Remedial Investigation in progress

EPA remedial project managers (RPMs) Nikia Greene (OUs 3, 7, 8 and 13), Ken Champagne (OU1) and Allie Archer (OUs 4 and 12) led the FYR. The Montana Department of Environmental Quality (MDEQ) participated in this review as the support agency representing the state of Montana for all OUs except the SSTOU, where it is the lead agency. Potentially responsible parties (PRPs) finance and implement cleanup at the Site, with the exception of the Streamside Tailings OU (SSTOU) where MDEQ is implementing the remedy using funds provided by the PRP. MDEQ has reviewed all supporting documentation for this report and provided input to the EPA during the FYR process. The PRPs were notified of the initiation of the FYR. The review began on 5/28/2020.

[1] The Clark Fork River OU (OU9) became part of the Milltown Reservoir Sediments/Clark Fork River Superfund Site.
[2] The EPA has formally deferred Superfund action at an additional OU, the Active Mining Area, which is regulated by MDEQ pursuant to an active mine permit.

The EPA has decided in this report that the cleanup activities completed to date at the Streamside Tailings OU are protective in the short term. This means the current remedy is protective of human health and the environment. The removal of tailings-impacted soils is complete, and sampling of surface water and groundwater monitors contaminant levels, which are expected to decrease. MDEQ and the EPA will determine if any adjustments to monitoring or performance goals are needed. Access and use restrictions are being considered to further protect the public.

The EPA has decided in this report that the cleanup activities completed to date and additional planned cleanup activities at the Berkeley Pit/Mine Flooding OU will be protective once complete. In the meantime, contaminated mine water is contained and prevented from entering into the alluvial aquifer and Silver Bow Creek. Institutional controls are in place to restrict the use of groundwater in the Butte Water District Controlled Groundwater Area.

The EPA has decided in this report that the cleanup activities completed to date at the Warm Springs Ponds Active and Inactive OUs will be protective when the final remedy is selected and implemented. In the meantime, the initial cleanup activities protect human health and the environment. Currently, water from Silver Bow Creek is treated and monitored prior to leaving the ponds into Clark Fork River, and systems are in place to ensure no groundwater contamination leaves the area.

The EPA has decided in this report that the cleanup activities completed to date at the Rocker Timber Framing and Treating Plant OU are protective in the short term. This means the current remedy is protective of human health and the environment. Currently, groundwater and surface water are monitored to ensure no unacceptable exposures, the waste area is fenced, and institutional controls are in place to restrict the domestic use of groundwater. The EPA will determine if additional actions are needed to improve the cleanup.

The EPA has decided in this report that the cleanup activities completed to date and additional planned cleanup activities at the Butte Priority Soils OU will be protective once complete. Further cleanup work will address stormwater and snowmelt runoff, further groundwater control, and floodplain and contaminated sediment protection. Under the Residential Metals Abatement Program, residential properties throughout the OU and beyond are being cleaned up. Continued maintenance of the non-residential cleanup areas protects human health and the environment from waste that remains in place. Institutional controls are in place to restrict use of contaminated groundwater and prevent disturbing areas with waste left in place. Blood lead level monitoring shows improvement and will continue to be implemented and improved.

Sitewide Background

The Site is one of four contiguous Superfund sites in the upper Clark Fork River Basin in southwestern Montana. The other Superfund sites are the Anaconda Co. Smelter site, the Milltown Reservoir Sediments/Clark Fork River site and the Montana Pole and Treating Plant site. The Site covers about 85 square miles. It includes the entire length of Silver Bow Creek and associated land contamination from above the confluence with Blacktail Creek, westward about 26 miles. The Site also includes the Berkeley Pit and the underground mine workings of the historic Butte Mining District (Butte Hill), the urban centers of Butte and Walkerville, rural areas outside of Butte where mining took place, and the treatment/settling ponds at the Warm Springs Ponds (Figure 1-1).

Mining activities occurred in Butte, Montana, and in surrounding areas for over 100 years. Underground mining was extensive in Butte and Walkerville. Silver milling, followed by the extensive operation of copper and zinc smelters and mills, generated a variety of wastes. By the late 1880s, Butte became one of the nation's prominent copper mining centers. Mining crews disposed of wastes generated from mining, milling and smelting operations directly into Silver Bow Creek and Blacktail Creek and across Butte Hill. These waste disposal practices contaminated soil, sediment, groundwater and surface water with arsenic and heavy metals, leaving the natural landscape largely devoid of vegetation and wildlife.

The landscape surrounding the Site is characterized by high mountain peaks that reach elevations above 10,000 feet. Surface water and groundwater resources receive the most recharge in the spring and early summer due to melting mountain snowpack and spring rains. Beneath the Site, groundwater occurs in an alluvial aquifer and a bedrock aquifer. Additional details on the groundwater systems beneath the OUs are provided in each OU subsection of this FYR report.

Historically, Silver Bow Creek began at the Continental Divide and flowed through the area that is now the Berkeley Pit and the active permitted mine area.[3] Mining activity has permanently altered this uppermost reach of Silver Bow Creek. Currently, there is no surface water flow in the Silver Bow Creek channel above Blacktail Creek except during storm runoff or snowmelt conditions. Downstream of Butte, Silver Bow Creek flows west into Durant Canyon, mainly fed by Blacktail Creek. Within the canyon, the creek turns northward and enters the Southern Deer Lodge Valley and continues to flow for another 6.5 miles before entering the Warm Springs Ponds.

Table 1-2 provides a brief description of each OU. Figure 1-1 shows each OU on a map.

Table 1-2: OU Descriptions

Operable Unit	OU Description
OU1: Streamside Tailings OU (SSTOU)	The SSTOU consists of about 26 linear miles of Silver Bow Creek floodplain and in-stream surface water, and fluvially deposited tailings, which were once found along and in the creek, from just outside of Butte to the Warm Springs Ponds. It also includes associated groundwater contamination. Historically, the creek was used to dispose of smelter and mill tailings, and other waste products, and conveyed wastes out of Butte. Mining wastes carried from Butte were deposited in the floodplain, impacting water quality throughout Silver Bow Creek.
OU3: Berkeley Pit/Mine Flooding (BMFOU)	The Berkeley Pit is the BMFOU's major feature. It is 1,780 feet deep and encompasses 675 acres. The BMFOU consists of contaminated water in the Berkeley Pit, contaminated water in approximately 10,000 miles of associated underground mine workings (beneath the city of Butte and town of Walkerville as well as beneath the Montana Resources permitted active mine area), and other contaminated inflow to the BMFOU. Active mining continues in the Continental Pit nearby, in the Montana Resources permitted area, which is directly adjacent to the BMFOU. The active mining operations use Horseshoe Bend treated BMFOU water, which affects the water balance in the BMFOU.
OU4 and OU12: Warm Springs Ponds Active OU and Inactive OU (WSPOUs)	The Warm Springs Ponds surface area includes three historic tailings ponds, at the downstream end of the Site, that treat Silver Bow Creek water before discharge to the Clark Fork River. The Warm Springs Ponds OUs also include associated groundwater contamination and the nearby Mill-Willow Bypass. The WSPOU complex covers about 2,500 acres and contains 19 million cubic yards of mine waste.
OU7: Rocker Timber Treating and Framing OU	The Rocker OU surface area covers about 16 acres and is located south of U.S. Interstate 15/90 near Rocker, Montana, about 3 miles west of Butte (Figure 1-1). It includes soil and groundwater contamination associated with the former Rocker Timber Framing and Treating Plant. The surface boundary of the Rocker OU adjoins the SSTOU on one side.
OU8: Butte Priority Soils OU (BPSOU)	The BPSOU surface area covers a 5-square-mile area and encompasses the town of Walkerville and a large portion of the city of Butte, as well as associated alluvial aquifer contamination and the floodplain and surface water of Silver Bow Creek and Blacktail Creek. It is located a few miles west of the Continental Divide at an elevation range about 5,400 to 6,400 feet above mean sea level. The BPSOU is centered on Butte Hill, the location of the historic Butte Mining District.
OU13: West Side Soils	The West Side Soils OU lies generally to the north and west of the BPSOU. It includes other historic mining- and metals-impacted areas within the West Side Soils OU not addressed under the BPSOU, the BMFOU or the active mining area.

[3] Montana Resources operates an active permitted mine in the Continental Pit area.

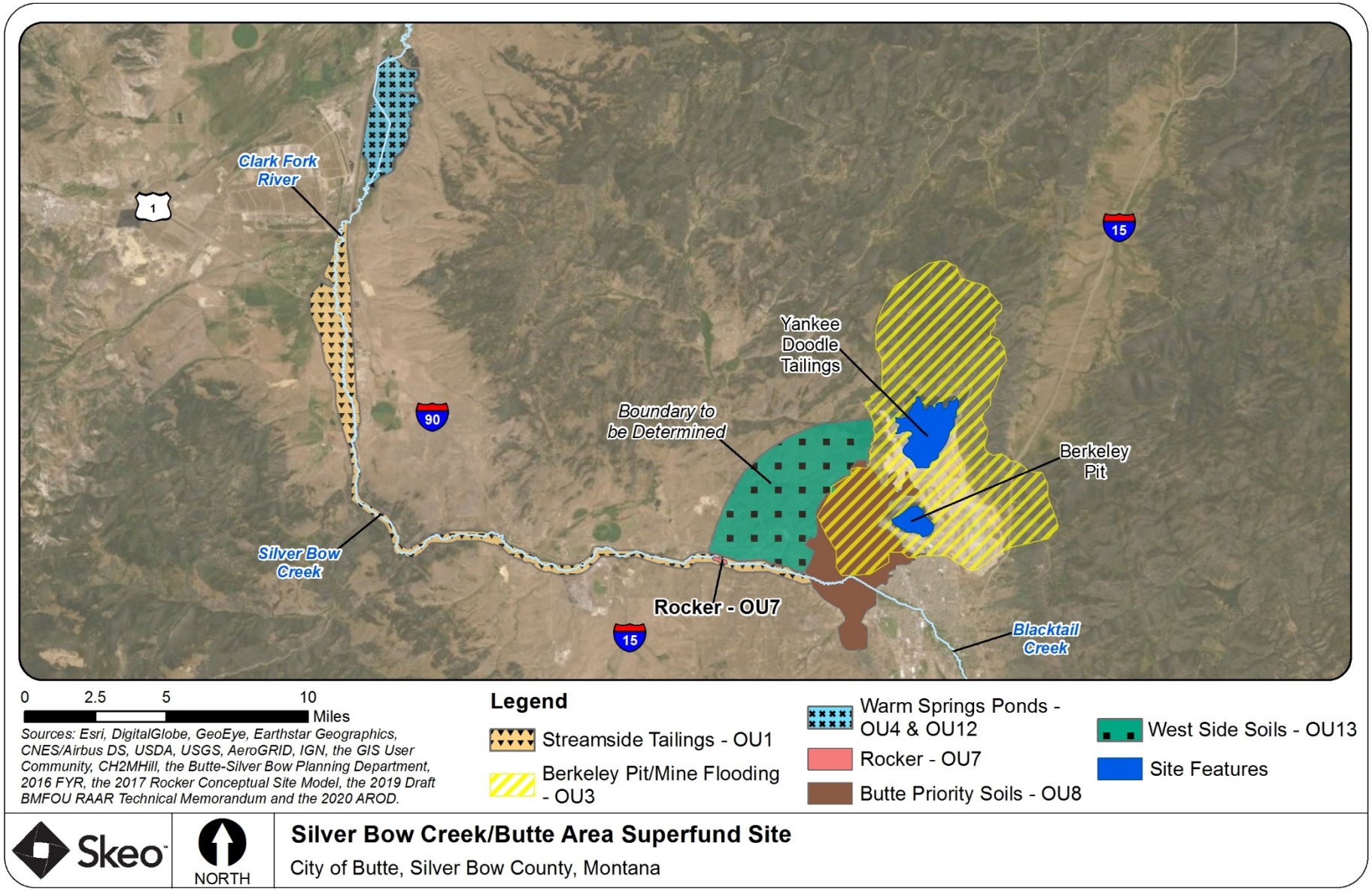
Land use in the area of the Site is diverse and includes neighborhoods, rural areas, commercial areas and industrial districts of Butte. The Site also encompasses the entire active mining area east of the Butte Hill. West and north of Butte, the Site includes stream and streamside habitat along the length of Silver Bow Creek between Butte and its confluence with Warm Springs Creek. Land in the Silver Bow Creek corridor is mostly privately owned and consists of sparsely populated open land used primarily for agriculture. The Warm Springs Ponds offer habitat for migrating waterfowl and breeding areas for dozens of songbird species and osprey. The Warm Springs Ponds area is a designated wildlife management area administered by the Montana Department of Fish, Wildlife and Parks.

The EPA designated the original Silver Bow Creek site as a Superfund site and listed it on the Superfund program's National Priorities List (NPL) in September 1983. Work began on a site-wide remedial investigation (RI) in 1984. Preliminary results indicated that upstream sources were partly responsible for the contamination observed in the creek. After a thorough analysis of the relationship between the two areas (Butte and Silver Bow Creek), the EPA concluded that they should be treated as one site under CERCLA. The EPA subsequently modified the Silver Bow Creek site to include the Butte Area, and the formal name was changed to the "Silver Bow Creek/Butte Area" Superfund site in 1987.

Screening studies and risk assessments identified contaminants of concern (COCs) and quantified human health and environmental risks from these COCs in solid media (including tailings, waste, sediment, soils and indoor dust), surface water and groundwater. Through OU-specific RI/FS studies, OU-specific action levels were established for site COCs (i.e., all OUs that have RODs developed).

Appendix A provides a list of the resources used during the development of this FYR Report. Appendix B provides the Site's chronology of events. This FYR Report is organized by OU. Each OU section includes the following sections: background, response actions, implementation, institutional controls, operations and maintenance (O&M), data review and technical assessment.

Figure 1-1: OU Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Silver Bow Creek/Butte Area		
EPA ID: MTD980502777		
Region: 8	**State:** Montana	**City/County:** Butte/Silver Bow and Deer Lodge

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the Site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA
Author name: EPA RPMs Nikia Green (OU3, OU7, OU8, OU13), Ken Champagne (OU1) and Allie Archer (OU4 and OU12)
Author affiliation: EPA Region 8 with contractor assistance from Skeo
Review period: 5/28/2020 – 8/30/2021
Date of site inspection: 9/15/2020 – 9/18/2020
Type of review: Statutory
Review number: 5
Triggering action date: 8/30/2016
Due date *(five years after triggering action date)*: 8/30/2021

Community Notification, Community Involvement and Site Interviews

Community involvement is an important and meaningful component of the activities at the Site. The EPA is aware that the size and location of the various parts of the Site have a range of potential effects on community members. Community members are in a position to share information that may not otherwise come to light during an FYR process. The EPA maintains and implements Community Involvement Plans (CIP) for the Site, maintains a site profile page for the Site, works with the Citizens' Technical Environmental Committee (CTEC), and helps make sure information is provided for the PitWatch.org website and periodic fact sheets. The EPA also released an environmental justice action plan for the site in December 2020. Currently the EPA is revising the OU8 (BPSOU) Community Involvement Plan and will include sections for OU3 (BMFOU) and OU7 (Rocker). As MDEQ is the lead for the SSTOU, it maintains and implements the CIP and State profile page for OU1. As part of this FYR, the EPA informed the community that the FYR was taking place. The EPA encouraged the public to contact EPA staff with information that could inform the EPA's determination regarding the protectiveness and effectiveness of the implemented remedies at the Site.

Public notices were published in the *Montana Standard* and *Butte Weekly* on September 9, 16 and 22, 2020 (Appendix D). They stated that the FYR was underway and invited the public to submit any comments to the

EPA. In addition, the EPA directly contacted over 80 community stakeholders to invite them to participate in an interview. The EPA will make the final FYR Report available to the public. The EPA will place copies of the document in the designated site repositories: CTEC's office at 27 West Park Street in Butte, the Montana Tech library at 1300 West Park Street in Butte, and the EPA Records Center in Helena. Upon completion of the FYR, EPA will place public notices in the local newspapers to announce the availability of the final FYR Report in the Site's document repositories and on its Silver Bow Creek/Butte Area website and will also post a notice of availability on the Site's profile page: www.epa.gov/superfund/silver-bow-butte.

The FYR process included stakeholder interviewees, community members, the current landowners and regulatory agencies involved in or affected by site activities. The purpose of FYR interviews is to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. During the FYR process, 17 people participated in interviews by phone or provided written comments. All issues raised were considered, reviewed and incorporated as appropriate into evaluations during this FYR. The interviews are summarized in Appendix E and discussed as appropriate in the technical assessments for each individual OU.

II. STREAMSIDE TAILINGS OPERABLE UNIT (SSTOU, Operable Unit 1)

Background

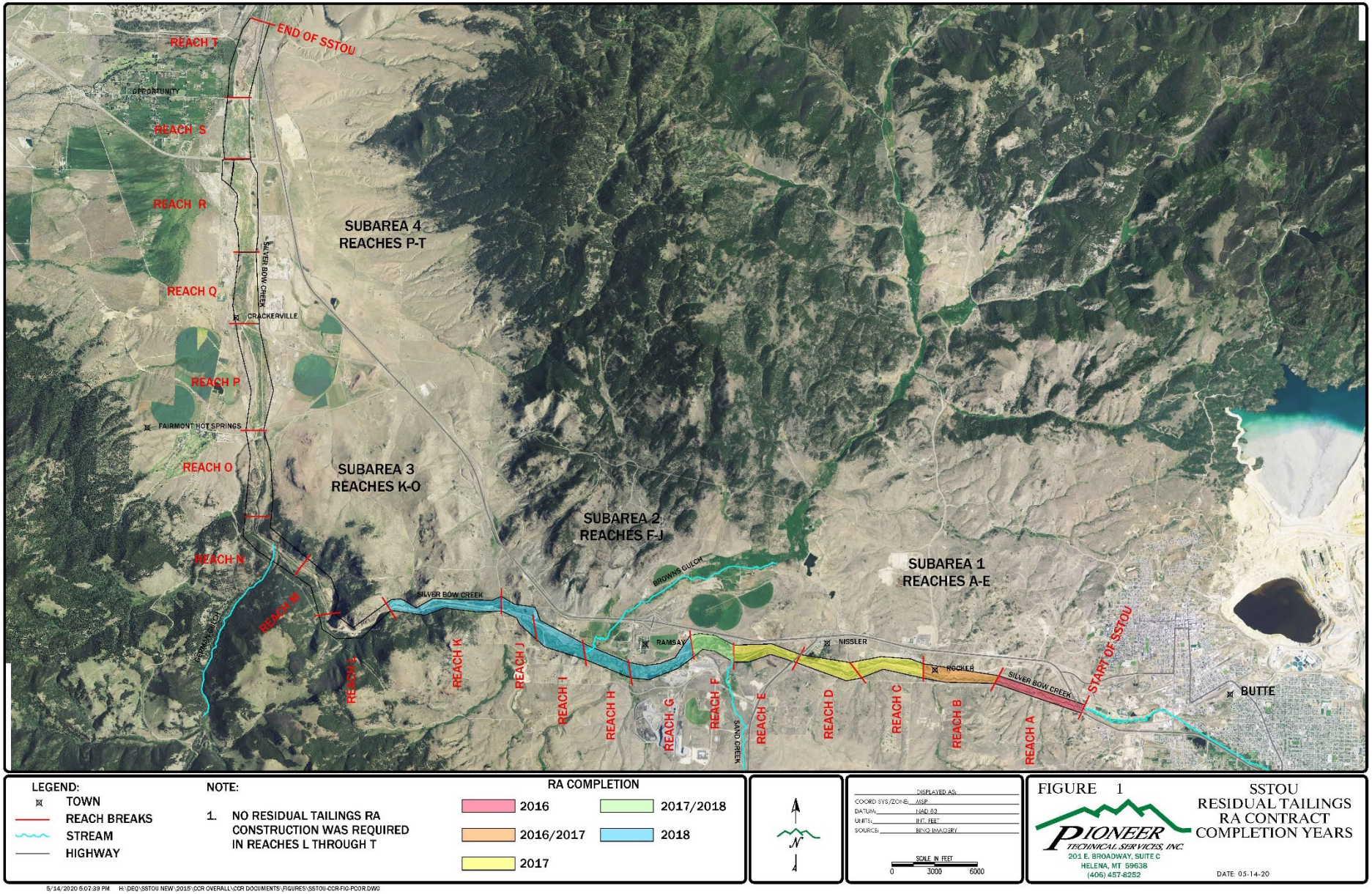
The SSTOU consists of about 26 linear miles of Silver Bow Creek and its floodplain and fluvially deposited tailings along the creek as well as contaminated railroad beds located near the creek. The surrounding areas include residences and ranches. Silver Bow Creek originates in Butte and flows west and north before entering the Warm Springs Ponds. Blacktail Creek is located upstream of Silver Bow Creek. Historically, the creeks were used to dispose of and impound smelter tailings and other mining waste and conveyed wastes out of Butte. The SSTOU boundary begins at the upstream end just outside of the Butte city limits and continues until Silver Bow Creek enters the Warm Springs Ponds (Figure 2-1).

Mining wastes and contamination carried from Butte were deposited in the floodplain, impacting water quality throughout Silver Bow Creek. The EPA estimated that 2.5 million to 2.8 million cubic yards (cy) of tailings and contaminated soils covered about 1,300 acres in the OU. In some areas, the tailings were several feet thick. Mining wastes caused acidic conditions and contaminated Silver Bow Creek and its floodplain with arsenic and metals including cadmium, copper, lead, mercury and zinc.

The SSTOU is divided into four subareas based on geologic and topographic features. Each remedial subarea is further divided into five remedial “reaches,” each about one mile in length, for a total of 20 remedial reaches within the SSTOU, which are identified longitudinally from upstream to downstream by the letters A-T (Figure 2-1).

Groundwater occurs in both bedrock and shallow alluvial aquifers within the SSTOU. Generally, alluvial groundwater flows toward and into Silver Bow Creek. Movement of groundwater within bedrock aquifers is controlled by open fractures and joints in the rock. Shallow alluvial aquifers in the SSTOU are typically impacted by mining-related contaminants.

Figure 2-1: SSTOU Site Map



Source: Figure 1, 2020 SSTOU Preliminary Close Out Report, Addendum 1

RESPONSE ACTION SUMMARY

Basis for Taking Action

EPA initiated environmental investigations in the vicinity of the SSTOU in 1982 to address mining impacts along Silver Bow Creek. Contamination was found in tailings and impacted soils, instream sediments, railroad bed soils, groundwater and surface water. In 1995, the PRP submitted a Phase II RI/FS to the EPA and MDEQ that incorporated all relevant pre-1991 Phase I RI data. The 1995 human health risk assessment identified potential exposure to arsenic in soils and groundwater as the primary risk to people living in or near the area. The EPA determined the risks posed by lead contamination in soils were generally within the acceptable range based on the risk model used in Butte.

The contaminated in-stream sediments of Silver Bow Creek are a critical contaminant pathway to impacted surface water and aquatic biota, and particularly, benthic macroinvertebrates. Contaminants in sediment posing a high risk to the environment are arsenic, cadmium, copper, lead, mercury and zinc.

Many near-stream tailings and impacted soil areas were devoid of vegetation. The primary contaminants in surface soils include arsenic, copper, lead and zinc.

Potential risks to ecological receptors were evaluated by comparing current or predicted conditions and chemical concentrations in exposed media against known conditions that lead to adverse effects. At the time of the assessment, Silver Bow Creek was devoid of fish and most other aquatic life forms due to the presence of mine waste contamination. The assessment found that these contaminants affect both the water quality and instream sediments in Silver Bow Creek and create a toxic environment for fish and most benthic macroinvertebrates.

Surface water has been severely impacted throughout the length of Silver Bow Creek and serves as a contaminant pathway to the aquatic environment. Surface water contaminants that pose the greatest risk to the health of the stream include copper and zinc.

Response Actions

The EPA and MDEQ selected the remedy for the SSTOU in the November 1995 Record of Decision (ROD) and 1998 Explanation of Significant Differences (ESD). The ROD describes the final remedial action objectives (RAOs) for the five media of concern at the SSTOU (Table 2-1).

Table 2-1: SSTOU RAOs

Medium	RAO
Tailings/Impacted Soils (T/IS)	• Prevent human exposure to T/IS from residential or occupational activity in the SSTOU. This will be accomplished, in part, through institutional controls that will require the entire SSTOU to be developed as a recreational corridor. • Prevent erosion or migration of inorganic contaminants of concern in T/IS into Silver Bow Creek or into groundwater that would prevent attainment of groundwater, surface water and sediment remediation levels. • Protect all solid waste in the SSTOU from flood displacement, washout or erosion in accordance with Applicable or Relevant and Appropriate Requirements (ARARs). • Prevent the saturation of T/IS by groundwater during any period of the hydrologic year or by bank storage of high-flow stream discharge. • Prevent migration of contaminants of concern in T/IS that would cause phytotoxicity in terrestrial vegetation.

Medium	RAO
In-Stream Sediments	• Remove all tailings and the majority of the contaminant load from the streambed. • Prevent exposure of aquatic species to instream sediments with concentrations of contaminants in excess of published (in peer-reviewed journals) risk-based concentrations. • Improve Silver Bow Creek over time to a condition that supports a self-reproducing fishery for trout species.
Railroad Materials	• Prevent exposure by recreational users of the railroad beds in excess of acceptable cancer and non-cancer risks from arsenic. Risks will be adequately reduced by removal of ore concentrate spills and other impacted railroad materials exhibiting arsenic concentrations in excess of 2,000 milligrams per kilogram (mg/kg). • Prevent erosion of contaminated railroad bed materials into Silver Bow Creek to the degree that surface water standards would be exceeded, or instream sediments would be contaminated, or vegetation on adjacent relocation or Streambank Tailings and Revegetation Study (STARS)[a] treated areas would be adversely impacted.
Groundwater	• Attain compliance with applicable MDEQ Circular WQB-7 standards, federal maximum contaminant levels (MCLs) and federal non-zero maximum contaminant level goals (MCLGs) for all OU groundwater. • Prevent discharge of groundwater that would prevent attainment of Silver Bow Creek Circular WQB-7 ambient standards or instream sediment remediation goals.
Surface Water	• Meet the more restrictive of the aquatic life or human health standards for surface water identified in MDEQ Circular WQB-7, through application of Is-classification requirements.[b] • Prevent exposure of humans and aquatic species to instream sediments with concentrations of inorganic contamination in excess of risk-based standards. A physical criterion is used to define those sediments posing the greatest risk to receptor species. A contingency is established to develop metal-specific concentrations that would be risk-based and allow sediment cleanup standards if the physical criterion standard cannot be employed appropriately. • Provided that upstream sources of Silver Bow Creek contaminants are eliminated, meeting the two remediation standards identified above should attain the remedial action objective to improve the quality of Silver Bow Creek's surface water and instream sediments to the point that Silver Bow Creek could support the growth and propagation of fishes and associated aquatic life, one of the designated goals for an Is-class stream, including a self-sustaining population of trout species.
Notes: a. Lab, greenhouse and field studies led to the development of a technology specifically for consideration at the SSTOU involving chemically amending floodplain tailings, commonly referred to as STARS. b. Silver Bow Creek (mainstem) from the confluence of Blacktail Deer Creek to Warm Springs Creek is currently classified “Is” for water use. The MDEQ undertook an effort to reclassify the stream some years ago but has not finally acted on that reclassification. The goal of the state of Montana is to have these waters fully support the following uses: drinking, culinary and food processing purposes after conventional treatment; bathing, swimming and recreation; growth and propagation of fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply.	

The major components of the SSTOU remedy, as described in the 1995 ROD, include:

- Removal of tailings and impacted soils, including the stream, streambanks, and near streambanks, from most areas in the 100-year floodplain.
- Excavated tailings and impacted soils will be placed in mine waste relocation repositories at locations to be determined during the remedial design/remedial action. To meet RAOs, removal will include tailings

and impacted soils where: (a) they are saturated by groundwater; (b) in-place treatment would not be effective because of thickness of tailings or lack of buffer material between the tailings and groundwater; or (c) treated tailings and impacted soils could be eroded into Silver Bow Creek.
- All waste left in place will be STARS-treated and protected from washout or erosion from lateral stream migration and flood flows.
- Fine-grained in-stream sediments in depositional areas are to be removed and placed in repositories with the excavated tailings and impacted soils. After removal of contaminated in-stream sediments, the channel bed and streambank will be reconstructed.
- All contaminated railroad materials that pose a risk to human health or the environment will be excavated, treated and/or capped.
- No separate remedial action is planned for groundwater or surface water. Remedial activities for the SSTOU tailings and impacted soils and for sources of contaminants upstream or off site under other cleanup actions are expected to reduce contaminant releases to groundwater and surface water, with the goal of ultimately attaining state water quality standards.
- Development and implementation of an institutional controls program and an operation and maintenance (O&M) plan.

The EPA and MDEQ updated the remedy in a 1998 ESD. Changes included:

- Increasing the volume of the SSTOU tailings and impacted soil based on additional information.
- Allowing modifications to the alignment and channel profile of Silver Bow Creek.
- Allowing use of a temporary stream diversion to facilitate dewatering and excavation of near-stream tailings and to enhance floodplain and streambank revegetation efforts.
- Adopting more protective in-stream sediment removal criteria based on other remedial design changes.[4]
- Adding a soil cover to the mine waste relocation repository design.
- Including sediment basins to capture contaminated overland flows from off-site mine waste sources.
- Eliminating treatment wetlands as the final land use in Subarea 1 was documented.
- Revising the proposed schedule for the SSTOU remedy implementation.
- Increasing the estimated cost of the SSTOU remedy.

The SSTOU ROD estimated that approximately 1,550,000 cy of tailings and impacted soils would be removed from the floodplain, and approximately 950,000 cy would be treated in situ with the STARS technology. While treatment would have reduced the leachability and mobility of the metals in the treated tailings and impacted soils, the ROD remedy would have allowed nearly 40% of the tailings and impacted soils to remain in place as a continuing potential source of COCs to groundwater and Silver Bow Creek. The ESD increased the over-excavation safety factor, which substantially increased the estimated volume of tailings and impacted soils in the OU to be removed and enhanced the overall effectiveness of the remedy.

Status of Implementation

Upon entry of a Consent Decree in 1999, which provided PRP funding for implementation of the ROD as modified, MDEQ, with approval from the EPA, assumed the lead for implementation of the remedial design and remedial action. Remedial construction generally proceeded from upstream to downstream (Subarea 1 through Subarea 4) across the 26-mile OU (Figure 2-1). Excavated materials were transported to the SSTOU Mine Waste Relocation Repository (MWRR) or off site to the Opportunity Ponds Waste Management Area, which is part of

[4] The ROD required that fine-grained (less than one millimeter) in-stream sediments in depositional areas be excavated and placed in a Mine Waste Relocation Repository (MWRRs). The agencies have determined that the revised criteria are more protective than the prior ROD criteria because (1) the new criteria address the entire Silver Bow Creek channel in the SSTOU, rather than just depositional areas, (2) the original criteria were found not to define adequately those contaminated sediments requiring removal, and (3) the stream bed of the new Silver Bow Creek channel will be constructed of clean, imported materials and the stream will be more stable geomorphically, reducing potential re-entrainment of and exposure to contaminated materials in the stream.

the Anaconda Co. Smelter NPL site. Placement of the wastes in the Opportunity Ponds Waste Management Area eliminated the potential for the numerous near-stream repositories to become potential sources of COCs to groundwater and Silver Bow Creek and reduced the associated ongoing monitoring and maintenance requirements.

The application of STARS technology using lime amendments for the in-situ treatment of tailings and impacted soils - were replaced with cost-effective actions that were effective to protect human health and the environment. In-situ treatment was limited to certain areas with low concentrations located far away from the anticipated channel migration corridor.

Stream Reconstruction

Throughout much of the SSTOU, Silver Bow Creek was reconstructed and realigned. In some stretches of the creek, the channel could not be relocated or completely reconstructed due to infrastructure, including active railroad lines and bridges. The entire stream channel was removed and replaced with a new, non-deformable channel section in areas where Silver Bow Creek is located directly at the toe of a railroad embankment or between two active railroads and removal of the railroad material was not feasible.

Deformable channel banks, designed to allow for stream migration over time, were constructed throughout a majority of the OU. Nearly 2 miles of additional stream length were added, increasing the total length of Silver Bow Creek from 24 to approximately 26 miles.

Railroad Materials

Remedy implementation included installation of engineered revetments on or adjacent to all contaminated railroad embankments adjacent to the stream channel to prevent erosion and to protect the embankment. Run-on control channels and sediment ponds were constructed where larger areas of runoff from railroad bed or rail yards could impact the floodplain. Clean rock cover was placed over all contaminated railroad embankments adjacent to the floodplain to prevent direct exposure and minimize erosion onto the floodplain. Portions of the embankment were removed where feasible and necessary to implement the remedy.

The remedy included excavation of the railroad embankment at bridge abutments to a depth of at least one to two feet, replacement of the bank with clean backfill material, and armoring. The remedy also included relocation of the Silver Bow Creek channel to provide for railroad bridge crossings. As part of constructing new bridges, installing culverts or relocating the bridges at locations along the creek, the entire bridge abutment sections, floodplain tailings and impacted soils, and the affected portions of the contaminated railroad beds were replaced with clean fill material. MDEQ also removed three bridges and associated portions of the embankments from the historic alignment (two in Reach B and one in Reach K) that were no longer needed after stream channel realignment was completed.

The contaminated railroad beds adjacent to but outside the remediated floodplain were covered by protective rock to prevent erosion of the underlying materials. The cover is intended to prevent erosion caused by the direct impact of rainfall on the side of the embankment.

All material removed from the railroad grades was treated as tailings and impacted soils and disposed of in the Opportunity Ponds Waste Management Area. All new embankments were constructed with clean imported fill materials.

Tailings and Impacted Soils

The remedy included excavation to a predetermined depth, established during design through test pitting and sampling, and off-site disposal of the material. The remedial action goal guiding the excavations was to remove 90% of the floodplain tailings and impacted soils with 95% confidence. Contaminant material removal was

considered achieved if at least four out of six of the COCs achieved the removal goal (Table 2-2). Verification sampling to confirm acceptable removal of contaminated material took place in each reach before application of replacement soil, topsoil and revegetation.

Table 2-2: SSTOU Tailings and Impacted Soil Removal Goals

COC	Removal Goals (milligrams per kg [mg/kg])
Arsenic	200
Cadmium	20
Copper	1,000
Mercury	10
Lead	1,000
Zinc	1,000

The initial SSTOU remedial action, conducted from 1999 to 2015, removed the majority of the tailings and impacted soils deposited in the Silver Bow Creek floodplain in Reaches 1-4. However, because of the project scale and limitations of field verification sampling, some deposited tailings and impacted soils remained in the floodplain. The residual tailings remedial action included a secondary pass through Subareas 1 through 2 to excavate the remaining areas of tailings and impacted soils. In addition to the tailings and impacted soils removal, areas of poorly performing vegetation were treated with vegetative backfill growth media. Minor streambank rehabilitation work was completed where necessary.

During this FYR period, final remedial action work in Reach A and B were completed. The Residual Tailings remedial action began with mobilization by the cleanup contractor to Reach A in January 2016, progressed downstream and was finished in Reach D in July 2017. In November 2017, work began in Reach E and progressed through Reach F. From January 2018 to April 2018, remedial action activities continued in Reach G and Reach H until suspension of work in April 2018 because of high stream flows. Reach I and Reach J were worked on concurrently from mid-April 2018 through mid-May 2018 before work started in Reach K and recommenced in Reach G and Reach H. All remedial action work was completed in reaches G through K by December 2018. Areas where residual tailings remain in place at depth are near utilities and in areas where existing ponds were expanded. Excavation was not completed in saturated areas where deeper excavation depths were not practical or safe. The contractor demobilized from the Site in February 2019. The EPA is reviewing the remedial action report submitted in 2020 and will determine with MDEQ if additional actions are needed.

Current actions consist of regular MDEQ inspections and monitoring of surface water, groundwater, vegetation cover and additional environmental media, and additional removal activities as needed.

Institutional Control (IC) Review

The 1995 ROD anticipated a need for certain institutional controls based largely on the need to protect areas of in-situ treatment, the MWRR and prevent shallow groundwater use. Currently, alluvial groundwater is not used for potable consumption within the SSTOU. MDEQ is currently working with the Greenway District, an entity that has constructed a trail system along Silver Bow Creek, to create an institutional control plan for the SSTOU, as required by the ROD.

At the time of this FYR, MDEQ is completing an assessment of compliance with performance standards for the Site. MDEQ will propose appropriate institutional controls based on final conditions. As a part of the assessment, MDEQ has prepared a Site Inspection Monitoring and Maintenance Plan that identifies key components of the remedy and known areas of waste left in place. That plan is under review by the EPA.

Table 2-3: SSTOU Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Area(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Areas of in-situ treatment	Yes	Yes	To be determined	To be determined	To be determined
MWRR	Yes	Yes	MWRR area	To be determined	To be determined
Groundwater	Yes	Yes	To be determined	To be determined	To be determined

Systems Operations/Operation and Maintenance (O&M)

The 1995 ROD describes the SSTOU O&M activities, including a long-term plan to monitor, manage and maintain reclaimed areas and on-site repositories. MDEQ, under its draft Site Inspection Monitoring and Maintenance Plan, conducts regular inspections for erosion and monitors surface water, sediments, groundwater, macroinvertebrates, periphyton and fish (see Data Review section below). The monitoring, management and maintenance program addresses vegetative performance on treatment areas, on-site repositories, remediated streambanks, streambank stability and channel meander. It also addresses in-stream sediment sampling for contaminant concentrations and macroinvertebrate abundance and diversity. Repairs to areas damaged or eroded over time are completed as needed. Vadose zone, saturated zone and overland flow monitoring will promote documentation of metals immobilization in all remediated areas of the SSTOU.

PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determinations and statements from the 2016 FYR Report as well as the recommendations from the 2016 FYR Report and the status of those recommendations.

Table 2-4: SSTOU Protectiveness Determinations/Statements from the 2016 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy at the SSTOU (OU1) is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed exposure pathways that could result in unacceptable risks.

Table 2-5: SSTOU Status of Recommendations from the 2016 FYR Report

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU1	An O&M Plan has been submitted but not yet approved.	Finalize and approve the O&M Plan.	Under Discussion	The EPA is reviewing the draft O&M Plan.	Not applicable
OU1	Institutional controls are not yet implemented.	Develop and implement an institutional controls plan.	Ongoing	MDEQ is evaluating the extent of institutional controls needed, as described in the 1995 ROD, and will propose an appropriate institutional control plan based on final conditions.	Not applicable
OU1	Areas of vegetation failure remain.	Identify and remove all remaining hot spots.	Ongoing	MDEQ continues to address the remaining hot spots through completion of the residual tailings remedial action.	9/30/2023
OU1	The interaction between groundwater and surface water is not fully characterized.	Conduct a more detailed assessment of how metal COC concentrations in groundwater influence metal COC concentrations in surface water.	Under Discussion	MDEQ produced a draft assessment of the groundwater and surface water interaction in the SSTOU, which is currently under EPA review and comment. MDEQ will continue monitoring groundwater and surface water as described in the Sampling and Analysis Plan for Performance Monitoring of the Streamside Tailings Operable Unit.	Not applicable
OU1	The ecological risk assessment did not consider the current fauna now present at remediated areas.	Evaluate risk to ecological receptors.	Under Discussion	MDEQ produced a draft assessment Updated Ecological Risk Assessment for the SSTOU, which is under EPA review and comment.	Not applicable

FIVE-YEAR REVIEW PROCESS

Data Review

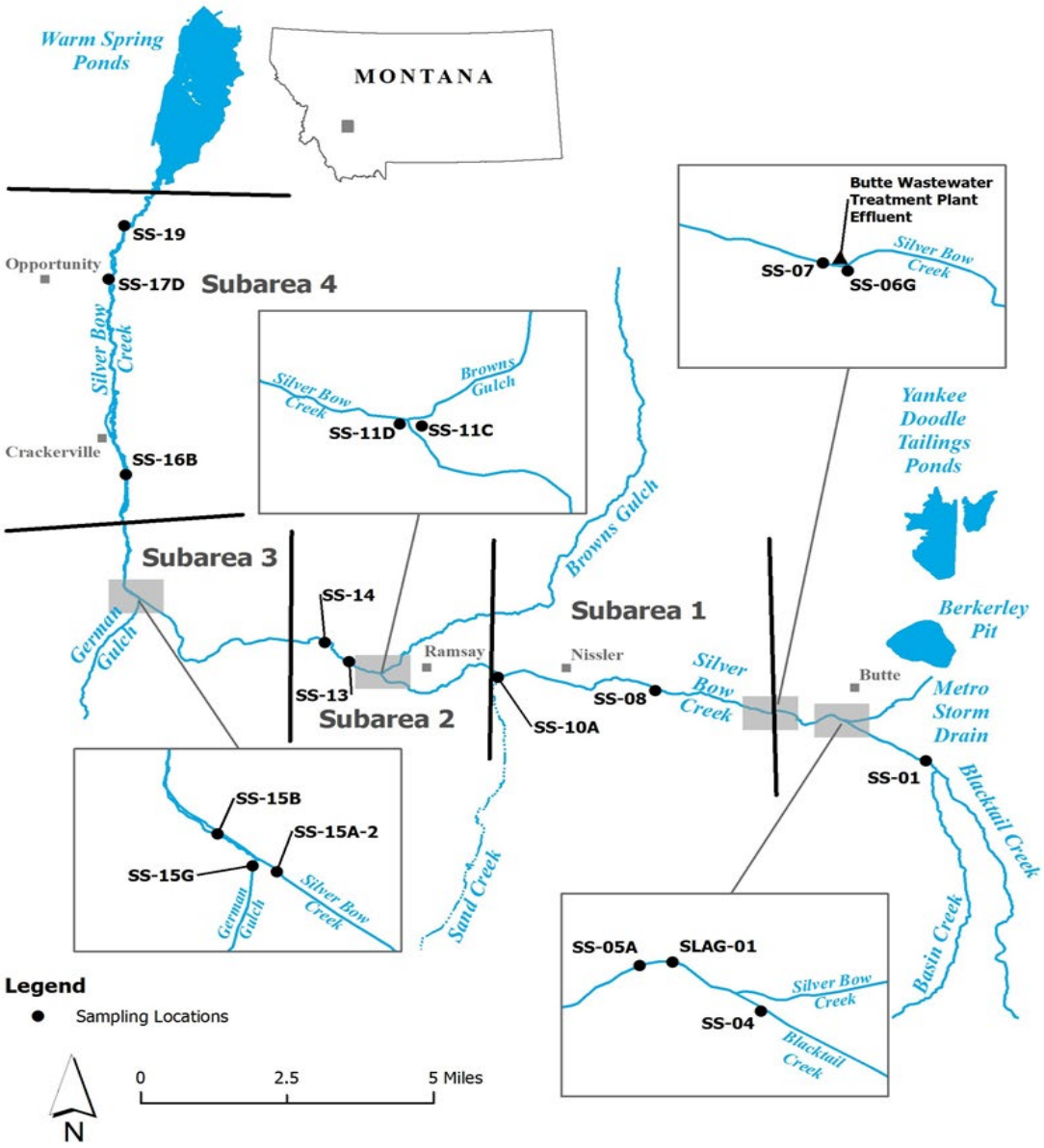
The ROD identifies remediation goals and performance standards for surface water and groundwater. The purpose of the surface water and groundwater monitoring program is to assess contaminant trends and provide a long-term record of environmental conditions in the SSTOU. In addition, MDEQ evaluates a broader range of parameters as part of the performance monitoring program for the SSTOU. The MDEQ performance monitoring program includes additional environmental media, not required by the ROD, including in-stream sediment, vadose zone water, macroinvertebrates, periphyton, vegetation, soils and birds.

Overall, conditions have improved, but elevated concentrations and contaminant loading within the SSTOU continue. Groundwater and surface water monitoring will continue, and conditions are expected to improve with the completion of the SSTOU remedial actions and continued remediation of upstream sources. The EPA is currently reviewing MDEQ's performance standard compliance report and an assessment of groundwater and surface water interactions. The EPA and MDEQ will determine if modifications are needed to the remedial action, and the monitoring or the performance standards in order to ensure long-term protectiveness.

Surface Water Monitoring

Surface water sampling has occurred at 13 sites located on Silver Bow Creek within the SSTOU between 2015 and 2019 (Figure 2-2). Each site was sampled on a quarterly basis generally in mid-March, early June, mid-September and early December.

Figure 2-2: SSTOU Surface Water Sampling Locations

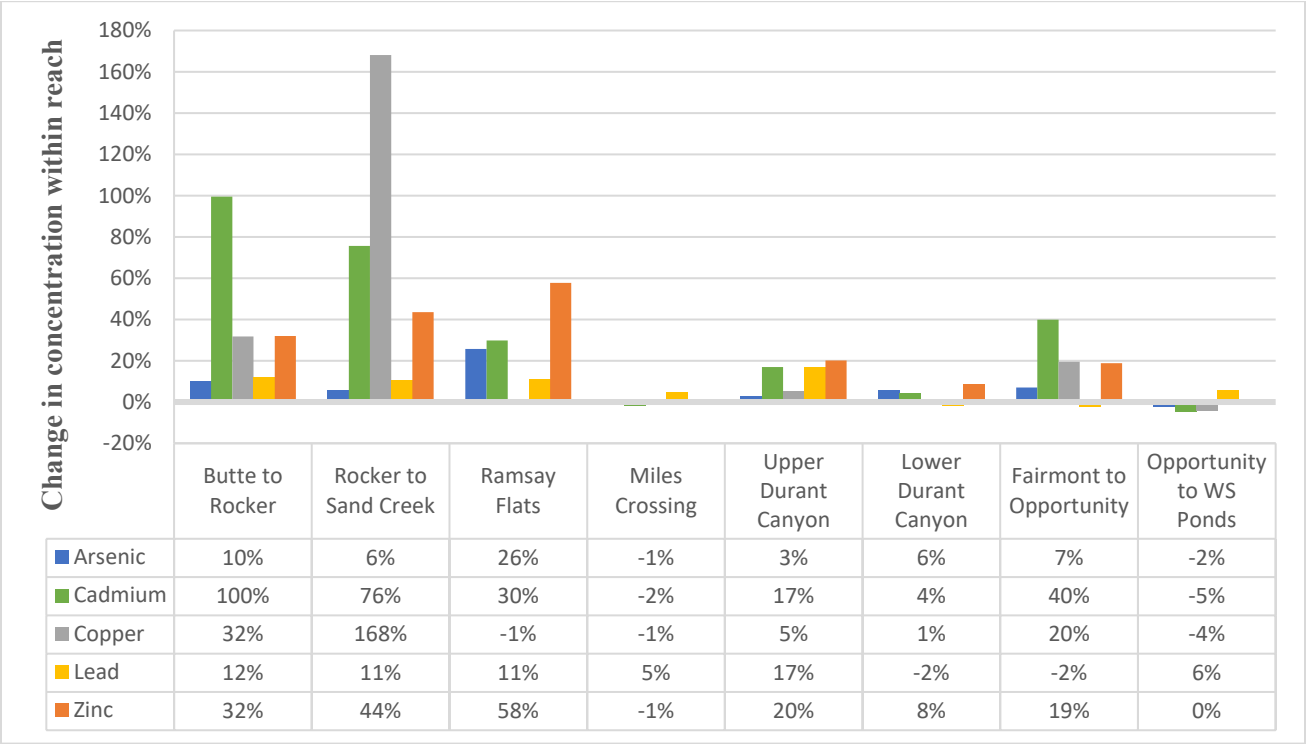


Source: Figure 2-1, 2020 Addendum to Surface Water and Groundwater Interim Performance Standards Assessment

Overall, MDEQ-reported rates of surface water remedial goal exceedances have declined over time, but the rate of decline has slowed in the most recent five-year period. MDEQ's 2020 assessment of performance standard compliance indicates that Subarea 1 remained a source of contamination within the SSTOU during the 2015-2019 period.

Despite general improvements, exceedances of surface water performance goals were common in 2019 in each subarea. Contaminant loading to surface water occurred heavily in both Subarea 1 reaches (Butte to Rocker and Rocker to Sand Creek), moderately in the Ramsay Flats and Fairmont to Opportunity reaches, and modestly in the Upper Durant Canyon reach (Figure 2-3). There was little or no contaminant loading in the Miles Crossing, Lower Durant Canyon, and Opportunity to Warm Springs Creek reaches.

Figure 2-3: Contaminant of Concern Concentration Gains and Losses Among Eight Reaches of the Streamside Tailings Operable Unit, 2015-2019



	Butte to Rocker	Rocker to Sand Creek	Ramsay Flats	Miles Crossing	Upper Durant Canyon	Lower Durant Canyon	Fairmont to Opportunity	Opportunity to WS Ponds
Arsenic	10%	6%	26%	-1%	3%	6%	7%	-2%
Cadmium	100%	76%	30%	-2%	17%	4%	40%	-5%
Copper	32%	168%	-1%	-1%	5%	1%	20%	-4%
Lead	12%	11%	11%	5%	17%	-2%	-2%	6%
Zinc	32%	44%	58%	-1%	20%	8%	19%	0%

Source: 2020 Assessment of Groundwater and Surface Water Interaction in the Streamside Tailings Operable Unit

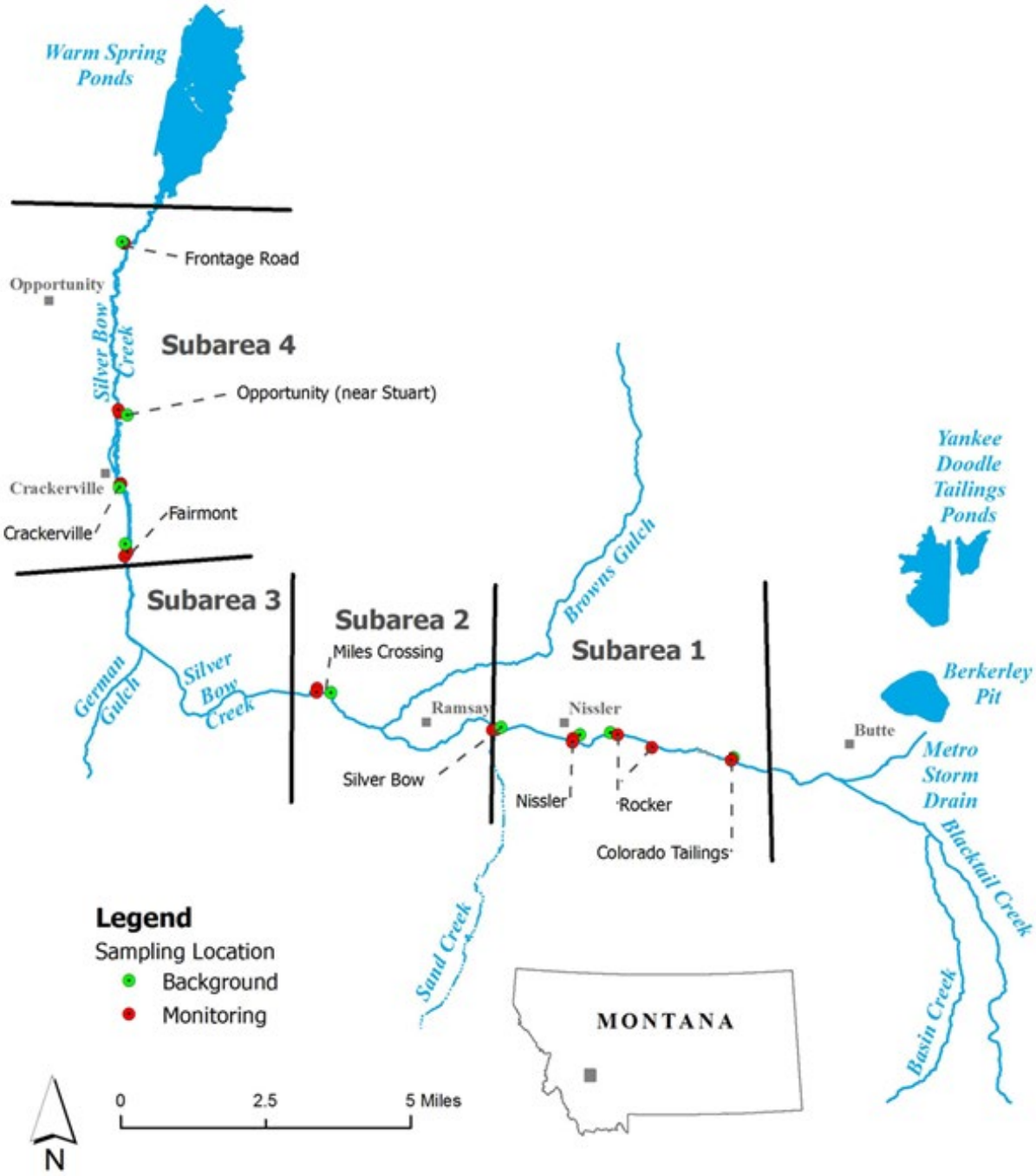
Overall streamflow levels, as well as peak spring runoff levels, during 2018 and 2019 were among the highest in the SSTOU over the past 20 years and since remediation efforts began. These conditions mobilize bed sediments and associated sediment-bound contaminants leading to an increase in metals concentrations in surface water. These high flow levels affect the ability to distinguish trends in contaminant concentrations due to the remedial actions, at least over the short term.

Groundwater Monitoring

As of 2019, MDEQ has collected 18 years of groundwater data (2002 to 2019). Sampling was conducted in 27 shallow groundwater wells located within the Silver Bow Creek floodplain of the SSTOU between 2015 and 2019 (Figure 2-4). Wells are clustered in groups of three with two monitoring wells situated within the floodplain and the remedial work zone and a background well located outside the work zone but in the immediate vicinity.

Some areas of the shallow alluvial aquifer of Silver Bow Creek within the SSTOU are contaminated by COCs, including areas of persistent contamination. Certain COC concentrations (specifically cadmium, copper and zinc) in monitoring wells regularly exceeded concentrations in paired background wells by several orders of magnitude. Average concentrations in monitoring wells and concentrations in paired background wells are included in Appendix I.

Figure 2-4: SSTOU Groundwater Sampling Locations



Source: Figure 2-2, 2020 Addendum to Surface Water and Groundwater Interim Performance Standards Assessment for Streamside Tailings Operable Unit

Groundwater and Surface Water Interactions

MDEQ has submitted to the EPA an assessment of groundwater and surface water interactions to identify reaches gaining flow or contaminants and evaluate if groundwater in the adjacent shallow aquifer demonstrated evidence of similar contaminant levels that could be responsible for the contamination of surface water. Preliminary findings suggest that the loading of COCs in surface water is likely directly related to groundwater contaminant mobilization in the shallow alluvial aquifer. However, additional assessment may be warranted.

MDEQ Performance Monitoring

MDEQ performs regular monitoring of additional media, within the SSTOU, including in-stream sediment, vadose zone water, macroinvertebrates, periphyton, vegetation, soils and birds.

In-Stream Sediment

Sediment monitoring in the SSTOU is conducted to compare sediment COC concentrations to ecological reference values and to determine the extent to which the streambed may be re-contaminated from upstream or other sources. Weighted mean sediment COC concentrations in the SSTOU exceeded the reference values in 98% of the samples for copper and zinc, in 84% of the samples for arsenic, in 77% of the samples for cadmium, in 66% of the samples for lead, and in 55% of the samples for mercury. The highest concentrations for copper and most other COCs in sediment often occurred at the Lower Area One sites in the vicinity of the Slag Canyon in Butte (upstream from the SSTOU). Downstream from the Slag Canyon, sediment COC concentrations tended to decrease rapidly through Subarea 1 and were lowest in Silver Bow Creek in Subarea 2. Concentrations in Subarea 3 (particularly below German Gulch) were also high, then tended to decrease through Subarea 4.

Vadose Zone Water

Vadose zone water quality is monitored in the vicinity of the MWRR to assess mobility of COCs from the repository into the underlying groundwater supply and surface water in the SSTOU. In general, concentrations were similar in 2019 to previous monitoring years. Based on a 10-year time series, concentrations generally do not appear to be increasing, with a few exceptions. It appears that arsenic concentrations in Lysimeter LYS-03 and copper concentrations in Lysimeter LYS-02 may be increasing over time. Concentrations in both lysimeters will be monitored in future years to look for continued increasing trends.

Macroinvertebrates and Periphyton

Macroinvertebrate and periphyton samples were collected at each surface water sampling site during the third quarter of 2019 and compared to reference values from specific bio-indices to evaluate biointegrity. All SSTOU sampling sites were classified as moderately impaired. In the four sites monitored outside the SSTOU, three were classified as moderately impaired and one was classified as unimpaired. Stressors implicated as likely impairments to macroinvertebrate biointegrity in the 12 SSTOU sites included nutrients and habitat disturbance in all sites, hypoxia in 9 of 12 sites, and metals in 5 of 12 sites.

Periphyton samples were evaluated for an array of metrics and bioindices to evaluate overall condition and impairments from specific stressors. All sites were assessed as being in either “good” or “excellent” condition based on the overall biological integrity score. However, certain individual metrics suggested impairment. Based on interpretation of nutrient-specific metrics, seven sites located in Subareas 2, 3 and 4 were impaired for nutrients. Nearly all sites were impaired for sediment. Impairment by metals was generally less common but was suggested by the data at some sites.

Vegetation, Soil and Bird Monitoring

Revegetation in each reach or phase of the SSTOU is monitored in temporal rotation starting one decade after remediation until a reach passes the performance standard or is repaired. Revegetation monitoring was conducted in 2019 in Reaches B, C, F and G. Soils were monitored in 2017 throughout the SSTOU, and birds were monitored throughout the SSTOU in 2018 and 2019. Reaches B, C, F and G surpassed vegetation performance standards, and therefore, monitoring will be discontinued in those reaches. As of 2019, formal bird monitoring is complete in the SSTOU. Data analysis on bird abundance and diversity indicate increased species counts.

Site Inspection

The site inspection took place on 9/17/2020. Participants included EPA RPM Ken Champagne, MDEQ project manager Joel Chavez, and Treat Suomi from EPA FYR support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. The group toured the entire length of SSTOU, including Subareas 1, 2, 3 and 4. The Site was well maintained overall. No issues were noted. The site inspection checklist and photos are included in Appendices F and G.

TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

The remedy is functioning as intended by the 1995 SSTOU ROD as amended by the 1998 SSTOU ESD. The removal of tailings-impacted soils was largely completed in 2019. Removal of tailings-impacted soils and the remedial activities for sources upstream or off site under other OUs' cleanup actions are expected to further reduce contaminant levels in groundwater and surface water. Long-term monitoring of surface water and groundwater will assess contaminant trends. MDEQ and the EPA are further assessing the groundwater and surface water interactions and will determine if any adjustments to planned remedial action, monitoring or performance goals are warranted.

Contaminant concentrations measured in groundwater samples collected since 2005 exceed the MCL at some sample locations. However, alluvial groundwater is not used for potable consumption within the SSTOU. Institutional controls to prohibit groundwater use will be implemented as necessary.

MDEQ is in the process of evaluating the SSTOU remedial action including assessment of compliance with removal standards, upstream and downstream surface water sampling, identification of potential upstream source areas, and institutional controls. The SSTOU includes a mix of public and private lands that will require various institutional controls. Currently, access to the majority of the SSTOU is limited, and public use areas do not present unacceptable exposures.

During the community involvement interviews, responding community members indicated the restoration has greatly improved the area.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy are generally still valid. Current and anticipated future land uses at the SSTOU have not changed since the ROD and groundwater is not used for potable consumption within the SSTOU. However, remedial actions have enhanced instream conditions and upland/riparian habitat at areas previously devoid of vegetation. The remedy selection

assumed that wildlife exposures would be limited as wildlife was not expected to frequent the SSTOU. Cleanup and restoration activities have increased the likelihood that wildlife and recreational users will use the SSTOU area. In 2020, MDEQ produced a draft assessment Updated Ecological Risk Assessment for the SSTOU, which is under EPA review and comment.

The ROD states the goals are compliance with standards for surface water and groundwater identified in MDEQ Circular WQB-7. Since the issuance of the ROD, Circular WQB-7 has been replaced by 2019 Circular DEQ-7 and standards for some COCs have been revised. The new, more stringent standards are currently used to evaluate compliance for the COCs.

Current and anticipated future land and water uses at, or near, the SSTOU have not changed since the ROD. Groundwater is not used for potable consumption within the SSTOU.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

OU: SSTOU	**Issue Category:** Institutional Controls			
	Issue: Institutional controls are not yet in place.			
	Recommendation: Develop and implement an Institutional Controls Assurance and Implementation Plan and implement required Institutional Controls.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	State	EPA	9/30/2022

OU: SSTOU	**Issue Category:** Remedy Performance			
	Issue: Groundwater and surface water monitoring indicate continued exceedance of performance goals.			
	Recommendation: Determine if groundwater and surface water interactions or residual upstream sources are affecting contaminant trends and implement response actions, as appropriate.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2023

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PROTECTIVENESS STATEMENT

Protectiveness Statement	
Operable Unit:	*Protectiveness Determination:*
SSTOU	Short-term Protective
Protectiveness Statement:	
The remedy for Streamside Tailings OU1 currently protects human health and the environment. In order for the remedy to be protective in the long-term, institutional controls are needed to prevent potential exposures, and a determination of how groundwater and surface water interactions or residual upstream sources are affecting contaminant trends is needed.	

NEXT REVIEW

The next FYR Report for the SSTOU of the Silver Bow Creek/Butte Area Superfund site is required five years from the completion date of this review and will be included in the site-wide FYR.

III. BERKELEY PIT/MINE FLOODING OPERABLE UNIT (BMFOU), Operable Unit 3)

Background

The 5,097-acre BMFOU is in the Butte Hill area near Butte and Walkerville, Montana. The BMFOU consists of waters in the Berkeley Pit, the underground mine workings, the associated alluvial and bedrock aquifers and other contributing sources of inflow to the Berkeley Pit/East Camp System (including surface runoff, leach pad and tailings circuit overflows). The Travona/West Camp system and the Outer Camp system (Figure 3-1) was originally in this OU but was transferred to the Butte Priority Soils Operable Unit in the 2002 BMFOU ESD and the 2006 BPSOU ROD. The surface boundaries of the OU are approximately the Continental Divide to the east, Silver Bow Creek above and below the confluence of Blacktail Creek to the south, Missoula Gulch to the west and the Yankee Doodle Tailings Impoundment (YDTI) watershed drainage system to the north.

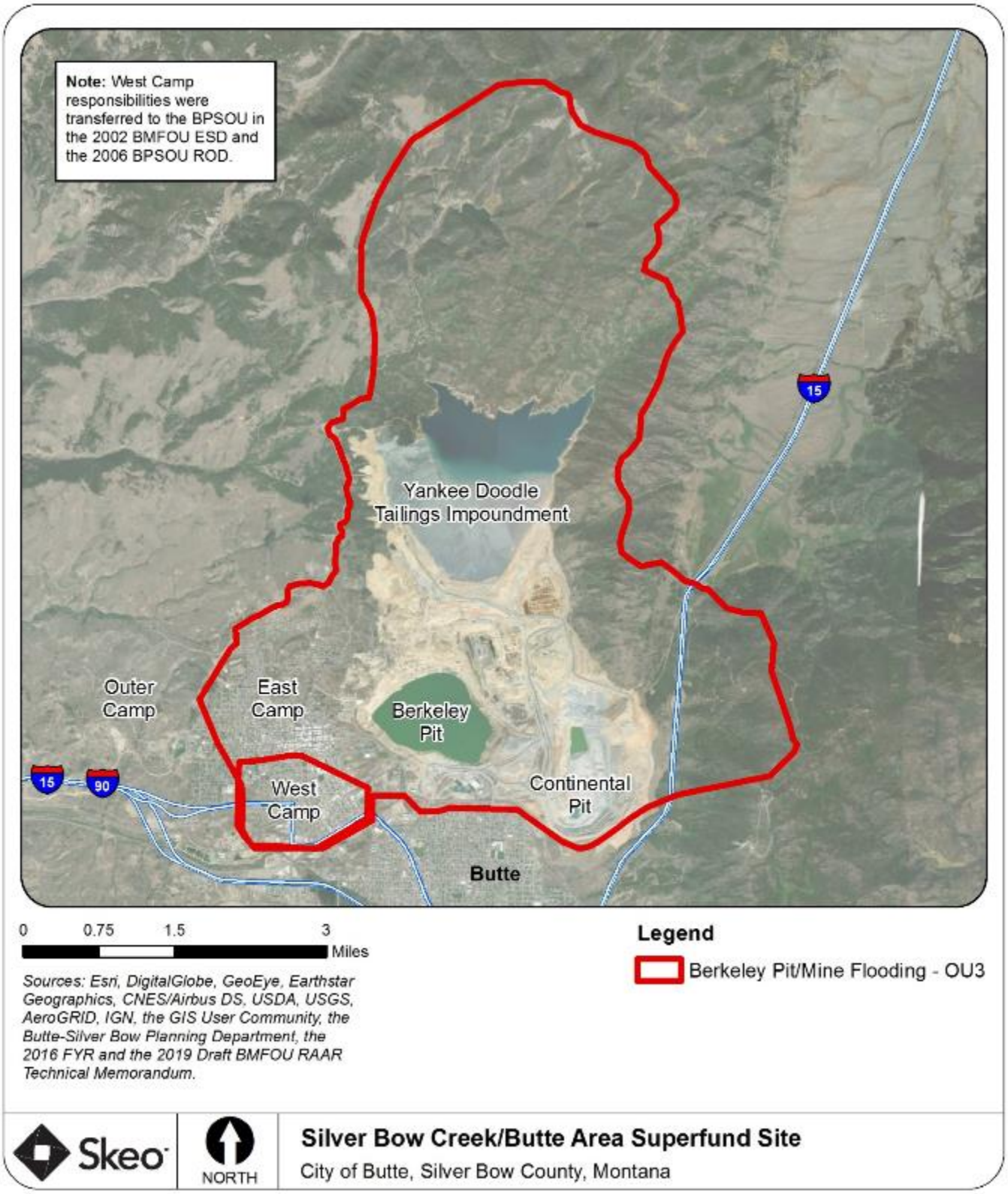
The Berkeley Pit is the major feature of this OU (Figure 3-1). It is 1,780 feet deep, encompasses an area of 675 acres and contains approximately 49.5 billion gallons of contaminated water. The Berkeley Pit/East Camp System encompasses approximately 10,000 miles of underground mine workings. The West Camp System, mentioned above, is in the southwest corner of the OU and includes the Travona, Emma and Ophir mines and associated underground workings. These two systems are separated by bulkheads installed in the late 1950s. They are considered to be separate hydrologic systems. The Outer Camp System consists of mine workings extended to the west and north that were at one time also connected to the East Camp and were hydraulically isolated with bulkheads many decades ago. The hydraulic separation has allowed Outer Camp System water levels to return to, or approach, pre-mining conditions. Remediation and maintenance of the West Camp groundwater (through the Butte Treatment Lagoon System) was transferred to the BPSOU in the 2006 BPSOU ROD and 2002 BMFOU ESD, and groundwater in the West Camp System is not managed under the BMFOU.

Underground mining, primarily for silver and copper, has been conducted in Butte since the late 1800s, with open-pit mining beginning at the Berkeley Pit in 1955. To allow historic underground and open-pit mining in the Butte area, Anaconda Company, now Atlantic Richfield Company (Atlantic Richfield), lowered groundwater by pumping. In 1982, Anaconda Company ceased operations and turned off the pumps used to control water levels in the underground mines and Berkeley Pit. Other mining and site operations were suspended in 1983, and Anaconda Company sold the mine in 1985. Montana Resources resumed mining in the Continental Pit, an open pit mine near, but separate from, the Berkeley Pit, in 1986, and open-pit mining continues to this day.

As a result of cessation of pumping, the artificially lowered groundwater level in the area has been rising toward pre-mining levels in both the underground mines and the Berkeley Pit. As the water level rises, it comes in contact with the remnants of Berkeley Pit ore, which is composed of highly altered porphyry copper mineral veins in the Butte quartz monzonite, is rich in pyrite and has no neutralizing potential. The oxidation of pyrite in the presence of air and water lowers the pH (resulting in acidic water in the Berkeley Pit) and causes a release of dissolved metals to the water. If levels were allowed to continue to rise, the hydraulic gradient could change, and contaminated water could flow out of the East Camp System into the surrounding alluvial aquifer and eventually to Silver Bow Creek. Remedial actions implemented at the BMFOU are designed to ensure the water levels of the East Camp System do not exceed a Critical Water Level (CWL, referred to herein as the Protective Water Level [PWL]).[5] A technical impracticability (TI) waiver of groundwater standards, pursuant to section 121(d)(4)(C)122(f) of CERCLA, is in place for the bedrock aquifer in the BMFOU, based on an extensive analysis which demonstrated it was not feasible from an engineering perspective to restore the bedrock aquifer to protective groundwater standards.

[5] Critical Water Level (CWL) is used in Site decision documents; however, more recent documents have used the term Protective Water Level (PWL). This FYR report uses PWL.

Figure 3-1: BMFOU Boundary



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

RESPONSE ACTION SUMMARY

Basis for Taking Action

The Berkeley Pit is filling with water originating from the underground mines, the surrounding bedrock and alluvial aquifers, and from surface inflows including surface water runoff and stormwater from the BPSOU. The water accumulating in the Berkeley Pit is contaminated with arsenic, cadmium, copper, lead, zinc and other hazardous substances in high concentrations and is highly acidic.

The EPA conducted the Remedial Investigation/Feasibility Study (RI/FS) from 1990 to 1994 via an Administrative Order on Consent with BMFOU Potentially Responsible Parties (PRPs). As part of the RI/FS process, the EPA conducted a baseline risk assessment in 1993 to evaluate potential future human health and ecological risks associated with mine flooding if no remedial actions are undertaken. The COCs, shown in Table 3-1, are found at elevated levels in Berkeley Pit water.

The human health risk assessment, conducted as part of the 1993 baseline risk assessment, concluded that future residents could be exposed if there was a release of water from the contaminated bedrock system and the Berkeley Pit into the alluvial system and Silver Bow Creek. A future residential scenario was developed that assumes no restriction of access to Silver Bow Creek or the alluvial aquifer as a source of drinking water. Exposure pathways included direct ingestion of contaminated drinking water (groundwater or surface water), incidental ingestion of contaminated surface water during recreation activities and dermal absorption of contaminated surface water during recreation activities. Direct ingestion of contaminated drinking water was found to the be predominant potential exposure pathway.

The 1993 baseline risk assessment also assessed the risks to waterfowl that contact the surface of the Berkeley Pit. The COCs found in the Berkeley Pit were found up to four orders of magnitude greater than recommended safe concentrations in drinking water of livestock or poultry.

The ecological risk assessment concluded that future risks to aquatic receptors were possible if contaminated Berkeley Pit water was discharged to Silver Bow Creek. The primary exposure route for aquatic receptors is ingestion of surface water/sediment, aquatic vegetation and contaminated prey such as macroinvertebrates. In accordance with EPA guidance, sediment and surface water were considered as an integrated exposure pathway because of the complex chemical equilibrium between these two media.

Table 3-1: BMFOU COCs in Groundwater and Surface Water

COC	Risk Category
Arsenic, cadmium, lead, sulfate and zinc	Human Health
Aluminum, arsenic, cadmium, copper, iron, lead and zinc	Ecological

Response Actions

After listing the BMFOU as part of the Silver Bow Creek/Butte Area in 1987, the EPA began sampling and scoping activities. The EPA conducted an Engineering Evaluation and Cost Analysis for the Travona/West Camp System in 1988 and 1989, and this formed the basis for a 1989 Action Memorandum that selected a temporary removal cleanup action for the West Camp System. The EPA issued an Administrative Order on Consent and a Unilateral Administrative Order to PRPs, Atlantic Richfield and Montana Resources, for this action in 1989 which resulted in the control the Travona/West Camp System to prevent unplanned discharges of contaminated groundwater.

The EPA selected the BMFOU remedy in a 1994 BMFOU ROD and revised it in a 2002 BMFOU ESD. The remedy addresses contaminated water in the Berkeley Pit, contaminated water in associated underground mine workings and other contaminated inflow to Berkeley Pit. The remedy's primary objective is to protect human health and the environment from risks posed by contaminated water in the bedrock aquifer and the rising contaminated waters in underground mines and the Berkeley Pit.

The RAOs established in the 1994 BMFOU ROD are as follows:

- Ensure that the PWLs for the East Camp System (5,410 feet above mean sea level (amsl)) and the West Camp System (5,435 feet amsl) are not exceeded so that contaminated mine water is contained and does not discharge to alluvial aquifer or Silver Bow Creek.
- Ensure that treated water discharged to the Silver Bow Creek drainage meets state of Montana and other pertinent water quality standards.
- Implement institutional controls on the public's access to contaminated bedrock aquifer water to ensure the protection of public health.
- Implement a comprehensive monitoring program to verify the protectiveness of the PWLs and to ensure that contaminated water is being contained.

The remedy selected in the 1994 ROD, as amended by the 2002 ESD, included the following components (also shown in Figure 3-2):

- Control of inflow from the Horseshoe Bend Area, with exceptions for short-term flows to the Berkeley Pit.
- Routing of stormwater runoff from upper areas of BPSOU to the Berkeley Pit.
- Treatment of surface water and groundwater from the Horseshoe Bend Area and Continental Pit water through treatment at the Horseshoe Bend water treatment plant (HsBWTP) and the potential use of water in the mining process or discharge to Silver Bow Creek.
- Placement of HsBWTP sludges in the Berkeley Pit.
- Treatment of West Camp water in the Butte Treatment Lagoons (now part of the BPSOU) starting in 2002.
- If water is discharged to Silver Bow Creek after treatment at the HsBWTP (instead of being used in active mining operations), it must meet all applicable surface water discharge standards identified in the ROD and ESD.
- Thorough evaluation of the ability of the HsBWTP to treat additional water from the Berkeley Pit four years prior to the East Camp System reaching the PWL and pumping or other efforts to divert water from the Berkeley Pit to the HsBWTP for treatment when the PWL is approached.
- Design and implementation of a long-term, comprehensive monitoring program to track the elevation and quality of the waters in the East, West and Outer Camp Systems to ensure protection of the alluvial groundwater system and Silver Bow Creek. This monitoring program includes the protection of waterfowl.
- Waiver of groundwater ARARs for the bedrock aquifer based on CERCLA's technical impracticability waiver provisions, and implementation of an institutional control program to restrict use of contaminated groundwater using land and water use restrictions, along with access controls.
- A public education program on the BMFOU remedial action.

As noted above, the EPA established a TI waiver for the bedrock aquifer ARAR standards for the BMFOU in the 1994 ROD. The focus of the selected remedy for the BMFOU is containment of the contaminated water followed by treatment of this water prior to surface water discharge; there are no water quality standards to be met in the alluvial or bedrock aquifers within the BMFOU boundary.

Figure 3-2: BMFOU Features

Source: Figure 2, 2002 Remedial Action Adequacy Review

Status of Implementation

To control inflow from the Horseshoe Bend Area, the PRPs instituted an inflow control program in 1996, capturing and integrating the Horseshoe Bend Area discharge into the mining process at the active Montana Resources mining operations. In September 2003, the HsBWTP was constructed. All surface water from the Horseshoe Bend Area is intercepted and treated using a high-density lime precipitation treatment system. During mining operations, this treated water is recycled back into Montana Resources' mining operations. The lime sludge generated in the HsBWTP has been added to the Berkeley Pit since the plant began operation in 2003.

The 2002 BMFOU Consent Decree between the EPA, MDEQ and the PRPs (established as Settling Defendants in the Consent Decree) contains a statement of work that describes the necessary steps to implement the ROD as modified by the ESD. These steps include remedial design, remedial action and O&M activities for the BMFOU. In accordance with the Consent Decree, the Montana Bureau of Mines and Geology (MBMG) monitors elevations and water inflows into the East and West Camp Systems and compares to the respective PWLs (as noted above, the West Camp System monitoring is now required under the BPSOU selected remedy). MBMG use this information to update the models of the Berkeley Pit and West Camp to provide EPA and MDEQ with a projected date by which PWLs will be met under the existing water management system.

The statement of work presented in the 2002 Consent Decree specifies that, as the PWL is approached for the East Camp System, the Settling Defendants will perform a Remedial Action Adequacy Review (RAAR) of the HsBWTP design and operation. The goal of the RAAR is to assess the adequacy of the plant as a treatment facility for the combined inflow of Horseshoe Bend Area, Berkeley Pit and Continental Pit waters to maintain the PWL. The statement of work requires that the RAAR be completed four years before the projected date at which the water level in the East Camp System is predicted to reach the PWL, with system upgrades identified in the RAAR to be implemented two years prior to the time the PWL is reached. In early 2019, MBMG predicted that the PWL would be reached by July 1, 2023. The model was updated in July 2020 and now predicts the PWL will be reached by May 2024. Based on this prediction, any remedial action upgrades would have to be completed by May 2022. Today, due to pumping water from the Berkeley Pit described later, the current water level in the pit has been steady and could potentially move this date out even further.

As part of the RAAR, the Settling Defendants conducted the following four main tasks:

- Developed an integrated water balance and water quality (mass load) model to support the overall water management for the BMFOU.
- Evaluated optimization of capacity and general operational efficiency of the HsBWTP.
- Implemented pilot studies to evaluate sludge disposal alternatives, alternate influent sources and alternative treatment enhancements (see below for the description of the Discharge Pilot Project and Polishing Facility).
- Submitted a draft Technical Memorandum summarizing the RAAR.

Atlantic Richfield and Montana Resources submitted the draft RAAR technical memorandum to the EPA and MDEQ in November 2019. The draft RAAR included several deliverables, including a water balance (Phase 1 and Phase 2), short-term and long-term optimization reviews to evaluate current operational functions of the plant, and pilot studies to evaluate sludge disposal and polishing treatment technologies to enable discharge to Silver Bow Creek. The draft RAAR provided water management scenarios to assist with evaluating the adequacy of the HsBWTP and associated facilities to treat waters from the site for incorporation into current mining operations or to treat water from the Berkeley Pit, Horseshoe Bend Area, and Continental Pit and discharge off site following cessation of mining. The main water management scenarios include conditions during which the mine is operating and two conditions for when the mine is closed (drain-down and steady-state).

The draft RAAR technical memorandum, and associated components, were reviewed by the EPA and MDEQ and a comment letter, dated October 6, 2020, was sent to the SDs. The SDs are currently working to revise the

documents to address the comments. The EPA will review the revised documents when they are submitted. The RAAR is not considered final until it is approved by the EPA in consultation with MDEQ.

In accordance with the findings and activities associated with the RAAR, the Settling Defendants began to implement the Berkeley Pit and Discharge Pilot Project in 2019. The intent of the project is to stop or slow the rate at which water levels rise in the East Camp System and Berkeley Pit. The Discharge Pilot Project includes the Polishing Facility, which was completed in 2019. The Polishing Facility provides technology to polish water to meet the requirements for discharge of treated water off site. The Discharge Pilot Project initiated discharge of treated water to Silver Bow Creek on September 30, 2019. As part of the Discharge Pilot Project, the Horseshoe Bend Capture System was started on September 26, 2019. It is designed to capture and pump the Horseshoe Bend Area flow to the YDTI for treatment while the HsBWTP will predominantly treat water pumped from the Berkeley Pit. The current water management operating components and infrastructure under the Discharge Pilot Project are shown in Figure 3-3.

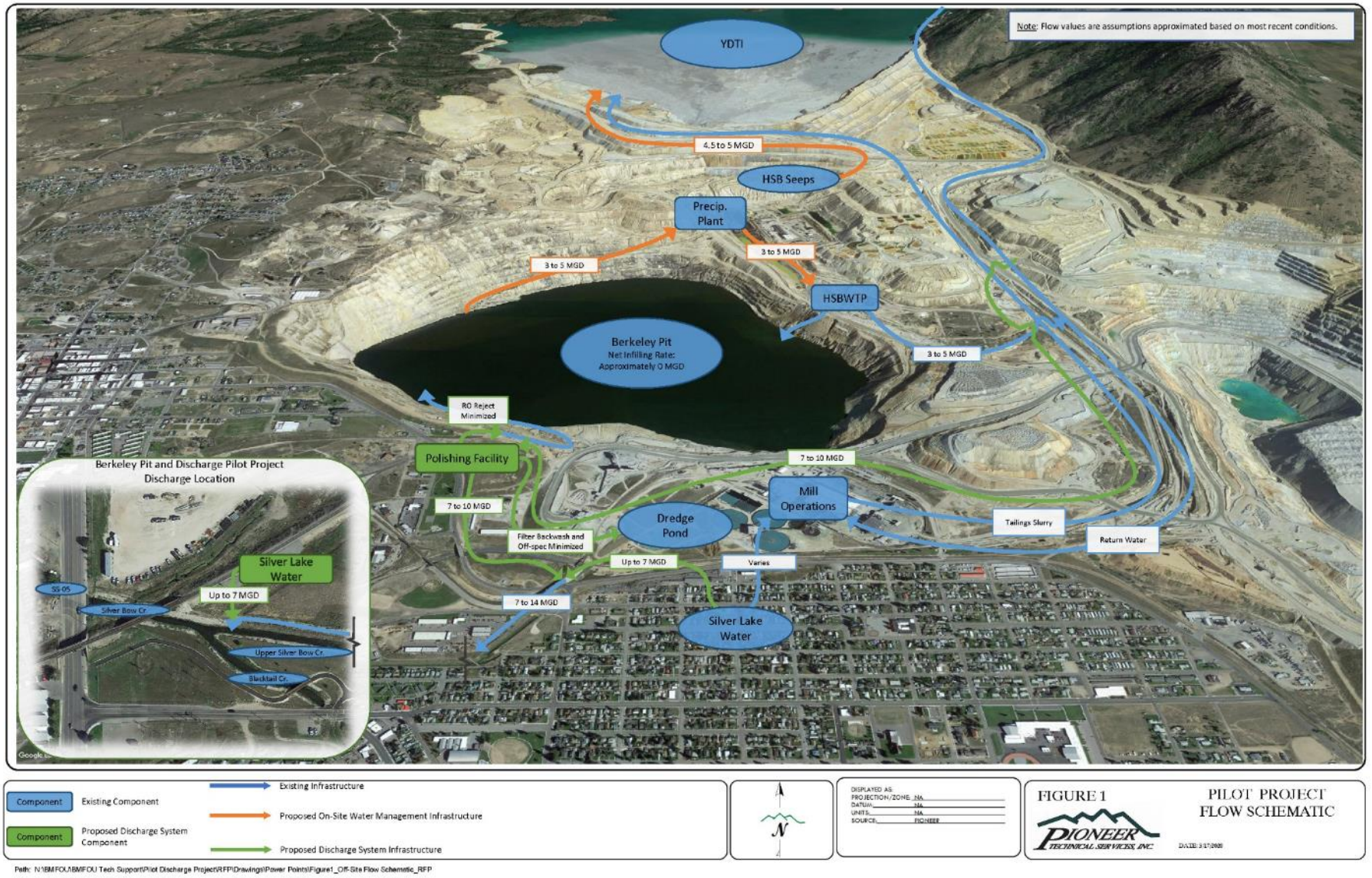
The public education program, required as part of the selected remedy, centers on the PitWatch.org website (https://pitwatch.org/). It provides detailed, regularly updated information on BMFOU-related activities. The EPA, MDEQ, city and county of Butte-Silver Bow (BSB), Atlantic Richfield and Montana Resources are working to further improve the information on PitWatch.org as well as how it is used as an outreach and education tool for the community.

Slope Stability Evaluation

On August 22, 2012, a rotational-like slump occurred through alluvial sediments in the southeast portion of the Berkeley Pit. On November 4, 2012, another slope displacement occurred, expanding the slump zone slightly to the west. As a result, Montana Resources initiated a slope stability study in November 2012. On February 8, 2013, another slope failure occurred. The main concerns with slope failures are that they could pose a safety risk for people working near or on the Berkeley Pit water (during sampling or routine operations) and that the slope failures will result in a water level rise that could impact the surrounding alluvial aquifer.

The 2012 slope stability study report concluded that rising pit water level is expected to have the greatest influence on potential slope instability in the extreme eastern part of the Berkeley Pit where the thickest sequence of in-situ alluvium and overlying fill occurs in the Southeast Corner, Pittsmont, Northeast Corner sectors and the Concentrator sector. The Neversweat sector (along the southwest pit wall) contains other potential instability areas of mine backfill not influenced by pit water levels. In 2015, the slope stability evaluation was revised, and additional geotechnical tasks were completed. The results concluded that even at a “worst case scenario” in which all potential slope instability areas would slide at the same time, the pit water level would rise only about 3.2 feet (or about 4 months of typical groundwater inflow). As a result of these slope failures and subsequent evaluations, changes were made to sampling, operations and waterfowl mitigation activities to remove or minimize human activity near the Berkeley Pit.

Figure 3-3: BMFOU Water Management Features



Source: 2020 Draft Final Berkeley Pit and Discharge Pilot Project Work Plan

Waterfowl Mitigation and Protection

In compliance with the ARAR requirements of the Migratory Bird Treaty Act and to reduce the risk to waterfowl from landing on the Berkeley Pit water identified in the BMFOU ecological risk assessment, the 1994 ROD required a plan addressing bird mortality due to the potential impacts to birds from use of the Berkeley Pit waters. A waterfowl observation and hazing program has been in place at the Berkeley Pit since 1996. Since 1996, the Settling Defendants have updated and revised the Waterfowl Mitigation Plan four times (1996, 2002, 2013 and 2020). The 2013 update was the result of a slump event in the Berkeley Pit that was described earlier. After the 2013 slump event, the use of boats for waterfowl protection was suspended indefinitely.

The 2020 revision was in response to a significant waterfowl mortality event in late 2016. On November 28, 2016, between 30,000 and 60,000 waterfowl landed on the Berkeley Pit. Despite intensive hazing efforts, including flare guns, fireworks, lasers, drone boat and flights, several thousand waterfowl did not respond, and more than 2,900 waterfowl ultimately died. In response to this event, several interim measures were implemented during the 2017 and 2018 migration seasons and the Waterfowl Mitigation Plan (now called the Waterfowl Protection Plan) was updated in 2020. The interim measures included:

- Forming a Waterfowl Advisory Board to review relevant information and provide recommendations on protection practices.
- Conducting a literature review of deterrent and hazing techniques.
- Testing various deterrent and hazing options.
- Integrating the information into the updated Waterfowl Protection Plan.

The objectives of the 2020 Waterfowl Protection Plan include:

- Minimize, insofar as is practical, the contact of waterfowl with waters of the Berkeley Pit using up-to-date techniques and expertise to do so.
- Employ observation and hazing programs appropriate for this unique area and in a manner that is protective of waterfowl and safe for the people responsible for their implementation.
- Re-evaluate the effectiveness of the protection program on an ongoing basis and modify the program "Adaptive Management" to accommodate changing conditions over time at the area.
- Meeting the BMFOU ROD requirements of developing and maintaining a formal plan.

The 2020 updated plan, which has been approved by the EPA in consultation with MDEQ and U.S. Fish and Wildlife Service, accounts for changes in waterfowl migration patterns and site conditions that have occurred since 2002. Recent observations have shown that fall migration is occurring later into the season and that the Berkeley Pit does not typically freeze over in the winter, whereas other large waterbodies in the area do on occasion freeze over, limiting stopover locations. The current plan consists of a combination of migration monitoring, an observation program and enhanced hazing efforts. The Settling Defendants document the protection and mitigation efforts monthly. The results of these efforts are summarized in the BMFOU Data Review section of this FYR Report.

Institutional Control (IC) Review

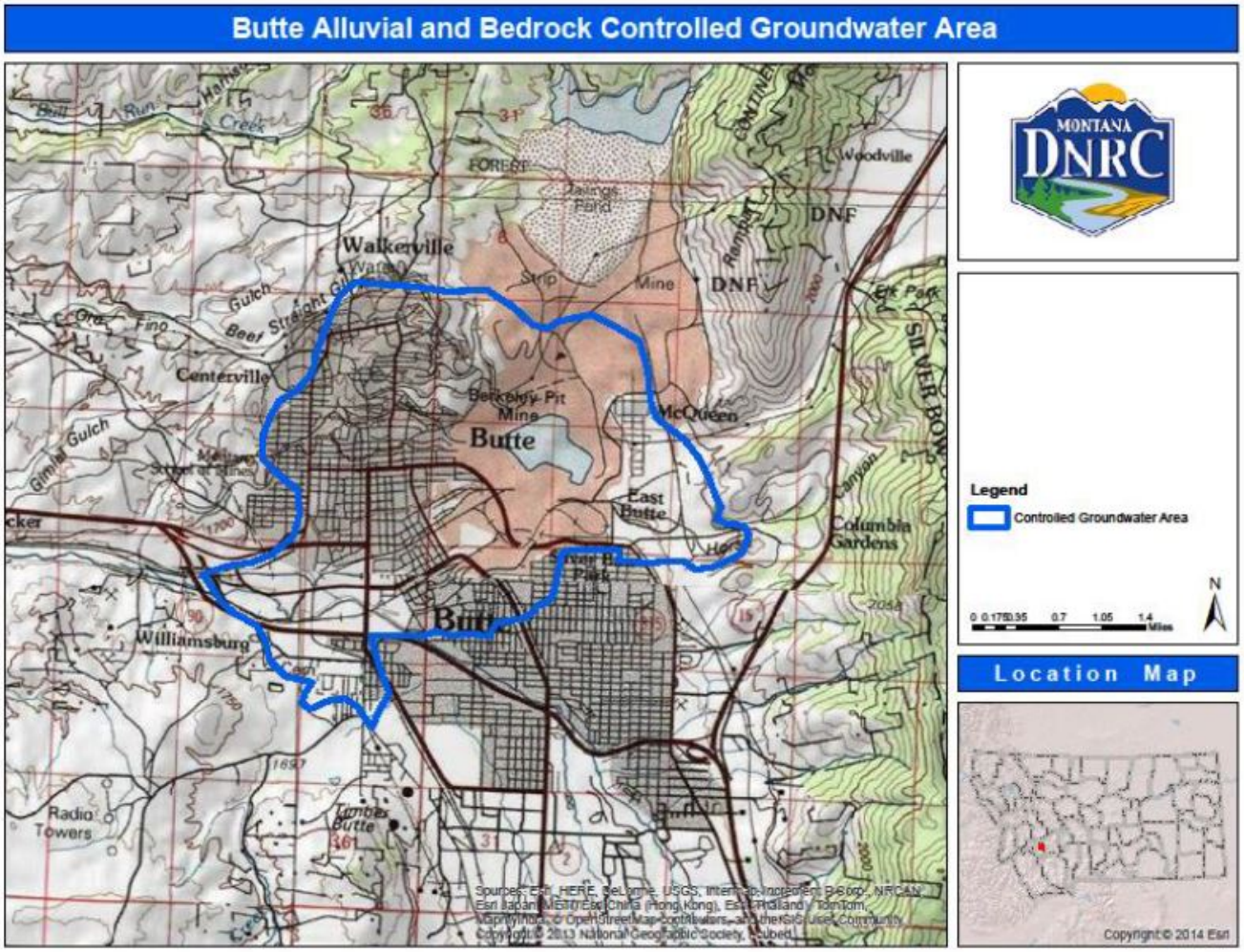
The Butte Alluvial and Bedrock Controlled Groundwater Area was established by the Water Resources Division of the Montana Department of Natural Resources and Conservation (DNRC) in October 2009 (Figure 3-4). This area was designated as a controlled groundwater area because the alluvial and bedrock aquifers have been impacted by over a century of mining and associated activities. The restrictions in the Butte Alluvial and Bedrock Controlled Groundwater Area were established to meet the requirements of the ROD or Consent Decree for the

BMFOU and BPSOU. This action under state law prohibits the construction of new groundwater wells for domestic or other purposes. The controlled groundwater area will not prevent the use of existing domestic and commercial wells. A program was created by the water district to assist with the abandonment of existing domestic water wells. The well abandonment program will be implemented to discourage inappropriate uses of groundwater from existing wells and encourage owners to take existing wells out of service voluntarily in exchange for being hooked up to public water. An administrative entity will be identified to monitor and enforce these restrictions. Current, existing wells are tested semi-annually and are below MCL standards.

Table 3-2: BMFOU Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Areas	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	BPSOU and BMFOU	Restrict use of contaminated groundwater	Butte Alluvial and Bedrock Controlled Groundwater Area, 2009

Figure 3-4: BMFOU Institutional Control Map



Systems Operations/O&M

Although the BMFOU is not in the O&M phase of the Superfund process, systems O&M is occurring on operating systems in order to ensure the continued effective operation. Systems O&M is ongoing for the water treatment systems (including the HsBWTP, Polishing Facility and the Discharge System) and management systems at the BMFOU in accordance with the 2019 Final Discharge System Operations Assurance Plan and the 2020 Discharge System Work Plan. An overview of the components of the water treatment and management at BMFOU is provided in Table 3-3 below and shown in Figure 3-3. Additional information regarding O&M activities for the HsBWTP and the Polishing Facility and Discharge System are provided below.

Table 3-3: BMFOU Water Treatment Component Capacity

Component	Design Maximum Capacity	Confirmed Maximum Capacity
HsBWTP	7.06 MGD Dual Stage high density sludge	6.02 MGD (January 2018)
Polishing Facility	9.5 MGD Filtration 3.0 MGD reverse osmosis Permeate	Not yet confirmed
HsB Capture System /YDTI	Up to 8 MGD	Not yet confirmed
Source: Exhibit 11, Draft BMFOU Remedial Action Adequacy Review MGD = million gallons per day		

HsBWTP

The HsBWTP is the BMFOU's primary remedy component with an ongoing O&M component. The HsBWTP is a two-stage high density sludge lime precipitation water treatment system consisting of two primary treatment units and five ancillary process systems. The treatment facility is fully automated with remote alarm indication. The major treatment components all have redundant systems to eliminate downtime due to equipment failure.

The HsBWTP is also equipped with an automated treated water control loop. If treated water exceeds the acceptable pH range, this system will automatically recycle water through the plant until the pH is acceptable. Quarterly reporting on Horseshoe Bend water treatment plant system performance and O&M activities have continued since the previous FYR.

In 2018 and 2019, the Settling Defendants finalized short- and long-term optimization reports for the HsBWTP. These reports evaluated the current operational functions of the plant and made recommendations for optimizing operations. The long-term optimization evaluation determined that the HsBWTP is currently optimized for dual-stage HDS operations. Evaluations indicate that the plant can operate at the design maximum rate of 7.06 MGD in dual-stage mode with adoption of the Phase 1 recommendations and not limit overall treatment performance. The SDs are currently planning to conduct hydraulic testing to demonstrate that the HsBWTP can process this flow effectively. One recommendation is to optimize the HsBWTP for single-stage HDS operations by increasing the size of the Stage 2 alkalization tank and increasing alkalization tank hydraulic residence time, which will improve plant performance during annual cleanout. Reconfiguration of discharge pipe systems to allow dual single-stage operations will provide increased HDS treatment capacity for greater flexibility of water treatment. Any long-term modifications to the HsBWTP would be approved by the USEPA and Montana DEQ, with a schedule for completion of modifications at least 2 years before the PWL is expected to be reached.

The Phase 2 evaluation focused on long-term water treatment system performance and identifying improvements expected to take more time to plan, design and implement. The improvements and related recommendations were developed from bench- and pilot-scale technology testing conducted on site, adjacent to the HsBWTP, and off site. The draft Phase 2 evaluation technical memorandum was reviewed, and commented on, as part of the EPA's review of the draft RAAR documents and is not yet final.

A pilot-scale, dual-stage high density sludge system that replicated HsBWTP operating conditions was operated on site to determine if optimal treatment conditions could be identified, to evaluate the impact of different feed water sources, and to support effluent polishing technology testing. The remedial action adequacy is continuing to be evaluated as EPA comments are addressed and the Pilot Project continues to operate and gather data.

Pilot Project – Polishing Facility and Discharge System

As part of the Pilot Project, the Settling Defendants initiated off-site discharge on September 30, 2019. The Discharge System consists of:

- Infrastructure to convey YDTI return water to a new water treatment plant (Polishing Facility).
- The Polishing Facility water treatment system.
- Piping infrastructure for transporting treated effluent, off-spec effluent, reverse osmosis brine and multi-media filtration system waste (i.e., backwash water).
- Pump and piping infrastructure to restart pumping water from the Berkeley Pit. The water is sent through a copper recovery circuit before being sent to either the HsBWTP or the Horseshoe Bend Capture System.
- Infrastructure to combine treated effluent with Silver Lake water (if necessary, for up to one year) and discharge to Silver Bow Creek through the Horseshoe Bend Effluent Line and Discharge Structure.[6] Silver Lake water was allowed to be used for flow augmentation for one year from the beginning of discharge on September 30, 2019. A two-month extension was granted in September 2020, but after November 30, 2020, no Silver Lake water may be used for flow augmentation and has since been discontinued.

The Polishing Facility treated water met the 2002 BMFOU Consent Decree interim discharge standards during 2019 and 2020. There were no significant issues with the process systems or conveyance infrastructure. Silver Lake water was used for effluent flow augmentation for two weeks in December 2019, and for a total of two weeks for the first two quarters of 2020. From July through November 23, 2020, Silver Lake water was used almost continuously for flow augmentation when the flow in Blacktail Creek was low. The Silver Lake infrastructure was disconnected and winterized on November 23, 2020, and at this time it is not permitted, or anticipated, to be used in the future. Reverse osmosis treatment will be used, as necessary, to meet discharge standards.

Starting in October 2020, the Settling Defendants voluntarily transitioned from the interim discharge standards to the final discharge standards outlined in the 2002 BMFOU Consent Decree. This change was done in accordance with the Final Discharge System Operations Assurance Plan, dated November 21, 2019. While the majority of the final discharge standards are the same as the interim discharge standards, there are some differences. In the final discharge standards, the standard for cadmium is more stringent, a standard for uranium is added, and standards for radionuclides (radium 226/228, uranium, gross alpha particle and gross beta/photon emitters) are added. The radionuclide standards are based on federal drinking water standards. Since October 2020, the radionuclides have been below standards, however, the Settling Defendants are not analyzing for beta/photon emitters. The performance standard for beta/photon emitters is a dose rather than a concentration. Consequently, to meet the beta/photon limit, 179 different radionuclides would need to be analyzed. The Settling Defendants will evaluate the applicability of the radionuclide final discharge standards as well as alternative testing methodology for beta/photon emitters. Further data collection for radionuclides is proposed; as such, the settling defendants are planning to request to move back to the interim discharge standards.

In 2019, the Discharge System successfully treated 447 million gallons of water from the YDTI prior to off-site discharge which, as noted, met interim discharge standards required by the Consent Decree. Additional components of the Discharge System will continue to be commissioned and demonstrated during 2020. Since the start of the Pilot Project, and Berkeley Pit pumping in late September 2019, surveys of the water level in the Berkeley Pit show the water level has remained essentially unchanged with just a 0.04-foot rise from October 2019 to December 2020.

Horseshoe Bend Capture System/YDTI

During mine operating site conditions, captured Horseshoe Bend Area water, or Berkeley Pit water, is conveyed to YDTI and mixed with lime supercharged mill tailings. The YDTI is currently used as a tailings impoundment for mining operations. It is recognized as both a storage facility and as a potential pre-treatment polishing basin that is a component of the Discharge Pilot Project. Prior to the initiation of the Horseshoe Bend Capture System, the two main sources of influent to this large basin have been freshwater inputs from upgradient drainages and

[6] Located west of Anaconda, provides water conveyed via pipeline to BSB for industrial use.

water used to slurry mill tailings to the YDTI for disposal. The slurry water includes (return) water from the YDTI, effluent from the HsBWTP, and additional fresh water from Silver Lake.

Storage in the YDTI supernatant pond provides increased time for gypsum precipitation and particulate settling.

This passive effluent polishing within the YDTI is a beneficial element of the water treatment components for the site because a reduction in the calcium and sulfate concentrations, to saturation levels, will reduce the O&M issues associated with potential gypsum scaling in the downstream polishing treatment system (filtration and reverse osmosis) needed to enable discharge to Silver Bow Creek.

PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determination from the previous FYR Report as well as the recommendations from the previous FYR Report and the status of those recommendations.

Table 3-4: BMFOU Protectiveness Determinations/Statements from the 2016 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
3	Will be Protective	The remedy at the BMFOU (OU3) is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Table 3-5: BMFOU Status of Recommendations from the 2016 FYR Report

Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Rotational slumps have occurred at the Berkeley Pit and analysis indicates there will continue to be future slumps.	Complete implementation of the recommendations required by the EPA regarding the 2014 slope stability study.	Completed	Settling Defendants revised the slope stability evaluation in 2015 and continue to monitor slope stability quarterly. See Data Review for additional details on monitoring activities.	10/22/2015
Sampling of the water in the Berkeley Pit has been limited due to safety concerns of physically being on the surface of the water.	Implement current alternatives that are being developed.	Completed	Since July 2017, MBMG has collected water samples from the Berkeley Pit using a sampling drone boat.	7/19/2017
A portion of the Waterfowl Mitigation Plan has been modified due to safety concerns related to slope stability at the Berkeley Pit.	After implementing recommendations required by the EPA regarding the 2014 slope stability study, evaluate the remedy to determine any needed changes to the Waterfowl Mitigation Plan.	Completed	Interim measures were tested and implemented during the 2017 and 2018 migration seasons and the updated Waterfowl Protection Plan was finalized in 2020.	3/18/2020

FIVE-YEAR REVIEW PROCESS

Data Review

During this FYR period, MBMG collected groundwater and surface water data associated with water management in the East Camp System, as required in the ROD and the BMFOU Consent Decree. Groundwater monitoring is also conducted in the West Camp and Outer Camp areas to allow MBMG to track the effectiveness of the remedy and ensure that contaminated water is contained. The Berkeley Pit surface water and depths are also sampled. Water level monitoring assesses whether the water levels are less than the PWLs for both the East Camp and West Camp systems. Water level and water quality monitoring, domestic well sampling, and quarterly slope stability monitoring and results are discussed below. Data collected during ongoing O&M activities for remedial components are included above in the System Operations/O&M section.

Water Level and Water Quality Monitoring

Long-term monitoring of the Berkeley Pit and all ancillary mine shafts and monitoring wells is ongoing, as required in the BMFOU Consent Decree. The current monitoring program in the East Camp, West Camp and Outer Camp consists of 75 sites with 56 monitoring wells, 12 mine shafts and seven surface water sites, including the Berkeley Pit and the Continental Pit (Figures C-2 through C-5 in Appendix C). MBMG provides monthly and annual summary reports to site agencies. The reports share monitoring data and trends; data from some of the monitoring locations date back to 1983 when the Site was first listed on the NPL. This FYR Report includes data through 2019, as reported in the Water-Level Monitoring and Water-Quality Sampling 2019 Consent Decree Update (2019 Update).

The 1994 BMFOU ROD and 2002 Consent Decree established PWLs for the East Camp and West Camp bedrock systems. In addition, the 2002 Consent Decree specified compliance points at which groundwater levels could not exceed the PWLs. In the East Camp bedrock system, the maximum water level cannot exceed an elevation of 5,410 feet amsl at any of the 14 compliance points. In the West Camp bedrock system, the maximum water level cannot exceed an elevation of 5,435 feet amsl (USGS NAVD29 datum) at well BMF96-1D. In addition to the compliance point stipulations, water levels in the East Camp bedrock system must be maintained at lower elevations than West Camp water levels.

MBMG continued monitoring activities in the Berkeley Pit, East Camp, West Camp and Outer Camp systems. The East Camp System includes mines and mine workings that drained to the Kelley Mine pump station at the time mining and dewatering were suspended in 1982. The West Camp System includes mines and underground workings that historically drained to the East Camp from the southwest portion of the Butte mining district but were hydraulically isolated from the East Camp by the placement of bulkheads within the mine workings. The Outer Camp System consists of mine workings extended to the west and north that were at one time also connected to the East Camp and were hydraulically isolated with bulkheads many decades ago. The hydraulic separation has allowed Outer Camp System water levels to return to, or approach, pre-mining conditions.

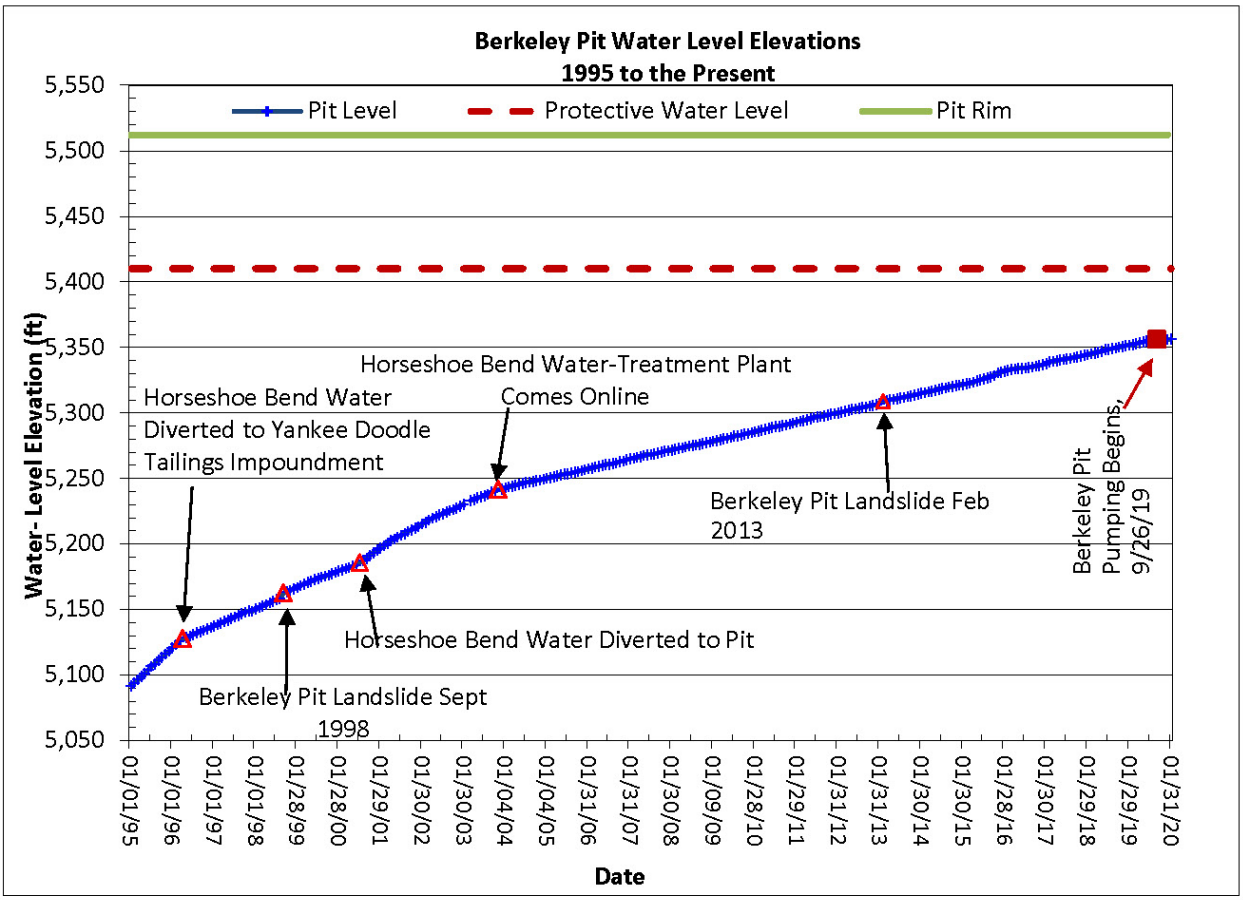
East Camp System

The East Camp System consists of the Anselmo, Belmont, Granite Mountain, Kelley, Steward, Lexington and Pilot Butte mines and the Berkeley Pit. Water elevations are collected regularly from the Berkeley Pit and the other mines and compared to PWLs to ensure water continues to flow toward the Berkeley Pit. Surrounding alluvial and bedrock wells are monitored for elevation and water quality to further ensure the remedy is functioning to contain contaminated water to the Berkeley Pit.

Water Level Elevation Monitoring

Berkeley Pit water level elevations are surveyed each month. A hydrograph showing the Berkeley Pit's water level rise since 1995 is shown below as Figure 3-5. Also shown in the hydrograph are activities or events that have impacted the water level rise including the 2013 slump.

Figure 3-5: Berkeley Pit Hydrograph 1995-2019



Source: Figure 3-18 in the 2019 Update

The 2002 Consent Decree requires water levels in the Berkeley Pit (and all the points of compliance [POCs]) to be maintained below the PWL at all times so as to maintain the existing hydraulic gradients that enable the Berkeley Pit to serve as a collection point for surface water and groundwater. The POCs are six mine shafts and eight bedrock monitoring wells (see Figure 3-2 for POC locations). Selected POCs are listed in Table 3-6 along with their December 2019 water-level elevations and the depth below the PWL. Based on this information, the compliance point water level elevation currently closest to the PWL is the Pilot Butte Mine, which is located about a half-mile north of the Berkeley Pit.

The 2002 Consent Decree also contains a stipulation that the water levels in the POC locations must remain above the water level in the Berkeley Pit to further ensure that the hydraulic gradient continues to flow toward the pit. As reported in the 2019 Update, during the entire monitoring period (1983-2019), the highest POC water level elevation has always been more than 20 feet above the Berkeley Pit water level elevation. The water level at each POC as compared to the Berkeley Pit was not highlighted in the 2019 Update but this FYR performed this comparison in Table 3-6 below. POC elevations remain above the level in the Berkeley Pit for these select POCs. MBMG should consider including these calculations in future monitoring updates.

Table 3-6: BMFOU POC Locations and December 2019 Water Level Elevations

Point of Compliance	December 2019 Water Level Elevation (feet)	Depth Below PWL (feet)	Elevation Above Pit Water Level (feet)
Anselmo Mine	5,376.95	33.05	20.81
Granite Mountain Mine*	N/A	N/A	N/A
Pilot Butte Mine	5,382.08	27.92	25.94
Kelley Mine	5,368.72	41.28	12.58
Belmont Well #2	5,367.95	42.05	11.81
Well A	5,368.42	41.58	12.28
Well C	5,361.74	48.26	5.60
Well G	5,371.72	38.28	15.58
Berkeley Pit (not a compliance point)	5,356.14	53.86	N/A

Notes:
Source: Water-Level Monitoring and Water-Quality Sampling, 2019 Consent Decree Update.
N/A = Not applicable
* = Water-level monitoring at the Granite Mountain Mine was suspended mid-2016 and was recently reestablished.

Berkeley Pit Monitoring

Sampling of the Berkeley Pit was suspended after the rotational slumps occurred in 2012 and 2013. Semi-annual sampling and vertical profiling in the Berkeley Pit Lake resumed in 2017, and continued throughout 2019, bringing the monitoring program back into compliance with the 2002 Consent Decree. Sampling and profiling are conducted using an unmanned, autonomous boat (drone boat) developed by the Electrical Engineering Department at Montana Tech and MBMG. For 2019, samples were collected from four depths during April and three depths during the November sample events. In addition to collecting samples for inorganic analysis, a vertical profile throughout the upper portion of the water (~0 to 600 feet) was performed to measure in-situ physical parameters. The physical parameters measured were pH, specific conductance, temperature, oxidation reduction potential (reported as Eh), dissolved oxygen and turbidity.

As of December 2019, the Berkeley Pit water is about 850 feet deep and consists of roughly 49.5 billion gallons of low pH, high salinity water. Physical parameters of pH, specific conductance, oxidation reduction potential reported as Eh, temperature, and turbidity profiles were performed in April and November 2019, at depths up to 600 feet. Some dissolved constituents and physical parameters from near-surface depths (1 to 5 feet) during 2019 are presented in Table 3-7 below.

Sampling and profiling show continued increasing trends in pH and dissolved oxygen in the water column. Decreases in iron and arsenic concentrations noted in the 2017 and 2018 sampling/profiling data continued in 2019. Concentrations of copper and zinc remained similar to those seen in 2012, 2017, 2018 and 2019 samples.

Table 3-7: Berkeley Pit Surface Chemistry (1 to 5 Feet)

Date	pH	Specific Conductance	Total Dissolved Solids	Total Acidity	Iron	Copper	Zinc	Arsenic	Sulfate
	SU	µS/cm at 25°C	mg/L	mg/L as $CaCO_3$	mg/L	mg/L	mg/L	µg/L	mg/L
June 2012	2.55	7,652	10,463	3,563	211	49	631	74	7,740
December 2012	2.61	7,632	12,229	3,651	204	49	589	64	9,560
May 2017	3.47	7,510	9,360	3,438	8.4	59	582	5	7,033
July 2017	3.44	7,510	9,511	3,689	11.2	62	607	8	6,895
November 2017	3.93	7,300	9,526	3,532	1.9	57	598	5	6,932
March 2018	4.12	7,620	9,746	3,503	2.7	63	597	8	7,180
September 2018	3.08	6,915	9,835	3,827	4.0	66	604	5	7,210
November 2018	4.13	7,330	9,476	3,882	3.2	59	573	6	7,019
April 2019	3.95	7,070	9,177	3,763	4.1	58	570	4	6,735
November 2019	4.03	7,340	9,585	4,067	2.8	64	571	12	6,974

Notes:
SU = Standard units
µS/cm at 25°C = Microsiemens per centimeter at 25 degrees Celsius
mg/L = milligrams per liter
$CaCO_3$ = calcium carbonate
µg/L = micrograms per liter

Alluvial and Bedrock Groundwater Monitoring

The East Camp System monitoring network consists of alluvial and bedrock monitoring wells (Figure C-2 and C-3 in Appendix C). Within the alluvial aquifer, groundwater generally flows toward the Berkeley Pit. Groundwater in the alluvial aquifer south of the Berkeley Pit is contaminated by historic mining activities and is flowing north, which means there is no southward migration of contaminated groundwater (Figure C-2). Water quality in the alluvial aquifer is variable and generally corresponds with proximity to source areas.

Within the bedrock monitoring system, water levels are monitored in the underground mines and the Berkeley Pit. In 2019, water levels rose between 6.31 and 8.55 feet in the underground mines and 7.21 feet in the Berkeley Pit, which is consistent with previous years during this FYR period. Based on volume estimates of the underground mines and December 2018 water level elevations, 85% of the underground workings are flooded. Because about 12% of the underground workings are above the PWL elevation of 5,410 feet, less than 3% of the underground workings remain to be flooded.

Water level monitoring continues to confirm that the flow of water in the affected bedrock aquifer is toward the Berkeley Pit. The potentiometric surface map (Figure C-3) for the East Camp bedrock aquifer shows the flow of water from all directions is toward the Berkeley Pit. Although there have been short-term influences on water levels in several of these wells, the overall direction of groundwater flow has not changed.

Recent updates to the Berkeley Pit model indicate that as of January 2020, if pumping of the Berkeley Pit (as part of the Pilot Project) was stopped, the East Camp bedrock system water level will reach the PWL elevation of 5,410 feet in the Pilot Butte Mine in May 2024. However, as pumping of the Berkeley Pit has continued, and the

water level has remained steady, that date is extended. As of December 2020, if pumping of the Berkeley Pit were stopped, the PWL elevation would be reached in April 2025.

West Camp System[7]

The West Camp System includes mines and underground workings that historically drained to the East Camp from the southwest portion of the Butte Mining District but were hydraulically isolated from the East Camp by the placement of bulkheads within the mine workings (Figure C-4 in Appendix C).

Pumping of groundwater in the West Camp System continues to control water levels; water levels were about 12 feet below the PWL at the end of 2019.

Recent data from the West Camp monitoring sites generally indicate either no change, or a small decrease, in dissolved constituents. Dissolved constituent concentrations remain below values observed during initial flooding of the West Camp mine workings. Arsenic concentrations exceed the MCL in samples from the Chester Steele Park well and Travona and Emma mines, while radium exceeds the MCL in the Emma Mine and Chester Steele Park well. Concentrations in monitoring well BMF96-4 remain low and do not exceed any standards.

Outer Camp System

The Outer Camp System consists of mine workings extended to the west and north that were at one time also connected to the East Camp and were hydraulically isolated with bulkheads many decades ago (Figure C-5 in Appendix C).

Water quality in the Outer Camp is better than water quality in the East Camp or West Camp bedrock systems, based on higher pH and alkalinity and lower metal concentrations. The better quality is attributed to differences in geology and a geochemical equilibrium being reached. The workings in this area have been flooded for a longer period, and the groundwater is isolated from the rest of the Butte Hill mines.

Domestic Wells

The domestic well monitoring program included eight wells, and more recently, a combined effort with BPSOU includes over one hundred domestic wells. There were no water quality exceedances of the five COCs (arsenic, cadmium, copper, lead and zinc) in domestic wells within the Controlled Groundwater Area, which is consistent with historic results. However, several sites have concentrations above MCLs or SMCLs for other constituents. Iron, manganese, and sulfate exceeded the SMCL (which is not a health-based standard) at two locations. Nitrate and uranium exceeded their respective MCLs at five locations. Results were within the same order of magnitude as the MCL. These findings for non-COC constituents are attributed to local geologic conditions, are likely not related to rising water levels in the bedrock mine workings and are, therefore, outside the scope of the Site. Each well owner was sent a letter that described the sampling objectives for the project and included a complete analytical report of their sample and comparison to the DEQ-7 standards.

Berkeley Pit Slope Stability Monitoring

Since 2015, Montana Resources has conducted quarterly monitoring at several locations along the Berkeley Pit highwall. Monitoring activities include surveying monitoring points for movement and operation of dewatering wells in each sector. The most recent monitoring event was conducted in the fourth quarter of 2019. No significant movement was noted. Slope stability will continue to be monitored.

[7] As noted above, responsibility for West Camp/Outer Camp monitoring and control was transferred to the BPSOU in the 2002 BMFOU ESD, and these activities are now required under the 2020 BPSOU Consent Decree. Data is presented in this section so that a complete picture of bedrock aquifer monitoring is presented to the public.

Site Inspection

The site inspection took place on 9/15/2020. Participants included EPA RPM Nikia Greene, representatives from Atlantic Richfield and Montana Resources, and Treat Suomi from EPA FYR support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy.

Site inspection participants met at Montana Resources offices and then took a driving tour of specific OU features. The first stop was the bird mitigation shelter, referred to as the "Bird Shack," near the Berkeley Pit, where participants observed the systems in place for migratory bird protection. Participants then observed the Berkeley Pit and the HsBWTP. The HsBWTP was currently shut down due to an issue with sludge accumulation. This is a common occurrence and part of regular O&M. The issue was resolved, and the HsBWTP was operational within two weeks. Site inspection participants observed the Horseshoe Bend Capture System, which includes over seven miles of new piping. Participants then headed to the YDTI and the Continental Pit. The inspection concluded at the Polishing Plant where operation staff members joined the inspection. Prior to entering the plant, a safety briefing was conducted. Participants discussed the system and observed various operational components. Nikia Greene, Hope Mariska, WSD contractor, and Treat Suomi then traveled to and observed the discharge structure at Silver Bow Creek and discussed the plan to update the discharge structure to better align with the overall system design. During the inspection, participants did not observe any issues that call into question the protectiveness of the ongoing remedial actions and remedy implementation at the BMFOU.

The site inspection checklist and photos are included in Appendices F and G, respectively.

TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The remedy is expected to function as intended by the 1994 BMFOU ROD as modified by the 2002 BMFOU ESD upon completion of the remedial construction. In the meantime, contaminated mine water is contained and prevented from migrating into the alluvial aquifer and Silver Bow Creek, and institutional controls are in place to restrict the use of groundwater in the Controlled Groundwater Area. The Berkeley Pit is filling with contaminated water originating from the surrounding bedrock and alluvial aquifers and also from surface inflows. As the Berkeley Pit is the lowest elevation in the bedrock system, contaminated mine water is contained and prevented from migrating off site.

The 2020 Berkeley Pit model filling update predicts the PWL will be reached in May 2024, assuming a start date of January 2020 and no pumping from the Berkeley Pit. In accordance with the 2002 Consent Decree, the Settling Defendants have completed the draft RAAR. In addition, the Discharge Pilot Project was designed, constructed, and commissioned in 2019, including the commencement of the Polishing Plant discharge. When the Discharge Pilot Project is operating as designed, it will further delay the date when the PWL will be reached. The Pilot Project includes the Polishing Plant, which was completed in 2019. The Polishing Plant provides technology to polish water to meet the requirements for discharge of treated water off site. In 2019, the Discharge System successfully treated 447 million gallons of water from the YDTI prior to off-site discharge. Additional components of the Discharge System will continue to be commissioned and demonstrated during 2020. In October 2020, the Settling Defendants transitioned from the interim discharge standards to the final discharge standards outlined in the 2002 BMFOU Consent Decree. These final discharge standards now include radionuclides and beta/photon emitters. Since October 2020, the radionuclides have been below standards; however, the Settling Defendants are not analyzing for beta/photon emitters. The performance standard for beta/photon emitters is a dose rather than a concentration. Consequently, to meet the beta/photon limit, 179 different radionuclides would need to be analyzed. To ensure compliance with the final discharge standards, the Settling Defendants should evaluate alternative testing methodology for beta/photon emitters. In addition, the applicability of the radionuclide final discharge standards should be evaluated. Further data collection for radionuclides is proposed; as such, the settling defendants are planning to request to move back to the interim

discharge standards. The EPA, in consultation with MDEQ, will consider modification and/or deletion of the final standards of radionuclides, based upon the evaluation of effluent and/or influent monitoring data. In the interim, there is no reasonable expectation that radionuclides would exceed MCLs for gross alpha, gross beta, radium 226/228 and uranium. In addition, Silver Bow Creek is not currently used for drinking water nor is it a source to clean water supply.

Water level monitoring confirmed that water levels within the East Camp and West Camp systems are below their respective PWLs and above the level of the Berkeley Pit water level. During this FYR, the EPA confirmed that all POC elevations are above the water level in the Berkeley Pit; therefore, contaminated groundwater continues to move towards the Berkeley Pit. This information was not highlighted in the 2018 Consent Decree Update. In order to ensure compliance with the 2002 Consent Decree stipulation that all POC water levels must remained above the level in the Berkeley Pit, this information should be clearly presented in the monitoring updates.

Surface water sampling resumed in the Berkeley Pit using a drone boat in 2017. Slope stability analyses are ongoing and will continue to monitor and evaluate the potential for slumps within the Berkeley Pit area. Waterfowl mitigation and protection activities have been updated and activities strengthened to ensure the protection of waterfowl in the area of the BMFOU.

As noted, an institutional control in the form of a controlled groundwater area (October 2009), which prevents use of the groundwater for domestic use has been enacted, and no domestic wells currently use the bedrock aquifer. MBMG, in cooperation with the Butte-Silver Bow Health Department, collects annual water quality samples for wells associated with the Butte Alluvial and Bedrock Controlled Groundwater Area to ensure contaminants associated with historical mining operations are not present in harmful concentrations in groundwater supplies. The results of these monitoring activities confirm that site COCs are not present in groundwater supplies above their respective standards. Some private wells showed exceedances for analytes that are not COCs for the BMFOU or the Site. These exceedances are reflective of general groundwater quality in the area and not attributed to the Site.

During the community involvement interviews, concerns were raised that community members generally do not understand how water quality is managed at the BMFOU and more transparency is needed. The EPA, MDEQ, BSB, Montana Resources and Atlantic Richfield are working to update and improve the community website Pitwatch.org to help the community further their understanding of water management at the BMFOU.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of remedy selection are still valid. Current State of Montana water quality standards (Circular DEQ-7) are reflective of the surface water quality discharge standards identified in the 1994 BMFOU ROD and revised by the 2002 BMFOU ESD, except for the cadmium standard, which the EPA plans to update in an amendment to the Consent Decree and its Statement of Work as well as a decision document. No additional exposure pathways were identified during this review that should be addressed in order to evaluate remedy protectiveness.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
None

OU: BMFOU	**Issue Category:** Remedy Performance			
	Issue: In October 2020, the Settling Defendants voluntarily transitioned from the interim discharge standards to the final discharge standards outlined in the 2002 BMFOU Consent Decree. The final discharge standards include radionuclides and beta/photon emitters. Since October 2020, the radionuclides have been below standards, however, the Settling Defendants are not analyzing for beta/photon emitters. The performance standard for beta/photon emitters is a dose rather than a concentration. Consequently, in order to meet the beta/photon limit, 179 different radionuclides would need to be analyzed. Further data collection for radionuclides is proposed, as such, the settling defendants are planning to request to move back to the interim discharge standards.			
	Recommendation: In order to ensure compliance with the final discharge standards, the Settling Defendants should evaluate alternative testing methodology for beta/photon emitters. In addition, the applicability of the radionuclide final discharge standards should be evaluated. The EPA, in consultation with MDEQ, will consider modification and/or deletion of the final standards of radionuclides, based upon the evaluation of effluent and/or influent monitoring data.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2022

OTHER FINDINGS

Two additional recommendations were identified during the FYR. These recommendations do not affect current and/or future protectiveness.

- To ensure compliance with the 2002 Consent Decree stipulation that all POC water levels remain above the water level in the Berkeley Pit, clearly present this information in the monitoring updates.
- Update and improve the community website Pitwatch.org to help the community further their understanding of water management at the BMFOU.

PROTECTIVENESS STATEMENT

Protectiveness Statement	
Operable Unit: 3	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The remedy at BMFOU (OU3) is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.	

NEXT REVIEW

The next FYR Report for the BMFOU at the Silver Bow Creek/Butte Area Superfund site is required five years from the completion date of this review and will be included in the site-wide FYR.

IV. WARM SPRINGS PONDS ACTIVE (OPERABLE UNIT 4) AND INACTIVE (OPERABLE UNIT 12)

Background

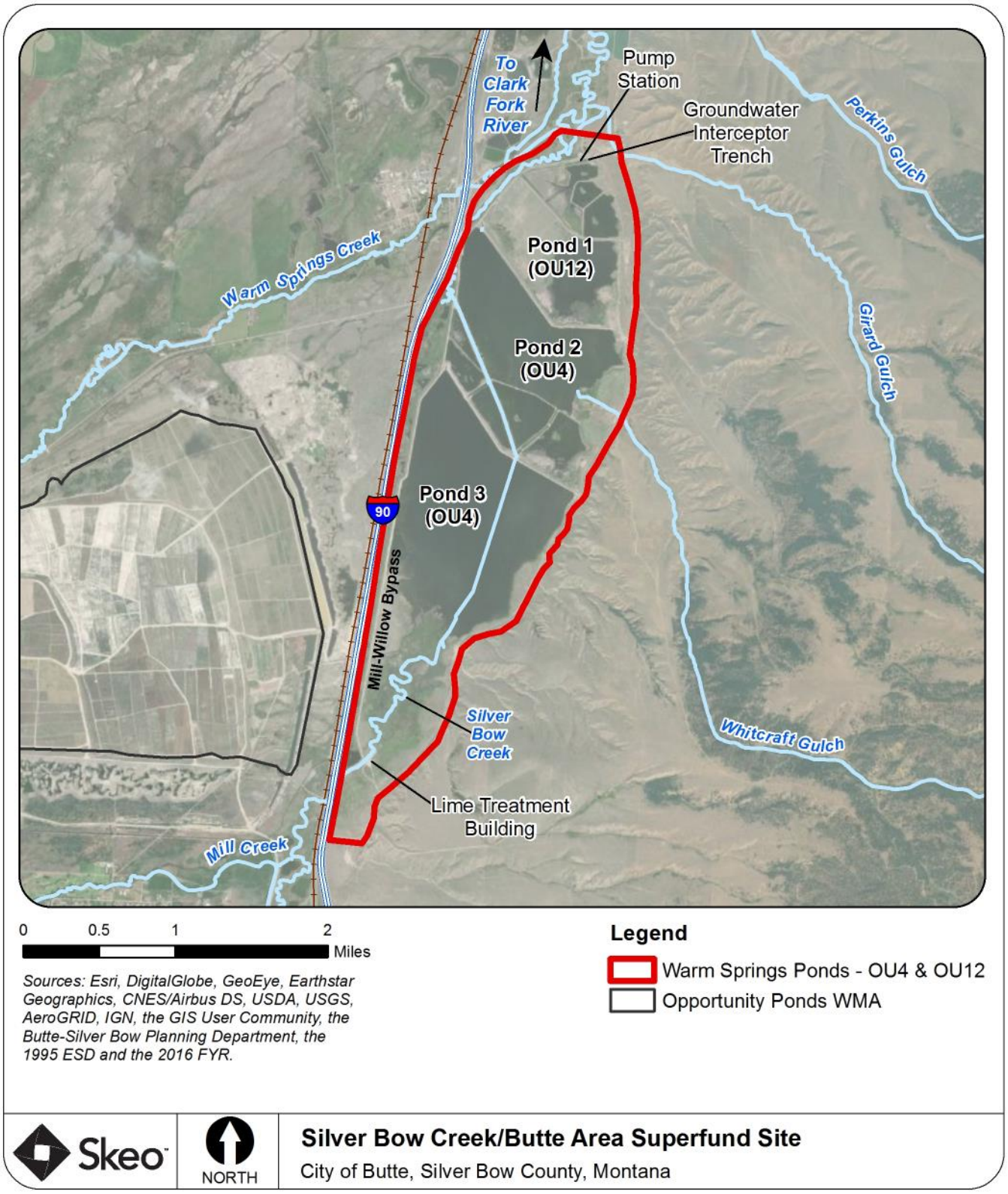
The Warm Springs Ponds Active OU4 and Inactive OU12 (WSPOUs) are at the lower end of Silver Bow Creek, about 27 miles downstream of Butte. The WSPOUs cover about 2,500 acres and consist of a series of three sediment settling ponds. The Anaconda Copper Mining Company constructed the ponds in an effort to prevent tailings and other sediments from entering the Clark Fork River, which begins about a half-mile below Pond 1. Ponds 1 and 2 were completed in 1911 and 1916, respectively, and Pond 3 in 1959 (Figure 4-1; see Response Actions for additional information about the ponds). The Active Area (OU4) consists of Ponds 2 and 3. The Inactive Area (OU12) consists of Pond 1. Pond 1 no longer plays a role in settling sediments and is essentially isolated from the active treatment portion of the pond system.

Before remedial action, the Inactive Area OU contained an estimated 3.4 million cubic yards (cy) of contaminated sediments, tailings and soils (2.9 million cy were in Pond 1 and about 475,000 cy were downstream of Pond 1). Downstream source materials consisted of over-bank deposits that settled out along Silver Bow Creek before the construction of Pond 1. Upstream Ponds 2 and 3 contain 4.89 million cy and 11.2 million cy respectively.

The ponds are the primary hydrologic features within the OUs. Three creeks from the south and the west flow through the OUs. Mill and Willow creeks from the west and south flow into the Mill-Willow Bypass, which routes the comparatively less contaminated water in these two creeks around the ponds and to the Clark Fork River. Silver Bow Creek, the longest of the three creeks, flows from the south and enters Pond 3 near the southern end of the OU. Tailings and other sediments and contaminants from Silver Bow Creek physically settle to the bottom as the velocity of the incoming water decreases. Water flowing out of Pond 3 goes primarily into Pond 2, with a smaller volume used to maintain several wildlife ponds between Ponds 2 and 3. The effluent from Pond 2 flows into the Mill-Willow Bypass as a regulated point-source discharge. It then flows down the bypass to the Clark Fork River.

The shallow groundwater system in the WSPOUs is complex. The presence of the pond system affects shallow groundwater elevations and groundwater movement within the area. The uppermost aquifer at the site is a 10- to 15-foot-thick sand and gravel unit approximately 10 feet below ground surface. This sand and gravel aquifer appears to be present throughout the upper Deer Lodge Valley. Groundwater movement through the WSPOUs is generally south to north, although a significant component of groundwater enters from the Opportunity Ponds area of the Anaconda Co. Smelter site to the southwest.

Figure 4-1: Warm Springs Ponds Active OU and Inactive OU



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

No domestic wells are located in the WSPOUs. However, several wells are located within a mile east of the pond system. These wells are in bedrock aquifers that do not appear to be affected by the pond system. The town of Warm Springs pumps its water from supply wells in unconsolidated Tertiary deposits from depths of about 200 feet. These wells are supplied with water from groundwater resources west of and hydraulically isolated from the WSPOUs.

The WSPOU complex is designated as a wildlife management area that is administered by the Montana Department of Fish, Wildlife and Parks under a 2005 lease with Atlantic Richfield. Property within the WSPOUs is owned exclusively by Atlantic Richfield. Together, the settling ponds and wildlife ponds offer habitat for migrating waterfowl and breeding areas for songbirds and osprey. The lease allows recreational use of the area but restricts swimming and limits fishing to catch-and-release only.

RESPONSE ACTION SUMMARY

Basis for Taking Action

Environmental investigations determined sediments, surface water, soils and groundwater were all affected by contaminants in the WSPOUs. Pond bottom sediments, tailings deposits and contaminated soils contain the majority of the contaminants. The Montana Department of Health and Environmental Sciences conducted a public health and environmental risk assessment and identified potential risk to workers or recreators due to ingestions of arsenic and lead in contaminated soil, sediments and tailings.

In addition, the EPA determined the existing berms protecting the ponds failed to meet current dam safety standards. Their failure due to a flood or earthquake could result in catastrophic consequences including loss of life.

Response Actions

Pre-ROD Activities
Anaconda made the first attempt to control the amount of sediment carried into the Clark Fork River from Silver Bow Creek in 1911 by building a 20-foot-high tailings dam on Silver Bow Creek near the town of Warm Springs. This effort created Pond 1.

In 1916, Anaconda built another 18-foot-high dam at Warm Springs, upstream from the first dam, creating Pond 2. The dam was subsequently raised 5 feet, to a total height of 23 feet, from 1967 to 1969.

A third, and much larger, 28-foot-high dam was built upstream of Pond 2 by Anaconda between 1954 and 1959, primarily for sediment control. The structure created Pond 3. The height of the dam was increased by 5 feet to a maximum height of 33 feet, from 1967 to 1969.

In 1967, Pond 3 was converted into a treatment facility to treat mill waste losses, precipitation plant spent solution from Butte operations, and overflow from the Opportunity Ponds. Treatment consisted of introducing a lime/water suspension from the Anaconda Smelter into Silver Bow Creek above Pond 3. The addition of the lime suspension raised the pH of the creek water to facilitate precipitation of heavy metals in the Pond 3.

Remedial Actions

Active Area (OU4)

Following initiation of a removal action that removed tailings from the Mill-Willow Bypass that was completed in November 1990, the EPA signed an interim ROD for the WSPOUs in September 1990. The final remedy will be selected following completion of upstream OU cleanups or as otherwise appropriate.

In June 1991, the EPA signed an ESD that identified the Inactive Area of Pond 1 and the area beneath Pond 1 as a separate action to be addressed under a separate 1992 ROD (OU12). The changes enabled the EPA to proceed with necessary work on the active portions of the pond system (Ponds 2 and 3) and allowed the EPA to conduct a more thorough evaluation of various alternatives for closing the inactive portions of the pond system.

The retained elements of the 1990 ROD address Active Area OU4: Pond 2 and Pond 3, the Mill-Willow Bypass and berms, inlet and outlet structures, treatment improvement features and monitoring systems. The overall RAOs established for the Active Area OU4 are:

- Prevent releases of pond bottom sediments due to earthquakes or floods.
- Meet ambient water quality standards for aquatic life in the discharge of treated water at the identified compliance point.
- Prevent ingestion of water containing contaminant concentrations above MCLs and established reference doses for copper, iron, zinc and cadmium. Also prevent ingestion of water containing arsenic in concentrations that would cause an excess cancer risk greater than 1×10^{-7} to 1×10^{-4}.
- Reduce the potential for tailings in the Mill-Willow Bypass to reach the Clark Fork River through continuation of the removal action in this area.
- Reduce the potential for tailings in upstream areas of Silver Bow Creek to reach the Clark Fork River.
- Reduce the potential for human exposure to exposed tailings and other surface contamination to satisfy acceptable intake criteria.
- Reduce the metals contamination in the groundwater downgradient of the ponds to achieve compliance with MCLs.

Major components of the selected interim remedy for the Active Area OU are:

- Allow the ponds to remain in place; Pond 2 and Pond 3 will continue to function as treatment ponds until upstream sources of contamination are cleaned up and upstream in-stream standards can be met without treatment.
- Raise and strengthen all pond berms according to specified criteria to protect against dam failure in the event of major earthquakes or floods and increase the storage capacity of Pond 3 to receive and treat flows up to the 100-year flood.
- Construct new inlet and hydraulic structures to prevent debris from plugging the Pond 3 inlet and to safely route flows in excess of the 100-year flood around the ponds.
- Comprehensively upgrade the treatment capability of Ponds 2 and 3 to fully treat all flows up to 3,300 cubic feet per second (cfs) (100-year peak discharge) prior to discharge and construct spillways for routing excess flood water into the bypass channel.
- Remove remaining tailings and contaminated soils from the Mill-Willow Bypass (an action begun pre-ROD under a removal action), consolidate them over existing dry tailings and contaminated soils in the Pond 1 and Pond 3 berms, and provide adequate cover material, which will be revegetated.
- Reconstruct the Mill-Willow Bypass channel and armor the north-south berms of all ponds to safely route flows up to 70,000 cfs (one half of the previously estimated probable maximum flood).
- Flood (wet-closure) all dry portions of Pond 2. Wet closure cells are constructed by inundating exposed tailings deposits by adding a lime slurry and then flooding with water to effectively neutralize acidic conditions and cause dissolved metals to precipitate and bind to soil particles.
- Establish surface and groundwater quality monitoring systems and perform all activities necessary to ensure compliance with all ARARs.
- Implement institutional controls to prevent future residential development, swimming and consumption of fish by humans. The 1991 ESD further specified that specific institutional controls shall be initiated in cooperation with local governments (see Institutional Control Review).

Interim discharge standards for Pond 2 discharge of treated water are included in Table 4-1.

Table 4-1: Warm Springs Pond Active OU: Pond 2 Discharge Standards

Constituent	Daily Maximum (mg/L)	Monthly Average (mg/L)
Total Recoverable Arsenic	0.02	0.02
Total Recoverable Cadmium	0.0039[a]	0.0011[a]
Total Recoverable Copper	0.018[a]	0.012[a]
Total Recoverable Iron	1.5	1.0
Total Recoverable Lead	0.082[a]	0.0032[a]
Total Recoverable Mercury	0.0002	0.0002
Total Recoverable Selenium	0.26	0.035
Total Recoverable Silver	0.0041[a]	0.00012[a]
Total Recoverable Zinc	0.12[a]	0.11[a]
Total Suspended Solids	45.0	30.0
pH	6.5 to 9.5 standard units	--
Notes: a. Hardness-dependent standards. This concentration represents the standard calculated at a hardness of 100 mg/L as $CaCO_3$. Source: Active Area Unilateral Administrative Order		

Inactive Area (OU12)

The 1992 ROD selected an interim remedy for the Warm Springs Ponds Inactive Area OU12. The overarching remedial action objectives for the Inactive Area OU were to substantially reduce or eliminate risks to human health and the environment and meet federal, state and local laws. Media-specific remedial action objectives were as follows:

- Prevent releases of pond bottom sediments during floods or earthquakes.
- Meet ambient water quality standards established pursuant to the Montana Water Quality Act for arsenic, cadmium, lead, mercury, copper, iron and zinc at a compliance point just above the starting point of the Clark Fork River.
- Prevent ingestion of water above the Montana Public Water Supply Act's MCLs for arsenic, cadmium, lead, mercury and silver, and established reference doses for copper, iron, lead, zinc and cadmium.
- Prevent ingestion of water containing arsenic in concentrations that would cause increased cancer risks greater than 1 in 10,000.
- Substantially reduce the potential for direct contact, inhalation and ingestion of exposed tailings and contaminated soils. This objective applies to humans, fish and wildlife.
- Reduce the levels of arsenic, cadmium and other contaminant concentrations in the groundwater within the Inactive Area to preclude off-site migration of water in excess of Montana groundwater MCLs.

Major components of the selected interim remedy for the Inactive Area OU12 are:

- Remove all tailings and contaminated soils from the adjacent portion of the Mill-Willow bypass channel and from the area below Pond 1 not planned for wet closure. Consolidate the wastes over existing dry tailings within the western portion of Pond 1.
- Modify, or enlarge if necessary, the adjacent portion of the bypass channel to safely route flood flows up to 70,000 cfs, which is one half the previously estimated probable maximum flood for the combined flows of Silver Bow Creek, Willow Creek and Mill Creek.
- Raise, strengthen and armor with soil cement the north-south aspect of the Pond 1 berm.
- Stabilize the east-west aspect and extend and armor the north-south aspect of the Pond 1 berm.
- Relocate the downstream portion of the bypass channel and convert the present channel into a groundwater interception trench.

- Deepen the converted groundwater interception trench and install pumps to allow for a pump-back system. Pump intercepted water that fails to meet specified standards back to the Active Area for treatment.
- Construct wet-closure berms to enclose the submerged and partially-submerged tailings and contaminated soils.
- Chemically fix (immobilize) the tailings and contaminated soils, now enclosed by smaller berms, by incorporating lime and lime slurry onto or into them.
- Implement long-term ecological monitoring.
- Implement institutional controls to prevent residential development, swimming, domestic well construction and disruption of dry-closure caps.
- Dry closure measures in the ponds involved pumping out the existing and then protecting the tailings and contaminated soils from direct exposure by covering with lime & soil barriers, followed by revegetation with native species.

Final WSPOUs Remedy

A final remedy for Active Area OU4 and Inactive Area OU12 will be selected following completion of upstream OU cleanups or otherwise as appropriate.

Status of Implementation

Atlantic Richfield conducted the interim remedial actions for both OUs under two Unilateral Administrative Orders and EPA enforcement and oversight from July 1990 through September 1995. Initial cleanup began with the Mill-Willow Bypass expedited response action in 1990 and 1991. Work continued through both the Active and Inactive Areas from 1992 through 1995. The EPA has determined that Atlantic Richfield has met all interim remedial action construction requirements.

During remedial action, pond embankments were raised and strengthened as necessary to provide treatment capacity for inflows up to the 100-year peak discharge and to withstand a maximum credible earthquake for the area; the Pond 3 inlet structure was constructed to safely pass flows up to the 100-year flood and to route flows greater than the 100-year flood around the ponds; the Mill-Willow Bypass was reconstructed to safely route the expected flows from up to one-half the probable maximum flood and to enhance aquatic and terrestrial habitat; and wet closures were constructed to submerge tailings and contaminated soils within portions of the WSPOUs.

On March 31, 1993, the new lime treatment facility was brought on-line at the inlet to Pond 3. The treatment facility added the ability to control the lime feed by four different modes: pH feedback, lime dosage rate (based on flow rate), constant lime feed rate, and system on/off cycles.

Lime Treatment Pilot Study

A Lime Rate Optimization Pilot Study began in November 2013 to determine if reducing lime addition during winter and spring months can improve pH and arsenic discharge compliance during summer months, without negatively affecting arsenic and copper discharge concentrations during the remainder of the year.

The first two years of the Pilot Study (2014 and 2015) were conducted at an approximate 25% reduction in lime dosage. After observing minor positive results and no negative impacts, lime addition was reduced further, to approximately 50% relative to pre-study conditions, and with a target post-lime pH range of 8.0 to 8.3 at the sampling location downstream of the lime addition plant. An extension to the study was requested and approved in November 2017 in which existing operational conditions would be maintained. Operations have continued under the approved conditions to the present time. In October 2019, Atlantic Richfield submitted an interim assessment for 2018 and the first half of 2019 operations. The EPA is currently reviewing the findings.

Institutional Control (IC) Review

The OU4 ROD called for institutional controls to prevent future residential development, swimming and consumption of fish by humans. The 1991 ESD further specified that the following specific institutional controls shall be initiated in cooperation with local governments at the site:

- Renewal of the lease agreement between Atlantic Richfield and the Montana Department of Fish, Wildlife and Parks, for continuation of use of major portions of the area as a wildlife refuge.
- Implementation of a conservation easement with restrictive covenants by Atlantic Richfield for the Site, to ensure that future development will not include residential use and will not cause disruption of disposal areas or waste ponds.
- Implementation of a permit development system, in cooperation with Anaconda-Deer Lodge County and Atlantic Richfield, which will prevent residential development at the Site. The permit system includes the development of a master plan, which will designate the ponds as a wildlife refuge.
- Implementation of a water well ban in the area. The well ban shall prohibit water wells within the waste ponds at the Site permanently and shall temporarily prohibit water wells within the Site in areas outside of the waste ponds, until such time as ARARs are achieved for the groundwater at the Site.
- Implementation of a ban on swimming in the ponds at the Site, to be accomplished through the posting of appropriate signs at the Site.

The OU12 ROD called for institutional controls to prevent residential development, swimming, domestic well construction and disruption of dry-closure caps.

Atlantic Richfield submitted a petition to DNRC for designation of the Warm Springs Ponds Active and Inactive Area OUs as a controlled groundwater area pursuant to Section 85-2-506(2)(f), Montana Code Annotated. The petition included a request that DNRC issue an order establishing a permanent water well ban for potable water supply within these OUs. DNRC approved the petition and established a controlled groundwater area at the WSP, effective May 25, 1995 (Figure 4-2).

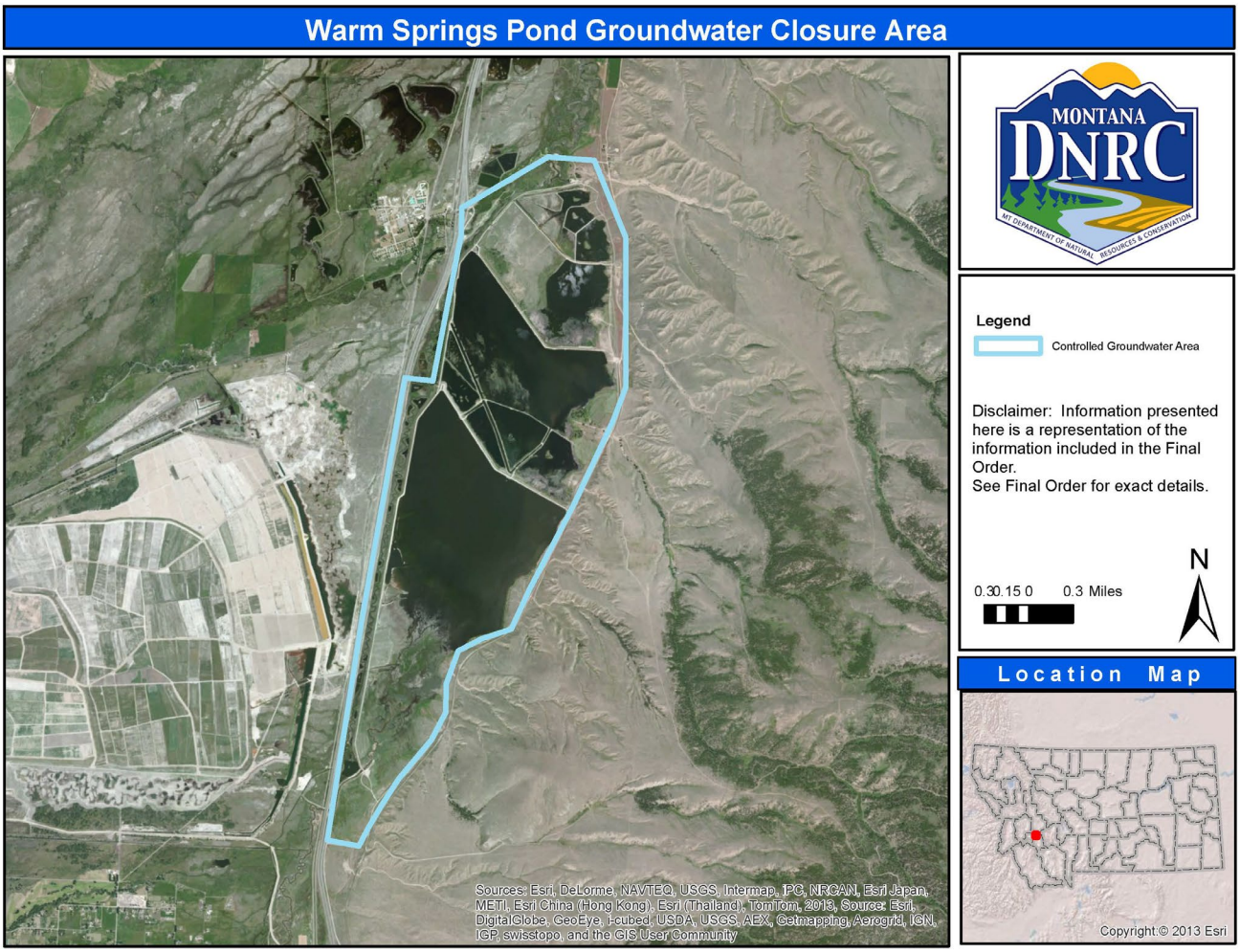
Atlantic Richfield currently owns all property within the WSPOUs. The area is a designated wildlife management area administered by the Montana Department of Fish, Wildlife and Parks, under a 2020 lease with Atlantic Richfield. The lease allows recreational use of the area but restricts swimming and limits fishing to catch-and-release only. Signage is posted at entry points to the ponds describing the Montana Department of Fish, Wildlife and Parks fishing regulations. The current agreement with Montana Department of Fish, Wildlife and Parks extends to December 31, 2024

It was originally envisioned that restrictions on future development would be accomplished through a conservation easement with restrictive covenants. However, that approach proved difficult to implement. Instead, the implementation of land use restrictions has involved Atlantic Richfield working with Anaconda-Deer Lodge County and include a development permit system to prevent the Warm Springs Ponds from being used for residential habitation or in other ways that could disturb the remedy. In addition, the area lies within the 100-year floodplain, making it subject to building restrictions. Additional institutional controls may be considered in the final ROD.

Table 4-2: WSPOUs Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Area(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Surface water	Yes	Yes	OU4 and OU12	Prevent swimming and consumption of fish	2005 Property lease
Land use	Yes	Yes	OU4 and OU12	Prevent future residential development	County permit system
OU12 Cover	Yes	Yes	OU12	Prevent disruption of dry-closure caps	To be determined
Groundwater	Yes	Yes	OU4 and OU12	Prohibit installation of potable groundwater wells	1995 Controlled Groundwater Area (Figure 4-2)

Figure 4-2: WSPOUs Controlled Groundwater Area



Systems Operations/O&M

The O&M plan was updated and approved in 2019 to reflect current operations.

System Overview

The primary objective of the Active Area OU4 system is to treat the incoming water so that water leaving the system meets established water quality standards. This objective is accomplished through integrated operation of the full system that includes Pond 3, Pond 2 (including the wet closure facilities), the facilities to bypass around Pond 2, the Pond 1 wet closure facilities, the three wet closure cells below Pond 1, and the Groundwater Interception and Pumpback System. Pond 3 is the primary treatment pond, with Pond 2 serving to enhance performance under normal flow conditions.

The processes at Active Area OU4 involve two primary active operational controls: chemical (lime) precipitation and hydraulic controls. First, the quantity of lime added to the influent stream can be adjusted. The dissolution and mixing of the lime that occurs in Silver Bow Creek and in Pond 3 produces a desired pH adjustment. Second, hydraulic controls can be altered so that the water surface elevations (and volumes) of Ponds 3 and 2 are raised or lowered. Water flows can also be routed differently between or around the ponds and wet closures to modify detention times and improve removal efficiencies.

Flows entering the system vary greatly. Flows from Silver Bow Creek enter the Pond 3 at the inlet structure where the pH is adjusted by lime addition. Flow passes through Pond 3 and Pond 2 prior to discharge from the outlet structure. Flows from Mill and Willow Creeks are diverted into the Mill-Willow Bypass above the inlet structure. Other system flows include the effluent from the Inactive Area Pumpback Station, which pumps water from the Groundwater Interception Trench back to Pond 2. In addition, a small flow is maintained from Pond 2 into Pond 1 of the Inactive Area, which is subsequently returned to Pond 2 as part of the pumpback discharge.

Inspection and Monitoring

Regular inspection and maintenance are required for embankment, water conveyance and hydraulic structures facilities, including monitoring related to dam safety, piezometers, dry closure areas and hydraulic facilities.

The Data Review section discusses surface water and groundwater monitoring results. Surface water monitoring includes flow, levels, water characteristics (e.g., pH, temperature, dissolved oxygen), lime usage and weather, which could be used in evaluating impacts on pond system performance. Groundwater monitoring includes both water quality and groundwater level. Both sets of data are used for compliance monitoring to verify that contamination is contained during the time the Pumpback System is in use. Data are further used to establish the point in time when the Groundwater Interception Trench and Pumpback System can be terminated.

PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determinations and statements from the 2016 FYR Report as well as the recommendations from the 2016 FYR Report and the status of those recommendations.

Table 4-3: WSPOUs Protectiveness Determinations/Statements from the 2016 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
4	Will be Protective	The final remedy at Warm Springs Ponds Active OU (OU4) is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed exposure pathways that could result in unacceptable risks.
12	Will be Protective	The final remedy at Warm Springs Ponds Inactive OU (OU12) is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed exposure pathways that could result in unacceptable risks.

Table 4-4: Status of Recommendations from the 2016 FYR Report

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
4	Arsenic surface water standard seasonally exceeded in effluent.	Complete arsenic treatment optimization studies, and then determine if additional remedial action is needed and if meeting RAOs is feasible.	Under Discussion	The Lime Rate Optimization Pilot Study is ongoing. An extension to the study was requested and approved in November 2017. In October 2019, Atlantic Richfield submitted an interim assessment for 2018 and the first half of 2019 operations. EPA is currently reviewing the findings and will assess if meeting RAOs is feasible.	Not Applicable
4 and 12	New exposure pathways for wildlife/aquatic life may now be present.	Evaluate contaminant pathways.	Considered But Not Implemented	EPA anticipates considering all human and ecological exposure pathways during the final remedy decision process.	Not Applicable

FIVE-YEAR REVIEW PROCESS

Data Review

This FYR data review includes surface water sampling data at four points in the Active Area OU4 flow path, including the discharge, as well as Inactive Area groundwater monitoring. Overall, data are consistent with prior years of monitoring. In addition, results of the watershed biological monitoring and the five-year dam safety inspection are discussed in this section.

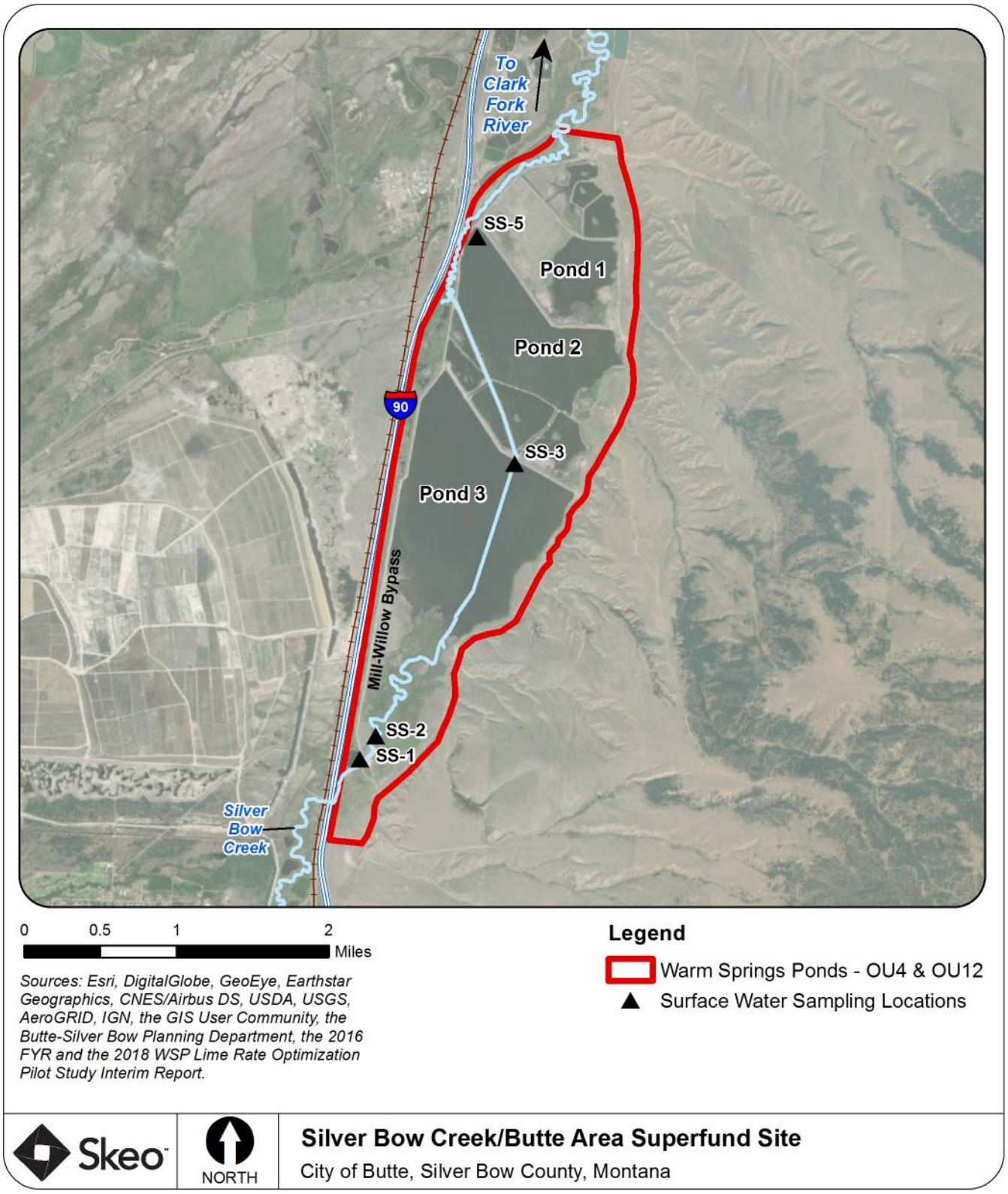
Surface Water

As illustrated in Figure 4-3, surface water quality is monitored at Pond 3 Inlet (SS-1), Pond 3 discharge (SS-3) and Pond 2 discharge (SS-5). In addition, pH is monitored downstream of lime addition (SS-2), Data collected at SS-5 are used to evaluate Pond 2 performance as well as comply with the monitoring requirements. Surface water standards at the WSPOUs are applied to effluent composite samples taken at SS-5. Grab samples are collected from this location on a daily basis during active lime treatment to assure the target pH is being met.

The standards contain daily maximum and monthly average limitations for the total recoverable concentrations of nine trace elements (arsenic, cadmium, copper, iron, lead, mercury, selenium, silver and zinc), total suspended solids (TSS) and pH.

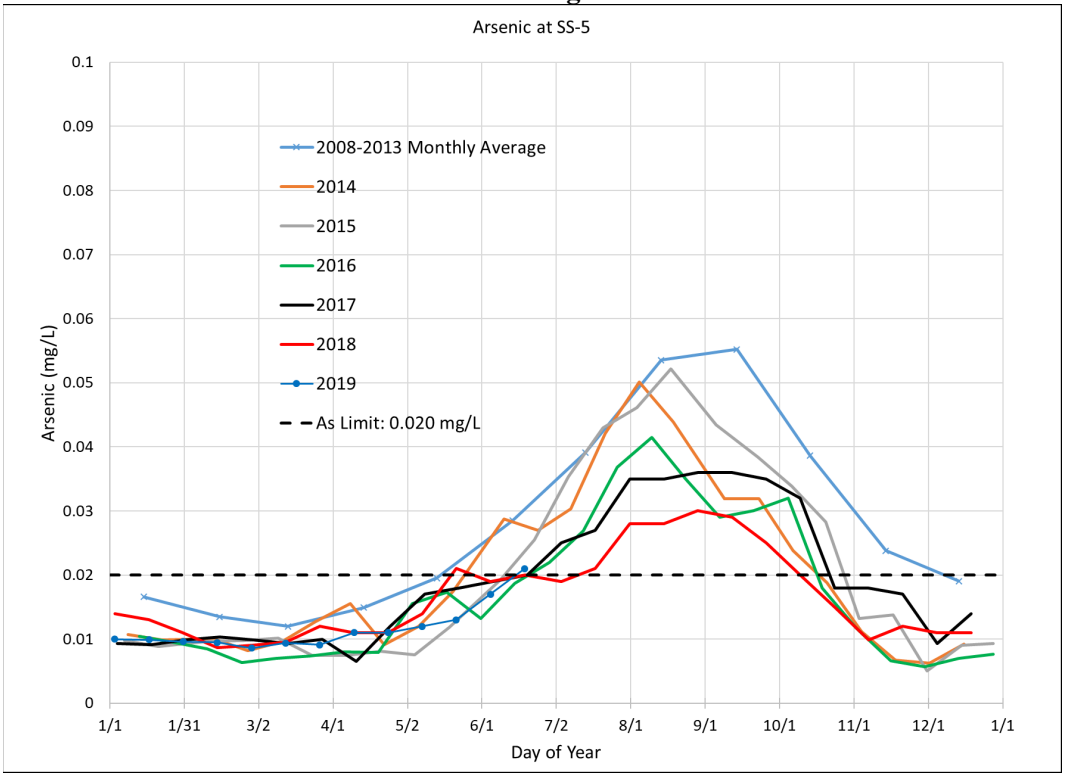
Through June 2019, Pond 2 discharge SS-5 was in compliance with the Final Daily Maximum Standards for all constituents, with the exception of arsenic, copper and pH exceedances (Figures 4-4, 4-5 and 4-6). Influent and effluent data for January 2015 through December 2019 are presented in Appendix J. Arsenic and copper are the only constituents to exceed the monthly performance standards during this review period. Although the discharge from the Pond 2 exceeds the performance standard seasonally, human health is protected. The arsenic standard is set to protect human health through drinking water and no people are consuming the Pond 2 effluent or using the upper Clark Fork River as a potable water source.

Figure 4-3: WSPOUs Sampling Points



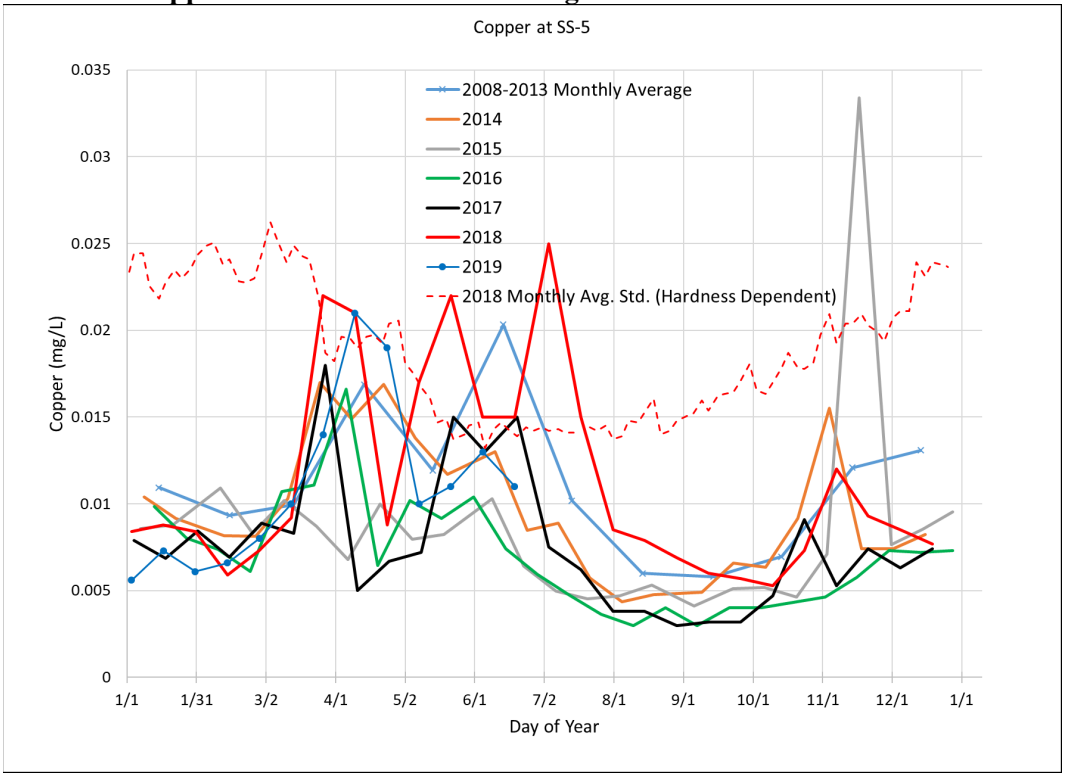
Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure 4-4: WSPOUs Arsenic Concentrations at Discharge SS-5



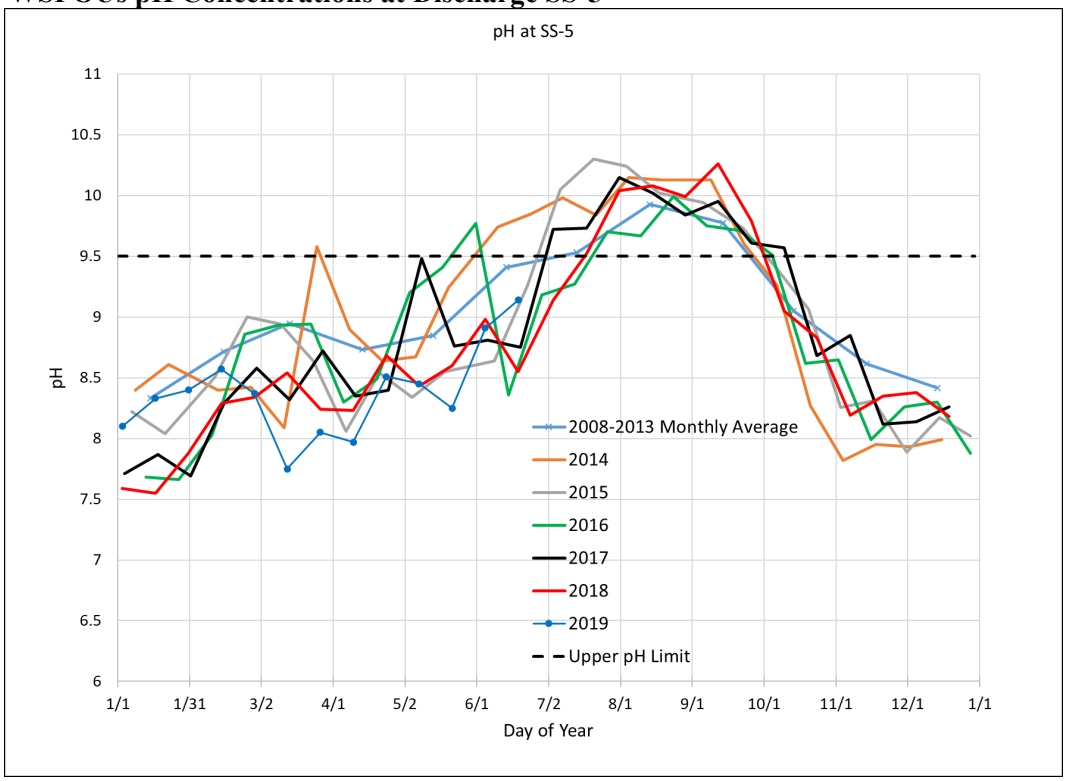
Source: ARCO, 2019. Warm Springs Ponds Operable Unit of the Silver Bow Creek Area NPL Site, Docket No. CERCLA-VIII-91-25 - Warm Springs Ponds (WSP) Lime Rate Optimization Pilot Study Interim Report, 2018 Through June 2019; Prepared/submitted October 8.

Figure 4-5: WSPOUs Copper Concentrations at Discharge SS-5



Source: ARCO, 2019. Warm Springs Ponds Operable Unit of the Silver Bow Creek Area NPL Site, Docket No. CERCLA-VIII-91-25 - Warm Springs Ponds (WSP) Lime Rate Optimization Pilot Study Interim Report, 2018 Through June 2019; Prepared/submitted October 8.

Figure 4-6: WSPOUs pH Concentrations at Discharge SS-5



Source: ARCO, 2019. Warm Springs Ponds Operable Unit of the Silver Bow Creek Area NPL Site, Docket No. CERCLA-VIII-91-25 - Warm Springs Ponds (WSP) Lime Rate Optimization Pilot Study Interim Report, 2018 Through June 2019; Prepared/submitted October 8.

Groundwater

The objective of the Inactive Area groundwater monitoring program is to verify compliance with the specified groundwater quality performance standards at wells immediately north of the groundwater interception trench. Semi-annual groundwater monitoring activities were conducted during the reporting period. Groundwater quality results are well below standards and are presented in Appendix J.

Biological Monitoring

Although not part of the interim remedy monitoring requirements, annual benthic macroinvertebrate-based monitoring has been performed at stream reaches with ongoing or future remedial actions from Silver Bow Creek upstream of the Warm Springs Ponds, downstream through the upper Clark Fork River. In addition to providing current assessments of ecological conditions, these sampling events extend the long-term data set for evaluating water quality trends and the effectiveness of remedial activities.

Sampling locations at the WSPOUs include Silver Bow Creek at Opportunity, upstream of Pond 3 (SBC Station 2.5), Silver Bow Creek below the Pond 2 discharge (SBC Station 4.5) and Mill-Willow Bypass above Pond 2 discharge (MW Station 5). Overall, environmental conditions in the watershed are improving. In 2017, the biological integrity at Opportunity (Station 2.5) scored non-impaired for the first time since monitoring began. Biological integrity also improved at Silver Bow Creek below the Warm Springs Ponds (Station 4.5), with the 2019 bioassessment being the highest reported score since 2003. The Mill-Willow Bypass (Station 5) BMI community continues to be classified as non-impaired.

Dam Safety

Atlantic Richfield submitted the required five-year dam safety report in December 2016 (as scheduled, after the 2016 FYR was completed). Dam safety inspections have confirmed that the Warm Springs Ponds facilities

comply with state of Montana Dam Safety Regulations. The next five-year dam safety inspection is to be scheduled for 2021. Interim annual reports indicate no issues with dam safety.

Site Inspection

The site inspection took place on 9/17/2020. Participants included EPA RPM Allie Archer, Dave Griffis from Atlantic Richfield, Steve Lubbock from Pioneer Technical Services and Treat Suomi from EPA FYR support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy. The site inspection checklist and photos are included in Appendices F and G, respectively.

Participants met at the WSPOUs lime treatment building. The group toured the ponds to observe the condition of remedial components, including the treatment plant, ponds, berms and spillways. Fencing and Montana Department of Fish, Wildlife and Parks signage were observed at all property entrances. The Site was well-maintained overall. The remedy appeared to be in working order.

TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The interim remedy at WSPOUs is functioning as intended. The final actions at these OUs will be determined following implementation of remedial actions at OUs in upstream areas that are expected to reduce contaminant inputs to the WSPOUs.

While the discharge concentrations for cadmium, lead, mercury, iron and zinc have been in compliance with discharge standards for the Pond 2 discharge, arsenic and, only occasionally, copper continue to exceed standards on a seasonal basis. Atlantic Richfield is continuing to study and better understand the arsenic cycling at the ponds and has recommended that the lime optimization Pilot Study be extended to November 2021.

Revegetation efforts have proven to be successful at both the dry closures and along the Mill-Willow Bypass. The removal of tailings in combination with the reconstruction of the Mill-Willow Bypass has prevented erosion of tailings from the Mill-Willow Bypass into the Clark Fork River. In general, the revegetation effort prevents exposure of human and ecological receptors to COCs associated with tailings via direct contact, ingestion or inhalation.

Off-site migration of groundwater exceeding performance standards is prevented by the interceptor trench. The wet closures remain inundated and biologically active. The wet closures are functioning as intended to prevent mobilization or direct exposure to COCs.

Dam safety inspections have confirmed that the Warm Springs Ponds facilities comply with state of Montana Dam Safety Regulations.

DNRC's controlled groundwater area and the fact that all land parcels within the boundary of the WSPOUs are owned and controlled by Atlantic Richfield continue to effectively prevent the use of contaminated groundwater, swimming in the ponds, or any other use that could compromise the remedy. Additional controls that run with the land will be considered as part of the final remedy.

During the community involvement interviews, respondents had questions about the final remedy closure and timing, notably how the pond closures will affect the overall watershed. Respondents also indicated uncertainty about the reason for catch-and-release fishing regulations, and whether it was about the well-being of the fish population, or about the safety of eating the fish.

The EPA will consider land use and watershed impacts as well as public comments during the final remedy selection process. The EPA will continue to consider WSPOUs as part of the larger Butte-Anaconda-Clark Fork River Superfund complex and consider the watershed-wide impacts.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Active Area discharge standards identified in the Unilateral Administrative Order are no longer valid as Montana standards are now more stringent. In addition, the ecological risk assessment called for in the 2011 FYR has not been completed but will be completed prior to final remedy selection. Updates to discharge and performance standards, as well as assessment of all risk pathways will be considered in the decision-making process for final remedy selection.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

Pursuant to CERCLA Section 121(d), the EPA has identified the federal Endangered Species Act of 1973, as amended (ESA), as an applicable or relevant and appropriate requirement (ARAR) for the ongoing remedial actions at the Site. ESA Section 7(a)(2) requires federal agencies to ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of federally designated critical habitat. ESA Section 9 addresses certain prohibitions, including the unauthorized take of listed species. Consistent with ESA Section 7(a)(2), the EPA has evaluated the potential effects of its remedial actions at the Site on any threatened and endangered species and their designated critical habitat, as applicable. In 2018, the EPA prepared and submitted to the U.S. Fish and Wildlife Service (FWS) a Biological Assessment (BA) that includes the agency's determinations with which the FWS has concurred, that its actions may affect, but are not likely to adversely affect, the Canada lynx and grizzly bear. The EPA has also prepared and submitted to the FWS, a 2020 revised BA concluding that its actions may affect, and are likely to adversely affect, the threatened bull trout and its designated critical habitat. Consistent with the ESA, the FWS is in the process of preparing a Biological Opinion related to the EPA's 2020 revised Biological Assessment.

No other information has come to light that could call into question the protectiveness of the remedy.

ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU4 and OU12

OTHER FINDINGS

One additional recommendation was identified during the FYR. These recommendations do not affect current and/or future protectiveness:

- The EPA will continue to coordinate with the FWS to facilitate completion of the Biological Opinion and the ESA Section 7(a)(2) consultation process.

PROTECTIVENESS STATEMENTS

Protectiveness Statement	
Operable Unit: 4	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The final remedy at Warm Springs Ponds Active OU (OU4) is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed exposure pathways that could result in unacceptable risks.	

Protectiveness Statement	
Operable Unit: 12	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The final remedy at Warm Springs Ponds Inactive OU (OU12) is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed exposure pathways that could result in unacceptable risks.	

NEXT REVIEW

The next FYR Report for the WSPOUs at the Silver Bow Creek/Butte Area Superfund site is required five years from the completion date of this review and will be included in the site-wide FYR.

V. ROCKER TIMBER FRAMING AND TREATING PLANT OPERABLE UNIT (ROCKER OU), Operable Unit 7

Background

The 16-acre Rocker OU is south of U.S. Interstate 15/90 near Rocker, Montana, about three miles west of Butte, in Silver Bow County (Figure 5-1). The Rocker OU is on both the north and south sides of Silver Bow Creek.

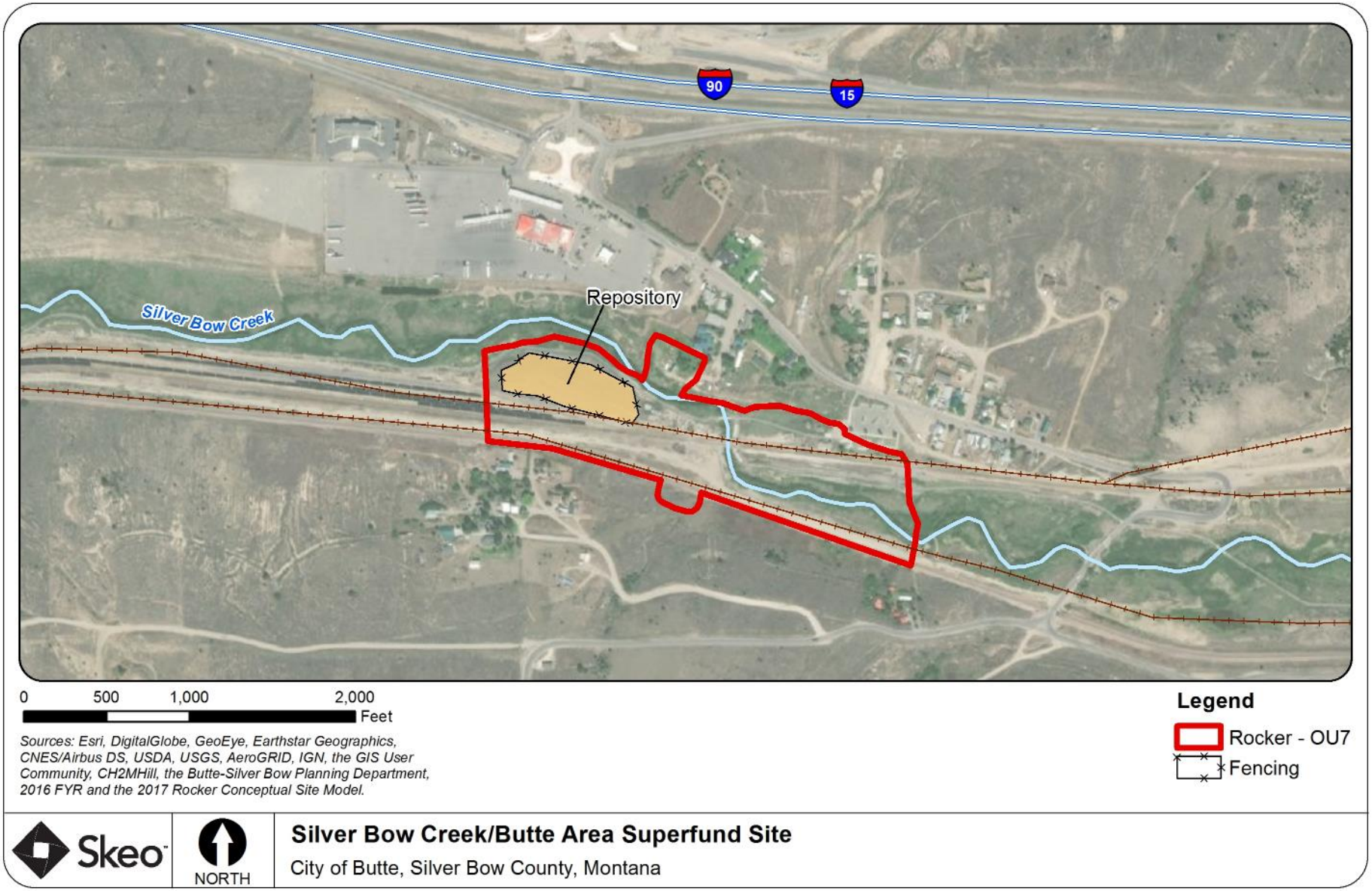
The Rocker Timber Framing and Treating Plant was built in 1909. It operated until the plant's closure around 1957. The Anaconda Company, predecessor to Atlantic Richfield, owned and operated the plant. Initially, the facility treated mining timbers with a creosote solution. Later, it used arsenic trioxide solutions for treatment. During plant operations, spilled process materials (arsenic trioxide powder), treated wood chip residues, and dripped or leaked process solutions (creosote and caustic heated arsenic brines) resulted in contaminated soils and significant groundwater contamination. Arsenic in soils and groundwater at the Rocker OU is the primary COC. Other metals contamination from mine waste was also present at various locations at the Rocker OU.

Groundwater flows through the shallow/upper and deep/lower alluvium and Tertiary sediments. However, only the deep alluvial aquifer and Tertiary aquifer are currently used for human consumption of groundwater. The alluvial formation has been subdivided into the shallow alluvial aquifer (the upper 20 feet of alluvial sediments) and deep alluvial aquifer (from about 20 feet below ground surface to the upper surface of the Tertiary age sediments). The deep alluvial aquifer pinches out toward the western portion of the OU.

The community of Rocker is zoned for residential, commercial and agricultural uses. Land uses in the Rocker OU are currently industrial and railroad uses with some recreational use on the Greenway Trail along Silver Bow Creek. There are many wells in the area that are not currently in use due to local restrictions implemented in response to the potential for contaminant migration to private wells and efforts by Atlantic Richfield to work with local well users to abandon wells and use alternative water supplies. Existing wells can still be used, but well owners have been notified of the potential risks.

The three parcels that make up the Rocker OU are owned by Atlantic Richfield and Rarus Railroad. The property currently includes a repository of treated materials contoured to promote proper surface drainage, leaving a 15-foot-high vegetated knoll. The area of treated materials is fenced to limit access and trespassing. Riprap along a portion of the north side of the repository area protects against erosion during flood events in Silver Bow Creek.

Figure 5-1: Rocker OU Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

RESPONSE ACTION SUMMARY

Basis for Taking Action

Between 1989 and 1995, the EPA conducted investigations at the Site to characterize the nature and extent of soil and groundwater contamination. From these investigations, the EPA concluded that contaminated soils and groundwater at the Rocker OU posed an imminent and substantial endangerment to workers, trespassers and future potential residents at or near the OU.

Arsenic is the primary COC. For surface soils, more than 95% of the cancer and non-cancer risk was due to the presence of arsenic. No other contaminant (including other metals, creosote and polycyclic aromatic hydrocarbons) was determined to pose unacceptable cancer or non-cancer risk in excess of the EPA's acceptable risk range. Arsenic contributed over 99% of the future potential cancer risk from consuming groundwater.

Response Actions

In 1989, the state of Montana directed Atlantic Richfield to remove contaminated soils and debris with concentrations exceeding 10,000 mg/kg arsenic. About 1,000 cy of contaminated material were removed to a licensed disposal facility. Areas involved in the removal action were subsequently covered with about 1 foot of fill material from a nearby off-site area. Nevertheless, other materials with arsenic concentrations exceeding 10,000 mg/kg were identified at three locations remaining on site.

After an RI/FS was conducted by Atlantic Richfield under an administrative order on consent, the EPA issued a 1995 ROD and a 2014 Rocker ESD, selecting and modifying the remedy. The remedy addresses surface soil, alluvium and groundwater contaminated by wood-treating compounds and mining waste. RAOs for the Rocker OU are:

- Attain groundwater standards (ARARs) or other risk-based levels for inorganic (primarily arsenic) and organic COCs for groundwater underlying and adjacent to the OU and protect human health during and after cleanup. Owing to the nature of the groundwater contamination, the aquifers of preferred use, and the quality/quantity of water available from water-producing zones in the Rocker OU, this RAO is primarily intended to prevent further contamination of the two lower aquifers. A secondary part of the RAO is to attain ARAR levels outside of waste unit boundaries in the upper aquifer.
- Prevent release of contaminated groundwater to Silver Bow Creek that would result in a violation of surface water ARARs or other risk-based contaminant levels.
- Prevent migration of contaminated groundwater from areas where levels exceed groundwater standards into regions where levels are within groundwater standards.

The remedy selected for the Rocker OU in the 1995 ROD and amended by the 2014 Rocker ESD included:

- Groundwater Source Material Removal and Treatment of Shallow Groundwater:
    - Excavate contaminated soils in areas where groundwater arsenic concentrations exceed 10,000 µg/L. Treat excavated soils with iron sulfate and lime amendments and dispose of treated soils in an on-site repository. Contingent remedy of containment and treatment of contaminated groundwater. Rely on natural attenuation to achieve cleanup standards outside of the waste unit boundary.
    - The 2014 ESD changed the ARAR for arsenic in groundwater from 18 µg/L to 10 µg/L.
- Contaminated Surface and Near-Surface Soils:
    - Excavate surface soils with arsenic concentrations in excess of 1,000 mg/kg to a depth of 18 inches. Treat excavated soils with iron sulfate and lime amendments and dispose of treated soils in an on-site repository. Cover soils with arsenic concentrations ranging from 380 mg/kg to 1,000

mg/kg with 18 inches of clean soil and revegetate. Implement institutional controls to protect the remedy, prevent future residential use, and prevent domestic groundwater use until cleanup is achieved.

- Well Ban and Alternative Water Supply:
    - Implement a groundwater well ban for new wells within a quarter-mile radius of the OU in any of the three aquifer units. Construct an expanded capacity water supply system for the community of Rocker.
- Groundwater:
    - Monitor and demonstrate that the requirements of the ROD have been met. Return the groundwater resource to the community after cleanup levels are achieved and provide O&M for the repository and soil covers.
    - For groundwater, cleanup levels are based on the state's standards for Class I and Class II groundwater.
    - If necessary, a contingent remedy of additional hydraulic controls may be implemented to contain plume expansion.

The Statistical Evaluation and Implementation Plan, which is part of the work plan attached to the 2000 Rocker OU Consent Decree, established a trigger action level for implementing a contingent groundwater remedy. That trigger action level is an arsenic concentration of 18 µg/L in groundwater in certain wells. The 2014 Rocker ESD further calls for evaluation of technologies to address the groundwater plume. After the evaluation of technologies, the contingent remedy trigger will be re-evaluated.

Status of Implementation

The PRP began Rocker OU remedy construction in April 1997 and finished in October 1997. PRP excavated 48,000 cy of soils contaminated with arsenic above 1,000 mg/kg to a depth of five feet below the seasonally low groundwater level. Excavated soil was then treated in a pug mill with iron sulfate and lime amendments. Soil sampling confirmed treated soils had leachable arsenic concentrations below 0.30 mg/L.

Treated soils were disposed of in an on-site repository. A two-acre portion of the shallow aquifer was excavated and replaced with a gravel-filled zone beneath the repository. This zone previously contained arsenic-impacted soil and sediment and was excavated to a depth of about five feet below the annual average shallow groundwater elevation and backfilled to an elevation about one foot above the annual average shallow groundwater elevation, for a total thickness of approximately six feet. The top of the gravel-filled zone was leveled out and covered with a geotextile filter fabric. Impacted material that had been excavated from the Rocker OU was treated with ferrous sulfate and calcium carbonate, placed on top of the fabric, capped with 18 inches of cover soil, seeded with a mixture of native grasses, fertilized and mulched with straw.

The PRP treated groundwater contaminated with arsenic above 1,000 µg/L in open excavation trenches using iron sulfate, lime and potassium permanganate amendments. During remedy implementation, additional areas of contamination were identified and treated. Groundwater contamination on the south side of the OU was treated with ferrous iron through a groundwater injection trench. Additional soils were excavated, treated and stored in the on-site repository. Monitored natural attenuation was expected to address remaining groundwater contamination. The PRP covered other soils above 380 mg/kg with clean cover soil and revegetated the entire area.

Although the remedy removed the primary source and about 63% of the secondary source (in the form of impacted alluvium) to a depth of five feet below the water table, the remaining impacted alluvium was not removed because of concerns associated with excavating into the saturated zone and releasing arsenic adhering to impacted alluvium. Remedial action was completed October 1997.

As part of the remedy implementation, a new water main was constructed to connect the existing Butte-Silver Bow County water supply line to Rocker. A 300,000-gallon water supply reservoir was also constructed to

supplement the increased water usage. In 2011, the nearby Town Pump truck stop installed two adsorptive arsenic media treatment tanks on its well to ensure the water meets current drinking water standards.

More than 40 monitoring wells were installed during the remedial investigations. During remedy implementation, seven wells were constructed within the remediation footprint as treated source materials were backfilled into excavated areas. Those wells were designated as interior "gravel wells" because their screened intervals were within the treated groundwater that was backfilled with clean gravel. In addition, exterior and contingency (POC) wells in each of the three aquifer zones were installed.

During remedy implementation, two areas of contamination were identified that had not been included in the remedy design. Groundwater contamination on the south side of the site within the Rocker rail siding was treated with ferrous iron though a groundwater injection trench. An infiltration gallery was left in place in the event that groundwater needs to be re-dosed in this area. A second area of soil contamination was identified in the floodplain of Silver Bow Creek. These materials were excavated, treated, and stored in the on-site repository.

Post-Construction Monitoring and Investigations

Post-remedy monitoring showed arsenic concentrations increasing in groundwater. As stated in the 2014 ESD, data evaluated during the 2011 Five-Year Review showed several contingency wells had a quarterly arsenic concentration equal to or greater than 10 µg/L. In addition, 21 of the 24 wells that are part of the monitoring program, but are not contingency wells, had quarterly arsenic concentrations exceeding 10 µg/L, with some showing an increase in arsenic concentrations over time. Therefore, the EPA concluded the remedy had failed to meet the RAOs for the Rocker OU. The EPA consequently directed the Settling Defendant (SD) to review conditions and evaluate other actions and technologies that can be suitably applied in order to attain RAOs at the Rocker OU.

The SD began developing an updated conceptual site model (CSM) in 2014 and in 2017 submitted an updated draft CSM compiling the 20 years of performance monitoring to provide updated background and site characterization information and an evaluation of the site sources, pathways and receptors. The EPA, in consultation with MDEQ, reviewed and provided comments on the CSM document in a letter dated August 30, 2017. The SD's prepared a QAPP to address data gaps within the CSM and collect data for a focused feasibility study (FFS). The SD performed field work in the fall of 2020 to collect further data to support the updated CSM and FFS. After review of the data and the FFS, the EPA, in consultation with MDEQ, will determine if contingent remedies included in the 2014 ESD, or other actions, are warranted to address remaining groundwater contamination.

Institutional Control (IC) Review

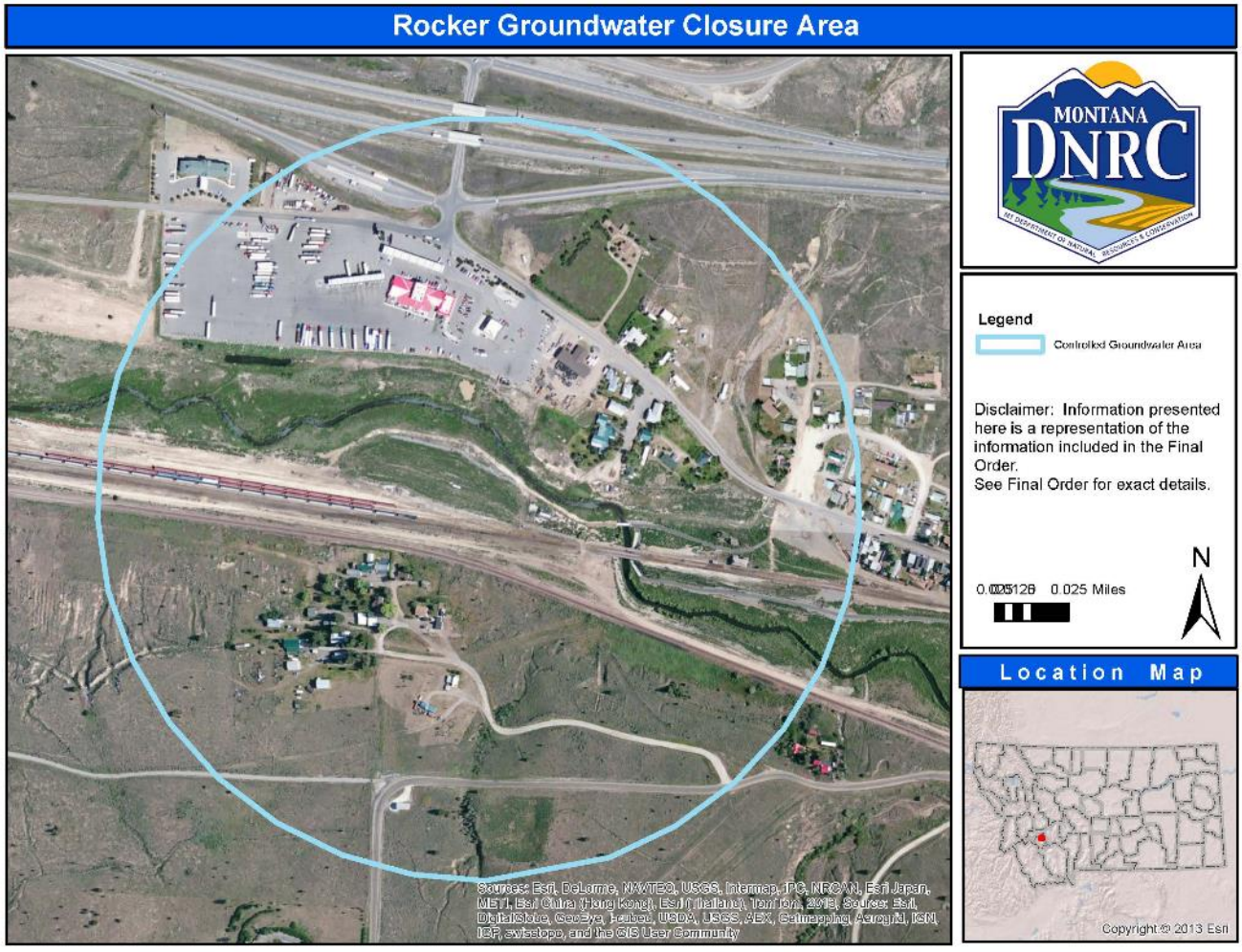
Future development and use of groundwater resources in the area was restricted via a 1997 well ban, implemented under state law as a controlled groundwater area, which prohibits direct consumption of groundwater via wells in order to prevent migration of the contaminated groundwater into the deeper, high-quality groundwater systems in the area (Figures 5-2).

The soil repository lies within railroad property and property owned by Atlantic Richfield. Per a 2000 CD, Atlantic Richfield is to execute and record a deed restriction, running with the land, that restricts property use. These restrictions are to exclude use of any portion of the OU for residential purposes and ban installation of any new groundwater wells. Table 5-1 describes the institutional controls planned and in place at the Rocker OU.

Table 5-1: Rocker OU Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Quarter-mile buffer around the Rocker OU and a small portion of the SSTOU	Restrict all new appropriation of groundwater.	Controlled groundwater area established in 1997. 2000 Consent Decree
Soil	Yes	Yes	Rocker Soil Repository	Prohibit residential development and protect the soil repository.	2000 Consent Decree In addition, Atlantic Richfield is to execute and record a deed restriction, running with the land, that restricts property use.

Figure 5-2: Rocker OU Controlled Groundwater Area



Systems Operations/O&M

The PRP began quarterly O&M activities in 1998, including regular groundwater and surface water monitoring and inspection of general site and vegetation conditions. Current monitoring is conducted in accordance with the 2000 O&M plan. The objectives of the quarterly Rocker OU groundwater monitoring program are:

- Confirm treatment results and track groundwater quality trends.
- Document the long-term efficacy of the iron/lime/oxidant groundwater treatment process carried out in 1997.
- Document potential migration of the arsenic plume.
- Document that nearby public and domestic water supplies remain unaffected by the Rocker OU arsenic plume.
- Document changes in water table elevation and flow patterns following excavation and treatment of the shallow alluvial hydrostratigraphic unit.
- Monitor compliance with arsenic groundwater performance standards.

Quarterly sampling events include:

- Measuring the water level in all Rocker OU monitoring wells and staff gauges in Silver Bow Creek.
- Sampling three private wells and 31 monitoring wells.
- Measuring field parameters in Silver Bow Creek.

In addition to groundwater monitoring, an annual qualitative inspection of general site conditions evaluates the uniformity of vegetation cover, presence of bare areas, identification of noxious weed infestations, location of erosive areas, condition of ditches, damage due to trespassing, and other conditions. Recommendations are made based on the overall condition of individual components (e.g., vegetation, erosion, security, channels) of the reclaimed area. No major issues were noted in the past five years.

PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determination and statement from the 2016 FYR Report and 2018 FYR Addendum as well as the recommendations from the 2016 FYR Report and the status of those recommendations.

Table 5-2: Rocker OU Protectiveness Determination/Statement from the 2016 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
7	Protectiveness Deferred	A protectiveness determination of the remedy at the Rocker OU (OU7) cannot be made at this time until further information is obtained. Further information will be obtained by taking the following actions: completion of the updated conceptual site model and further investigation of private domestic area wells. It is expected that these actions will take approximately 18 months to complete, at which time a protectiveness determination will be made.

Table 5-3: Rocker OU Status of Recommendations from the 2016 FYR Report

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
7	There appears to be a gap in the monitoring Network southwest of RH-05. In addition, during the most recent sampling event, arsenic was detected in tertiary well RH-72 at 230 µg/L, significantly exceeding the arsenic cleanup standard of 10 µg/L.	Upon completion of the CSM, update, develop and review the CSM to determine what additional investigation and/or action for this area is warranted to refine groundwater flow direction and to determine the extent of the plume in the southwest direction.	Addressed in Next FYR	The draft CSM has been reviewed by the EPA/MDEQ, and the SD has collected data in 2020 for an FFS to address the data gaps in the draft CSM. Upon completion, the EPA will determine if additional investigations or actions are needed.	Not applicable
7	Arsenic contamination in the alluvium beneath the remediated area appears to be a continuing source of arsenic to the groundwater.	Evaluate the situation and determine any needed updates to the selected remedy.	Addressed in Next FYR	The draft CSM has been reviewed by the EPA/MDEQ, and the SD has collected data in 2020 for an FFS to address the data gaps in the draft CSM. Upon completion, the EPA will determine if additional investigations or actions are needed.	Not applicable
7	A local private well has arsenic concentrations, at times, above the 10 µg/L standard.	Determine whether or not this well and all other domestic wells in the area meet drinking water standards and are not having an effect on the groundwater plume.	Completed	All use of the private well that exceeded the 10 µg/L standard was discontinued, and the residence was connected to the Rocker municipal water supply. The well can no longer be used as a source of drinking water because electrical service to the well pump was disconnected, the supply line from the well pressure tank was disconnected and capped, and plans are being made to abandon the well. No other residential wells in this area have exceeded the 10 µg/L standard. This and the Town Pump installation of a treatment system for arsenic on its well means that no known residents or customers are consuming groundwater exceeding the 10 µg/L standard.	9/30/2017
7	There is not a complete understanding of how the shallow groundwater interacts with surface water in Silver Bow Creek.	Update, develop and review the CSM to determine the potential impact on Silver Bow Creek.	Addressed in Next FYR	The draft CSM has been reviewed by the EPA/MDEQ, and the SD has collected data in 2020 for an FFS to address the data gaps in the draft CSM. Upon completion, the EPA will determine if additional investigations or actions are needed.	Not applicable

Table 5-4: Rocker OU Protectiveness Determination/Statement from the 2018 FYR Report Addendum

OU #	Protectiveness Determination	Protectiveness Statement
7	Short-term Protective	Based on new information and/or actions taken since the Five-Year Review completion date, the protectiveness statement for Rocker OU 7 is being revised as follows: • The remedy at OU7 currently protects human health and the environment because all use of the private well that exceeded the 10 µg/L standard was discontinued, and the residence was connected to the Rocker municipal water supply. This and the Town Pump installation of a treatment system for arsenic means that no known residents or customers are consuming groundwater exceeding the 10 µg/L standard. Other aspects of the remedy currently protect human health and the environment because land use controls are in place to prevent residential development within the OU and a ban on well use at the Rocker OU is still in place. The DNRC instituted a controlled groundwater area for the Rocker OU, and the Rocker residents were provided with an alternate community water system. However, in order for OU7 to be protective in the long term, the following actions need to be taken to ensure protectiveness. • The potentially responsible party (PRP) will revise the draft conceptual site model (CSM) per comments provided by the EPA in consultation with the Montana Department of Environmental Quality (MDEQ). Data gaps related to arsenic contamination in the alluvium beneath the repository, arsenic transport in groundwater, and arsenic transport to surface water, will be resolved and the draft CSM can be completed. Once the draft CSM is complete, data gaps are filled, and further analysis conducted, further action may be necessary to ensure long-term protectiveness.

The 2018 FYR Report Addendum did not identify any issues or recommendations. However, the Addendum did again state the need for the following actions, previously noted in the 2016 FYR:

- The SD will revise the draft CSM per comments provided by the EPA in consultation with MDEQ.
- Data gaps related to arsenic contamination in the alluvium beneath the repository, arsenic transport in groundwater, and arsenic transport to surface water, will be resolved using field data collected in the fall of 2020 under the FFS Data Collection QAPP, dated September 9, 2020, and the draft CSM can be completed.
- Once the draft CSM is complete, data gaps are filled and further analysis conducted, further action may be necessary to ensure long-term protectiveness.

FIVE-YEAR REVIEW PROCESS

Data Review

Data collected for Rocker OU include groundwater and surface water monitoring. Arsenic is the primary groundwater COC at the Rocker OU, so it is the only COC addressed in this FYR data review section. In addition, Atlantic Richfield has been updating the draft CSM and has conducted additional assessment of data gaps, including a field event in the fall of 2020 to collect data under the FFS Data Collection QAPP. Given the EPA is actively reviewing the draft CSM and has acknowledged the remedy is not functioning as intended, this data review provides a summary of annual groundwater monitoring data with the understanding that the EPA and MDEQ will continue to assess the draft CSM and overall remedy performance.

Groundwater Monitoring

The purpose of the groundwater monitoring program is to evaluate treatment results, track groundwater quality trends, and to monitor potential plume migration laterally and vertically. Also included is compliance monitoring at specified groundwater wells and long-term trend analysis for the FYR reports. Quarterly O&M activities began in 1998. Arsenic monitoring results are included in Appendix K.

The monitoring wells being sampled fall into three groups, based on their relation to the existing groundwater arsenic plume. Interior, exterior and contingency monitoring wells at the OU are defined in the Consent Decree Work Plan and included in the 2000 O&M Plan (Table 5-5).

Table 5-5: Rocker OU Groundwater Monitoring Wells

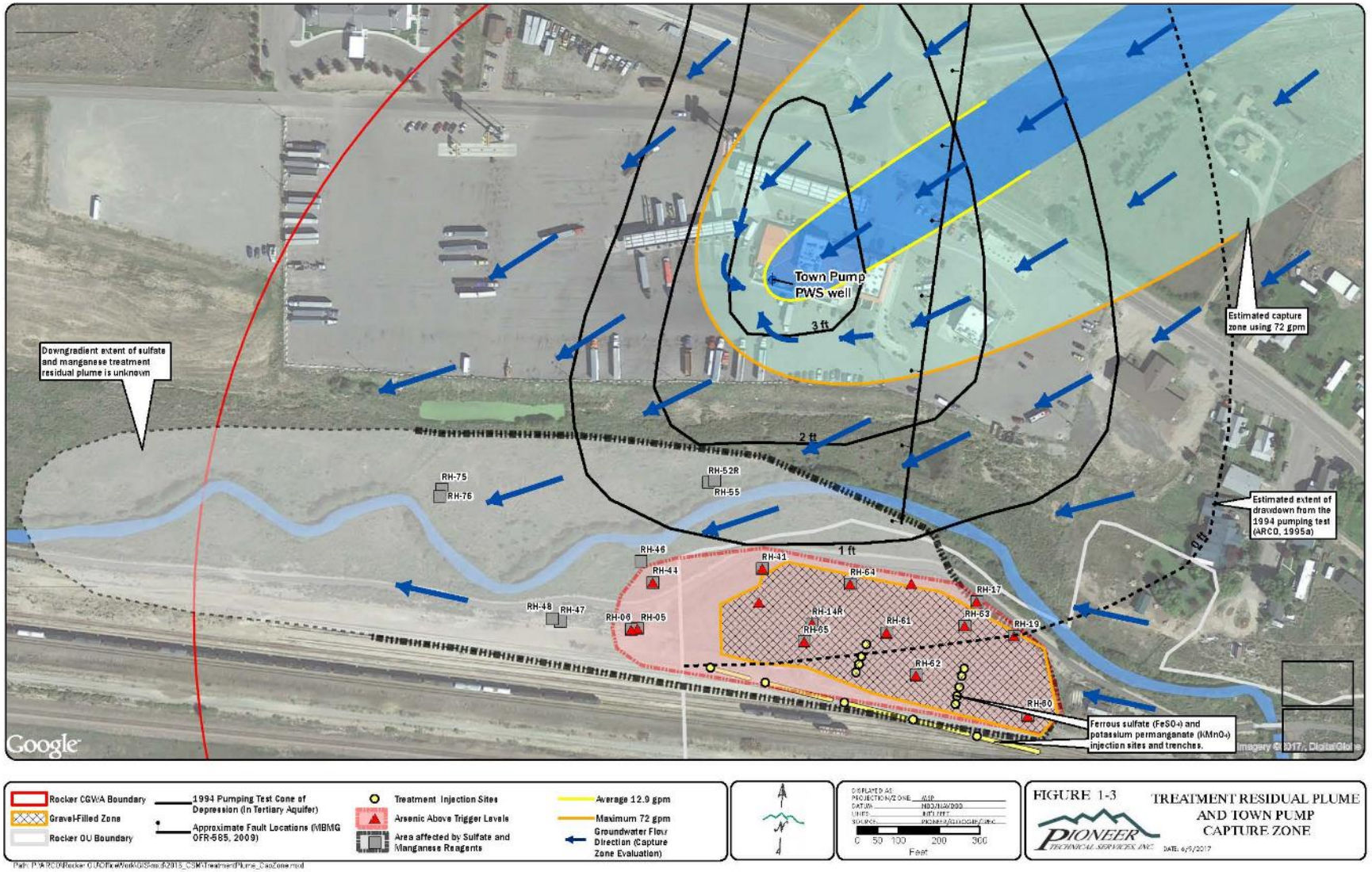
Aquifer	Well Grouping	Well
Shallow Alluvial Wells	Interior	RH-60, RH-61, RH-62, RH-63, RH-64, RH-65, RH-66
	Exterior	MW-01, RH-05, RH–07, RH-15, RH-17, RH-19, RH-41, RH-44, RH-47
	Contingency/Potential Contingency	RH-52R, RH-75
Deep Alluvial Wells	Exterior	RH-14R, RH-16, RH-18, RH-20
	Contingency/Potential Contingency	RH-12R, RH-51, RH-55
Tertiary Sediment Wells	Exterior	RH-06, RH-43, RH-48
	Contingency	Palmer, RH-36R, Rh-46, RH-53, RH-76, Town Pump 1

In the first and second quarters of 2019, one private well and 32 monitoring wells were sampled. In the third and fourth quarters of 2019, two private wells and 32 monitoring wells were sampled. In previous years, samples have been collected at three private wells and 31 monitoring wells. At the agencies' request, MW-01, a monitoring well typically used only for water level measurements, was redeveloped and sampled in the third quarter of 2017. This well continued to be sampled through the remainder of 2017, 2018 and 2019. In September 2017, the private residence which had regularly been sampled was connected to the municipal water supply, and the water supply well was decommissioned by removing the power supply for the pump. The well will be formally abandoned; the well has not been sampled since August 2017.

The highest arsenic concentrations occur in the interior shallow alluvial wells, particularly monitoring wells RH-62 and RH-65. The average arsenic concentrations in these wells during 2019 were 8,600 µg/L and 6,300 µg/L, respectively, which is consistent with post-construction monitoring (Appendix K).

Contingency wells were selected during the remedial design phase to identify any migration and expansion of the plume; no long-term significant changes have been noted in contingency wells. The Town Pump is a contingency well but was unable to be sampled at every event this FYR period due to plumbing issues; the well was sampled in fourth quarter 2019. Although the arsenic ARAR is now 10 µg/L, the action level for contingency wells remains 18 µg/L. In 2019, two contingency wells, RH-46 and RH-52R, displayed statistically significant increases in arsenic concentrations. Although these wells displayed increasing trends at the 95% confidence level, none of the contingency wells demonstrated arsenic concentrations exceeding the specified 18 µg/L trigger level during the 2019 monitoring period. The highest observed quarterly concentration was 11 µg/L arsenic at RH-53 and the maximum 2019 fourth-quarter rolling average was 10 µg/L arsenic, also at RH-53. Figure 5-3 includes the monitoring well network and 2017 plume extent.

Figure 5-3: Rocker OU7 Monitoring and 2017 Plume Map



Source: 2017 Draft Conceptual Site Model. Modified by Skeo.

Site Inspection

The site inspection took place on 9/16/2020. Participants included EPA RPM Nikia Greene, Loren Burmeister (Atlantic Richfield), Mike Potts (Pioneer) and Treat Suomi from EPA FYR support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy.

The group toured the Rocker OU to observe the condition of all remedial components, including site fencing, on- and off-site monitoring wells, and the capped repository area. The Site was well-maintained overall; the remedy appeared to be in working order. Chain-link fencing surrounds the Site. The O&M contractor regularly inspects the Site. The capped area of the repository and non-capped area were well-vegetated. Monitoring wells were secured and appeared to be in good condition.

TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Although implementation of the remedy has reduced arsenic concentrations and loads downgradient of the Rocker OU, elevated levels of arsenic in groundwater remain and RAOs for the Rocker OU related to groundwater have not been fully met. The EPA has requested revisions to a 2017 updated CSM to determine if contingency actions described in the 2014 ESD are needed. The EPA is reviewing recent site data which will lead to a revised draft CSM. After review, the EPA will determine if additional response actions are warranted to address remaining contamination.

In the interim, monitoring indicates no unacceptable exposures are occurring. The private well that exceeded the 10 µg/L arsenic standard was shut down since the previous FYR and the residence was connected to the municipal water supply. This action and the Town Pump installation of a groundwater treatment system for arsenic means that no known residents or customers are consuming groundwater exceeding the 10 µg/L standard. DNRC instituted a controlled groundwater area for the Rocker OU prohibiting new well installations.

Atlantic Richfield owns the gravel repository area and is subject to the 2000 Consent Decree land use restrictions that are in place to prevent residential development.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of remedy selection in the 1995 Rocker ROD, and revised by the 2014 Rocker ESD, are still valid (the 2014 Rocker ESD incorporated a revised arsenic ARAR). Potential exposures to the Rocker repository are prevented by fencing and access restrictions.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

OU: Rocker OU	**Issue Category:** Remedy Performance			
	Issue: High exceedances of the arsenic persist in monitoring wells, indicating potential source area loading. Upon completion, the updated conceptual site model will provide clearer assessment of site conditions and will indicate if additional actions are warranted.			
	Recommendation: Complete the conceptual site model and modify the remedy, if deemed necessary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA	9/30/2021

PROTECTIVENESS STATEMENT

Protectiveness Statement	
Operable Unit: Rocker OU	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy at Rocker OU7 is protective in the short-term. In order for the remedy to be protective in the long-term, the update to the conceptual site model needs to be completed to determine if additional actions are necessary.	

NEXT REVIEW

The next FYR Report for the Rocker OU of the Silver Bow Creek/Butte Area Superfund site is required five years from the completion date of this review and will be included in the site-wide FYR.

VI. BUTTE PRIORITY SOILS OPERABLE UNIT (BPSOU), Operable Unit 8

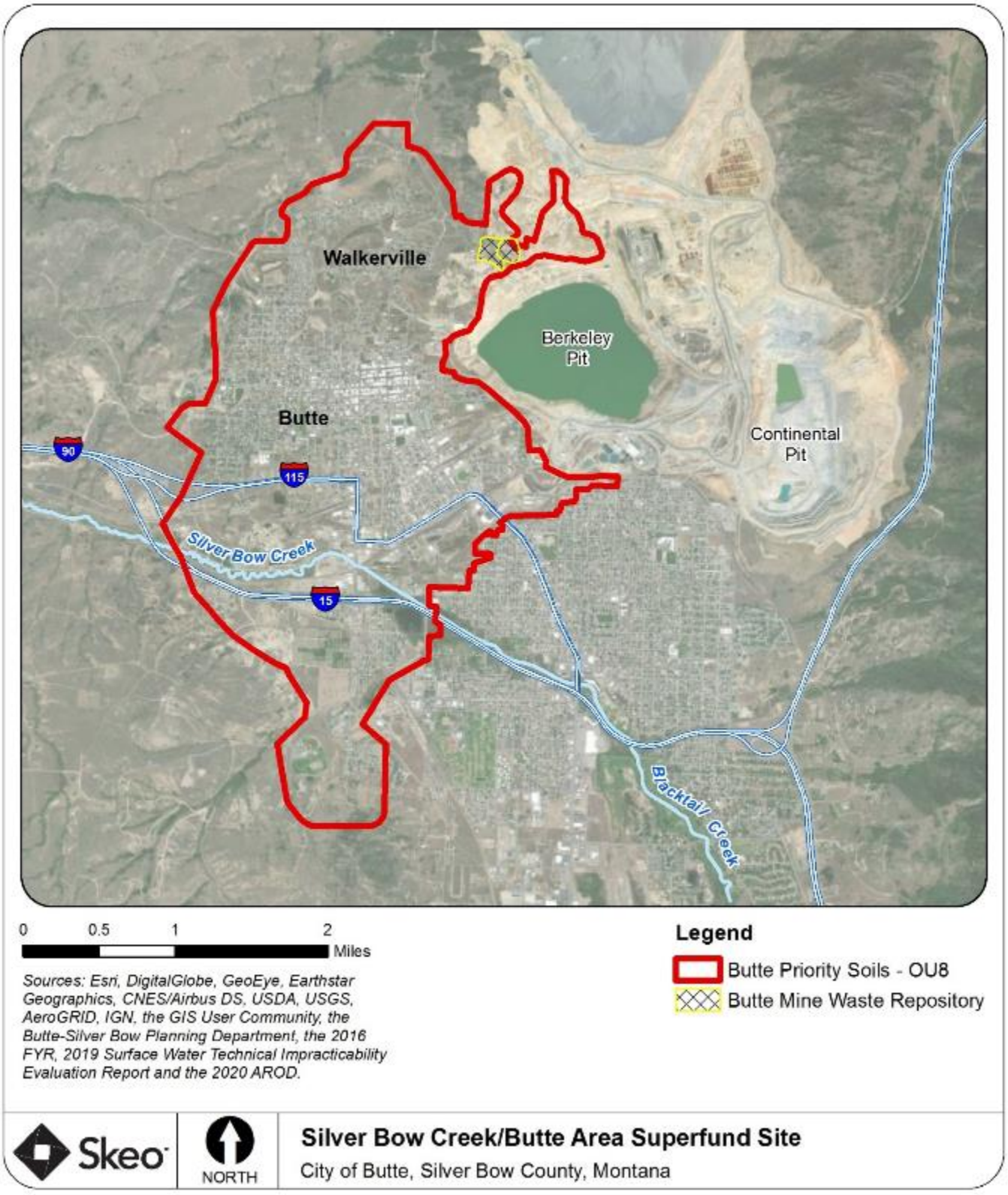
Background

The BPSOU includes impacted soils, mine wastes and contaminated attic dust within portions of the city of Butte and the town of Walkerville, along with mining-impacted alluvial groundwater and surface water associated with the historical and current Silver Bow Creek floodplain in Butte (Figure 6-1). Previously identified OUs 2, 5, 6, 10 and 11 were incorporated into the BPSOU.

The BPSOU is in a mostly urban setting. It includes neighborhoods, schools and parks as well as commercial and industrial areas. The communities of Butte and Walkerville were established close to the silver and copper mining and milling centers and facilities as a matter of convenience. Operations of mines, mills, concentrators and smelters in this area generated tailings, related wastes and a variety of other materials that were deposited in residential areas. Land use in the BPSOU is subject to county government regulation through local ordinances. As of 2019, 34,207 people lived in Butte. As of 2010, 675 people lived in Walkerville.

The two primary streams in the valley are Silver Bow Creek and Blacktail Creek. Blacktail Creek begins in the Highland Mountains to the south. As mining production increased, mills and smelters were located along the creek. To accommodate mineral processing activities, through the years, Silver Bow Creek was rerouted as needed and used for waste disposal. Tailings impoundments were placed in the floodplain and wastes were discharged directly into the creek. With the advent of open pit mining, most of the original Silver Bow Creek channel and floodplain were fundamentally altered by the Berkeley Pit and YDTI because the water source for the upper part of Silver Bow Creek was removed (i.e., the northern drainages now enter YDTI). Today, many of the waste deposits along historic Silver Bow Creek, above the confluence of Blacktail Creek, remain in place. Most are capped.

Figure 6-1: BPSOU Boundary



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

RESPONSE ACTION SUMMARY

Basis for Taking Action

Screening studies, remedial investigations and risk assessments have been conducted in Butte since the 1980s to identify COCs and to quantify actual and potential human health and environmental risks from COCs in tailings, waste, soils, indoor dust, surface water and groundwater. The primary COCs are arsenic, cadmium, copper, lead, mercury and zinc.

Possible exposure pathways for humans at the BPSOU include:

- Ingestion and inhalation of surface soils.
- Ingestion and inhalation of interior dust.
- Dermal exposure to surface water.
- Ingestion of surface water.
- Ingestion of groundwater.

Assessments of ecological risks focused on aquatic habitat in Silver Bow Creek and identified the following potential exposure pathways:

- Fish and benthic macroinvertebrates may be exposed by breathing and touching the surface water and sediment and by ingesting prey or sediment.
- Waterfowl may be exposed by direct ingestion of surface water and sediments or by ingesting contaminated prey.

Response Actions

The EPA began work at the BPSOU in 1987, starting with strategic removals – time-critical removals actions and expedited response actions (ERAs) – to address areas of greatest risk first.[8] RI/FS investigations began in the 1990s and finished in 2005. The EPA issued the ROD in 2006 and an ESD in 2011 (referred to as the 2006/2011 Remedy). The remedy was further revised by a 2020 ROD Amendment. The 2006/2011 Remedy included components to address:

- Contaminated solid media (mine waste, non-residential soil and residential soil/dust).
- Alluvial groundwater.
- Surface water (base flow and stormwater runoff).

While significant portions of the 2006/2011 Remedy have been implemented (see next section), the EPA, MDEQ and the PRPs (Atlantic Richfield and the city and county of Butte-Silver Bow (BSB)[9]) have been analyzing remaining technical issues within the BPSOU. The evaluations have mainly focused on the surface water remedy component.

Data collected since 2006 demonstrated that there were remaining uncontrolled sources of contamination that have the potential to contribute to surface water contamination within the BPSOU. Between 2011 and 2016, the EPA collected surface water, groundwater, sediment, pore water and soil samples to evaluate groundwater and surface water interactions in Blacktail Creek and Silver Bow Creek. Based on this additional analysis, EPA concluded that the 2006/2011 BPSOU Remedy did not address certain source areas that are impacting surface water.

[8] For a detailed summary of the removal actions, see the 2006 BPSOU ROD and the 2011 FYR Report.
[9] Burlington Northern Santa Fe Railway Company and Union Pacific Railroad Company are also named PRPs for the site and are performing remedial action under a 2011 Unilateral Administrative Order.

The 2020 ROD Amendment added to or modified several components of the 2006/2011 Remedy. The 2020 ROD Amendment expanded waste removal areas, modified performance standards and surface water RAOs, established a technical impracticability waiver for in-stream acute standards for copper and zinc, added contaminated groundwater capture, and added stormwater controls and related remedial actions. Table 6-1 provides a description of the RAOs and remedy components from the 2006/2011 Remedy and the 2020 ROD Amendment. Figures C-6 and C-7 in Appendix C provide a visual representation of some of the remedy components planned in the 2020 ROD Amendment.

In September 2020, the Federal District Court of Montana approved the Consent Decree to include the additional remedial actions specified in the 2020 ROD Amendment.

Table 6-1: BPSOU RAOs and Remedy Components

Media	RAOs	Remedy Components
Solid Media – Residential and Non-Residential (2006 ROD/2011 ESD and 2020 ROD Amendment)	• Prevent ingestion of, direct contact with, and inhalation of contaminated soils, indoor dust, waste rock and/or tailings or other process waste that would result in an unacceptable risk to human health assuming current or reasonably anticipated future land uses. • Prevent releases of contaminated solid media to the extent that they will not result in an unacceptable risk to aquatic environmental receptors. • Prevent releases of contaminated water from solid media that would result in exceedances of the Montana State Water Quality Standards for surface water. • Prevent releases of contaminated water from solid media that would result in exceedances of the Montana State Water Quality Standards for groundwater, except where ARAR waivers are appropriate and other means to protect from associated risks are available. • Remediate contaminated solid media to the extent that it will not result in an unacceptable risk to human health and/or aquatic environment receptors. • Prevent release of contaminated water from solid media that would result in degradation of surface water, in accordance with the surface water remedial goals.	Residential Contamination • Residential Metals Abatement Program (RMAP) (expanded in the 2020 ROD Amendment): o Multi-pathway approach to address both mining and non-mining related contamination at all residential properties. o Includes sampling at all properties (yard soil, interior living space dust, non-living space dust and lead-based paint) and comparison to action levels. o Long-term tracking and database program. o Community awareness program. o Medical monitoring. • Soil removed as part of the remediation program transported to the Butte Mine Waste Repository. Non-Residential Contamination (waste rock piles, mill tailings, slag, contaminated soils and aerial emissions) • Combination of source removal, capping and land reclamation. • Reclaimed areas including cover soil caps must achieve performance standards in the Butte Reclamation Evaluation System (BRES). • Institutional controls to protect capped and waste-in-place areas, restrict removal and disposal of contaminated dirt and determine land use requirements.

Media	RAOs	Remedy Components
Groundwater (2006 ROD/2011 ESD and 2020 ROD Amendment)	• Prevent ingestion of, or direct contact with, contaminated groundwater that would result in unacceptable risk to human health. • Prevent groundwater discharge that would lead to violations of surface water ARARs and remedial goals for the BPSOU. • Prevent degradation of groundwater that does not exceed current standards.	• Groundwater capture and treatment – Silver Bow Creek Area: Capture contaminated alluvial groundwater in the area with a subdrain and route this water to the Butte Treatment Lagoons for treatment prior to discharge. • Groundwater capture and treatment – Lower Area One (LAO): Intercept contaminated alluvial groundwater at LAO and base flow from Missoula Gulch in a hydraulic control channel and route to LAO treatment lagoons for treatment prior to discharge. • Groundwater treatment facility. • Groundwater monitoring. • Controlled Groundwater Area: Establish for the alluvial aquifer to prevent domestic use.
Surface water and stormwater (2006 ROD/2011 ESD and 2020 ROD Amendment)	• Prevent ingestion or direct contact with contaminated surface water that would result in an unacceptable risk to human health. • Return surface water to a quality that supports its beneficial uses. • Prevent source areas from releasing contaminants to surface water that would cause the receiving water to violate surface water ARARs and remedial goals (or replacement standards for ARARs appropriately waived) for the BPSOU and prevent degradation of downstream surface water sources, including during storm events. • Ensure that point-source discharge from any BPSOU Superfund water treatment facility meet ARARs. • Prevent further degradation of surface water. • Meet or appropriately waive and replace the more restrictive of chronic aquatic life or human health standards for surface water identified in Circular MDEQ-7 through the application of B-1 class standards. Institutional controls are required for stormwater controls.	• Surface Water Management Program: Uses BMPs to address contaminated stormwater runoff and improve stormwater quality (expanded in the 2020 ROD Amendment to include final stormwater controls at Diggings East, Buffalo Gulch, Grove Gulch, Northside Tailings and other uncontrolled drainages within the BPSOU, tailings removal in Silver Bow Creek, and disposal of waste in repositories as appropriate). • Excavation of contaminated sediments from the stream bed, banks and adjacent floodplain along Blacktail Creek and Silver Bow Creek (expanded in the 2020 ROD Amendment to include additional removals). • Hydraulic control, capture and treatment of contaminated groundwater to prevent its discharge to Silver Bow Creek surface water (expanded in the 2020 ROD Amendment to include installation of groundwater controls in the Butte Reduction Works area and route to Butte Treatment Lagoons). • Revegetate and provide public area for possible recreational use (added in 2020 ROD Amendment). • In-stream flow augmentation as appropriate once all major remedial components are designed and implemented.

Performance standards or action levels have been established for the soil remedy (soil, dust, vapor), groundwater and surface water in the 2006 ROD, 2011 ESD and the 2020 ROD Amendment.

The 2006 ROD identified action levels for COCs in soil, dust and vapor in residential areas and non-residential areas (Table 6-2).

Table 6-2: BPSOU Soil COC Action Levels

COC	Exposure Scenario	Action Level (mg/kg)
Lead	Residential	1,200
	Non-residential	2,300
Arsenic	Residential	250
	Commercial	500
	Recreational	1,000
Mercury	Residential	147
	Residential (vapor)	0.43 micrograms per cubic meter ($\mu g/m^3$)
Notes: Source: Table 12-1 and 12-2 in the 2006 ROD. $\mu g/m^3$ = micrograms per cubic meter		

The 2006 BPSOU ROD contained a waiver of ARAR standards for the alluvial groundwater within the defined TI Waiver Area described in the ROD, based on the technical impracticability to meet these standards, pursuant to section 121(d)(4)(C) of CERCLA). The selected remedy will not, and is not intended to, clean up groundwater to meet groundwater performance standards within the boundary of the waived standards. Therefore, there are no performance standards for groundwater in the area of the BPSOU alluvial aquifer covered by the TI waiver boundary (Figure C-8 in Appendix C).

Since the selected remedy requires the prevention of contaminated plumes from migrating outside the established TI zone, the boundary for the TI zone represents the POC boundary for groundwater. Groundwater performance standards must be met at these POCs (Table 6-3).

Table 6-3: BPSOU Groundwater COC Cleanup Goals

COC	2006 ROD Cleanup Goal ($\mu g/L$)[a]
Arsenic	10
Cadmium	5
Copper	1,300
Lead	15
Mercury	2
Zinc	2,000
Note: a. Source: Table 8-1 in the 2006 ROD. Represent dissolved concentrations.	

The 2020 ROD Amendment revised the 2006 ROD instream acute and chronic performance standards for some of the surface water COCs. The standards are based on flow regimes (base flow/normal high flow and wet weather) (Tables 6-4 and 6-5).

Table 6-4: BPSOU In-Stream Chronic Surface Water Performance Standards and Proposed Waived-to Chronic Performance Standards (Base Flow and Normal High Flow Conditions)

COC	2006 ROD Standard[a]	2020 ROD Amendment		Contingent Post-Construction Waiver[b]	
		New Standard	Basis	Waived-to Standard if Needed	Basis
Aluminum[c]	87 µg/L, dissolved	No change			
Arsenic	10 µg/L, total	No change			
Cadmium[d,e]	0.097 µg/L, total	0.26 µg/L, total	DEQ-7, 2017[f]	None – currently in compliance.	
Copper[d]	2.85 µg/L, total	No change		***Contingent waiver to BLM[g]***	Federal CCC, 2007
Iron	1,000 µg/L, total	No change			
Lead[d]	0.545 µg/L, total	No change		***Contingent waiver to 0.54 µg/L, dissolved***	Federal CCC, 1980, with diss. CF (1998)
Mercury	0.05 µg/L, total	No change			
Silver	No chronic standard for silver				
Zinc[d]	37 µg/L, total	No change			

Notes:

a. 2006 BPSOU ROD standards based on February 2006 version of DEQ-7 and represent the more stringent of the chronic aquatic or human health standard.

b. Numeric replacement performance standards are based on published federal water quality criteria, issued pursuant to section 403(a) of the federal Clean Water Act, 33. U.S.C. § 1314(a). See https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table. All contaminants will be eligible for replacement to other federally accepted performance standards for determining compliance if necessary.

c. DEQ-7 standards for aluminum refer to the dissolved fraction and do not represent a waiver of a performance standard.

d. Standards for cadmium, copper, lead, and zinc are hardness-dependent. Values shown are calculated at a hardness of 25 mg/L unless otherwise shown. Formulas to obtain chronic standards in µg/L are shown as follows (exp=exponent and ln=log natural):

COC	Montana DEQ-7 formula (total)	Federal CCC (dissolved)	Dissolved CF
Cadmium	exp{0.7977*[ln(hardness)]-3.909}	exp{0.7977*[ln(hardness)]-3.909}*CF	1.101672-ln(hardness)*(0.041838)]
Copper	exp{0.8545*[ln(hardness)]-1.702}	exp{0.8545*[ln(hardness)]-1.702}*CF	0.96
Lead	exp{1.273*[ln(hardness)]-4.705}	exp{1.273*[ln(hardness)]-4.705}*CF	1.46203-[ln(hardness)*(0.145712)]
Zinc	exp{0.8473*[ln(hardness)]+0.884}	exp{0.8473*[ln(hardness)]+0.884}*CF	0.986

- Montana DEQ-7 hardness-based standards for the total recoverable fraction have a minimum and maximum hardness range of 25 mg/L to 400 mg/L.
- The federal CCC or CMC hardness-based standards do not have a minimum or maximum hardness, and the contaminant specific dissolved correction factor should be applied.
- Conversion Factor introduced in 1998 publication of recommended water quality criteria (Federal Register v.63, No. 237, pp. 68354-68364).

e. The cadmium standards are updated according to the May 2017 version of DEQ-7.

f. The cadmium standard adopted here varies slightly from the DEQ-7 promulgated standard, which is 0.25 µg/L, based on EPA's calculation for the cadmium standard at a hardness of 25 mg/L using the formula in footnote d that is identical to the formula in footnote 12 of DEQ-7, resulting in a standard of 0.26 µg/L.

g. The BLM criterion in place at the time of compliance standard determination shall be the Replacement Standard for copper for both chronic and acute conditions.

No change = indicates no initial waiver of these standards. Contingent waiver values are expressed in the "Waived-to Standard" column.

BLM = Biotic Ligand Model

diss. CF = dissolved conversion factor

total = total recoverable or unfiltered sample

CCC = criterion continuous concentration (i.e., chronic)

CMC = criterion maximum concentration (i.e., acute)

Bold italic font indicates a waiver.

Table 6-5: BPSOU In-Stream Acute Surface Water Performance Standards and Proposed Waived-to Acute Performance Standards (Wet Weather Conditions)

COC	2006 ROD Standard[a]	2020 ROD Amendment[b,c]		Contingent Post-Construction Waiver[c]	
		New Standard	Basis	Waived-to Standard if Needed	Basis
Aluminum[d]	750 µg/L, dissolved	No change			
Arsenic	340 µg/L, total	No change			
Cadmium[e,f]	0.52 µg/L, total	0.49 µg/L, total	DEQ- 7, 2017	***Contingent waiver to 0.49 µg/L, dissolved***	Federal CMC, 2016 with diss. CF
Copper[d]	3.79 µg/L, total	3.6 µg/L, dissolved	Federal CMC, 1995, with diss. CF (1998)	***Contingent waiver to BLM[g]***	Federal CMC, 2007
Iron	No acute standard	No change			
Lead	13.98 µg/L, total	No change		***Contingent waiver to 14 µg/L, dissolved***	Federal CMC, 1980, with diss.CF (1998)
Mercury	1.7 µg/L, total	No change			
Silver[e]	0.374 µg/L, total	No change		***Contingent waiver to 0.30 µg/L, dissolved***	Federal CMC, 1980, with diss.CF (1998)
Zinc[e]	37 µg/L, total	No change		***Contingent waiver to the applicable Federal standard at time of Compliance Standard Determination***	

Notes:

a. 2006 BPSOU ROD standards based on February 2006 version of DEQ-7 and represent the acute aquatic standard.

b. DEQ-7 standards for acute copper and zinc are waived and replaced with federal water quality criteria based on section 121(d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(C), referred to as the TI waiver.

c. Numeric replacement performance standards are based on published federal water quality criteria, issued pursuant to section 403(a) of the federal Clean Water Act, 33. U.S.C. § 1314(a). See https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table. All contaminants will be eligible for replacement with other federally accepted performance standards for determining compliance, if necessary.

d. DEQ-7 standards for aluminum refer to the dissolved fraction and do not represent a waiver of a performance standard.

e. Standards for cadmium, copper, lead, silver and zinc are hardness dependent. Values shown are calculated at a hardness of 25 mg/L, unless otherwise shown. Formulas to obtain acute standards in µg/L are shown as follows (exp=exponent and ln=log natural):

COC	Montana DEQ-7 formula (total)	Federal CCC (dissolved)	Dissolved CF
Cadmium	exp{0.9789*[ln(hardness)]- 3.866}	exp{0.9789*[ln(hardness)]-3.866}*CF	1.136672-[ln(hardness)*(0.041838)]
Copper	exp{0.9422*[ln(hardness)]-1.7}	exp{0.9422*[ln(hardness)]-1.7}*CF	0.96
Lead	exp{1.273*[ln(hardness)]-1.46}	exp{1.273*[ln(hardness)]-1.46}*CF	1.46203-[ln(hardness)*(0.145712)]
Silver	exp{1.72*[ln(hardness)]-6.52}	exp{1.72*[ln(hardness)]-6.59}*CF	0.85
Zinc	exp{0.8473*[ln(hardness)]+0.884}	exp{0.8473*[ln(hardness)]+0.884}*CF	0.978

- DEQ-7 hardness-based standards for the total recoverable fraction have a minimum and maximum hardness range of 25 mg/L to 400 mg/L.
- The federal CCC or CMC hardness-based standards do not have a minimum or maximum hardness, and the contaminant specific dissolved correction factor should be applied.
- Conversion Factor introduced in 1998 publication of recommended water quality criteria (Federal Register v.63, No. 237, pp. 68354-68364).

f. The cadmium standards are updated according to the May 2017 version of DEQ-7.

g. BLM criterion in place at the time of compliance standard determination shall be the Replacement Standard for copper for both chronic and acute conditions. For acute conditions (wet weather events), the BLM standard or any other appropriate EPA-approved methodology that will perform in non-equilibrium conditions such as storm water or diel pH cycling shall be used. The criteria for defining frequency for collection of individual parameters will be defined in the Surface Water Monitoring Plan.

No change = indicates no initial waiver of these standards. Contingent waiver values are expressed in the "Waived-to Standard" column.

diss. CF = dissolved conversion factor

total = total recoverable or unfiltered sample

Bold italic font indicates a waiver.

The ROD Amendment provides for contingent waivers of aluminum, arsenic, cadmium, copper, lead, mercury, silver, and zinc during acute, wet-weather conditions and chronic, normal flow conditions only if noncompliance with the DEQ-7 standards is demonstrated after construction of the technically practicable remedial elements. DEQ concurs with such waivers based on the technical impracticability of meeting the State standards for all contaminants during all flow conditions,

Status of Implementation

Response actions at the BPSOU began in 1987. They have included removal or capping of waste rock dumps, rail beds and tailings piles. Other actions included extensive revegetation, yard soil/attic dust removals, reclamation of the Syndicate Pit, initial stormwater controls, construction/operation of groundwater capture systems in the Silver Bow Creek drainage above its confluence with Blacktail Creek and LAO area, and construction/operation of a water treatment facility at Butte Treatment Lagoons.[10] A brief description of the implemented remedies is provided below. All work was conducted under the 2011 Unilateral Administrative Order (UAO) and predecessor orders. Additional remedial work is planned as part of the 2020 ROD Amendment. The UAO was updated in 2020 specific to RMAP work and became effective on November 16, 2020. Contaminated soil from source removal activities is disposed of at the Butte Mine Waste Repository (Figure 6-1).

Solid Media – Residential

The EPA and MDEQ approved the BSB RMAP in 2010. The RMAP requires a multi-pathway approach to address arsenic, lead and mercury above action levels in yard soil, indoor dust (living space and direct exposure to non-living space dust), interior and/or exterior lead paint, and lead solder in household drinking water pipes. The RMAP boundary was expanded in the 2020 ROD Amendment to include rural residential properties outside the BPSOU boundary to the north, south and west. Work in the expanded area will include all RMAP facets (soils, living area dust, lead-based paint and attic dust). The EPA will implement the RMAP expansion by UAO, which will be updated accordingly.

Major components of the RMAP include:

- Homes adjacent to the BPSOU that have lead, arsenic or mercury in attic dust will also be addressed in the same manner as homes within the BPSOU (the RMAP defines the area for which attics with elevated levels will be addressed in Appendix A of the RMAP; the area is known as the Residential Metals Expanded Area).
- Properties whose owners refuse access, properties without current exposure pathways and vacant properties will be flagged and tracked in the RMAP database for future actions.
- The RMAP requires developing and implementing community awareness and educational programs in conjunction with a medical monitoring program.

The RMAP completed 1,602 abatement projects and sampled 3,796 residential parcels as of December 31, 2020.

Ongoing residential contamination remediation activities include:

- RMAP assessments.
- RMAP cleanups, including attic dust.
- Community outreach and education.
- Health studies and medical monitoring.
- Long-term tracking methods (database).

[10] A state of Montana District Court decision known as Silver Bow Creek Headwaters Coalition v. State of Montana, DV-10-431 (August 17, 2015) declared that the surface area between Texas Avenue in Butte to the confluence of Blacktail Creek with Silver Bow Creek was named "Silver Bow Creek." This area will be referred to as Silver Bow Creek above its confluence with Blacktail Creek. The EPA has called the surface area from Texas Avenue to the confluence with Blacktail Creek the "Metro Storm Drain" in prior Superfund removal and remedial documents and publications, including the 2006 BPSOU ROD.

This FYR reviewed the RMAP Construction Completion Reports and the Data Summary Reports and it appears that mercury is not currently analyzed in yard soil. While mercury is being analyzed for in indoor dust and basement soil samples, the basis of the analysis method is unclear. It appears mercury results are based on XRF; however, no information has been provided to correlate XRF to laboratory methods, nor has there been any discussion of mercury data validation. Residential yard soil, attic, and basement abatements are conducted when soil concentrations of lead and arsenic exceed action levels. The reason for the exclusion of mercury from yard sampling is unclear.

To date, two public health studies examining the effectiveness of the RMAP have been completed. The Phase 1 medical monitoring study evaluated blood lead levels from 2003 through 2010 and was summarized in the 2016 FYR Report. The Phase 2 Report focused on blood lead data collected from Butte children from 2012 through 2017. The BPSOU Data Review section of this FYR Report discusses the results of the Phase 2 Report.

Solid Media – Non-Residential

A full list of the contaminated non-residential areas addressed through removals and caps/revegetation was provided in the 2016 FYR Report. The BRES program, including the development of schedules and corrective action plans, continues to be implemented by the PRPs. The 2006 BRES implementation plans will be revised to incorporate optimization techniques, new technologies and lessons learned from implementing the BRES procedures and is pending EPA approval. The revised BRES implementation plans, when approved, will be an element of the Solid Media Management Program, and will be attached to the Solid Media Management Plan to be submitted by the Settling Defendants for EPA review and approval in accordance with the updated Statement of Work under the 2020 Consent Decree.

The BRES evaluations performed by BSB evaluate site cover conditions, erosion conditions, site edge conditions, and the presence of exposed waste, barren areas and existing vegetation. BRES evaluations are conducted by BSB on an ongoing basis, and the current BSB evaluation team is responsive when cap integrity has been compromised. Poor vegetation conditions at sites are being identified, and actions are being taken to improve these conditions through vegetation/reclamation improvement plans.

In addition, several insufficiently reclaimed or under-reclaimed sites are specifically described in Attachment C to the Statement of Work attached to the 2020 Consent Decree. These will be evaluated and capped and revegetated appropriately in accordance with the terms of that Statement of Work. Some sites (usually some of the earliest that were reclaimed under non-Superfund authority) will have to be evaluated under the Solid Media Management Plan. Potentially, reclamation will have to occur again.

Groundwater

The groundwater remedy consists of two capture systems that function to intercept groundwater prior to discharging to Silver Bow Creek. The first capture system is the BPSOU subdrain (subdrain) (previously referred to as the Metro Storm Drain (MSD) Subdrain). The storm drain is a manmade surface water conveyance channel originally constructed in the 1930s. Starting in 2003, the subdrain was installed and the entire storm drain channel was reconstructed and lined to separate contaminated groundwater from surface water. The contaminated groundwater captured by the subdrain system is routed to the Butte Treatment Lagoons for treatment. The second capture system is the Lower Area One (LAO) capture system that parallels Silver Bow Creek, as shown in Figure 6-2. The LAO groundwater capture-and-treatment system suppresses the groundwater table such that a positive gradient (i.e., away from Silver Bow Creek) is maintained to the north of Silver Bow Creek, limiting the potential of groundwater entering Silver Bow Creek. The eastern extent of the LAO capture system consists of an unlined ditch, about 1,500 feet in length, along the southern boundary of the Butte Reduction Works (BRW)-00 Pond. Base flow due to groundwater capture is observed on a continuous basis in the BRW-00 Pond. Groundwater captured in the BRW-00 Pond is gravity-fed to the Butte Treatment Lagoons for lime treatment. Both the LAO and BPSOU capture-and-interception systems will be thoroughly evaluated and improved as needed under the 2020 Consent Decree Statement of Work.

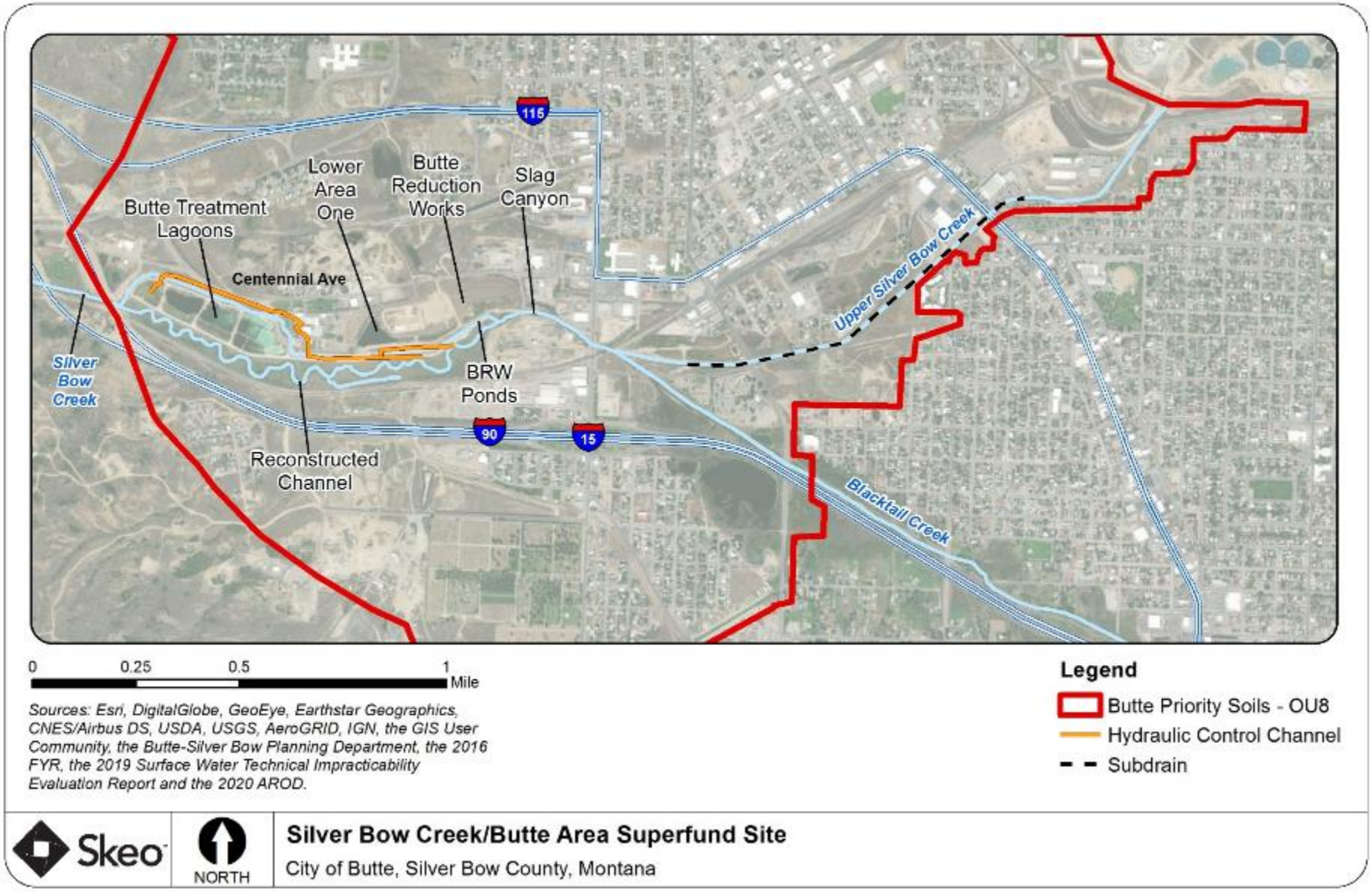
The interim groundwater monitoring plan has been updated annually and was converted to a Quality Assurance Project Plan (QAPP) format in 2019. The agencies are still reviewing the 2019 QAPP, which will include an update on the POC wells used to assess compliance outside the TI boundary.

Surface Water/Stormwater

Surface water cleanup work and wet weather control cleanup work was done under Superfund removal authorities pre-ROD. This work included the removal of substantial portions of the Colorado Tailings and Butte Reduction Works tailings in the LAO removal action, and the construction of catch basins in the Missoula Gulch area, as well as controls on railroad facility runoff. Surface water monitoring is occurring under a draft Interim Surface Water Monitoring Plan.

Since 2009, the PRPs have implemented three cycles of upfront stormwater control BMPs to mitigate contaminated stormwater runoff. These actions included the reclamation and revegetation of areas identified as contamination contributors to stormwater runoff, initiation of stormwater system sediment cleanout activities on a periodic basis, the expansion and improvement of existing catch basins and the initiation of a curb and gutter program. These implemented stormwater controls are now being monitoring and maintained under their respective O&M plans. The agencies and Settling Defendants have developed nine new remedial elements – five of which will address or control stormwater - and the implementation of these elements will be the fourth and final cycle, as described in the Statement of Work under the 2020 Consent Decree.

Figure 6-2: BPSOU Detailed Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Institutional Control (IC) Review

Atlantic Richfield and BSB finalized the BPSOU Institutional Control Implementation and Assurance Plan in October 2019 and it is included as Appendix E to the 2020 Consent Decree. As required by the decision documents for the BPSOU, all required institutional controls have been implemented as follows:

- Growth Policy/Zoning Ordinance: The 2008 Growth Policy includes zoning requirements that limit allowable land use and types of development to those that are consistent and compatible with the remedy.
- Controlled Groundwater Area: Two controlled groundwater areas established by DNRC in 2009 include areas of the BPSOU (Figure 6-3).
- Private Well Monitoring Program: MBMG's Private Well Monitoring Program (BMFOU and BPSOU) QAPP was approved in August 2020. The primary goal of the sampling is to obtain COC concentration data for groundwater from private wells within the Butte Alluvial and Bedrock Controlled Groundwater Areas. Wells were identified through a search of the MBMG GWIC that included a quarter-mile buffer zone around the Butte Alluvial and Bedrock Controlled Groundwater Areas; 108 wells were determined to meet the program requirement.
- Hook-up Ordinance: Ordinance Number 13.20.210 requires all prospective potable water users to connect to the BSB water system where municipal service is available, i.e., within 300 feet of an existing water main.
- Excavation Ordinance: In 2013, BSB passed an ordinance (number 13-6, 9-7-2013) that outlines the procedures for the enforcement of the 2009 Excavation and Dirt-Moving Protocols for all earthmoving to be performed in and near the Butte-area Superfund sites. Its purpose is to ensure contaminated soils disturbed during excavation or dirt moving activities do not migrate onto clean property, are not exported to any location except the Mine Waste Repository and are properly capped.
- Stormwater Management Ordinance: In 2011, BSB passed an ordinance (number 10-13, 4-20-2011) that outlines the procedures, protocols and requirements for implementing and enforcing effective stormwater management within the BPSOU. It is located in Chapter 32 (Stormwater Management) of the BSB municipal codes.
- Restrictive Covenants: Presently in place where response actions have or will occur, including properties identified as source areas (collectively, referred to as "Source Area Properties") and other real property where stormwater conveyance and management structures (collectively referred to as "Superfund Stormwater Structure Properties") are present.
- RMAP Access Agreements: As part of the RMAP, BSB obtains access rights and covenants on properties within the BPSOU on which BSB has performed actions under RMAP and will continue to seek access rights and covenants on properties on which it performs actions in the future. When access is denied, BSB will track the attempt to gain access of the property for environmental assessment within the RMAP database. After three unsuccessful attempts are made, the EPA and MDEQ will be notified. On a case-by-case basis, the EPA and/or MDEQ may notify the property owner that a notice corresponding to the title records of the subject property could be recorded. Future changes in ownership will be monitored annually; if ownership changes, access attempts will be reinstituted. The tracking process just came into effect in November 2020. Previously BSB has notified the EPA and MDEQ on several occasions and the agencies have met with landowners, which proved to be productive.

BSB maintains a GIS system that stores information and runs applications pertinent to ensuring institutional controls are implemented and maintained. The Community Protective Measures Program is the primary tool for providing risk education to the community. The Community Protective Measures Program provides a range of information to enhance and maintain the Butte community's awareness of potential sources of and risks from arsenic, lead and mercury in and around homes and commercial properties, as well as approaches residents can take to avoid exposures. The educational components include the distribution of educational materials to local contractors (e.g., electricians, roofers, carpenters), hardware/lumber suppliers, childcare facilities/programs (e.g.,

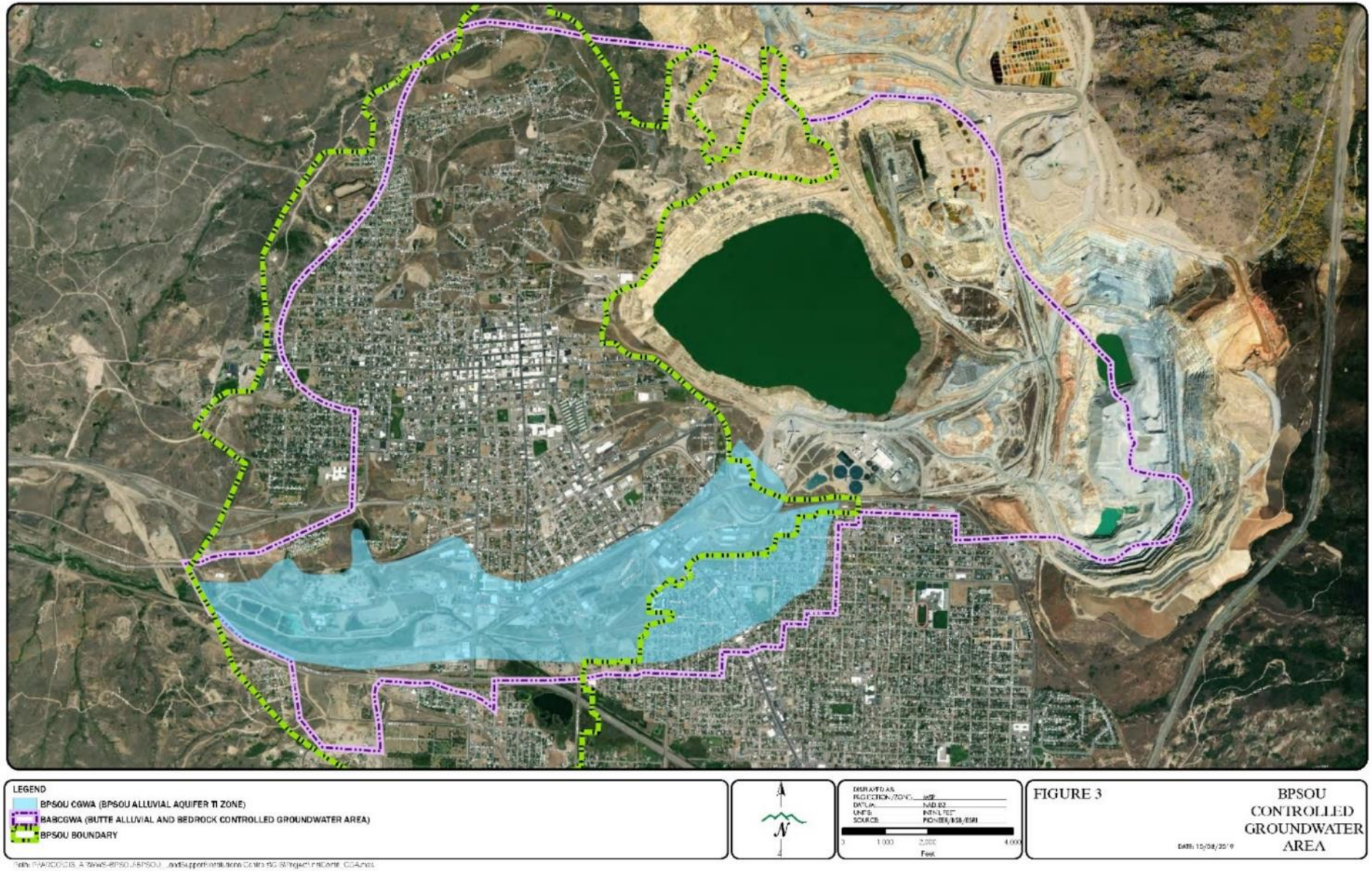
Head Start), and housing authorities (e.g., Human Resource Council). Informative presentations are also available for real estate agents and landlords.

Periodic mailings to property owners and public service announcements aired by the local television station are designed to provide public awareness. Additional outreach relies on the medical community, particularly pediatricians and the Women, Infants and Children (WIC) program to inform the public about risk, health monitoring and RMAP activities. Representatives from RMAP participate in community health fairs and family fairs to provide outreach to the community. See Table 6-6 for a summary of the institutional controls in place at the BPSOU.

Table 6-6: BPSOU Summary of Planned and/or Implemented Institutional Controls (ICs)

Media, Engineered Controls, and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Solid media	Yes	Yes	BPSOU	Protect remedy components associated with areas where waste was left in place. Educate residents regarding the RMAP program and risks associated with residential contamination.	BSB earth-moving ordinance, restrictive covenants, zoning ordinances, community awareness and education, Butte-Silver Bow County database/GIS tracking system (2013).
Groundwater	Yes	Yes	BPSOU and BMFOU	Restrict all new appropriation of groundwater. Ensure that existing wells are part of an education and abandonment program.	Butte Alluvial and Bedrock Controlled Groundwater Areas, 2009 BSB also enacted a “hook-up” ordinance.
Surface and stormwater	Yes	Yes	BPSOU	Ensure protocols and requirements are implemented and enforced to ensure effective stormwater management. Ensure BSB has perpetual access to inspect and maintain water conveyance structures and enact penalties for anyone damaging these structures.	Stormwater management ordinance (2011).

Figure 6-3: BPSOU Controlled Groundwater Area



Source: 2019 BPSOU Institutional Control Implementation and Assurance Plan

Systems Operations/O&M
The BPSOU is still in the remedy implementation phase, with routine O&M activities for certain components (Butte Treatment Lagoon System, existing stormwater projects and non-residential soil remedial projects). O&M activities are summarized below.

Soil Remedy

Non-Residential (BRES)

The BPSOU consists of 178 reclaimed sites, each requiring evaluation once every four years. Prior to 2012, the sites had been evaluated on varying schedules resulting in incomplete evaluations and a backlog of maintenance obligations. In 2012, BSB divided the sites into four quadrants and distributed a quarter of the reclaimed area to each quadrant to streamline the evaluation schedule and ensure maintenance follows the BRES methodology. In 2014, BSB created a database and GIS to better facilitate data entry and data tracking.

The BRES evaluations are summarized in annual summary reports. The proposed corrective actions are provided in the annual corrective action plan reports. This FYR period covers all four quadrants, which have now all been evaluated twice in accordance with the current methodology.

The BRES field evaluation includes performance standards and methodology to conduct evaluations measuring stability, integrity and degree of human and environmental protectiveness. Sites or particular issues on sites that do not meet or are in imminent danger of not meeting BPSOU performance standards are identified as "trigger items." Trigger items are those specific and particular conditions at a site that "trigger" corrective action and/or increased monitoring/evaluation to ensure the sites are appropriately maintained to meet or exceed protectiveness of human and environmental health. The following field parameters are monitored at each site:

- Vegetation (% Live Cover): Refers to the percentage of ground surface covered by plant growth. A live cover estimate of 0% to 20% triggers an action. Undesirable or noxious weeds are only allowed to account for 5% of total live cover or 0% adjusted live cover.
    - 0% to 20%: This category triggers a Vegetation Improvement (VI) or a Reclamation Improvement (RI) on the site. VI and RI plans are required to be implemented within the calendar year they are developed. Generally, if VI is implemented and the site again falls into this low category during its next evaluation (four years later), a more detailed and comprehensive RI Plan is required.
    - 21% to 40%: if more than 10% of the site is covered by noxious weeds, a VI Plan must be developed and implemented. If less than 10% of the site is covered by noxious weeds, the site falls into the monitoring category and undergoes a regularly scheduled evaluation in four years.
    - 41% to 100%: A site is in the monitoring category and undergoes a regularly scheduled evaluation in four years' time.
- Erosion: Scores are based on a modified version of the Bureau of Land Management Erosion Classification System. An erosion score of 55 or greater requires an engineering assessment and corrective action.
- Other trigger items: Site edges (areas located along the sides and just outside the site), exposed waste, subsidence, barren areas and gullies, all of which require corrective action, with the exception of site edges and gullies that are stable/not actively eroding.

In 2016, BRES evaluations took place in Quadrant 1, which consists of 28 sites, 123.6 acres and is in the northeast section of the BPSOU. The results of the 2016 BRES evaluations are summarized in the 2016 Summary Report. Trigger items were present at all sites. Due to poor vegetative cover and/or high percentage of noxious weeds, VI plans are required at 11 sites and RI plans are required at four sites. Due to erosion issues, including gullies, barren areas and exposed waste, engineering assessments are required with a Corrective Action Plan implemented based on the results at seven sites.

In 2017, BRES Evaluations took place in Quadrant 2 of the BPSOU. Quadrant 2 consists of 100.28 acres and 50 sites. The area was last evaluated in spring 2013. This evaluation is the second time the quadrant has been evaluated since 2012, at which time each site was assigned to a quadrant. The results of the 2017 BRES evaluations are summarized in the 2017 Summary Report. Trigger items were present at 43 sites. Twelve sites required VI plans and two sites required RI plans. An engineering assessment is required at one site.

In 2018, 78 sites in Quadrant 3 (134.4 acres) were evaluated. Fourteen sites were not evaluated because they are on the Insufficiently Reclaimed or Unreclaimed Site lists. Ten sites have engineered caps and are not evaluated for vegetation or erosion. Of the sites evaluated, trigger items were present at 51 out of 54 sites. Fourteen sites require VI plans and 12 sites required RI Plans. Seven sites require engineering assessments.

In 2019, BRES evaluations took place in Quadrant 4 of the BPSOU. Quadrant 4 consists of 21 sites over 148.3 acres. Three sites were not evaluated: one site has an engineered cap, and two sites are on the Insufficiently Reclaimed or Unreclaimed Site lists. Trigger actions were present at all evaluated sites in Quadrant 4. Eight sites required VI plans and four sites required RI plans. None of the sites required an engineering assessment.

The results of the evaluations and the recommended action plans are tracked in a database managed by the City and County of Butte-Silver Bow. The database allows for more effective tracking of issues and historical patterns. Issues are addressed as they arise, and community needs are considered in ensuring that long-term O&M issues that are discovered are addressed sustainably. Currently, annual reports provide a summary of the results of the evaluation and the recommended action plan but there is no mention of the status of action plans already implemented within each quadrant. Increased reporting that covers the status of already implemented action plans will allow interested parties to identify the progress for corrective action plans and vegetation management plans.

Stormwater

The BPSOU contains the following stormwater system components:

- Superfund stormwater structures (SSWS).
- Stormwater infrastructure/engineered controls on reclaimed mine sites under the BRES program.
- Portions of the BSB municipal stormwater systems within the boundary of the BPSOU or directly related to the performance of a remedy component.

These components are inspected on a regular basis in accordance with the 2018 Interim O&M Plan. All components are identified within the plan as well as GIS databases. Each component has a specified inspection protocol and frequency.

Sediments collected in and removed from the stormwater systems within the BPSOU are transported to the Butte Reduction Works drying beds at the Butte Treatment Lagoons and final disposal at the BSB Mine Waste Repository. BSB staff perform the regular maintenance work on stormwater structures. For all SSWS and BRES sites with stormwater features, BSB is supposed to compile all information into an annual maintenance report; however, as of the preparation of this FYR report, an annual report has not been produced. For elements of the BSB municipal stormwater system, BSB will not prepare specific reports for agency review. Instead, BSB will document time and expenses for stormwater maintenance activities through its typical operations and accounting practices.

PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determination and statement from the previous FYR Report as well as the recommendations from the previous FYR Report and the status of those recommendations.

Table 6-7: BPSOU Protectiveness Determination/Statement from the 2016 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
8	Will be Protective	The remedy at BPSOU (OU 8) is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled.

Table 6-8: BPSOU Status of Recommendations from the 2016 FYR Report

Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Annual BRES reports were limited in their analysis and summary.	Provide a BRES annual report that is timely, has adequate tracking to maintain the caps, performs required O&M activities and meets the program schedule.	Completed	BRES reports submitted during this FYR period were timely and adequate tracking is provided in the database maintained by Butte-Silver Bow.	12/14/2016
Community members have information about site areas where damage from trespassing and stormwater occur without a centralized way to report this information.	Establish a means for community members to report illegal trespassing, significant stormwater damage and stormwater issues related to Superfund.	Addressed in Next FYR	BSB and its consultants continue to implement requirements of its Municipal Separate Storm Sewer System (MS4) permit. The MS4 program provides a mechanism for citizens to report alleged violations of State stormwater regulation. Specifically, BSB's stormwater management program website includes a web-based form and contact information to report observations of potential illicit discharges, construction project complaints or other violations of stormwater regulations. BSB will report on the monitoring and enforcement of the Stormwater Management Ordinance on a yearly basis, although this has not yet occurred.	N/A
The community involvement process highlighted that there is a fair amount of concern in the community regarding remedy implementation and maintenance at the BPSOU.	Provide a written response to issues raised by community members concerning the alluvial aquifer groundwater rate of flow, the stability of the contaminated plume in the alluvial aquifer, and the functioning of the subdrain capture system.	Completed	The 2020 ROD Amendment and Consent Decree summarize the results of several deliverables that address these concerns. Fact sheets have also been prepared and additional community outreach is planned and/or occurring and/or has happened pre- Consent Decree.	2/4/2020

FIVE-YEAR REVIEW PROCESS

Data Review

Data are collected throughout the BPSOU primarily by BSB and Atlantic Richfield. The data includes soil remedy data from the RMAP and BRES programs as well as other solid media remedial projects, surface water drainage and collection and water treatment at the Butte Treatment Lagoons in the LAO. This data review focuses on providing an overview of the activities associated with and data collected as part of the RMAP, data collected and evaluated in support of the updated surface water remedy in the 2020 ROD Amendment, and groundwater POC monitoring.

Residential (RMAP)

The Allocation Agreement between BSB and Atlantic Richfield provides the Butte-Silver Bow Health Department with funds to conduct soil abatements of residential yards in the BPSOU when soil lead concentrations exceed 1,200 mg/kg or soil arsenic concentrations exceed 250 mg/kg. Additionally, the agreement provides for a multi-pathway program to abate other hazards (attic dust, interior dust and paint) associated with lead, arsenic and mercury. The program also provides biological testing, education and community outreach.

Environmental assessments are performed to identify potential sources of lead, arsenic and mercury exposures. Environmental assessments consist of soil testing, attic dust testing, interior dust testing and X-ray fluorescence testing for lead-based paint. The residences where exposures are identified during the environmental assessment process are prioritized for abatement. Contaminated soils are removed and replaced with geotextile fabric, clean fill, topsoil and sod. Interior abatement involves paint stabilization and cleaning using the High Efficiency Particulate Air (HEPA) vacuum, wet wash and then HEPA vacuum technique again. Attic dust abatement consists of vacuuming out the contaminated dust using an industrial vacuum equipped with HEPA filtration.

During this FYR period, metals abatement activities were performed in 2016, 2017,2018, 2019 and 2020 (Table 6-9). The results were summarized in annual reports.

Table 6-9: BPSOU Residential Abatements and Assessments, 2016 to 2020

Year	Soil Abatements	Attic Abatements	Interior Dust Abatement	Paint Abatement	Total Abatements	Environmental Assessments
2016	30	96	0	0	126	240
2017	30	99	3	0	132	200
2018	29	88	6	1	124	219
2019	29	94	4	0	127	190
2020	28	92	4	0	124	198

Medical Monitoring

Blood lead screening is available to all residents of the City and County of Butte-Silver Bow. Testing is conducted by the Butte WIC program, which is located at the Butte-Silver Bow Health Department. In addition to blood testing, families are educated about potential exposures to lead, arsenic and mercury hazards in and around their homes. Environmental assessments are offered to all WIC clients and are expedited if potential exposures are identified during the interview process. When a child's blood tests high for lead, the RMAP prioritizes that home for immediate action if the yard or attic lead is elevated. RMAP also investigates and helps fix other potential lead sources including lead-based paint.

In 2006, the EPA required that the children's blood lead dataset, collected as part of RMAP, be used to study lead exposure to assess effectiveness of the RMAP. Every five years, a medical monitoring study is conducted to

assess the effectiveness of the RMAP.[11] The first study, Phase 1, was completed in 2015 and the results were discussed in the previous FYR. The health department completed a Phase 2 health study in March 2020. It evaluated Butte blood lead level records for about 2,330 children collected during 2012 to 2017. The Phase 2 study was conducted using data collected under the RMAP to evaluate trends in blood lead levels in children organized by neighborhood. The objective is to determine if there are trends that show whether levels have changed since the Phase 1 study and if there are differences in levels due to demographic or geographic variables. The results of the study are presented in terms of a variety of metrics, including age, gender, house age, neighborhood and season. The key findings were:

- Among infants less than 12 months old, 20 out of 373 individuals had blood lead levels above 5 µg/dL.
- Among children 12 to 60 months of age, 172 out of 2,330 individuals had blood lead levels above 5 µg/dL.
- Three of the 326 adults tested had blood lead levels greater than 5 µg/dL.
- Uptown neighborhoods continue to show higher percentages of samples greater than 5 µg/dL throughout the study period. This observation may be due to the age of the homes (pre-1940 and likely to have lead paint) as well as the extent of mining contamination in the Uptown area, both of which are being addressed through RMAP.
- In both Uptown and the Flats, the percentage of elevated blood level levels declined from the 2003-2010 period to the 2012-2017 period. During the 2003-2010 study period, 27.6% of Uptown blood lead levels exceeded 5 µg/dL, while 11.7% of the Flats blood lead levels exceeded 5 µg/dL. In the 2012-2017 study period, 15.2% of the Uptown blood lead levels exceeded 5 µg/dL, while 4.1% of the Flats blood lead levels exceeded 5 µg/dL.
- Blood lead levels are about 20% to 30% higher on average in the warmer half of the year. Seasonal variation can be attributed to increase in contact with soil as well as seasonal variation in lead in drinking water.
- The percentage of Butte children with blood level levels above 5 µg/dL has dropped dramatically over the time period evaluated in the first two health studies, with the rate of decline slowing as levels approach those found in children across the U.S. In Butte, this percentage decreased from 33% in 2003 to 5% in 2017.
- While the statistical analysis shows that blood lead levels have decreased significantly since 2002, there was no statistical difference in levels from 2012 when compared to levels in 2017. This indicates that the decrease is slowing down.
- The percentage of Butte children with elevated blood lead levels is higher than the average reported in the national survey of blood lead levels. The study cited several possible explanations including continued exposure to soil and lead paint not yet abated through RMAP and sample collection method. In Butte, blood is collected via finger prick; however, venous samples (collected via blood draw) usually provide a more reliable measurement.

The Phase 2 study included the following recommendations:

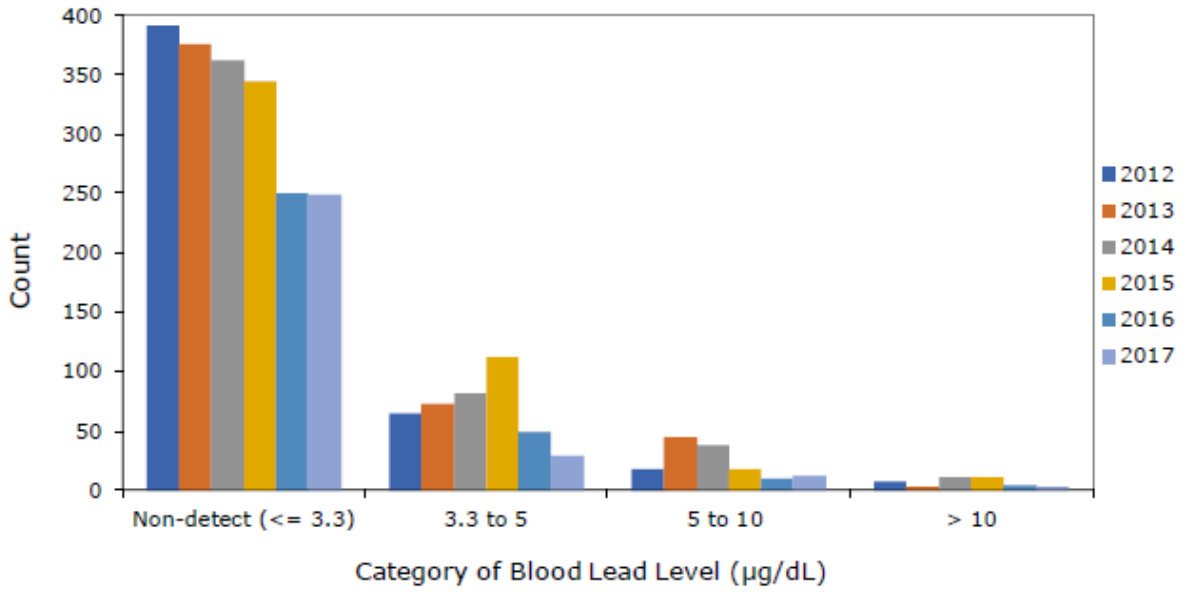
- RMAP Recommendations
    - Assess landlord participation rates and determine if additional outreach is needed.
    - Establish an environmental health clinician specializing in pediatrics to facilitate tracking and follow up for cases with elevated blood lead levels.
- Future Exposure/Biomonitoring Studies
    - Continue focus on lead biomonitoring.
    - Increased tracking and refined follow-up for individuals with elevated blood lead levels.

[11] Prior to 2013, the health department used the Centers for Disease Control and Prevention (CDC) recommended 10 micrograms per deciliter (µg/dL) as a blood lead "level of concern." Based on a review of several studies, the CDC revised this level to 5 µg/dL. The health department adopted the 5 µg/dL level in 2013 as part of the RMAP health studies as a risk management tool to identify children who might have elevated lead exposures so that actions could be taken to reduce such exposures.

    - Increased outreach to local pediatricians and clinics to augment the available blood lead data.
- Future Epidemiology/Disease Studies
    - Continue periodic updates of cancer incidence and mortality in BSB versus state and national rates.
    - Review community health needs assessments to determine the prevalence of major diseases that are continuing community concerns.
- Public Outreach
    - The EPA and PRPs (Atlantic Richfield and BSB) should supplement public meetings and flyers with local news media and social media communication as well as more proactively engaging members of the public.

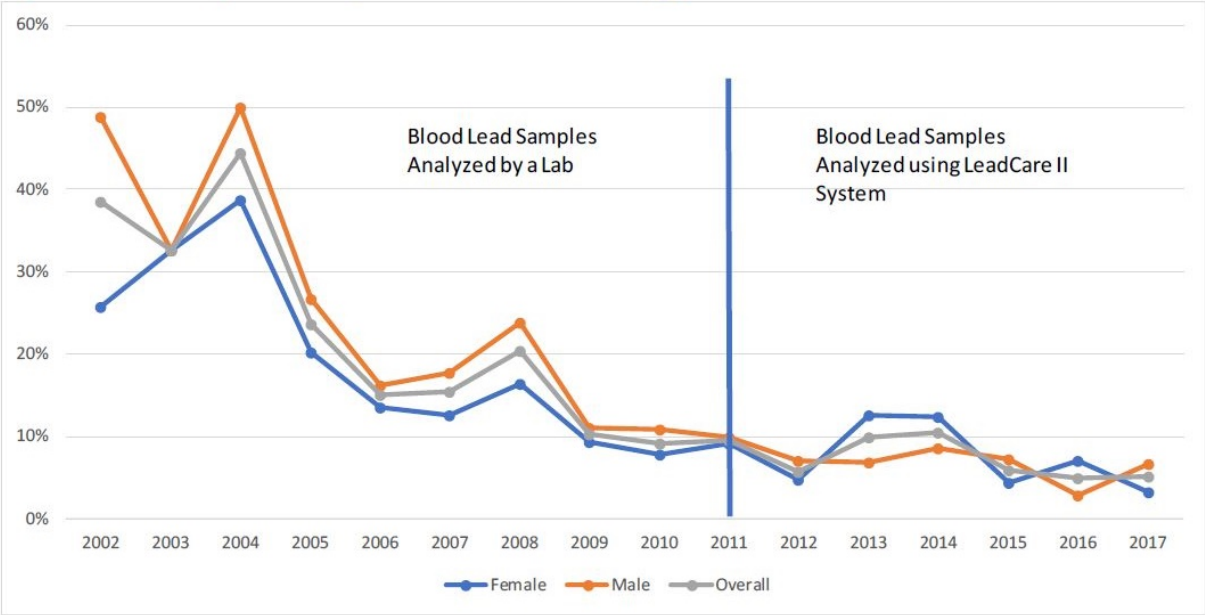
Figure 6-4 summarizes the distribution of blood lead levels in children between 2012 and 2017. Data used to prepare Figure 6-4 and provided in the Phase 2 study, shows that 70% to 85% of the blood lead samples were non-detects (less than the level of detection of 3.3 µg/dL). This is consistent with the previous FYR, where declines in blood lead levels were observed. When evaluating the entire database of over 5,000 records (2002 to 2017), the reported statistics show that the percentage of samples above the level of detection (3.3 µg/dL) or reference value (5 µg/dL) are decreasing over time (Figure 6-5). Since there still remains a small percentage of children with blood lead levels above the reference value, the health department concluded that the RMAP has been an important community-wide mechanism for identifying and reducing lead exposures and that the RMAP should be continued.

Figure 6-4: BPSOU Overall Distribution by Years of Blood Lead Levels for Children 12 Months to 60+ Months Old



Source: Second Butte RMAP Medical Monitoring Study (Phase 2) Report. March 2020.

Figure 6-5: BPSOU Trend in Percentage of Children 12 Months to 60+ Months Old with Blood Lead Levels Above 5 µg/dL



Note: Figure 21 shows that the percentage of children with BLLs greater than 5 µg/dL declined more in the earlier period (2002 to 2011) than it did in the more recent phase (2012 to 2017). Note that the earlier samples were analyzed in a laboratory, whereas after 2011 the samples were analyzed using the LeadCare II system, which provides a more immediate result but has a higher LOD than the laboratory results (3.3 µg/dL vs. 0.1 µg/dL).

Source: Second Butte RMAP Medical Monitoring Study (Phase 2) Report. March 2020.
LOD = Level of detection

Groundwater/Surface Water Interaction

The surface water and groundwater remedies at the BPSOU are designed to capture contaminated groundwater and prevent its discharge to surface water. The groundwater remedy is not intended or anticipated to clean up groundwater. Two groundwater captures systems (BPSOU subdrain and the LAO capture system) and design elements ensure that groundwater is not discharging to Silver Bow Creek.

Between these two capture systems, and upstream of the reconstructed Silver Bow Creek floodplain, is an approximately 3,000-foot-long segment of Blacktail Creek/Silver Bow Creek, or a gap, in which alluvial groundwater is not captured. Loading studies to estimate groundwater inflow in the gap zone have been inconclusive due to uncertainties in flow measurements (i.e., changes in surface water flow rates are within the measurement error of the stream gauging method). The abundant surface water monitoring data show slight increases in concentrations of COCs in specific areas under certain conditions.

In 2018, the EPA and MDEQ finalized the Groundwater and Surface Water Interaction Report for the BPSOU. This report incorporates the results of numerous previous investigations as well as routine surface water, sediment and groundwater monitoring and a 2016 pore water investigation. This report formed the basis for the updated remedy selection in the 2020 ROD Amendment. A summary of the conclusions presented in the report is as follows:

- Contaminated groundwater appears to be discharging into Silver Bow Creek and Blacktail Creek based on several findings:

    - Positive pore water heads, which indicate transport from groundwater to surface water is possible, were observed in most areas during sampling events in 2016, including upstream, in Slag Canyon and in Butte Reduction Works reaches.
    - The dissolved and total recoverable COC concentrations observed and the seasonal trends in COC concentrations in surface water cannot be adequately explained without a groundwater component.
    - Pore water COC concentrations in all of the areas except for the confluence, while not similar to groundwater, are most easily explained by a local groundwater source once geochemical mechanisms are considered.
    - Vertical gradients show that groundwater gradients are upward in the Slag Canyon area and paired wells close to the streams respond to changes in the surface water stage, indicating groundwater and surface water are in communication. Additionally, wells BPS11-05A1/BPS11-05A2 and BPS07-13A/BPS07-13B indicate an upward gradient on the southside of the streams.
- In general, pore water concentrations are not similar in concentration to nearby groundwater. However, pore water COC concentrations were relatively higher in areas with higher groundwater concentrations.
- The results of the evaluations show that for copper, arsenic and zinc (and likely cadmium), groundwater flow from streamside wastes is a primary source of COCs to surface water. The contaminated groundwater forms either zinc-bearing calcite in the surface water or poorly crystalline sulfides in the pore water, contaminating sediments.
- Dissolved copper and arsenic concentrations tend to be higher under normal high-flow conditions, relative to base flow, whereas the reverse is true for zinc due to different geochemical mechanisms acting on zinc compared to copper and arsenic.
- Non-winter zinc spikes occur when groundwater levels increase during a normal high flow event and lower pH groundwater flows into surface water, lowering the pH and dissolving zinc-bearing calcite in shallow sediments and surface water.
- Typically, under base flow conditions where surface water flows are relatively low, sediment is not suspended such that most of the COC concentrations measured in surface water should be dissolved. However, for copper, total recoverable concentrations at base flow are significantly higher than the dissolved concentrations.
- Total recoverable zinc concentrations are also higher than dissolved under both normal high flow and base flow conditions at all stations except for SS-01.

Alluvial Groundwater Point of Compliance Monitoring

The Alluvial Aquifer Technical Impracticability Zone was established in the BPSOU ROD. Since 2007, additional wells have been drilled to better define the perimeter boundary. During this FYR period, perimeter monitoring wells, or POC wells, have been refined. There are currently 14 POC wells. In the most recent monitoring events in 2019, there were no exceedances of the groundwater cleanup goals. Under the updated Statement of Work, additional refinement is planned for the POC wells and perimeter monitoring.

Groundwater (Butte Treatment Lagoons, including BPSOU Subdrain and LAO)

Atlantic Richfield conducts maintenance and monitoring tasks in accordance with the 2016 Draft Final Butte Treatment Lagoon Groundwater Treatment System Routine Operations, Maintenance and Monitoring Plan. Reports are submitted quarterly and annually to the EPA.

Operations

The system is generally operated in auto mode. About 678 million gallons of water were pumped into the Butte Treatment Lagoons via the influent pump station (measured at INF-04) in 2019. Between 2016 and 2019, total influent volumes ranged from 606 million gallons in 2016 to 678 million gallons in 2019. Average daily flow ranged from 899 to 1,804 gallons per minute (gpm). Lime usage ranged from 285 tons in 2016 to 343 tons in 2018. Effluent water from the Butte Treatment Lagoons was monitored using the electromagnetic flow meter

installed in the effluent discharge line. In 2019, about 595 million gallons of treated effluent water were discharged to Silver Bow Creek via the effluent discharge at EFS-07. Between 2016 and 2019, total effluent volumes ranged from 491 million gallons in 2016 to 613 million gallons in 2018.

During this FYR period, only three exceedances of the pH target were recorded. The target pH for effluent discharge is 9.5 standard units (SU). All were recorded in 2016. In response to these exceedances, which were attributed to the lagoons freezing in cold weather, a permanent carbon dioxide addition system was installed to limit the increase in pH at the effluent monitoring station. The system consists of one 1,000-pound carbon dioxide storage tank complete with pressure gauge, regulator, internal vaporizing/pressure-building unit and interconnecting tubing, a carbon dioxide unloading station and fill box near the Automatic Sampling Building, and a carbon dioxide discharge hosing and gas diffuser. Addition of carbon dioxide at this location began in November 2017.

The subdrain pumps were generally operated in auto mode to maintain a constant vault level during most of the year. In 2019, about 252 million gallons were pumped from the subdrain into the Butte Treatment Lagoon system, with an average flow of 477 gpm. The 2019 volume and flow rate were consistent during this FYR period. The West Camp pump station pumped about 112 million gallons of water into the lagoon system, with an average flow rate of 213 gpm in 2019, consistent with annual volume and average flow rate in 2016 through 2018.

Maintenance

System maintenance during this FYR period included sludge removal activities completed biannually in the fall and spring. In 2019, about 2,600 cubic yards of dried sludge were removed from the drying bed in the Butte Reduction Works area to the Mine Waste Repository. In accordance with standard operating procedures, subdrain jetting and pigging activities as well as video inspections are conducted biannually.

Visual inspection of the Butte Treatment Lagoon system is conducted quarterly. Routine maintenance activities are conducted on a regular basis based on the inspections. Vegetation maintenance activities are also conducted as needed to address minor erosion from construction activities. Weed spraying for knapweed also occurs in the summer months.

Monitoring

Effluent water samples are collected twice weekly at the Butte Treatment Lagoon effluent sampling station EFS-07 (SS-1). Influent waters are sampled weekly at the influent pump station INF-04 (SS-2). Field grab samples are collected monthly at station MSD-HCC (SS-3), where the collected subdrain flow discharges to the upper Hydraulic Control Channel. Samples are analyzed for total recoverable metals (aluminum, arsenic, cadmium, calcium, copper, iron, lead, magnesium, mercury, silver, uranium and zinc) and hardness. Also, alkalinity, total dissolved solids, total suspended solids, and nitrates/nitrites are measured monthly at influent station INF-04 (SS-2), effluent station EFS-07 (SS-1) and MSD-HCC station (SS-3). Field parameters are collected daily at many points in the system. Real-time data are collected by an automated monitoring system. Analytical results are compared to the standards in the 2006 ROD.

With the exception of the results shown below, there were no exceedances of the water quality standards in the Butte Treatment Lagoons effluent during this FYR period (Table 6-10).

Table 6-10: BPSOU Effluent Water Quality Standard Exceedances

Year	COC	Water Quality Standard	Number of samples; maximum concentration
2017	Mercury	0.00005 mg/L	2 samples; 0.000062 mg/L
2018	Cadmium	0.00076 mg/L	1 sample; 0.00082 mg/L
2019	Cadmium	0.00076 mg/L	4 samples; 0.00099 mg/L
Source: Annual O&M reports			

During this FYR period, the Butte Treatment Lagoon system performed effectively through the reporting period and operators continue to optimize treatment.

Site Inspection

The site inspection took place on 9/15/2020. Participants included EPA RPM Nikia Green and Treat Suomi from EPA FYR Support contractor Skeo. The purpose of the inspection was to assess the protectiveness of the remedy.

Site inspection participants met at Silver Bow Creek and the BPSOU Subdrain area. Participants observed the ongoing work at Parrot Tailings (conducted by the Montana Natural Resource Damage Program) and observed the county buildings that will be removed during the implementation of state of Montana's waste removal project at Parrot Tailings. Participants then observed Northside Tailings and Blacktail Creek. From there, participants met with Dave Griffis from Atlantic Richfield and Brad Hollamon from Pioneer. Participants observed the Butte Reduction Works, the Butte Treatment Lagoons and the LAO. Dredging was occurring at the Butte Treatment Lagoons during the site inspection.

Participants then observed the ballfield on Copper Mountain. This area included a Resource Conservation and Recovery Act (RCRA) cap, but the groundwater beneath the area is part of the BPSOU. Seeps have been observed beyond the fence on the ballfields. The EPA plans to require Atlantic Richfield to investigate and characterize groundwater in this area. A draft SOW has been developed and will be finalized and implemented in 2021. Participants then met with Eric Hassler from BSB and observed several BRES sites, including Grove Gulch, Rising Star East and West, Amy and Goldsmiths sites, and other sites in Walkerville. Examples of the positive effects of updates and improvements in the BRES program were evident throughout many of the sites visited.

Participants discussed the stormwater BMPs implemented throughout the BPSOU and observed those BMPs that have been implemented at BRES sites. See Appendices F and G for the inspection checklist and photos, respectively.

TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

The remedy is expected to function as intended by the decision documents when it is completed. In the interim, the RMAP program, BRES, institutional controls, and ongoing monitoring and remedial activities ensure that unacceptable human health risks are being controlled.

The capture systems and the Butte Treatment Lagoons have generally attained effluent standards for the treated water released into Silver Bow Creek. Technical evaluations and data analyses during this FYR period were conducted to support the development of the 2020 ROD Amendment. The results indicated that there are remaining uncontrolled sources of contamination that have the potential to contribute to surface water contamination within the BPSOU. The upcoming remedial actions will address these uncontrolled sources, ensuring the remedy will be protective of the environment.

The Institutional Control Implementation and Assurance Plan was finalized in 2019. It provides a summary of all implemented institutional controls in place at the BPSOU and establishes monitoring plans. BSB developed a GIS-based program to track institutional controls in the BPSOU. Institutional control monitoring occurs during routine inspection and maintenance activities. There were no indications during the FYR process that institutional controls are not being implemented. Additional community outreach has occurred during this FYR period and will continue.

RMAP implementation continues to remove contaminated soil, dust and other material from residential properties across Butte and remains on schedule for timely completion. However, mercury is not currently analyzed in residential yard soil samples and the type of mercury analysis being performed for attic dust and basement soil is unclear. Abatements in yards, attics, and basements are based on arsenic and lead. The 2006 ROD specifies an action level for mercury and mercury sampling is required under the RMAP. BSB should provide justification for excluding mercury analysis from yard sampling and specify the analytical methods being used to evaluate mercury in attic dust and basement soil. If XRF is being used for mercury analysis, justification of the validity of these results is needed (i.e., correlation to laboratory results should be demonstrated and results must be validated). If justification cannot be provided, the RMAP quality assurance project plan should be revised to incorporate appropriate mercury sampling and analysis methods.

The number of blood lead test results greater than 9.9 µg/dL decreased significantly from 1990 to 2012. While medical monitoring continues to show improvements, the rate of decrease in blood lead levels is declining. The Phase 2 monitoring report made several recommendations for implementation of Phase 3, including landlord participation assessments, increased tracking and follow-up for individuals with elevated blood lead levels, and increased public outreach. These recommendations should be implemented to ensure that the RMAP program continues to improve blood lead levels in Butte. The expansion of the RMAP program to those outside of the BPSOU boundaries who request site sampling and remediation should further improve the protectiveness of this part of the remedy.

The BRES program continues to operate and BSB is monitoring, tracking and implementing corrective action plans appropriately. Progress is tracked using GIS. Annual reports currently only cover the inspection activities and corrective actions needed but do not include the actions that have been ongoing from the previous year's report. These actions are tracked in monthly reports. While there is no indication that the corrective actions are not occurring, more effective reporting will allow interested parties to identify the progress for corrective action plans and vegetation management plans. In addition, the 2020 ROD Amendment includes additional remediation and soil management for cleanup under the BRES program.

Stormwater structures and engineered controls are inspected on a regular basis in accordance with the 2018 Interim O&M Plan. All components are identified within the plan as well as GIS databases. For all SSWS and BRES sites with stormwater features, BSB is supposed to compile all information into an annual maintenance report; however, as of the preparation of this FYR report, an annual report has not been produced.

Overall, community members expressed satisfaction with cleanup activities in the BPSOU and believe that work done to date in Butte has vastly improved quality of life for Butte's citizens and has improved people's health and livelihoods. There were concerns about the long-term maintenance and monitoring of remediated areas and whether these areas will be monitored in perpetuity. Concerns were raised with landlord participation in the RMAP and air monitoring at the Mine Repository; however, community members agreed the RMAP was overall effective and that the repository was in a good location. Community members were very excited and pleased with the expansion of and improvements to the RMAP program agreed to in the 2020 BPSOU Consent Decree. EPA will be working with community members and considering their suggestions to help ensure that effective outreach occurs during the expansion of the program.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Overall, while toxicity values and risk assessment methods have changed since the 2006 ROD, these changes were reviewed during this FYR period and cleanup goals remain valid for solid media and groundwater.

This FYR conducted a thorough evaluation of solid media and dust cleanup goals and this is included in Appendix H. Based on this evaluation, soil action levels remain valid for lead, arsenic and mercury. For lead in soil, the EPA's Office of Solid Waste and Emergency Response Directives 9355.4-12 (EPA, 1994) and 9200.4-27P (EPA, 1998), were identified as federal chemical-specific To Be Considered guidance documents. However, since 1994 and 1998 when those documents were issued, increasing evidence has shown that blood lead levels below 10 µg/dL may also have negative health impacts. Because of this, the agencies will look at the cleanup levels used at this site and determine if any additional work needs to be done.

There is a TI waiver for alluvial groundwater. However, groundwater cleanup goals were established for areas outside the TI zone based on DEQ-7 standards, which are equivalent to MCLs. These cleanup goals remain valid.

The 2020 ROD Amendment reviewed all 2006 ROD instream acute and chronic performance standards and revised these standards for some surface water COCs. The standards are based on flow regimes (base flow/normal high flow and wet weather). Some of these standards have been waived or could be waived in the future, to protective federal water quality criteria. All surface water performance standards remain valid.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

While the following observations do not affect protectiveness, the EPA has received persistent public comments and community responses pertaining to several issues including the restoration of Silver Bow Creek above the confluence of Blacktail Creek, differences in lead soil cleanup goals between Montana Superfund Sites, contaminated groundwater in the Parrot Tailings area and the performance of the BPSOU Subdrain. These are described and clarified below.

During community interviews, the community organization, Restore Our Creek Coalition, expressed the desire to restore Silver Bow Creek. The EPA responded to these concerns in the 2020 ROD Amendment's Responsive Summary. The EPA, MDEQ, BSB and Atlantic Richfield have met with Restore Our Creek Coalition many times since 2016 to listen to their concerns and desires and discussed ways to incorporate these ideas into the 2020 ROD Amendment.

While the EPA, MDEQ, BSB and Atlantic Richfield understand and appreciate Restore Our Creek Coalition's desire to create a segment of Silver Bow Creek that would begin at Texas Avenue and continue down to the confluence with Blacktail Creek, there are practical and technical limits to what can be achieved in this area. Where a creek once existed, a mine was developed, and a city has grown. There are multiple landowners, buildings, streets, pipelines, utilities and other infrastructure, including the stormwater system required as part of the remedy, throughout this area. Further, there are no headwaters to provide a source of water for a restored, natural creek. It is not feasible to use the remedy to return this area to the condition it was in 150 years ago, before mining began and before a city was built on top of it. However, if land is identified and acquired and infrastructure could be moved, a lined stream compatible with and not impairing or impeding the function of the remedy, it could be constructed by others, potentially beginning at Casey Street. Any stream in this area would have to be lined to keep metals in groundwater out of it, and to allow the necessary groundwater capture-and-treatment system to function effectively to protect Blacktail and Silver Bow Creeks. The concept of a lined creek is not part of the 2020 ROD Amendment, as it would not be done for remediation purposes, but the remedy design includes an area that is set aside for the potential construction of this project, if the state of Montana and the community want to provide funds for this purpose and to operate, repair and maintain such a feature as a community amenity. An EPA-funded feasibility study concluded that, while difficult, a lined stream could be constructed in the Silver Bow Creek above the confluence area. The 2020 Consent Decree's attachments contain commitments by all Consent Decree parties to cooperate with such efforts in the future, and a 2020 Memorandum of Understanding between the State of Montana and Butte-Silver Bow County includes further steps to potentially

assist with the creation of a lined creek within Silver Bow Creek above the confluence.

Community members also indicated confusion about why the amount of lead allowed in soils in Butte is higher than in Anaconda. This question was also addressed in the 2020 ROD Amendment's Responsive Summary. The combination of the RMAP and the comparatively low bioavailability of lead within the BPSOU support the use of a 1,200 mg/kg lead cleanup level as a protective remedy. The EPA's risk assessment guidance recommends performing site-specific bioavailability studies. The BPSOU is unique in that the EPA has performed multiple studies, including both laboratory studies and animal studies, to evaluate the site-specific bioavailability of lead in soil. These studies, which are described in more detail in the 2006 ROD and 2011 ESD, show that soil lead bioavailability in Butte is about 3 times lower than the default assumption. Because lead in Butte soils is less biologically available (coupled with the effectiveness of the RMAP) the site-specific soil lead action level for Butte can be set about three times higher than the default lead screening level of 400 mg/kg and can be as protective as the default level at generic sites. The reason the EPA has adopted the default soil lead screening level of 400 mg/kg at other Superfund sites is that those sites do not have the benefit of site-specific information on bioavailability to deviate from the default assumption.

In addition to concerns about the lead cleanup goal and the Silver Bow Creek restoration, a community member raised concerns about the effectiveness of the BPSOU subdrain and contaminated groundwater in the Parrot Tailings area. As indicated in the 2020 ROD Amendment Responsiveness Summary, the EPA is confident that the BPSOU subdrain method of capturing contaminated groundwater is proven and has worked and will continue to work at the BPSOU to intercept and collect contaminated groundwater. Based on investigations conducted after installation of the subdrain, additional contaminated groundwater collection is now being required by the EPA and the contingency for such actions described in the 2006 BPSOU Record of Decision has been invoked in the 2020 BPSOU Record of Decision Amendment. The EPA responded to both of these concerns in the Responsiveness Summary in the 2020 ROD Amendment. Regarding the comment concerning the contaminated groundwater in the Parrot Tailings area, the EPA understands that, since 2017, the state has been collecting additional groundwater data as part of the Parrot Tailings Waste Removal Project area and downgradient as far as Blacktail Creek and the Silver Bow Creek confluence area. The EPA will evaluate all available data, including the state's data, as part of the remedial design for the enhancements to the BPSOU groundwater collection and treatment system.

ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
None

Issues and Recommendations Identified in the FYR:

OU: BPSOU	Issue Category: Monitoring			
	Issue: The Phase 2 blood lead level monitoring report made several recommendations for implementation of Phase 3, including landlord participation assessments, increased tracking and follow-up for individuals with elevated blood lead levels, and increased public outreach.			
	Recommendation: Implement the recommendations.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2022

OU: BPSOU	Issue Category: Monitoring			
	Issue: Mercury is not currently analyzed for in residential yards and abatements are based on arsenic and lead and the incorrect laboratory method is being used to analyze mercury in attics and basements.			
	Recommendation: BSB should provide justification for excluding mercury analysis from yard sampling and specify the analytical methods being used to evaluate mercury in attic dust and basement soil. If XRF is being used for mercury analysis, justification of the validity of these results is needed (i.e., correlation to laboratory results should be demonstrated and results must be validated). If justification cannot be provided, the RMAP quality assurance project plan should be revised to incorporate appropriate mercury sampling and analysis methods.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2022

OTHER FINDINGS

Several additional recommendations were identified during the FYR. These recommendations do not affect current and/or future protectiveness:

- Annual BRES reports currently only cover the inspection activities and corrective actions needed but do not include the actions that have been ongoing from the previous year's report. These actions are tracked in monthly reports. Increased reporting that covers the status of already implemented action plans will allow interested parties to identify the progress for corrective action plans and vegetation management plans.
- BSB is supposed to compile all stormwater control maintenance information into an annual maintenance report: however, as of the preparation of this FYR report, an annual report has not been produced. Reporting should be implemented in order to effectively track and communicate maintenance of these systems.

PROTECTIVENESS STATEMENT

Protectiveness Statement	
Operable Unit: 8	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The remedy at the BPSOU (OU 8) is expected to be protective of human health and the environment upon completion. In the interim, exposure pathways that could result in unacceptable risks are being controlled through the RMAP, BRES, institutional controls and groundwater and surface water monitoring activities.	

NEXT REVIEW

The next FYR Report for the BPSOU at the Silver Bow Creek/Butte Area Superfund site is required five years from the completion date of this review.

VII. WEST SIDE SOILS OPERABLE UNIT, Operable Unit 13

The area west and northwest of the city of Butte is known as the Independence Mining District, although its boundary is not well defined. Generally, the West Side Soils OU area was established to encompass the Independence Mining District in an area of primarily range land, with some rural residences. The area encompasses over 6,000 acres and consists of 70 large, abandoned mine areas, over 400 mine claim exploration sites, and approximately 80 residences.

As defined in the BPSOU 2006 ROD, the West Side Soils OU lies generally to the north and west of the BPSOU and includes other historic mining and metals-impacted areas within the Site not addressed under the BPSOU, the BMFOU or the active mining area. The West Side Soils OU abuts the BPSOU and active mining area/BMFOU to the east, and the Streamside Tailings OU and Rocker OU to the south. The boundary of the West Side Soils OU is currently undetermined, although the mine study area has been defined for the initial RI work (see Figure 1-1 in Section I of this FYR Report).

Since the spring of 2019, as part of the site characterization efforts, approximately 4,000 surface soil samples at mine areas and in adjacent soils, along with 200 subsurface soil samples within mine dumps using a direct-push rig, over 100 surface water samples in drainages near the mine area, and 40 sediment samples in the drainages have been collected. In addition, approximately 25 surface water and sediment samples were collected in the spring and fall within the Blacktail and Basin Creeks southwest of Butte. Analysis of the data is proceeding to determine the nature and extent of contamination. An RI report will be prepared, followed by a feasibility study. Once the RI/FS is completed, the EPA will select a remedy for the West Side Soils OU through a ROD. The ROD will identify the remedial actions that the EPA is planning on taking and their locations.

The remedy for the West Side Soils OU is not assessed in this FYR because the EPA has not selected a remedial action for it yet.

APPENDIX A – REFERENCE LIST

OU1: SSTOU

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OU3: BMFOU

EPA Record of Decision, Butte Mine Flooding Operable Unit Silver Bow Creek/Butte Area NPL Site. U.S. Environmental Protection Agency Region 8. September 1994.

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OU7: Rocker OU

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OU8: BPSOU

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APPENDIX B – SITE CHRONOLOGY

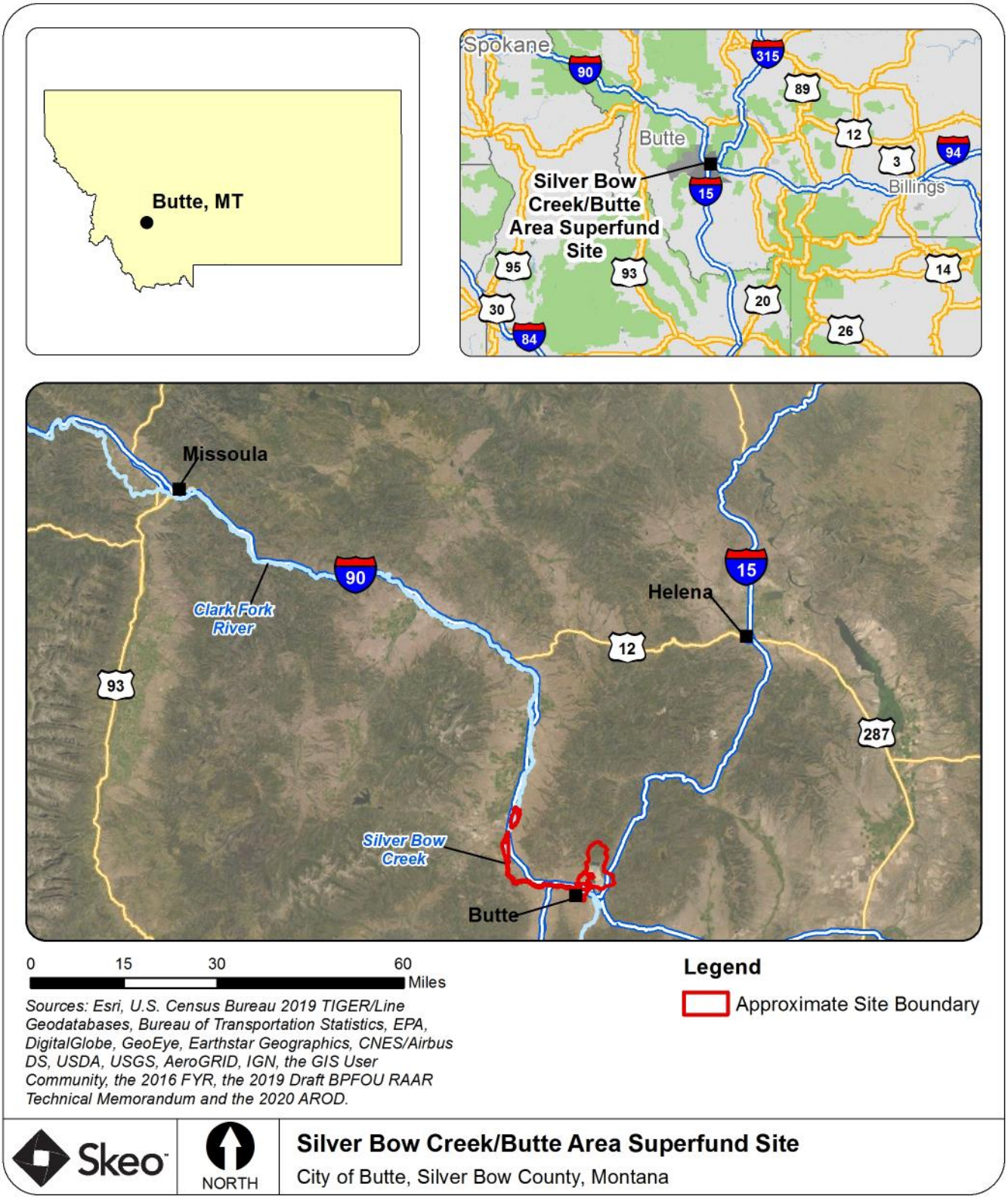
Table B-1: Site Chronology – Sitewide

Event	Date
Mining at the Berkeley Pit ceased; the underground dewatering pumps in the Kelley mine were shut off; underground workings and Berkeley Pit began flooding with groundwater	1982
EPA proposed Silver Bow Creek site (original portion) for listing on Superfund program's NPL	December 30, 1982
Mining at the Continental Pit ceased; water from the Horseshoe Bend seep was diverted into Berkeley Pit	1983
EPA added Silver Bow Creek site (original portion) to NPL	September 8, 1983
Mining resumed in Continental Pit by Montana Resources; operations included heap leaching of old Berkeley Pit waste rock	1986
EPA issued Silver Bow Creek (original portion) sitewide Phase I RI Final Report	January 1987
Butte Area portion added to Silver Bow Creek site by Federal Register Notice	July 22, 1987
Walkerville time-critical removal action completed	February 1988
MDEQ directed cleanup of 1,000 cubic yards of contaminated soil at Rocker OU Timber Butte time-critical removal action completed West Camp non-time-critical removal action completed EPA completed RI/FS for Warm Springs Ponds Active Area OU 4	1989
EPA issued Administrative Order on Consent for Mill-Willow Bypass removal action at Warm Springs Ponds	June 1990
EPA issued Interim ROD for Warm Springs Ponds Active Area OU 4	September 28, 1990
BPSOU Soils time-critical removal action completed	1991
EPA issued ESD for Warm Springs Ponds Active Area OU	June 24, 1991
PRP completed RI/FS for Rocker OU	August 2, 1991
EPA issued Unilateral Administrative Order for Warm Springs Ponds Active Area OU	September 25, 1991
PRP completed RI/FS for the SSTOU	September 30, 1991
Anselmo Mine Yard and Late Acquisition/Silver Hill time-critical removal action completed Lower Area One non-time-critical removal action completed Manganese time-critical removal action completed	1992
EPA issued Interim ROD for Warm Springs Ponds Inactive Area OU PRP began remedial action for Warm Springs Ponds Active OU	June 30, 1992
EPA issued Unilateral Administrative Order for Warm Springs Ponds Inactive Area OU ROD implementation	June 17, 1993
Residential/source areas removal action: many residential yards and waste rock dumps throughout Butte and Walkerville were addressed	1994
PRP began remedial action for Warm Springs Ponds Inactive OU	May 18, 1994
PRP completed RI/FS for BMFOU in 1994 EPA issued a ROD for BMFOU	September 29, 1994
SSTOU RI/FS completed EPA issued ROD for SSTOU	November 29, 1995
Rocker OU RI/FS completed EPA issued ROD for Rocker OU	December 22, 1995
Horseshoe Bend water diverted away from the Berkeley Pit and pumped up to the Yankee Doodle Tailings Pond	1996
Stormwater time-critical removal action began and continued until the BPSOU ROD was issued. This included the construction of catch basins and the reclamation of the Alice Pit.	1997
Montana Resources ceased heap leaching and started pumping water from the Berkeley Pit to the precipitation plant to extract copper from the water Old Butte Landfill/Clark Mill Tailings removal and Resource Conservation and Recovery Act action completed	1998
EPA issued ESD for SSTOU	August 31, 1998

Event	Date
United States issued Consent Decree for SSTOU, which provided for implementation of the 1996 SSTOU ROD as modified by 1998 ESD	November 13, 1998
Railroad beds time-critical removal action addressing contaminated soil on railroad beds and rail yards throughout Butte hills began	1999
Montana Resources temporarily ceased mining in Butte; Horseshoe Bend water started flowing into the Berkeley Pit, triggering planning and construction of the Horseshoe Bend water treatment plant	2000
EPA issued first FYR, with emphasis on Warm Springs Ponds OUs	March 23, 2000
Walkerville residential removal action	2000-2001
United States issued Consent Decree for Rocker OU	November 7, 2000
EPA issued ESD for BMFOU	March 2002
United States issued Consent Decree for BMFOU	August 14, 2002
Settling Defendants began construction of Horseshoe Bend water treatment plant	2002-2003
Montana Resources resumed mining; Horseshoe Bend water treatment plant started operating; treated Horseshoe Bend water recycled and used in mine operations	2003
Montana Resources resumed pumping Berkeley Pit water to the precipitation plant for copper extraction	2004
Railroad beds time-critical removal action at BPSOU completed	2004
EPA issued second FYR, with emphasis on Warm Springs Ponds OUs	September 30, 2005
PRP completed RI/FS for BPSOU EPA issued ROD for BPSOU	September 21, 2006
Horseshoe Bend water treatment plant performance test conducted	November 2007
Residential Metals Abatement Program approved	March 2010
EPA issued third FYR	June 27, 2011
EPA issued ESD for BPSOU	July 18, 2011
EPA issued Unilateral Administrative Order for remedy implementation at BPSOU	July 21, 2011
2010 Groundwater Data Analysis Report completed	February 2012
EPA issued revised Community Involvement Plan for BPSOU	February 2013
EPA issued BPSOU Public Health Study Phase 1 Report	July 2014
EPA issued ESD for Rocker OU	September 30, 2014
Montana Resources completed the Final BMFOU Berkeley Pit Slope Stability Evaluation	October 22, 2015
MDEQ submitted SSTOU Site Inspection and Monitoring and Maintenance Plan and Preliminary Close Out Report (PCOR)	June 2016
EPA issued fourth FYR	August 30, 2016
PRP submitted 2016 Five-Year Dam Safety Inspection Report for Warm Springs Ponds OUs	December 9, 2016
PRP submitted draft Rocker OU7 conceptual site model	June 9, 2017
EPA issued FYR Addendum for Rocker OU7	July 18, 2018
PRP submitted Warm Springs Ponds Lime Rate Optimization Pilot Study Interim Report	October 8, 2019
Montana Resources completed the RAAR	November 22, 2019
EPA issued BPSOU ROD Amendment	February 4, 2020
BSB issued Phase 2 RMAP Medical Monitoring Study	March 4, 2020
Montana Resources completed the Final 2020 Berkeley Pit Waterfowl Protection Plan	March 18, 2020
United States issued Consent Decree for BPSOU	May 22, 2020
MDEQ submitted SSTOU PCOR Addendum	May 2020
Montana Resources completed Final Updated PWL Predictive Model	July 30, 2020

APPENDIX C – SITE MAPS

Figure C-1: Site Vicinity Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure C-2: BMFOU Potentiometric Map for East Camp Alluvial Aquifer[12]

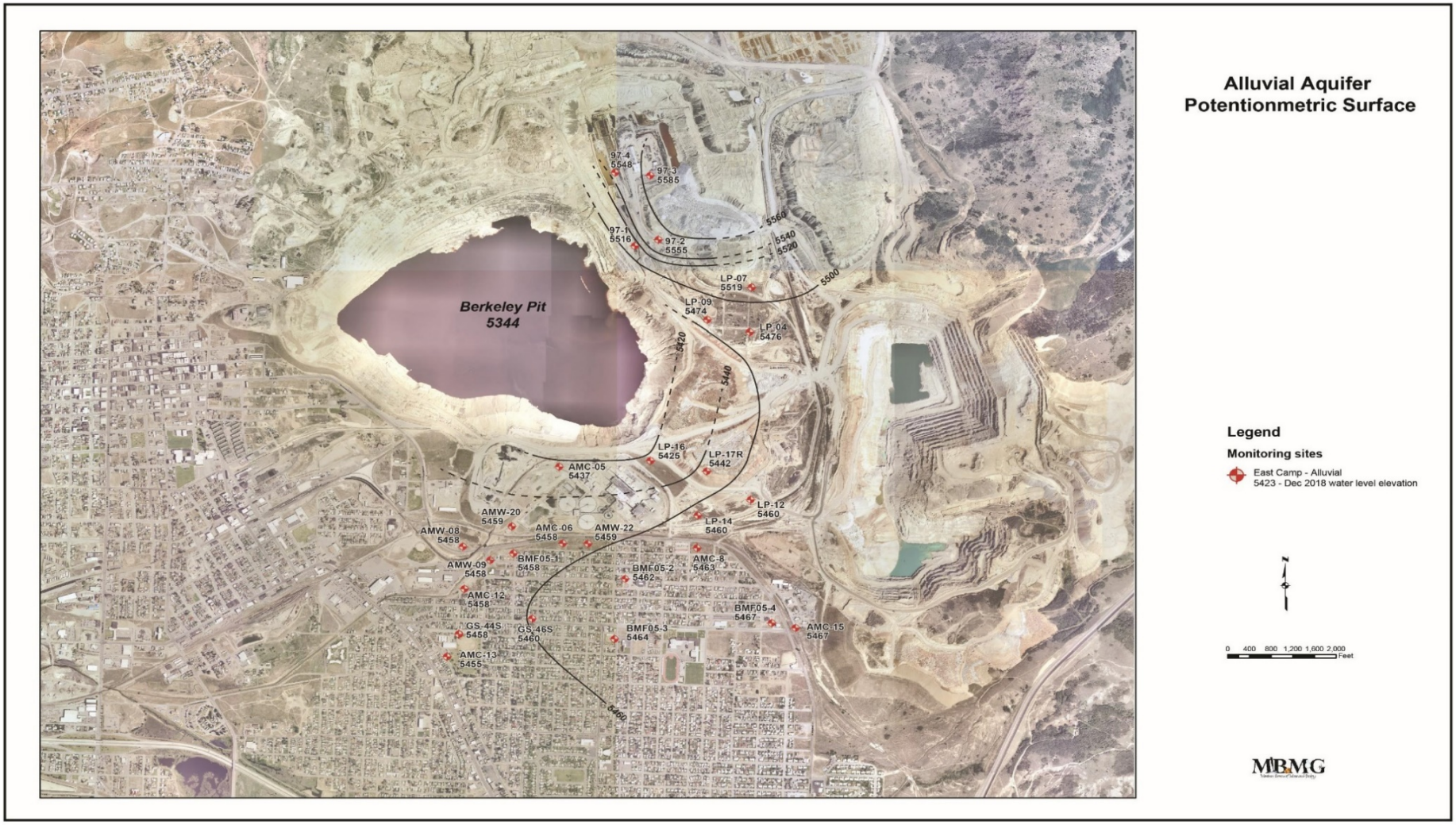


Figure 2-13. Alluvial aquifer potentiometric map for December 2018 (contour interval is 20 ft).

[12] BMFOU Water-Level Monitoring and Water-Quality Sampling 2018 Consent Decree Update

Figure C-3: BMFOU Potentiometric Map for East Camp Bedrock Aquifer[13]

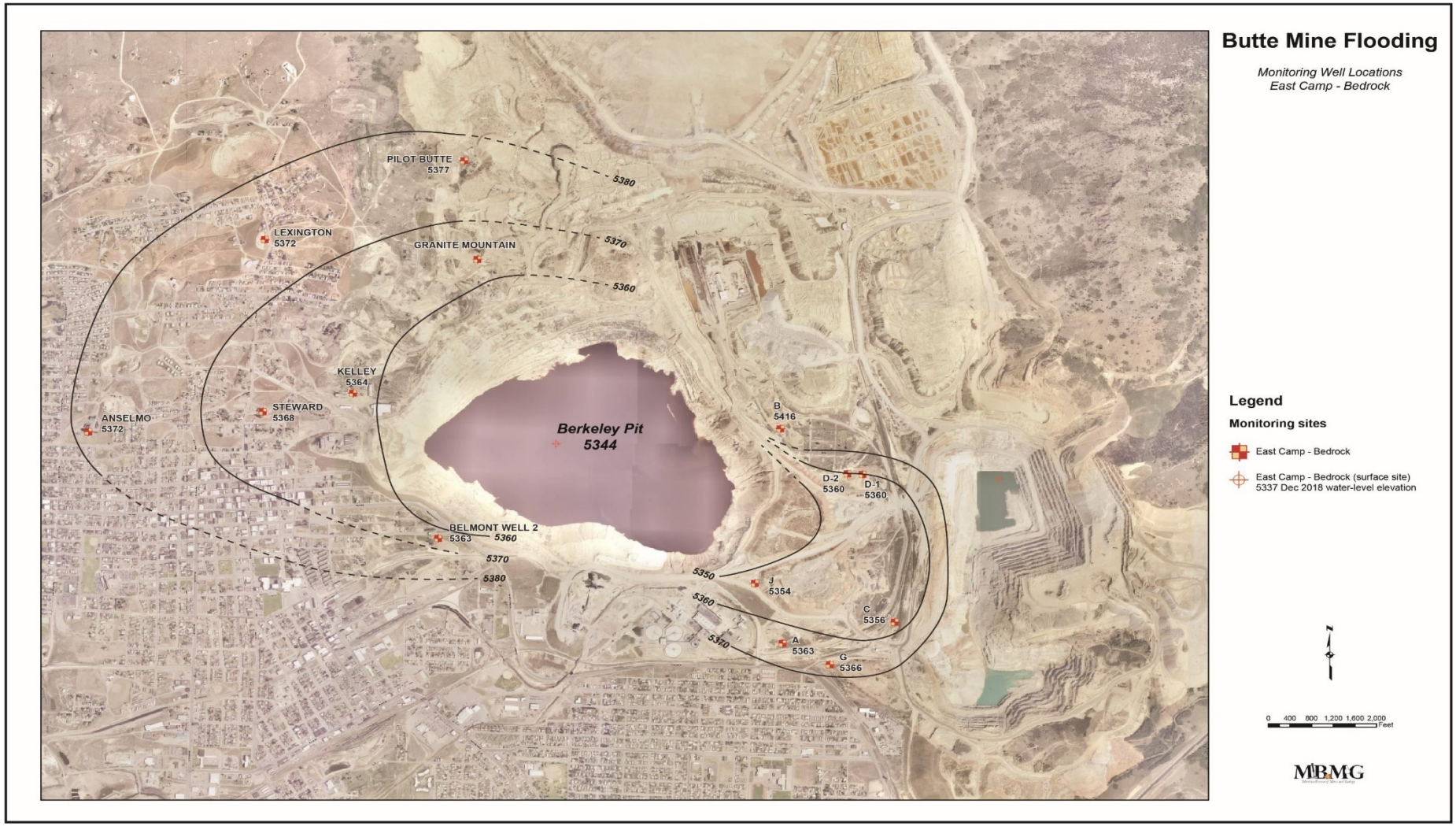


Figure 3-15. Potentiometric map for the East Camp bedrock aquifer, December 2018 (contour interval is 10 ft).

[13] BMFOU Water-Level Monitoring and Water-Quality Sampling 2018 Consent Decree Update

Figure C-4: BMFOU West Camp Monitoring Sites[14]

Figure 4-1. West Camp monitoring sites location map.

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[14] BMFOU Water-Level Monitoring and Water-Quality Sampling 2018 Consent Decree Update

Figure C-5: BMFOU Outer Camp Monitoring Sites[15]

Figure 5-1. Outer Camp monitoring sites location map. 138

[15] BMFOU Water-Level Monitoring and Water-Quality Sampling 2018 Consent Decree Update

Figure C-6: BPSOU 2020 ROD Amendment Surface Water Remedy Components[16]

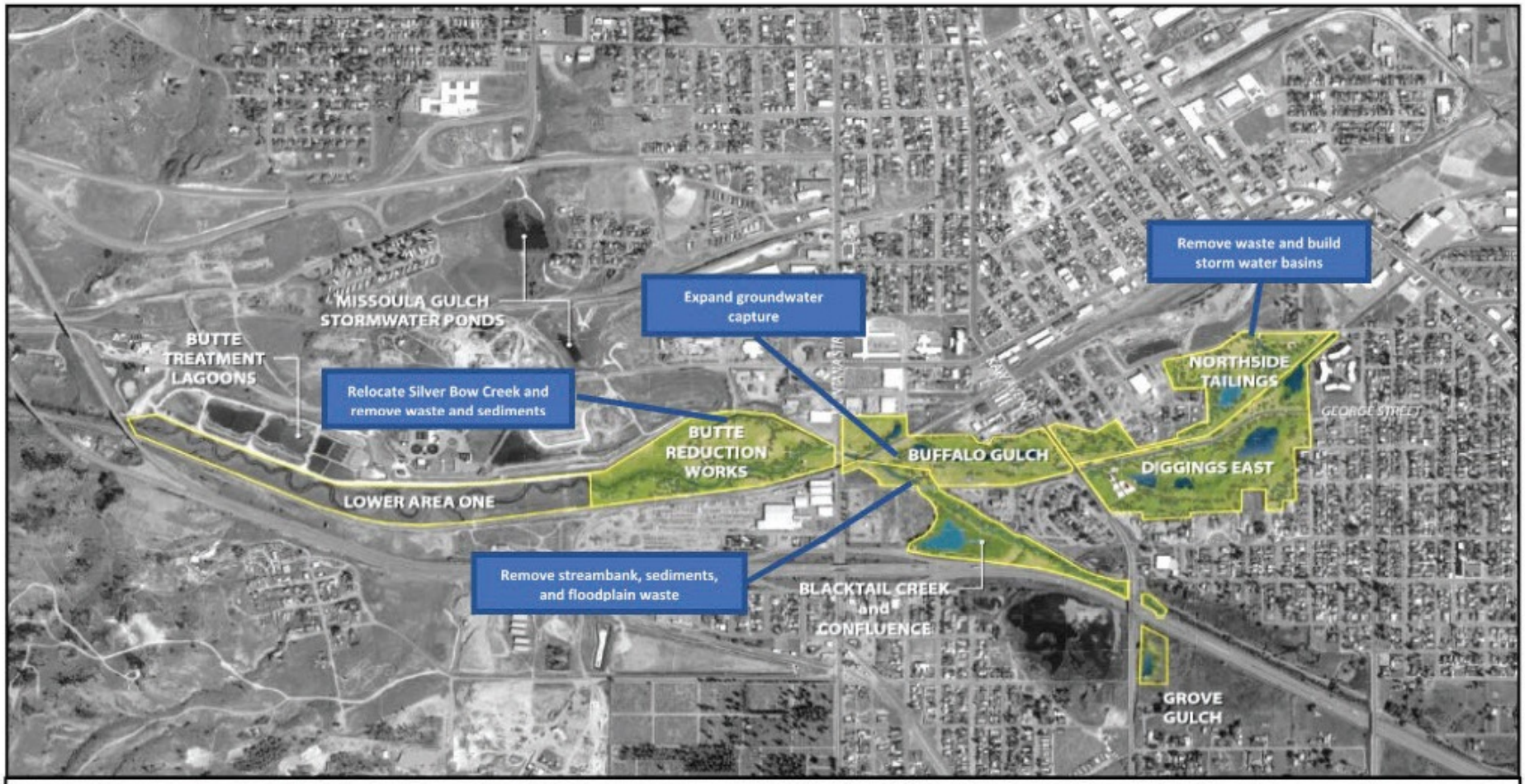
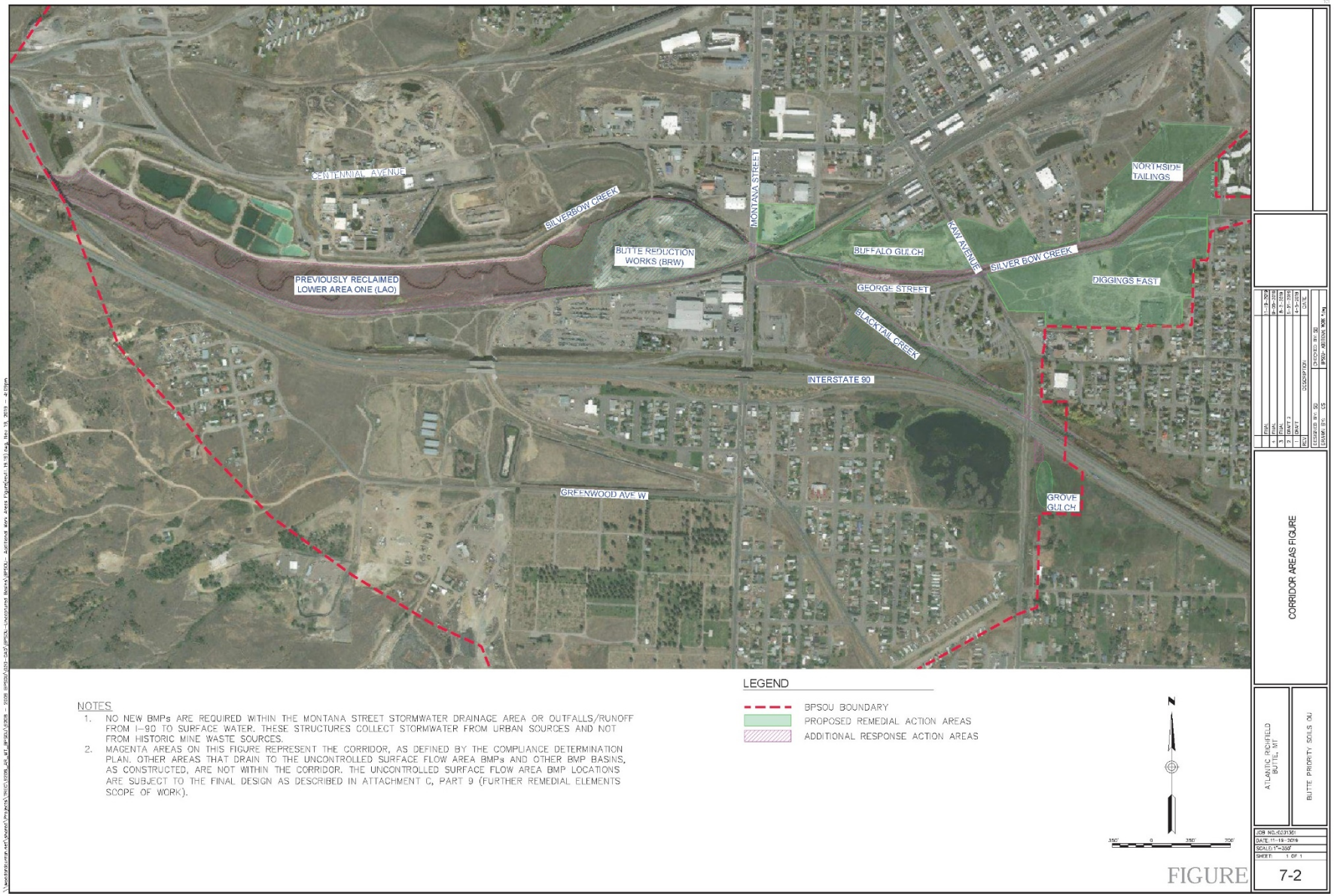


Figure 4
Locations of Surface Water Remedy Components
Butte Priority Soils Operable Unit
Silver Bow Creek /Butte Area Site

Figure produced by Land Design, Inc.

[16] 2020 BPSOU ROD Amendment

Figure C-7: BPSOU 2020 ROD Amendment Additional Reclamation Areas[17]

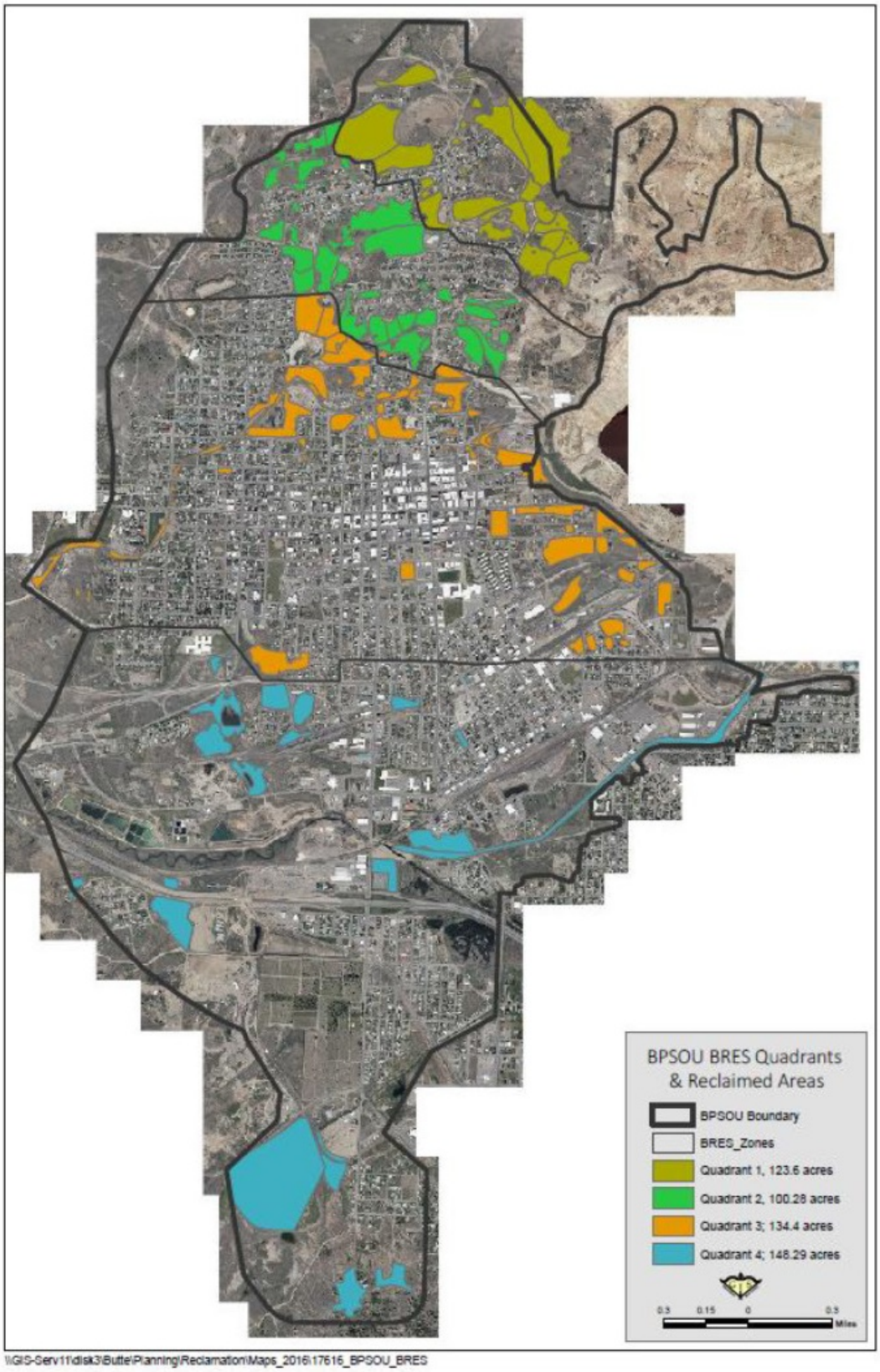


[17] 2020 BPSOU ROD Amendment

Figure C-8: BPSOU Groundwater Technical Impracticability Waiver Zone[18]

[18] 2006 BPSOU ROD

Figure C-9: BPSOU BRES Quadrants[19]



[19] BPSOU BRES 2019 Field Evaluation of Previously Reclaimed Sites, Summary and Technical Recommendation Report

APPENDIX D – PRESS NOTICES

EPA published the following notice in *Butte Weekly* on 9/9/2020, and 9/16/2020.

U.S. Environmental Protection Agency, Region 8
Begins Review of Cleanup Progress at the Silver Bow Creek/Butte Area Superfund Site, Silver Bow and Deer Lodge, MT

The U.S. Environmental Protection Agency (EPA) has begun the fifth Five-Year Review of the cleanup progress at the Silver Bow Creek/Butte Area Superfund Site in Butte, Montana.

Background
The boundary of the site begins above Butte, near the Continental Divide, includes Berkeley Pit and the interconnected mine workings and the Warm Springs Ponds (a treatment area), and extends westward along Silver Bow Creek. The site covers about 26 miles of stream and streamside habitat. EPA is overseeing the cleanup for most areas of the site, in consultation with the Montana Department of Environmental Quality (DEQ). DEQ is the lead implementing agency for Streamside Tailings area (main portion of Silver Bow Creek). Cleanup actions so far have included the removal of mining waste, treatment of arsenic contaminated soils, amendment and capping of mine waste, residential yard cleanups mainly for lead, stormwater controls, groundwater controls, capture and treatment, surface water controls (such as basins, treatment plants and treatment systems), excavation of mine waste along the banks of Silver Bow Creek, and the reconstruction of Silver Bow Creek. The large source areas within the site that have posed the greatest threats to human health and the environment have been removed and/or remediated.

The Five-Year Review Process
The purpose of the Five-Year Review is to evaluate how ongoing cleanup actions are working at the site and to measure the progress towards achieving cleanup objectives. EPA uses the Five-Year Review to ensure that cleanup actions are protecting people's health and the environment. Specifically, EPA looks at any changes in scientific knowledge about site contaminants and exposure pathways, the status and effectiveness of legal documents regarding property restrictions, and changes in regulatory standards. EPA expects to finalize the fifth Five-Year Review, which will describe the findings and recommendations for follow-up actions, by March 2021.

We Want to Hear from You
As part of the Five-Year Review process at the Silver Bow Creek/Butte Area Superfund site, EPA will interview community members and stakeholders who have concerns, questions, or information about the site that they think EPA should consider. If you would like to participate in an interview, please contact EPA Community Involvement Coordinator Dana Barnicoat by September 30, 2020.

Contact
Dana Barnicoat, EPA Community Involvement Coordinator, (406) 457-5007, Barnicoat.dana@epa.gov

For more information, please visit the EPA website at www.epa.gov/superfund/silver-bow-butte or the site's information repositories:

The Citizens' Technical Environmental Committee (CTEC)
27 West Park Street
Butte, Montana 59701
(406) 723-6247
Buttectec.org

Montana Tech Library
1300 West Park Street
Butte, Montana 59701
(406) 496-4281

The following are the ads posted in the *Montana Standard*, published on 9/2/2020, 9/9/2020, and 9/16/2020.

U.S. Environmental Protection Agency, Region 8
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APPENDIX E – COMMUNITY INVOLVEMENT

The FYR process included interviews with parties affected by the Site, including community members, the current landowners and regulatory agencies involved in or affected by site activities. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. During the FYR process, 22 people participated in an interview by phone or provided written comments. All issues raised were considered, reviewed and incorporated as appropriate into evaluations during this FYR. The interviews are summarized here and discussed as appropriate in the technical assessments for each individual OU sections.

Public Officials and Community Groups

Clark Fork Coalition – Alex Leone:
Mr. Leone is a member of the Clark Fork Coalition, a community organization. Mr. Leone said there is a lack of transparency in communicating with the community about what is happening with the BMFOU, and the taking of water from Silver Lake. He hopes that the release of this FYR Report will spur action at Warm Springs Ponds, moving from an interim ROD to a final ROD. Mr. Leone stated that the SSTOU cleanup is a huge success story. His greatest concerns are about Warm Springs Ponds filling with sediment, and issues related to the French drain that catches contamination. Mr. Leone believes that part of the problem with communication with the public is that the cleanup process is hard to explain without using complex terminology. He suggested that more signage with direct wording and warnings about contamination in the fish at Warm Springs Ponds would be helpful. Mr. Leone also stated that it seemed odd to him that the lead standards are different for Butte and Anaconda, and that the standards seem arbitrary.

CTEC – Joe Griffin:
Mr. Griffin is a vice president at CTEC, a technical advisor to the Clark Fork education program and on the technical advisory board of the Clark Fork Coalition. Mr. Griffin stated that his main concern is that the EPA is not looking holistically across the whole Clark Fork watershed, or at the broader picture. He said that newspaper, radio and TV are important resources for informing the public, and that most people want to know only about major site milestones rather than receiving information all the time. He believes that the Residential Metals Abatement Program (RMAP) is a national example. However, he has heard that the community has concerns about the action levels. Mr. Griffin said that another community concern is about renters and the options available for people with landlords who do not want to use the program. He said that, at Warm Springs Ponds, the arsenic level is high because it gets stored in the sediments and then is released in the spring and summer. Mr. Griffin noted that while the Superfund program only addresses issues related to metals, temperature, habitats, water flow and nutrients in the ponds must also be considered. He said that even though the EPA is dealing only with the metals, water flow and nutrients may have adverse effects on those other areas.

Butte-Silver Bow District 5 – County Commissioner Dan Olsen:
Mr. Olsen is the Butte-Silver Bow District 5 Commissioner. Mr. Olsen stated that the Consent Decree is a big step in a long process. He believes that the park reuse will be a fantastic addition to the area and serve as a long-lasting memorial for the area's history. Commissioner Olsen reported that regular media and online updates would be helpful to share the project's status with the community. He believes that RMAP is a great program. He also said there are people who are not aware of the program who could benefit from it. Mr. Olsen also voiced concern that there is currently no way to force landlords to allow the cleanup of their buildings. He stated that the EPA needs to get the word out that Butte is being cleaned up, and will eventually be delisted from the NPL, to make the area more desirable.

Trout Unlimited – Casey Hackathorn:
Mr. Hackathorn is a member of the community organization Trout Unlimited. He stated that the SSTOU seems to be the furthest along, and that its cleanup has been a significant transformation and a great story. He believes that it is important to figure out how to treat and manage stormwater as it comes out of the BMFOU and address its downstream impacts on the ecology. Mr. Hackathorn stated that very few community members understand who decides how water quality is being managed at Butte Mine Flooding. He would like to see community forums address that. He believes that it would be good to reinstate the annual tours that took place at Warm Springs Ponds and to have similar opportunities to visit the BPSOU. Mr. Hackathorn's biggest concern is that the action levels for Butte and Anaconda are different. It is hard to explain why that is the case, from a community health standpoint.

Restore Our Creek Coalition – Richard Tretheway:
The Restore Our Creek Coalition is a community organization. Its greatest concern is the fact that much of the cleanup requires perpetual treatment. Mr. Tretheway stated that because there is contamination capped on site that requires regular monitoring and ongoing treatment, the potential for problems will remain in the future. He stated that the organization has witnessed a major improvement in communication between their group, the community and the EPA over time. The organization's concerns about residents in the Silver Bow Creek Corridor entail both environmental justice concerns associated with proposed remedial systems in the corridor and the potential for transient exposures during and after subsurface disturbances. He stated that the organization's focus is on the first mile of Silver Bow Creek between Texas Avenue and the creek's confluence with Black Tail Creek. The Restore Our Creek Coalition believes that the Site must be remediated at the source in a comprehensive way to protect the future and that the first mile of Silver Bow Creek must be fixed.

GoBirdMontana – Gary Swant:
Gary Swant is the founder of the community organization GoBirdMontana. Mr. Swant conducts bird surveys and does consulting work through his company. Mr. Swant's greatest concern about the Site is the final disposition of Warm Springs Ponds. He stated that the area is a significant fall and spring migration staging area for birds, and that the area has become so important that capping or draining the ponds would do significant damage to current migratory paths. Mr. Swant does not think that the general public understands much about the nuances of the Site, despite efforts to inform them through articles and public information resources. He believes that some people may not understand the difference between reclamation and restoration regarding the Site. Mr. Swant stated that Warm Springs Ponds could be classified as an Important Bird Area vital to the migration of many waterfowl species.

Citizen– Fritz Daily:
Fritz Daily expressed his discontentment involving the cleanup and restoration of the area from Texas Avenue to Montana Street on Silver Bow Creek. He stated that Judge Brad Newman's decision in the Silver Bow Creek Headwaters Coalition Lawsuit ruled that Silver Bow Creek from Texas Avenue to Montana Street is a Creek and "Waters of the State of Montana," protected as such in the Montana Constitution. He questioned why the State of Montana and the Butte-Silver Bow local government hasn't acted in accordance with this ruling.

Mr. Daily stated that a quality Silver Bow Creek needs to be re-created to flow through the middle of the town, where the citizens can play, fish, and enjoy the amenities of a restoration. He believes that Butte and the Clark Fork River Basin are entitled to a quality cleanup and restoration under Superfund/state law and the Montana constitution as well. Mr. Daily strongly believes that the EPA has failed Butte Montana with their Superfund decisions and have not properly protected the health and environment of the community. Mr. Daily further stated that the EPA, the state, and the local government only conduct public hearings and request public input to satisfy the legal requirements.

Mr. Daily believes that there needs to be a comprehensive plan that includes a financial commitment addressing total cleanup and restoration, total removal of all tailings, creating a quality creek flowing through the town, addressing the inefficient French drain, and using the Restore Our Creek Vision Statement as guide to complete the cleanup and restoration.

MDEQ, MT Department of Justice and PRP Representatives

MDEQ Project Officers– Daryl Reed and Joel Chavez:
Daryl Reed is the project officer for the BMFOU, the WSPOUs, the Rocker OU, the West Side Soils Operable Unit and the BPSOU. Joel Chavez is the project officer for the SSTOU. They stated that the SSTOU cleanup was successful and has been properly maintained and that the establishment of a recreation corridor/trail is a successful reuse at the Site. Their concern regarding the BMFOU is that the Remedial Action Adequacy Review (RAAR) does not address the long-term integration of the components needed to maintain the BMFOU remedy, which will likely require use of a large equalization basin such as the Yankee Doodle Tailings Impoundment or the Continental Pit between the Horseshoe Bend water treatment plant (HsBWTP) and the Polishing Plant. Regarding the WSPOU, they are concerned about the challenge of completing a robust remedial investigation and feasibility study (RI/FS) based on existing conditions and evaluating the options for the long-term disposition of buried tailings in the ponds in the near future. Their concern at the Rocker OU involves the amount of time needed to complete the administrative process to amend the Record of Decision (ROD) and the Consent Decree. Regarding the BPSOU, they are concerned about whether the EPA will continue to provide the level of oversight needed to ensure the success of remedial design and remedial action implementation. They also voiced concern about whether the EPA has sufficient funding to implement the remedies for the abandoned sites at the West Side Soils Operable Unit.

They stated that the Butte Mine Waste Repository location has many benefits, including its proximity to projects for truck hauls yet also not located near any residential developments, as well as the fact that stormwater and groundwater drain to the nearby Berkeley Pit.

Regarding RMAP, they voiced concerns about renters having difficulties getting property assessments if their landlords/property owners refuse to sign access agreements. They are hopeful that this issue will be adequately addressed in the revised RMAP, which may require EPA intervention.

Montana Dept of Justice, Natural Resource Damage Program - Brian Bartkowiak:
Mr. Bartkowiak works for the Natural Resource Damage Program in the Montana Department of Justice. He stated that The Natural Resource Damage Program is concerned that a complete feasibility study of all potential options will not be performed as part of the final decision on WSP, including both OU 4 and OU 12. He believes that much more outreach needs to be performed to inform the community of what Warm Spring Ponds are and what benefits and potential impacts they have on the Upper Clark Fork River. Mr. Bartkowiak said that a large limiting factor in the success of remedy and restoration in the Upper Clark Fork Basin is the availability of cold, clean water and that current and future cleanup should focus on maximizing the amount of this kind of water in the upper Clark Fork.

Atlantic Richfield (site PRP) BPSOU Representative– Loren Burmeister:
Mr. Burmeister works for Atlantic Richfield. He stated that the BPSOU cleanup is confounded by the fact it is in the middle of a neighborhood, and the cleanup has to take that into account, which leads to unique remedies. Mr. Burmeister believes that Butte has unfortunately been defined by its Superfund status, and that its Superfund status has stifled growth in the area and deterred people from moving there. He believes, however, that the Consent Decree will be an asset to the community and an opportunity to capitalize on future economic growth. Mr. Burmeister stated that the Berkeley Pit may offer other opportunities in the future for reuse or continued use. He said that Atlantic Richfield has a broad and diverse team of technical experts, as

well as EPA technical consultants, and that, together, they have a wide range of expertise available to make the best decisions for public health and the environment. Mr. Burmeister stated that the caps at the Site are in good condition and well maintained and that they have improved the appearance and quality of health in Butte. He believes that the largest challenge with RMAP is with the renting community as some landlords are not interested in participating in the program. He also believes that the Butte Repository is in a prime location where it cannot affect groundwater, and any runoff goes into the Berkeley Pit and will eventually get treated.

Atlantic Richfield WSPOU Representative– Dave Griffis:
Mr. Griffis also works for Atlantic Richfield. He stated that the WSPOU is a popular and valuable public recreation area (fishing, hunting, wildlife viewing, bike riding), and an award-winning habitat area for wildlife. Mr. Griffis reported that some perceived negative effects include the presence of high-hazard dams (classified as such in accordance with State of Montana Dam Safety Regulation definitions) and residents' limited awareness and acceptance of contamination and the risks associated with a Superfund facility in the Upper Clark Fork River Basin. He stated that the Site is well monitored on a daily basis and well maintained by a professional team. Mr. Griffis reported that ensuring the safety of personnel and the public are an important part of the day-to-day operations. He believes that changes to the WSPOU could significantly change recreation resources and wildlife habitat value that has been established and improved over the 100^{+}-year life of the Site's remedy. Regarding the Butte Repository, Mr. Griffis believes that its location minimizes exposure and risk to the community, and other potential receptors, and also minimizes the potential for migration of materials away from the Site.

Montana Resources Representative - Mark Thompson
Mr. Thompson works for Montana Resources. He stated that there is a divergence from the community perception about BMFOU versus how it is actually being managed. He believes that in actuality, the work to date is well past what is required, and the success is a demonstration of responsible management of the site by those involved. He said that there was good foresight and getting started early on the work was critical. Mr. Thompson thinks that the pit is overall perceived as an unmanaged issue and that it is a shortcoming on all parties involved by not stating clearly how it is well monitored and managed. He believes that the remedy at BMFOU can be implemented effectively, and his biggest concern is on getting that message out to the community. Mr. Thompson thinks that community members are getting information differently, and that they need to move toward social media to be more effective. He also stated that the Consent Decree was very responsible from all parties involved and is pleased with how the project has progressed.

<u>General Community Interview Themes</u>

In terms of community transparency and overall communication of site information, the general sense was that things have improved dramatically in the last five years. There were several opportunities for improving community involvement and information dissemination that were offered. Some key points included:

- Additional communication and transparency about the water treatment taking place at BMFOU is desired. There are efforts underway by the EPA and PRPs to update PitWatch and ensure that information is made available to the community.
- The information about the site and specific OUs is very complicated and complex to explain and read through. The EPA website can be challenging to navigate and find what you are looking for. Specific requests and suggestions included:
    - There should be more plain language used for the public.
    - CTEC has someone to distill down information, but that still may not be enough to be helpful for the public. Many of the folks involved with CTEC are retired

engineers and scientists and there is still difficulty for the average community member in understanding the material.
    - There needs to be follow-up and feedback from the community to the EPA to ensure there is adequate comprehension on the part of the community and adequate opportunity to influence outcomes.
    - Atlantic Richfield is working to have more transparency and information during the upcoming work on BPSOU. Specifically, they are planning to share more information regarding traffic and public plans during remediation. The Atlantic Richfield website is being used to try to have more publicly available information and links to helpful places.
    - Community members suggested that creating a website with calendars of scheduled activities and utilizing social media would be beneficial.
    - Becoming more active in engaging with the media.
    - Creating a user-friendly, public clearinghouse of information would be helpful, such as a website with an interactive map showing all the areas that have been cleaned up.
    - Need to get the word out as the project proceeds that "Butte is cleaning up its Superfund sites so they can be delisted. Butte can be considered a 'clean' place to live and work."

Some OU-specific feedback from various stakeholders resulted in the following OU specific themes.

Warm Springs Ponds OU:

- Many believe that WSPOU provides great recreational opportunity to the public, and that the parks are very useful in addition to serving as a critical bird area.
- The annual tours at Warm Springs Ponds were helpful. Some suggest they should be reinstituted, and maybe used at BMFOU too.
- Warm Springs Ponds still being under the IROD is a point of concern. People want to see long term plans and to make it a priority right now. The lack of information about the progress is concerning for many. The lack of current action was also mentioned as a concern, along with it not being a sufficient or complete remedial action.
- The ponds have become such an important bird area that it would be doing significant damage to the current migratory paths if they were capped or drained.
- There were mixed responses related to the fishing regulations:
    - Most people felt that everyone who fishes there is aware of the regulations. Many mentioned the booklets of information received when obtaining your fishing license and signage at the site that states the regulations.
    - Many were concerned that visitors and tourists, mainly in the springtime, might not be knowledgeable about Superfund or the fishing regulations. There were also mixed opinions about the reason for catch and release, and whether it was about the wellbeing of the fish population, or about the safety of eating the fish.
    - It was mentioned that some tourists are unwilling to listen to the rules. Some people do not see the signs, and more signage would help with more direct wording and explanations about why the regulations exist.
    - It was also mentioned that the regulations are very complicated to understand. They could be more uniform and have better explanations of the management goals.

West Side Soils OU:

- A noted concern is that if soils are present and not cleaned up, restoration dollars will be unavailable.

Stream Side Tailings OU:

- Many are very happy with how SSTOU has been remedied and are also happy about the consent decree. It is believed to be a model remediation and has been an area of significant transformation.
- Some questioned what the roles are going to be moving forward, towards completion- Is Deer Lodge county taking over?

BMFOU:

- There is a lack of communication/transparency about the water treatment taking place at BMFOU. Many would like to know more about the treatment and what exactly is taking place. Some questioned how water is managed coming out of BMFOU and its downstream impacts on the ecology. Also mentioned that very few folks understand who gets to make decisions at BMFOU and how water quality is being managed and would like to see community forums addressing those things.

BPSOU:

- Work done to date on the Butte Hill has vastly improved quality of life for Butte's citizens and has improved people's health and livelihoods.
- The open spaces created by the cleanup in uptown Butte, such as Foreman Park, are wonderful.
- There are concerns about long-term maintenance and monitoring. Specifically concerns that remedy areas will need ongoing maintenance and monitoring for hundreds of years.
- Many are very encouraged by the consent decree for BPSOU and are excited to see what comes of it.
- A community member indicated that the Site is a positive example of site reuse, and the consent decree will only add to that, regarding residential developments and businesses.
- Blood Lead Levels:
    - Those who were aware noted that the blood lead levels in children, and others, have come down substantially.
    - Some noted the difference in standards/action levels between Butte and Anaconda. It is hard to explain from a community health standpoint. It is odd that the standards are different, and the standards that are in place seem arbitrary.
- Concerns:
    - Was mentioned that the schedule endorsed by EPA officials for the delisting of BPSOU in/beginning in 2024 is unrealistic.
    - Remedy for BPSOU is located in the heart of butte and surrounded by urban areas, will involve interaction with the public, and will pose a risk and other issues.
    - There needs to be an air monitoring system for the Butte Repository on Butte hill.
- RMAP:
    - Those who were familiar felt that RMAP is a major accomplishment in terms of environmental justice. It is a national model of a successful program to address lead

and arsenic. There has been excellent outreach to the community. The RMAP staff are professional, competent and effective.
    - Seven responders indicated that they had participated or knew people/family members who participated in the program.
    - Comments specific to outreach options and expansion of the program:
        - Concern about if it has enough staff and equipment when it gets expanded and to acquaint new folks with the program.
        - Many are concerned that renters are not included in the RMAP program. It is only available to owners as it currently stands. Touching base again with the landlords association would be good, as well as a periodic re-promotion of the program. Some landowners don't know, and as they change, they may need another reminder. There is also no means for another entity to come in and assess/remediate, like Atlantic Richfield or the EPA, if the landlord isn't interested in participating in the program.
        - May not be using the right media to reach out to residents. Mailers are good, but social media, billboards, possibly other formats, should be added.
        - Door to door survey of the community about the program could be helpful.
- Repository:
    - All interviewees who answered said they don't mind where it is located, and the current location is seemingly the best place for it to stay. It limits the negative effects/exposure in the area. It isn't infringing on anyone and seems safe and adequate.
- Restoration of Silver Bow Creek:
    - ROCC reiterated their desire for the first mile of the creek to be restored.

Rocker OU had no OU specific themes.

Finally, there were several respondents who indicated the EPA needs to view the site as a whole watershed, instead of in separate pieces. This includes considering the interactions between the Silver Bow/Butte Area, Anaconda Co. Smelter, and Milltown Reservoir Sediments/Clark Fork River Superfund Sites. Some suggested that the EPA should have developed a comprehensive plan from the beginning that coordinated all of the seven operable units and a way to explain how the OUs were tied together or an end vision for Butte. Similar frustration was had about the fact that the OUs cannot be disentangled and divided up by geography rather than grouping them all together.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Treat Suomi	**Interviewer affiliation:** Skeo
Subject name: Loren Burmeister	**Subject affiliation:** Atlantic Richfield Company
Subject contact information: Loren.Burmeister@bp.com	
Interview date: 9/30/2020	**Interview time:** 2:00 pm
Interview location: Phone	
Interview format (Select):	Phone
Interview category (Select):	Community Organization

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I live in butte, on the southeastern edge of butte. I am intimately familiar with all of the OUs and can answer questions on all of them.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   I am aware of the 100+ years of spreading contamination and around butte. Mining materials were washed downstream, and it resulted in contamination in the silver bow creek and the creation of the

Warm Springs Ponds. 17 smelters spread contamination in Butte, and it is being addressed through the RMAP program.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   Butte cleanup is confounded by the fact it is in the middle of a residential neighborhood, and the cleanup has to take that into account. It leads to unique remedies, for example the groundwater beneath public areas had a controlled groundwater area put in place to collect and treat the water that is underneath Butte. A removal might have been a more permanent solution, but because there are homes and business, removal wasn't an option. Contamination exists on residences and on public properties. The whole City of Butte is considered and perceived as "dirty." Butte has unfortunately been defined by its Superfund status. It has stifled growth in the area and deterred people from moving there. Because of the consent decree, a large remedy has been agreed to that will make the remedial component an asset to the community and an opportunity for them to capitalize on future economic growth. Berkeley Pit may have other opportunities in the future for reuse or continued use. Reuse can be supplemented with the remedies and can be an economic booster.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   The remedy that we have to implement specifically in BPSOU is located in the heart of Butte and surrounded by urban areas and will involve interaction with the public and will pose a risk and other issues. I'm not concerned that we can't manage it appropriately but will need to be cognizant of getting the work done effectively and keeping people safe. We will implement detailed traffic and site control plans they will submit to EPA for approval to make sure they are protecting the public and community engagement plans. BSB, MDEQ and EPA will be working with us.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   From a citizen standpoint, there are a number of websites available that outline what has been done and what will be done, and future plans from EPA, Atlantic Richfield, and BSB. They take highly technical information and consolidate it down to be readable on the Atlantic Richfieldwebsite. It obviously doesn't reach everyone, but it gives a good avenue for the public to be informed. We've held a number of public engagement forums where we tell them what we are doing and seek their input. We advertise those meetings and have them in comfortable settings and try to get a range of people and give them an opportunity to be heard. The media is reached out to occasionally and vice versa. We need to become more active in engaging with the media to ensure getting the information out. The best way for the public to get their thoughts out is through CTEC, and they help them distill technical information down and present it back to the public.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   As a citizen, generally I think the opportunities are there to be informed, but they haven't been well advertised. The EPA site has a lot of useful information, but the website is hard to navigate. Sharing with the public is a challenge, as it is here. but it's not easily or intuitively accessible. AR's website has links to helpful places like EPA Region 8 to help get the information out.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   Atlantic Richfield has a broad and diverse team of technical experts that are fully utilized to ensure they are selecting the best technologies. EPA has technical consultants that are well positioned to perform analysis. Between the two parties they have a wide range of expertise available to make the best decisions for public health and the environment. The third piece, CTEC, hired a tech expert to weigh in on components. Montana resources as well and the three of them share information on BMFOU and BPSOU to ensure the protective remedy in place has the most accurate and up-to-date data. The cleanups across Butte Hill are extensive, over 600 acres of the mine dump that have been capped and revegetated. Some were made into parks, and some were more limited in public access. The caps are good and well maintained. They have improved the appearance and quality of health in Butte. Also engaged with a Montana tech ecology expert to have a biodiverse set of plant species/native species in the reclamation.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and- release only. Are most people aware of the fishing regulations?

   Yes, anyone who fishes out there is very aware. As a fisherman it is our responsibility to check the regulations. FWP provides booklets of information and at Warm Springs Ponds there is signage at the site that states the regulations. A lot of people may not realize it is a public access area for fishing/recreation.

9. All reclaimed areas in the Butte Priority Soils Operable Unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   Trespassing is fairly common on the sites. A lot of encroachment from neighbors with vehicles, and private property migrating onto the site. Atlantic Richfield has a process for this, where vehicles get tagged and removed if they are left there long enough. Property damage happens commonly in the summer, and occasionally lit on fire from fireworks. BSB Fire Department tries to mitigate, but it does happen, though it hasn't caused any problems because the cap is thick, and vegetation grows back quickly. We'll continue to manage vandalism and trespassing, but it hasn't caused any risks to the environment or human health.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

    Yes, I'm aware and have utilized it at a previous residence in the attic, it was contaminated, and they remediated the lead and arsenic and re-insulated it. The metal monitoring program has shown lower blood lead levels and shows that the program is effective.

11. Have you or your family members participated in the RMAP program?

    Yes, I did, no one else.

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

Own.

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

I know that the RMAP does extensive advertising because they have metrics that they need to meet. It is sometimes a challenge to find people to voluntarily participate in the program. If someone isn't aware of the program, they should be.

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

I think the largest challenge with RMAP is with the renting community. For many rental properties around Butte, the landlord isn't interested in participating in the program. That is not fair the renter. There is also not really a means for another entity to come in and assess/remediate like Atlantic Richfield or EPA. EPA needs to use their authority to ensure health by insisting that something be performed by the landlord to make sure the tenets are safe.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

No, the repository is positioned in a prime location. It can't affect groundwater because it is so high up. Any runoff goes into the Berkeley pit and will eventually get treated. It is fenced and there is limited potential to harm human health. It sits far from residential area and is in a prime location for waste disposal.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

BSB Superfund Department

17. Is there anyone else we should talk to?
Josh Bryson, Joe Griffin, Michelle Shay

18. Is there anything we have not covered that you would like to share?

No

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

Yes

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Dana Barnicoat	**Interviewer affiliation:** EPA
Subject name: Joe Griffin	**Subject affiliation:** Community Member
Subject contact information: jgriffin.redmountain@gmail.com	
Interview date: 10/2/2020	**Interview time:** 11 am
Interview location: Phone	
Interview format (Select):	Phone
Interview category (Select):	Community Organization

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I live in the lower west side of Butte, in BPSOU. I'm familiar with all of them, BPSOU, mine flooding, WSP, and SSTOU mainly.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

I don't know so much about the human health side, as a hydro geologist. Personally, I think this is a healthy place to live.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   It's all in progress, and the parts are all coming together. I used to work at firm that monitored the mines. I've seen how it's progressed over time. There was trial and error progress by releasing water into the creek. It's taken 47 years because the science and technology takes a long time to put everything together, but it has been building the blocks for a really good remedy. It wouldn't have mattered whether the consent decree was signed or not, the EPA stated what work needed to be done.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   I am interested in seeing these storm water ponds built and how well they work and where we end up going with that. How well they work depends on optimizing their operation. My main concern is that we need to look at this as a holistic think across the whole Clark fork watershed. When can we start to look at balancing that? The USGS has somewhat done that in their annual meetings. They mostly talk about Clark fork but have moved on to Silver Bow Creek in those discussions.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   Through my contacts with EPA, USGS, contractors, Atlantic Richfield etc. I am an active member of CTEC since the 90s. As part of CTEC, we are invited to technical meetings and that ensures me this is going in the right direction. For me being a scientist, I can get the water quality data from USGS, from Atlantic Richfield through their new data portal, and I can call MDEQ and get their data about once a year. It is all readily available data. Allie also got me data I wanted from Atlantaic Richfield. I've talked to ROCC and they still have some problems with creek, but the rest of community is on board with a park rather than restoring the creek. Certain people have an agenda, and some want it done the right way.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   It hasn't been as good as it is now. It has been improving. It was hard for people to understand that negotiations are something always done in private. The technical side was being presented, but it is hard for the public to get that. The meetings are good, but I am not sure how helpful the fact sheets are. The newspaper, radio, and TV are important, but most people don't want constant information on this, just milestone moments. Yes, I inform myself.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

CTEC, the county health department and Karen Sullivan. What is really hard for the community to understand is that the Superfund site isn't going to cure all your ill's. We have an active mine and there is dust coming off that mine. Julia Crain and Eric Hassler are good. Atlantic Richfield too but folks trust them less than EPA.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and-release only. Are most people aware of the fishing regulations?

I am aware and I am interested in the fish in the Clark fork. I think five years ago or so FWP decided they better establish fish regulations on SSTOU. They did studies and although it is catch and release, they don't want to further stress an already stressed fish population. It largely goes beyond metals, and I personally urge NRD to look into nutrient and temperature management. One place NRD and remedy implementation fit together well was Milltown.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

I'm not aware of any.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

Yes, and the two amendments to ROD included RMAP. I think it is an example to the rest of the county. I have participated in the last two medical monitor studies. I think we live in a safe community. Atlantic Richfield has readily participated in the program and has been a good partner. What I hear in community is a concern with the action levels. People want to make links back to diseases, and I don't think it can be done. I believe in this program and I believe it is adequate.

11. Have you or your family members participated in the RMAP program?
Yes, very happy with it. My yard is fine, and had the attic rewired and cleaned.

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.
Own.

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

I think it is as good as it can get. Butte-Silver Bow tried all sorts of things and some people ignored it. I'm hoping the flagged properties work and will be able to be cleaned up in the future. One concern is for the people renting and the options available for those landlords don't want it.

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

    Not really.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

    No, I don't. It may not be well suited for the next phase. It's placed within the drainage of Berkeley Pit. I have never seen dust coming off of it. It could be expanded indefinitely. But it is an issue about where they can establish a new one, I am hopeful it can be at the mine.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

    Eric Hassler.

17. Is there anyone else we should talk to?

    The owners of Finland hotel, husband and wife, Michelle shay, all of the commissioners.

18. Is there anything we have not covered that you would like to share?

    They have largely completed rebuilding the creek. Managing stormwater is going to be the biggest effort since the consent decree has been finalized. I believe the extent of what is practical has now been agreed to by the CD. The ponds were meant to be left in place, and I understand why the IROD is in place. Silver Bow c

    Creek doesn't meet standards going into the ponds, but it meets them coming out, so the ponds are very effective. They need to think about managing the arsenic or leaving it alone and look at the other parameters. The arsenic is really high because it gets stored in the sediments, then it gets released in the spring/summer. They add Lyme in the winter, then the pH in the summer naturally goes high and it approaches 10 then it starts to release arsenic. It may be time for EPA and the state to start looking at the site as a watershed to look at broader picture.
    Warm Springs Ponds is very critical because it deals with Silver Bow Creek, Anaconda, and Clark Fork River. Superfund only covers metals issues, and I'm worried about temperature, habitat, flows, and nutrients with the ponds. EPA is dealing only with the metals, and that may have adverse effects on these other areas.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

    Include my name, as being the VP of CTEC, technical advisor of the Clark Fork education program, and on the technical advisory board of Clark fork coalition.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Treat Suomi	**Interviewer affiliation:** Skeo
Subject name: Casey Hackathorn	**Subject affiliation:** Trout Unlimited
Subject contact information: Casey.Hackathorn@tu.org	
Interview date: 9/30/2020	**Interview time:** 1:00 pm
Interview location: Phone	
Interview format (Select):	Phone
Interview category (Select):	Community Organization

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I live in Missoula and work with Trout Unlimited. I work on sites for water quality, BMFOU, BPSOU, SSTOU, and the ponds.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   Broadly, just being a Superfund site impacts the psyche of the town. I am an outsider in Butte, but

people are proud of the mining history. They are sad though about the negative impacts on community health, and what the future of the town looks like includes the health of the streams.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   SSTOU seems to be the furthest along, it has been a significant transformation. There are still some challenges, but a huge victory and a great story. I am encouraged by the consent decree for BPSOU. I understand that the Mine Flooding water is starting to be treated but would like to know more about the treatment and what is going on. Same with the Warm Springs Ponds, it has stayed on the interim ROD for a while. But I am interested in the next steps for ponds.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   Water quality would be the biggest thing. Figuring out how to treat and manage the storm water is a big deal. How water is managed coming out of Mine Flooding and its downstream impacts on the ecology, too. Similarly with how the ponds are managed.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   I go to a lot of meetings. Community forums from BTRC, CTEC, and meetings for roll out of the Consent Decree. I dive into the actual documents at times. I have an engineering degree and worked in environmental sector my whole career, and I still feel challenged working through the documents. EPA has done a good job leading up to the consent decree and I would like to see some of those efforts for other OUs. I have no one answer but having some presentations at community forums for informing people that are interested. For the folks that are engaged, it would be great to be able to speak to project managers and ask questions. There are lots of efforts put into big decisions like Consent Decrees, but there are lots of moving parts that going beyond those decision points, but other opportunities would be good. Very few folks understand who gets to decide at BMFOU and how water quality is being managed, and I would like to see community forums addressing those things.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   I've been around for about a decade. It comes in waves. For the ponds, there used to be an annual tour, and that hasn't happened for several years as far as I know. Something similar for BMFOU would be good too. It would be nice to have opportunities to visit BPSOU sites in progress to communicate what is happening.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   CTEC does a pretty good job as the TAG group in providing honest information. I have high regard for the professionals who work for the state and for EPA and consider them credible regardless of the frequency of communication. I haven't spent a lot of time up there. I am passively

aware and have been to Robert Powell's seminars but don't have much knowledge.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and- release only. Are most people aware of the fishing regulations?

   I am guessing that most of the general public is not, but most people that fish there probably do.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   No

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

    I'm only peripherally aware. I would say that my biggest concern would be that the action levels are different between the two counties of Butte and Anaconda, and it is hard to explain from a community health standpoint.

11. Have you or your family members participated in the RMAP program?

    No

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

    Own

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

    Not really familiar

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

    I don't know

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

    No

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

I would probably contact Nikia or someone at EPA.

17. Is there anyone else we should talk to?

No one comes to mind

18. Is there anything we have not covered that you would like to share?

I don't think so.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this
questionnaire in the Five-Year Review Report?

Yes, I'm comfortable.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Dana Barnicoat	**Interviewer affiliation:** EPA
Subject name: Alex Leone	**Subject affiliation:** Clark Fork Coalition
Subject contact information: alex@clarkfork.org	
Interview date: 9/29/2020	**Interview time:** 1:00 pm
Interview location: Phone	
Interview format (Select):	Phone
Interview category (Select):	Community Organization

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I live in Anaconda, close to downtown Anaconda. Mostly the ponds, mine flooding, and stream side tailings.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   Very aware, I moved to Anaconda to be closer to the issues. I put on some outreach events on Warm Springs Ponds before Covid. There are the human health effects and the broader Superfund stigma, and the community dogma that continues to impact these communities.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   For BMFOU, I do feel there is a lack of transparency in communicating with the community with what is happening and the taking of water from Silver Lake. They are taking water from YDT and mixing with Silver Lake and there is not transparency about how much is being discharged. There are rumors about Mitsubishi and Butte-Silver Bow. They need to be daylighting the complicated issues related to water use and discharge and why is this dilution happening. Warm Springs is biggest elephant in room. When Silver Bow Creek meets standards, my concern is this will linger forever, and I hope this Five-Year Review will spur some action and begin the process of going from interim ROD to final ROD. This is why we held these outreach efforts. I was very heartened when Ken and Allie set up tours. We are ready and hope EPA is ready to discuss the future of the ponds. SSTOU is a huge success story. There are some issues occurring, but the state knows and is working on them. It would be great to know the role EPA plays there in the long term, and I think the public would appreciate it. I was frustrated talking to Nikia and asking about the water mixing, and felt brushed off, like that is not for the public to know. And sometimes that is not helpful to the community. We want to know what is going on.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   The ponds filling with sediment, what the lifespan is on that, and issues with the French drain that catches contamination out of WSS.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   By talking to Allie Archer and project managers. They're working on getting more information out and publicly available. I currently have access to monthly reports which is helpful. EPA doesn't seem to have the ability to keep information updated, and it feels like my organization has more info on our website than EPA. I want to continue to partner with them. Part of the problem with communication is that the process is hard to explain without using complex terminology.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   Communication has been great on other operable units. The best thing that I've seen with EPA outreach is when there is a good motivated public outreach person. There is definitely a gap compared to the Milltown superfund site. CTEC seems too complicated and technical to communicate the basics.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   Local newspapers, especially the Montana standard, Clark Fork Coalition, and CTEC as they do try to be objective and not polarized. EPA RPMs as well. I don't know enough about that OU.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and-release only. Are most people aware of the fishing regulations?

I think so. I bet most of the locals are but tourists for sure won't know. I see people fishing there all the time and mention it to the people I see. I have seen and heard of tourists unwilling to listen and don't know about superfund. I don't think people are even seeing the signs. More signage would help with more direct wording and warnings of contamination in the fish.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   No, I don't know.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

    Yes, I think it's a good program. I think it's odd the standards are different for Butte and Anaconda; the standards that are in place seem arbitrary.

11. Have you or your family members participated in the RMAP program?

    My friends in Butte have participated, and I've heard it's been received well.

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

    Rent

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

    I think it's going well. KBMF, a local radio station in Butte does a good job in getting out information. That's how my friends and I have heard about it. It's good for people in their 20s and 30s.

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

    I think so. Some folks close to the active mine have concerns about historic waste versus the current waste. Ed Banderob, a Greely neighborhood activist.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

    I don't have enough knowledge.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

I would try calling Nikia.

17. Is there anyone else we should talk to?

Karl Hanney, Nora Saks

18. Is there anything we have not covered that you would like to share?

No

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this
questionnaire in the Five-Year Review Report?

Yes

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name:	**Interviewer affiliation:**
Subject name: Dan Olsen	**Subject affiliation:** BSB Commissioner
Subject contact information:	
Interview date: 10/16/2020	**Interview time:**
Interview location:	
Interview format (Select): Email	
Interview category (Select): Local Government	

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I live in the Basin Creek area, south of town. I grew up at Phillips & Marcia and frequented the Belle (nka Blacktail) Creek, Diggins (nka Diggings East), Copper (nka Silver Bow) Creek areas as part of my playground.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   Since I'm on the CD negotiating team, I'm now fairly familiar with all of the areas. As a child I was only warned away from "Copper Creek" due to the obvious signs of pollution. But we played and dug in the "diggins".

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

I believe that all of these areas need the cleanup. They all currently look like moonscapes (sorry Luna!) and belie the danger below. I believe the CD is a very big step in a long process. Although it probably isn't 100% clean, it is a step that has been needed for years. I think the "park" reuse will be a fantastic addition to the area and be a long lasting memorial to what was here before.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

I know that we won't get 100 percent cleanup, but we'll have a better handle on what further needs to be done. For example, the Parrott cleanup was more polluted than expected, but most of it has been removed. I believe we'll find out more as the shovels remove the top layers. I have hope we'll be getting the majority of the "dirty dirt"..

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

I've been attending most of the meetings (public and secret) on the site for the past couple of years. They've been most informative. Most folks probably aren't that interested in spending that time. I think regular media and online updates would be helpful to get the "true" status of the project out to folks (those who will listen)

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

I think there is info out there if you are interested. Most folks probably will get updates from the media, but some will always head down the "conspiracy theory" rabbit hole . . . It's hard to drum up interest in the project. All we can do is make it as easy to obtain as possible.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

CTEC is generally a good source, BNRC.
BPSOU still has some "holes" in its cleanup, but I believe that the CD addresses these in their Unreclaimed and Underreclaimed sites work plans. The initial BRES sites were a prototype project and for the most part worked. Based on 20 (?) years of experience I think we're learning from our prototypes as to what worked and what didn't.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and- release only. Are most people aware of the fishing regulations?

I believe they are. The folks who read the fishing regs do. We are regular visitors to the Warm Springs Ponds for wildlife (mostly birds) watching. We also attended some meetings on the

WSP project and learned more.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   None that I know of.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

    It is a great program. My only concern is that there are folks who don't know about it that could benefit from it. I also am concerned that currently we don't have a way to force landlords to allow the cleanup of their buildings. This would impact some lower income citizens who may be at greater risk of the CoCs in their dwelling.

11. Have you or your family members participated in the RMAP program?

    Nope. We're outside the current boundaries. But the bigger boundaries are coming.

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

    Own.

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

    I think in general it is good, but it could be improved (alas, I have no grand ideas of how to accomplish that)

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

    I think we're getting better at bringing in the stakeholders and their affected citizens. Again, we could do better.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

    I believe that it is an appropriate location for now. It'll be a long haul from the BPSOU along the creek, but its gotta go somewhere and it really isn't in anybody's "backyard".

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

17. Is there anyone else we should talk to?

18. Is there anything we have not covered that you would like to share?

We also need to get the word out as the project proceeds that "Butte is cleaning up its SuperFund sites so they can be delisted. Butte can be considered a 'clean' place to live and work."

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

I don't mind being on record as a Commissioner. I'm doing what any engaged elected official should be doing. Listening, discussing and evangelizing.
Thanks for asking.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Dana Barnicoat	**Interviewer affiliation:** EPA
Subject name: Gary Swant	**Subject affiliation:** Community organization-GoBirdMontana
Subject contact information: GoBirdMontana LLC - gobirdmontana.org, birdmt@charter.net	
Interview date: 9/28/2020	**Interview time:** 9 am
Interview location: Phone	
Interview format (Select):	Phone
Interview category (Select):	Community Organization

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   I do consulting with Atlantic Richfield on birds. My knowledge is about trying to keep the birds out of the pit. For 10 years I have been doing bird surveys at Warm Springs. I am generally knowledgeable about the Berkeley Pit and Warms Springs, but not as much about other areas.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   I grew up in Deer Lodge and am generally knowledgeable. I am aware of the flooding and the

river sometimes running red or green. I was taught you don't go down to the Clark Fork River, and that it is dangerous.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   I taught biology at the high school in Deer Lodge. We used to go do sampling at the Clark Fork River. There was nothing alive. Since then the river has really recovered. Now there is fish all the way up to Warm Springs Ponds. Most of my knowledge about the restoration is from Warm Springs to Deer Lodge, downstream and not the upper reaches.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   My greatest concern is the final disposition of the Warm Springs Ponds. This a significant fall and spring migration staging area for birds. We need to restore Silver Bow Creek and eliminate the ponds. That might be historically accurate, but the ponds have become such an important staging area that we would be doing significant damage to the current migratory paths if they were capped or drained.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   I don't think the general public understands a lot about the site. I know there is an effort to get folks to understand through articles and such. But as I talk to people, they do not have a good sense. I don't think the average person in the upper Clark Fork really understand. There are organizations like Restore Silver Bow Creek. Also, people don't understand the difference between reclamation and restoration. People who think that we are going to get it back to how it was originally don't understand.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   Yes, I think I have. I know Nikia Greene personally, and I am in meetings with him. So I have a bit of a bias. I know that the Consent Decree was just accepted, and it is in the paper and there is currently a lot of information about it.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   I can't really answer that question because my knowledge is from Warm Springs Ponds, and south. So I don't want to comment on that piece.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and-release only. Are most people aware of the fishing regulations?

   Yes, most people are aware. I am out there weekly doing bird surveys, and it is one of the hottest fishing areas in SW Montana. Sometimes there are as many as 50 people fishing out, and I think it is well appreciated. It is one of the best birding areas in the state, but there are nowhere near the

number of birders as fishers. When I am out there people ask why we cannot keep the fish and I joke that they glow in the fridge. Not really - but I joke. I have never seen birds that eat the fish die in the area and the fish are probably okay to eat, but it is probably better to say you cannot from a legal perspective.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

I don't. The only thing that happens is mother nature. Summer thunderstorms results in soil leaching into the river, and I have seen fish kills.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

No, but I am aware of it in Anaconda.

11. Have you or your family members participated in the RMAP program?

No

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

Own

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

No comment

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

No comment

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

I think it is safe and adequate.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

The Silver Bow government but I don't know what particular department.

17. Is there anyone else we should talk to?

Two people at MT Tech - Dr Stella Capoccia and Dr. Robert Powell

18. Is there anything we have not covered that you would like to share?

Going back to Warm Springs, it is suitable to be an important bird area (IBA). And I am concerned that those ponds stay where they are at, rather than restore the creek to 1908 conditions. It is vital to the migration of many waterfowl species, that is why Fish and Game hired me to do the bird surveys.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

I would like to go on record. Next spring Atlantic Richfield is contracting with me to take people to go on bird watches. So we will be doing free bird walks in the spring.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Dana Barnicoat	**Interviewer affiliation:** EPA
Subject name: Mark Thompson	**Subject affiliation:** Montana Resources
Subject contact information: MThompson@montanaresources.com	
Interview date: 10/22/2020	**Interview time:** 1:30 pm
Interview location: Phone	
Interview format (Select): Phone	
Interview category (Select): PRP	

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   BMFOU is what I am involved in as part of my work for MR.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   I am very experienced with BMFOU RIFS and issues identified here and in the Consent Decree in mine flooding. I am knowledgeable of the groundwater contamination, and Horseshoe Bend. There is a divergence from the community perception about BMFOU versus how it is actually managed. In actuality, the work to date is well advanced past what is required, and the success is a

demonstration of responsible management of the site by those involved. There was good foresight and getting started early was critical. I think overall the pit is perceived as an unmanaged issue, and that is a shortcoming on all parties involved by not being able to make a good statement about how it is well monitored and managed.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

   I think for BMFOU is being done responsibly and successfully.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   For BMFOU, I'm confident the remedy can be implemented effectively so the biggest concern would be demonstrating that and getting that message out to the community. I think people are getting the information differently. PitWatch was made to try to effectively engage the community and it was effective with printed media, but now they need to move toward social media. Right now there is a gap with perception.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   We're in a dynamic era of information transmission, and PitWatch has to adapt. They are heading in that direction.

6. How effective has EPA or the state's communication been in the past? Do you feel that you have been kept adequately informed?

   I think a lot of the rules with public notices and meetings, is changing. People don't really show up to meetings to be educated, but the agency still follows those rules, and they need to adapt like PitWatch. MDEQ and EPA want to be transparent, and desire to educate and communicate, but people can get information on so many platforms and we need to find how to best reach people.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   No comment on BPSOU. CTEC is a good organization for distributing info, PitWatch, BSB, Atlantic Richfield, and Montana Resources

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and- release only. Are most people aware of the fishing regulations?

   I think those who fish there are aware, from verbal communication. Outside of my interactions I don't know how widely understood they are.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System (BRES). Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   Not aware.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

   Not involved or familiar in my capacity

11. Have you or your family members participated in the RMAP program?

   No

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

   N/A

13. How do you feel about the level of outreach to the affected residences and businesses, regarding RMAP?

   N/A

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

   N/A

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

   From a mine flooding perspective, it is a good location because the groundwater and surface water impacts are well contained.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

   Police, or MDEQ for permit violations.

17. Is there anyone else we should talk to?

No

18. Is there anything we have not covered that you would like to share?

    I am pleased with where MR is with the Consent decree and implementation of the remedy, being well in advance of the CD deadlines. It was very responsible from all parties involved and I'm pleased with how the project has progressed.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

    Yes

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name: Dana Barnicoat	**Interviewer affiliation: EPA**
Subject name: ***Restore Our Creek Coalition ROCC Northey Tretheway, spokesperson***	**Subject affiliation: Community Organization**
Subject contact information: ntretheway59701@yahoo.com	
Interview date: 9/30/2020	**Interview time:**
Interview location:	
Interview format (Select): Email	
Interview category (Select): Community Organization	

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   Restore Our Creek Coalition (ROCC) is composed of members from throughout the community.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

ROCC is most familiar and focused on the Butte Priority Soils Operable Unit (BPSOU). The contamination, right in the center of our community along the first mile of the Silver Bow Creek corridor, is from years of mine waste deposition and the accidental release of mine waste. The state of the mining laws that were in place have allowed the waste to be left where it was, and it has all led to leaving Butte where it is now.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

ROCC believes that the community has given a good effort and most recently, there was a good effort on the part of the people from the EPA, specifically Mr. Doug Benevento and Mr. Nikia Greene. It is evident that the EPA folks, in recent times, have listened to our community members and our desire to get the best cleanup possible; although some in our community believe EPA sanctioned cleanup has not gone far enough.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

Our greatest concern involves the fact that much of the cleanup requires perpetual treatment. Because there is much contamination capped and requires constant monitoring and treatment, the potential for problems will remain in the future. Because the cleanup was not done in a comprehensive manner and the contamination was not fully removed now, our fear continues that work already done will need to be done again to remedy that which was not done sufficiently.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

We look for information put forth by local government and the EPA. Due to our coalition status, we also hear from a network within the Butte community. Successfully disseminating information from the EPA about the site requires three objectives: 1. Ensure that the technical information is understood (plain English) by the stakeholders within the community; 2. The medium to inform about the information must reach all of the community and must take place on multiple media pathways; 3. There needs to be follow-up and feedback from the community to the EPA to ensure there is adequate comprehension on the part of the community and adequate opportunity to influence outcomes.

Bill Macgregor with ROCC has a study specific to this topic. The study indicates that the methods presently used by EPA with regard to the BPSOU and other Butte OU's, was the least effective for getting information to the public. Dana Barnicoat with EPA is now aware of the study and promised to contact Bill Macgregor to get a copy.

6. How effective has EPA or the state's communication been in the past? Do you feel have been kept adequately informed?

During the five year history of ROCC, we have witnessed a strong improvement in communication between our group, the community and the EPA. Mostly, this is due to the genuine effort on behalf of several individuals within the EPA, specifically the local group of Nikia Greene and Joe Vranka, and EPA administrators like Doug Benevento and Andrew Mutter.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

During the past five years, Restore Our Creek Coalition (ROCC) has taken the lead in working with the community to learn what our community wants to see in terms of cleanup and restoration in the BPSOU. ROCC, in working with the community, hired a New York land architectural firm to develop a comprehensive end land use plan for Silver Bow Creek. The document, ***Silver Bow Creek Headwaters Park****, was presented to the EPA and other stakeholders in 2016. Further, ROCC gathered 3,500 signatures in support of a restored Silver Bow Creek in the very first mile from Texas Ave. to the confluence with Black Tail creek. CTEC (Citizens Technical Environmental Committee) secured EPA TAG funds to conduct a feasibility review to confirm EPA's assurance to ROCC that remedial plans proposed for the Upper Silver Bow Creek Corridor would not preclude the restoration of the creek desired by the community.*

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and release only. Are most people aware of the fishing regulations?

No Comment. ROCC is focused on the first mile of Silver Bow Creek in the center of Butte.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System. Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

We are aware that erosion is occurring on capped waste areas and that cover is insufficient in many areas. Money should be redirected to proper remediation in several of these areas.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

No Comment (see # 8)

11. Have you or your family members participated in the program?

Not applicable for ROCC

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

Not applicable for ROCC.

13. How do you feel about the level of outreach to the affected residences and businesses?

ROCC is not involved with RMAP.

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

ROCC is not involved with RMAP. However, all issues and concerns of the community regarding EPA remediation and study, including the BPSOU, must always be addressed in the most effective ways possible. See response involving Bill Macgregor in response # 5. Our concerns about residents in the Upper Silver Bow Creek Corridor entail both environmental justice concerns associated with proposed remedial systems in the corridor and the potential for transient exposures during and after subsurface disturbances.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

ROCC is not involved with the Mine Waste Repository. Our sole focus is on the first mile of Silver Bow Creek between Texas Ave. and the confluence with Black Tail creek. We agree with residents who seek assurances that no repository will be sited near their homes.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

Butte-Silver Bow County Health Department and Butte-Silver Bow Sherriff.

17. Is there anyone else we should talk to?

All concerned groups within Butte Montana.

18. Is there anything we have not covered that you would like to share?

One final comment: Remediate the source in a comprehensive way to protect the future… AND "Fix the 1st mile of Silver Bow Creek".

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

Yes

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name:	**Interviewer affiliation:**
Subject name: Brian Bartkowiak	**Subject affiliation:** Montana Dept of Justice, Natural Resource Damage Program
Subject contact information: brian.bartkowiak@mt.gov	
Interview date: 10/27/2020	**Interview time:**
Interview location:	
Interview format (Select):	
Interview category (Select):	

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

   Warm Spring Ponds (OUs 4 and 12)

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

   I've been working in the Upper Clark Fork Basin on various sites since 1997. I am fairly familiar with the WSP.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and

reuse activities?

Since the first pond was constructed in 1917, they have been effective at treating contamination before entering the Clark Fork River. As upstream site are cleaned up, operation of WSP should focus on not only treating water, but maximizing the amount of cold, clean water to the Upper Clark Fork to support the remediation and restoration work, as well as maximizing aquatic and terrestrial habitat.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

   The Natural Resource Damage Program (NRDP) is concerned that a complete feasibility study of all potential options will not be performed as part of the final decision on WSP, including both OU 4 and OU 12. Allot of activities have occurred since the interim ROD in 1995 and options that were not feasible 25 years ago may be feasible today.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

   EPA tour of WSP. I believe a lot more outreach needs to be performed to inform the community of what WSP are and what benefits and potential impacts they have on the Upper Clark Fork River.

6. How effective has EPA or the state's communication been in the past? Do you feel have been kept adequately informed?

   No

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

   No comment

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and- release only. Are most people aware of the fishing regulations?

   Probably not.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System. Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

   No comment

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

    No comment

11. Have you or your family members participated in the program?

    No

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.

    N/A

13. How do you feel about the level of RMAP outreach to the affected residences and businesses?

    No comment

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

    No comment

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

    No comment

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

    Montana DEQ

17. Is there anyone else we should talk to?

18. Is there anything we have not covered that you would like to share?

    A major limiting factor in the success of remedy and restoration in the Upper Clark Fork Basin in the availability of cold, clean water. Current and future cleanup should focus on maximizing the amount of cold, clean water in the upper Clark Fork.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

    Yes

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name:	**Interviewer affiliation:**
Subject name: Dave Griffis	**Subject affiliation:** Atlantic Richfield Co
Subject contact information: dave.griffis@bp.com	
Interview date: 10/10/20	**Interview time:**
Interview location: remote/self completed	
Interview format (Select):	Email
Interview category (Select):	PRP

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this **interview?**

I reside on rural property North of Anaconda. I am familiar with the Butte Treatment Lagoons and Warm Springs Ponds.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the **community?**

WSP has a very long history that extends back to the early 1900s when embankments began being constructed in response to tailings migration down Silver Bow Creek due to runoff events and impacted materials from upstream mining activities. The site has been improved throughout it operating life and

currently the site contains water treatment systems, several wet and dry closures with tailings remaining in place as well as wildlife habitat and recreational features. Through ongoing water treatment activities, the site continues to mitigate possible migration of impacted material from upstream mining impacted sources and attenuates runoff/flooding effects from high flow events in the basin. In addition, the dry closure and wet closure areas effectively prevent migration of previously consolidated impacted materials throughout the Clark Fork Basin and form a barrier to several potential receptors. The WSP site serves as a popular and valuable a public recreational area (fishing, hunting, wildlife viewing, bike riding, etc.), and an award-winning habitat area for wildlife. Some of the perceived negative effects include the presence of high hazard dams (classified as such in accordance with State of Montana Dam Safety Regulation definitions) and residents limited awareness and acceptance of contamination and the risks associated with a superfund facility within the upper Clark Fork River basin.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse **activities?**

Very Positive. The site is well-monitored on a daily basis and well-maintained by a professional team. Safety of personnel and the public are very important in the day-to-day operations. In addition, embankment stability and the risks to environmental receptors and downstream properties, individuals and businesses are a high priority in how the site is maintained and continuously improved. The site owner and regulating agencies work together to ensure consistent and effective water treatment throughout the year under changing conditions, the recreational amenities and opportunities are managed and conducted by professional Fish, Wildlife, and Parks personnel. Updates and improvements to the water treatment systems, site embankments and various wildlife habitat components are carefully planned and executed on a regular basis to ensure the site function and resource value is optimized. BTL [Butte Treatment Lagoons] operations are operated and managed in a similar manner, Recreational opportunities at this site are currently limited, however there are valuable opportunities which can be advanced following completion of upstream remedial activities.

4. What is your greatest concern moving forward with the cleanup at the site or in specific **areas?**

Currently the WSP site provides the final assurance that unintended consequences of all upstream development and remediation activities will have limited impact on the downstream Clark Fork River system. Significant change in the operations of either the WSP or BTL systems such as reducing or discontinuing maintenance of the treatment systems and embankments would result in measurable negative effects downstream. In addition, changes to the WSP site could significantly change recreational resources and wildlife habitat value that has been established and improved over the 100+ year life of the site.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the **site?**

Through owner and agency communications, public presentations from local groups. Informational inserts in the newspaper, social media, internet site, and site tours with the community.

6. How **effective has EPA or the state's communication been in the past? Do you feel have been kept adequately informed?**

Due to focus and public interest at other sites, limited communication about the WSP and BTL systems from agencies and the site owner have been shared with the public in recent years. Additional factual communication would be beneficial, and recently efforts (within last 18 moths) have been improved. Through continuing public presentations and scheduled informational site tours all interested parties

and individuals will be more fully informed.

7. What organizations or people do you **consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?**

BP, Federal, state, and local agencies, and local technical groups. Through cooperative efforts these groups have been successful in progressing beyond the minimal remedial actions and are able to develop these sites as valuable recreational resources as well as important wildlife habitat areas when/where it is appropriate.

8. The **Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and-release only. Are most people aware of the fishing regulations?**

Yes, recreationists at the site have historically been well aware. Regulations are posted at each fishing access location as well as on the current FWP website. Finally, independent signage regarding swimming is displayed at the WSP site in key locations.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, **exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System. Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.**

N/A

10. Are **you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?**

Yes, no concerns.

11. Have you or your family members **participated in the program?**
N/A

12. Do you rent or **own where you live? Please only answer this question if you are comfortable doing so.**

Own

13. How do you feel about the level of outreach to the affected residences and **businesses?**

Satisfied

14. Do you think **there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?**

Not that I am aware.

15. Do **you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?**

The location minimizes exposure and risk to the community and other potential receptors. In addition, it is in a location that minimizes the potential for migration of materials away from the Silver Bow Creek\Butte Area Superfund Site. I do not have concerns with the current location, maintenance activities, or management of the site.

16. Whom **would you contact if you became aware of vandalism, trespassing or stormwater permit violations?**

Local authorities.

17. Is there anyone else we should talk **to?**

18. Is there anything we have not covered that you would like to share?

19. As a reminder, your responses will not be attributed to you unless you want **to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?**

Yes.

Silver Bow Creek/Butte Area SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Silver Bow Creek/Butte Area	
EPA ID: MTD980502777	
Interviewer name:	**Interviewer affiliation:**
Subject name: Daryl Reed, Joel Chavez	**Subject affiliation: MDEQ Project Officers**
Subject contact information:	
Interview date: 10/21/2020	**Interview time:**
Interview location: Helena, MT	
Interview format (Select): Email	
Interview category (Select): Local Government	

Interview Introduction

EPA conducts regular checkups, called Five-Year Reviews, at Superfund sites. A Five-Year Review is a way to evaluate the progress of cleanup actions and make sure they are protecting people and the environment.

As part of the Five-Year Review for the Silver Bow Creek/Butte Area Superfund site, EPA is speaking with community members to hear their concerns and gather more information about site conditions. We are interested in your opinions and would like you to be as candid as possible. Your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization.

We expect the interview to take about half an hour. Do you have any questions for us before we get started?

Site Orientation:

The Silver Bow Creek/Butte Area Superfund site covers 85 square miles in and around Butte, Montana. The site follows Silver Bow Creek from the city of Butte in Butte-Silver Bow County north to Warm Springs in Anaconda-Deer Lodge County. The site has seven areas, or operable units. Work focuses on arsenic and metals contamination from mining and ore processing. Contamination is widespread in soils, mine tailings, interior dust, surface water and groundwater.

Questions:

1. Which neighborhood do you live in? Which operable units are you most familiar with and would like to discuss during this interview?

MDEQ is responding to this Five Year Review for the entire site and will provide operable unit specific feedback, if applicable, accordingly throughout this questionnaire.

2. What is your understanding of the history of contamination at the site/specific site areas and their effects on the community?

Overall Response: Much has been written or spoken about regarding the impact mining has had on the current and future economic vitality of Butte and it's unique character. The difficulty lies is differentiating between the historic mining legacy, the still-visible scars of the Berkeley Pit and unreclaimed mine dumps, the Superfund

stigma, and the active mine operations at Montana Resources. There is hope that some of the remaining uncertainty will be resolved as the Priority Soils remedy is implemented in the coming decade.
SST (OU1): The Site was heavily contaminated with flood deposits and unregulated dumping of mine tailings and smelter waste from historic mining activity in Butte, MT. Until the Remedial Action began, this visible sign of environmental degradation negatively affected the community's attitude.

3. What is your overall impression of the site/specific site areas, including cleanup, maintenance and reuse activities?

SST (OU1): The cleanup was extremely successful, and the site has been properly maintained. The establishment of a recreational corridor/trail is a successful reuse of the site.

4. What is your greatest concern moving forward with the cleanup at the site or in specific areas?

SST (OU1): The Operation and Maintenance of the Site continues.
BMF (OU3): The PRPs have accomplished much during the last five years including construction, commissioning, operation, and testing of the Polishing Plant which has been discharging treated water since September 30, 2019 along with pumping water from the Berkeley to maintain a steady water elevation. The SDs also completed and submitted the draft Remedial Action Adequacy Review (RAAR) Technical Memorandum. The State is concerned that the RAAR does not address the long-term integration of the components needed to maintain the BMFOU remedy, which will likely require use of a large equalization basin like the Yankee Doodle Tailings Impoundment or the Continental Pit between the Horseshoe Bend Water Treatment Plant and the Polishing Plant.
WSP (OU 4 and 12): The interim remedy outlined in the Record of Decision which focuses on stabilization of the high hazard dam and on surface water treatment have been successfully implemented. The concern in the near future is the challenge of completing a robust Remedial Investigation and Feasibility Study based on the existing conditions and evaluating the options for the long-term disposition of the buried tailings within the ponds.
Rocker (OU7): There has finally been acknowledgement that the remedy has failed to meet the Remedial Action Objectives and Atlantic Richfield is completing a Focused Feasibility Study that may lead to an alternative remedy to remove the source material. The concern involves the length of time to complete the administrative process to amend the Record of Decision and the Consent Decree. Also, if the alternative remedy continues to rely on monitored natural attenuation there will need to be a long-term groundwater monitoring program.
BPS (OU8): The previous issues that the State had with the 2006 ROD will be addressed through the Governor's decision to remove the Parrott Tailings, the extensive removals at the Diggings East and Northside Tailings, the floodplain removals at Blacktail Creek and the Butte Reduction Works, and the expanded groundwater capture all outlined in the Consent Decree. Concerns now focus on whether EPA continues to provide the level of oversight needed to ensure the Remedial Design and Remedial Action implementation is successful.
WSS (OU13): EPA has apparently done a thorough job of characterizing the mine waste dumps on the abandoned mine sites and directed Atlantic Richfield to do the same level of effort on properties they own. (MDEQ has not been provided the draft Remedial Investigation to review.) The concern will be whether EPA has sufficient funding to implement the remedies at the abandoned sites.

5. How do you learn about what is happening at the site now? What do you think are the best ways to keep the community informed about activities at the site?

Overall Response: As the support agency, DEQ is actively involved with reviewing and commenting on the documents developed by Atlantic Richfield and EPA. Continued community involvement through various medias such as email, website, newspaper articles, and public meetings are effective ways to keep the community informed.
SST (OU1): The MT DEQ continues to manage the Site. Use of the recreational trail and word of mouth, seem most effective. Also, providing easy access to the DEQ project officer for the public via in person or telephone, is most effective for technical questions.

6. How effective has EPA or the state's communication been in the past? Do you feel have been kept adequately informed?

SST (OU1): Communication regarding the site has always been open and completely informative.
BMF (OU3): There is an on-going concern within the PitWatch group on how to inform the public about the basic concepts of the remedy like the protective water level, slope stability, and source of Butte's drinking water.
BPS (OU8): The End Land Use workshops during the Consent Decree public engagement process seemed very effective for communicating and getting feedback on the future remedy.

7. What organizations or people do you consider to be the most credible on environmental issues in your community? What are your thoughts about the cleaned-up area in the Butte Priority Soils operable unit, where a Butte Reclamation Evaluation System (BRES evaluation system) is in place?

Some of the capping efforts completed before 1998 do not meet current reclamation specifications. These sites have been identified and will be addressed using the processes outlined in the Insufficiently Reclaimed Sites in the Consent Decree Statement of Work. The BRES program is robust in it's periodic, on-going assessments of the reclaimed sites. The program needs to be strengthened in how sites are addressed that continue to receive low scores for either Vegetative Improvement or Reclamation Improvement.

8. The Montana Department of Fish, Wildlife and Parks runs a designated wildlife management area in the Warm Springs Ponds operable units. Swimming is restricted and fishing is limited to catch-and release only. Are most people aware of the fishing regulations?

DEQ has not witnessed or heard of anyone violating the swimming or fishing restrictions. The fishing access sites have highly visible kiosks where the regulations are posted.

9. All reclaimed areas in the Butte Priority Soils operable unit, including capped and vegetated mine waste, are routinely evaluated for problems such as erosion, exposed waste, and barren or exposed vegetation based on the Butte Reclamation Evaluation System. Are you aware of any events, incidents or activities at the reclaimed areas, such as vandalism, trespassing or emergency responses from local authorities? If so, please tell us about them.

No.

10. Are you familiar with the Residential Metals Abatement Program, or RMAP? What is your greatest concern about the status of the program?

Some renters have supposedly had difficulty getting property assessments if the landlord/owner refuses to sign the access agreement. Hopefully this issue will be adequately addressed in the revised RMAP Plan which may require EPA intervention.

11. Have you or your family members participated in the program?
NA

12. Do you rent or own where you live? Please only answer this question if you are comfortable doing so.
NA

13. How do you feel about the level of outreach to the affected residences and businesses?

Overall Response: DEQ and EPA continue to extend efforts to reach more than the usual attendees at meetings. The community has been responsive to newspaper articles covering issues or upcoming work.
SST (OU1): It has always seemed adequate. DEQ has always become more available and proactive when issues, out of the ordinary have arisen.

14. Do you think there are stakeholders in the community who may be overlooked by the Residential Metals Abatement Program or who have not had their concerns addressed? Who should we talk with to learn more about these stakeholders' concerns?

Some renters have supposedly had difficulty getting property assessments if the landlord/owner refuses to sign the access agreement. Hopefully, this issue will be adequately addressed in the revised RMAP Plan which may require EPA intervention.

15. Do you have any thoughts on the location of the existing Butte Mine Waste Repository (on Butte Hill)?

The Butte Mine Waste Repository (BMWR) location has many benefits including that it is relatively close to projects for truck hauls yet not near any residential developments. It is also beneficial that stormwater and groundwater near the BMWR drain to the nearby Berkeley Pit.

16. Whom would you contact if you became aware of vandalism, trespassing or stormwater permit violations?

NA

17. Is there anyone else we should talk to?

Joe Griffin, Nic Tucci, Chris Gammons.

18. Is there anything we have not covered that you would like to share?

No additional comments.

19. As a reminder, your responses will not be attributed to you unless you want to go on record in your official position representing a local community group or organization. If you are representing an organization, do you consent to have your name included along with your responses to this questionnaire in the Five-Year Review Report?

These are DEQ's responses. Daryl Reed is the project officer for BMF, WSP, Rocker, WSS, and BPS. Joel Chavez is the project officer for SST.
Daryl Reed: dreed@mt.gov; Office: 406-444-6433; Mobile: 406-459-8569
Joel Chavez: jchavez@mt.gov; Office: 406-444-6407; Mobile: 406-431-2251

Fritz Daily

[redacted]

November 29, 2020

Please make the following comments part of the official record on the upcoming five year review of Butte Superfund sites.

As I wrote in September 30, 2009 and again on May 6, 2015 concerning the last two five year reviews my thoughts concerning this five year review are exactly the same. While I realize my thoughts will have absolutely no impact on the five-year review, I still feel compelled to offer the comments. **Sadly, the reality is the EPA, State and sadly the Local Government only have public hearing and request public input to satisfy the legal requirement to have public hearings and have absolutely no intension of listening to or responding positively to public comment.**

I only offer the comments because in the future when the children of Montana are dealing with the mess that is now in place because of these incompetent decisions, at least they will know some folks actually cared and tried to change some of these incompetent decisions. I would like to emphatically state that I believe the Environmental Protection Agency has totally failed Butte Montana with their incompetent Superfund decisions and have not protected the health and environment of the community as is required by Federal Superfund Laws.

I believe the cleanup and restoration of Silver Bow Creek, the Butte Hill, the Montana Pole Site, and the cleanup and restoration of the Berkeley Pit are the most important issues facing this community. I believe if we do not get a responsible resolution to these issues this community is going to fail---Environmentally, Economically and Socially.

Prior to the Atlantic Richfield Company, now British Petroleum Company closing the Butte Mines, the Anaconda Smelter, the Berkeley Pit, shutting off the underground mine pumps, and eventually closing the East Continental Pit in 1983 thus ending mining as was known in Butte Montana for over 100 years, Butte Montana was a thriving economically solid community of 65,000 to 70,000 residents. Today we are a community of 34,000 residents struggling to survive and grow.

The proposed decision on Butte Priority Soils Operable Unit by the Butte Silver Bow Local Government, the EPA, the State of Montana and ARCO is a bad decision! Not restoring Butte's portion of Silver Bow Crick to a quality creek where children can fish and play is unconscionable and an irresponsible decision! The decision is the final decision for the Butte Superfund area and it along with the Berkeley Pit and Montana Pole decisions will have forever-negative environmental, economic and social consequences for Butte Montana!

Lowering the discharge standards to the Creek to allow for discharge from an inferior Berkeley Pit Treatment and Polishing plant treatment is even more unbelievable! Obviously the EPA solution to the treatment and discharge of contaminated Berkeley Pit water to Silver Bow Creek follows the proverbial adage---The Solution to pollution is dilution!

As a former Seven Term Montana Legislator, life-long Butte resident actively involved in Butte Superfund issues for well over 35+ years, I wrote on March 1, 2005 on the proposed 2006 Record of Decision on Butte Priority Soils---"I would like to submit my letter and related information and ask that they be included as my strong opposition to the proposed plan by EPA and ARCO on Butte Priority Soils Operable Unit."

- **Sadly, every ingredient that was necessary to implement a responsible cleanup for the Butte Priority Soils Superfund Area has been articulated many times over to the EPA by**

myself and other concerned citizens over the past several years. For whatever reason, the EPA has totally ignored this input. Public input means nothing to the EPA! They only have public meetings to satisfy the legal requirement of having the meetings.

- **Everyone knows, including the EPA the State and Arco/BP, using good science that is now available because of research by the Butte Natural Resource Council that was not available prior to the 2006 Record of Decision, what needs to be accomplished to have a responsible cleanup under Superfund law. We deserve a solution that requires a cleanup and restoration that is protective of human health and the environment and the Montana Constitution that protects waters of the State--- No more deals, no more band aids!**

Also keep in mind I am not alone on my thoughts. As David McCumber of the Montana Standard has written in his excellent editorials;
"The EPA has asked Butte citizens what they think about it {their plan} and the answers it has received at two public hearings have been resoundingly negative.... And a plan that has little popularity among many of the townspeople who are paying attention won a 10 to 1 endorsement from the commissioners who represent them."

- **Standard view: County's refusal to allow comments taints Superfund process!**
- ***"Fritz Daily is a warrior, and in our view one who is owed our gratitude in heaping portions. He fights for the right thing on behalf of Butte. Always has. One of the things Fritz says frequently is ringing in our ears as we approach the next phase of the Superfund cleanup of the Butte Hill.***
  It's no secret, what needs to be done. Everybody knows what needs to happen. We need to get the cleanup Butte deserves, and that means a free-flowing, meandering stream in the Upper Silver Bow Creek corridor. We believe he's right."

While I can go on and on about the incompetence of the EPA, State and sadly the Butte Silver Bow Local Government, in the request for comments on the final Consent Decree on Butte Priority Soils I wrote numerous comments to Judge Hadden. In my final comment letter, but also like the EPA I believe he did not read, I wrote in part in what I titled;

The End, Butte Deserves Better;

As I write probably my last letter and comments on the Butte Priority Soils Operable Unit Consent Decree, I'm sad and concerned that the quality comments submitted by me and other quality Butte residents to make Butte a better and environmentally safe place to live will not be seen or read by Judge Hadden! Unconscionably, Superfund law allows the EPA and State to summarize public comments and keep important facts and information from the Judge and basically tell the Judge what they want him to hear!
My greatest disappointment was the failure of the Butte Silver Bow Government and the State of Montana to not follow State Laws and the Montana Constitution and their Sacred Oath of Office to take Judge Brad Newman's decision on the successful Silver Bow Creek Headwaters Coalition's lawsuit seriously. I'm concerned that their decision will be used by out of state landowners in the future on the Ruby and other rivers to weaken Montana's Stream Access Law! It will also be used to weaken Montana watercourse laws protecting rivers and creeks in the Montana Constitution--- "All waters within the boundaries of the State are the property of the State, held in trust, for the use of its people."

The fact of the matter is as a community we had a tremendous opportunity to receive a quality cleanup and restoration as guaranteed by Superfund/State laws and the Montana Constitution. For whatever reason, for which I will never know why, our elected leaders and "trustees of our future" have chosen not to provide that quality cleanup and restoration! I'm concerned our great community will remain a town

of 30,000 people, with half of them retired, and our community will be left with little, if any chance for economic recovery! What a tragedy!

In my heart, as I have said and written probably well over a hundred times, Butte just deserves Better!

When the Superfund Law was enacted back in 1980 it had one main purpose---It was initiated to clean up contaminated waste sites in the United States! Primarily sites like Three Mile Island, Love Cannel and sites like Butte and Anaconda Montana that had been left with hundreds of thousands of tons of contaminated waste left over from the hundreds of years of mining making the United States the great Nation it is today.

A question that has been asked many times over the years and actually brought forward as a legal issue and probably discussed at length in secret meetings---Is the United States Government also responsible for the cleanup and restoration as the Potentially Responsible Party? The answer to the Butte and Anaconda situations is resoundingly YES! Butte miners were required by the United States government in WWI and WWII to mine the ore to provide the materials necessary to defend this country during times of war and to electrify the country. The ladies of Butte also "rose to the occasion" to help in that quest as well.

One must always ask the question why? As I wrote to a Quality Butte resident Pat Prendergast---**This situation reminds me of the old proverbial comment of the three greatest lies in the world---I'm here from the government and I am here to help you, the checks in the mail and you figure the third for yourself. It also reminds me of the great Judge Skiff Sheehy comment---"Once again the State gets the gold mine and Butte gets the shaft!" Only this time it is the Atlantic Richfield/British Petroleum Company getting the gold mine and Butte once again gets the shaft!**

My letter to Butte resident Pat Prendergast is attached and I would request it also become part of the official record on the next five year review. Here are a few paragraphs from that letter;

When the original 2006 Record of Decision on Butte Priority Soils was reached it was reached based on the premise that a "technically improbable waiver" was issued stating that it was impossible to remove the Parrot Tailing and the clean the contaminated ground water in the area. We now know that is absolutely false!

1. **It was made believing the Parrot Plume was standing still and was not moving.**
2. **It was made not knowing the groundwater in the Parrott Tailings Area is more toxic than Berkeley Pit water.**
3. **It was made not knowing that substantially more water flowing to Silver Bow Creek than originally projected.**
4. **It was made believing the water was flowing at a much slower rate that we now know is actually happening.**
5. **And we now know because of the removal of the first phase of Parrot removal---!"The Parrot plume contains 15 times more copper, 5 times more lead, and twice as much cadmium as the Berkeley and it contains the same amount of arsenic and zinc as the Berkeley. And is the most heavily contaminated mine water in the State and probably the entire United States.**

While I can go on and on, In the final analysis if we do not have a quality clean and restored Silver Bow Creek flowing through Butte where children can play and fish and the adults of the community can enjoy the amenities of a responsible cleanup and restoration as well, along with

addressing the Berkeley Pit, Butte Hill and Montana Pole Site, then we have all failed. That includes me!

- **And yes we can have a real creek flowing through our town connected to the groundwater, as required of a Creek. You absolutely can! As Judge Newman Ordered in the successful Silver Bow Creek Headwaters Coalition Lawsuit, Silver Bow Creek from Texas Avenue to Montana Street is a Creek and protected in the Montana Constitution as Waters of the State of Montana.**
- **For the record--- Silver Bow Creek from Texas Ave to Montana Street is a Creek and a watercourse and not a sewer, a storm drain or a "water feature"! Judge Brad Newman confirmed this in his decision in the successful Silver Bow Creek Headwaters Coalition Lawsuit against the State of Montana!**
- **The "stakeholders" in this critical decision are not the EPA/State representatives, the Atlantic Richfield British Petroleum Company and the contractors as claimed by the EPA here tonight. The true stakeholders are the folks from Butte and the Clark Fork and Columbia River Basins and most importantly the future of our great town---our kids and grandkids!**
- **The most important issue I always stress in my presentations and in my writing and meeting with EPA, State and Local folks is the importance of Butte Montana in the shaping and creating of this great nation.**

What I believe needs to be accomplished for butte to receive the quality cleanup and restoration of Silver Bow Creek, the Butte Hill, Berkeley Pit, and Montana Pole can be summed up in the Silver Bow Creek Headwaters Coalition's successful lawsuit------*"We care, and we just wanted to improve the economy of the town and make Butte a better and more environmentally safe place to live. We wanted to achieve that goal by recreating a quality clean and restored meandering Silver Bow Creek flowing through the middle of our town where the children could play and fish and the adults of the community could enjoy the amenities of the cleanup and restoration as well!"That includes; Removing all contaminated tailings, restoring the area to productive use, building a quality responsible treatment and polishing plant, properly cleaning the Butte Hill, dealing responsibly with the storm water issue, and removing all Montana Pole condiments.*

Fritz Daily

Brief Synopsis of Silver Bow Creek Headwater Coalition's Successful Lawsuit against the State of Montana

'It's a creek': Former District Judge Brad Newman questions legality of signing consent decree---
Montana Standard Headline---May 25, 2019!

In a recent public hearing, Judge Newman stated---*"DEQ is bound by the decision," "How can DEQ and the county enter into a consent decree that ignores the law of Montana? Silver Bow Creek is a natural water course. The decision I made the state did not appeal. It was a valid legal precedent. Despite man-made alterations, it is a natural water course not just in name only. Silver Bow Creek's legal status must be observed by the interested parties in this consent decree."*

The goal of Silver Bow Creek Headwaters Coalition LLC composed of Sister Mary Jo McDonald, Ron Davis and Fritz daily long time Butte residents was pretty simple---"We care, and we just wanted to make Butte a better and more environmentally safe place to live and to improve the economy of the town. We wanted to achieve that goal by recreating a quality clean and restored meandering Silver Bow Creek flowing through the middle of our town where the children could play and fish and the adults of the community could enjoy the amenities of the cleanup and restoration as well!"

Our philosophy was simple: The decisions made today on Silver Bow Creek are forever decisions and will have forever consequences! It is important that responsible decisions be made. Montana Code Annotated 85-2-13 requires any party attempting to change the name of a stream, mountain, river etc to---1. An application must be filed in the District Court where the stream exists to change the name of a watercourse or natural source of water supply. 2. A public hearing and process must be initiated expressing the desire to change the name.

As the lawsuit progressed, the original purpose of the lawsuit changed, due to the State's strong determination to defeat us at any cost.

Early on in the lawsuit, Judge Newman ordered that no such application to the Court to change the name of the Creek had ever taken place, nor any public process initiated. As the lawsuit process played out the State continually shifted and adapted positions, trying anything that might work to defeat us. Eventually they shifted the original purpose of the lawsuit addressing the name of the Creek---claiming that Silver Bow Creek from Texas Avenue to Montana Street was not a watercourse and a Creek.

After four years, Judge Brad Newman ruled no attempt had ever taken place to change the name of the Creek and most importantly he documented and confirmed, using State law and the Montana Constitution, that Silver Bow Creek from Texas Avenue to Montana Street was in fact a watercourse and a Creek based on the laws and Constitution of the State of Montana! The Order was not challenged on appeal!

In the Silver Bow Creek Headwaters Coalition's successful lawsuit against the State of Montana--- Judge Newman wrote;

- ***"The very act of the State in calling iconic Silver Bow Creek by any other name degrades the stream and demeans Butte's history and culture".***
- ***"This litigation seeks to ensure that the State of Montana and its agencies follow the law."***
- ***"In this case the Plaintiffs stand in the shoes of government. They are seeking as a private attorney general to force the State to act appropriately with respect to the State's waters held in trust for the public. Moreover, the illegal conduct of the State is continuing".***

- *"The issue raised in the Complaint is not what would happen to restoration of the creek should the State improperly change the name of the watercourse, but what already has occurred and will occur in the future as the result of the State's actions concerning the name of the creek without observing the statutory requirements to change its name."*
- **Article IX Section 3 of the Montana Constitution States---"All waters within the boundaries of the State are the property of the State, held in trust, for the use of its people."**

The most important issues stressed as the Silver Bow Headwater's Coalition's Lawsuit Process continued;

1. **Taxpayers Money---The State of Montana and its attorneys were willing to spend any amount of money and all available resources that it would take to defeat us. The length of time to do that meant nothing to them! I would estimate that the State spent over $500,000 in that effort! Judge4 Newman ordered the State to pay Jim Goetz $172,000.**

2. **Settlement Attempts---We made numerous attempts throughout the process to try and settle the case. Three separate settlements were actually negotiated with the Director of the Department of Environmental Quality, Richard Opper, only to have those Settlements overturned and rejected by the "Anti Butte Attorneys" in State Government.**
   Ironically Steve Bullock the Governor of the State of Montana actually personally called Jim Goetz on April 26, 2012 at which time they discussed the case and the possibility of Settlement. Settlement was also discussed at a meeting held in Bozeman with State Attorneys and the Director of the Environmental Quality on May 21, 2012 following a phone call from the Director requesting the meeting.

   Settlement discussions were also discussed at length in a Mediation Hearing held in Helena on February 7, 2013. Mediation discussions in Helena consisted of five State attorneys and the Director of the Department of Environmental Quality and lasted five hours. Silver Bow Creek Headwaters Coalition was represented by our attorney Jim Goetz and Fritz Daily. The State at the meeting in Bozeman and the Mediation in Helena expressed their strong desire, to as they put it in Bozeman, to "extort" more money from the Atlantic Richfield/British Petroleum Company for cleanup and restoration of the Creek and use the Natural Resource Damage monies for their own projects and purpose and thus refused to Settle the case.

3. **Most personal disappointment---In the process, the State made repeated attempts, for whatever reason, to complicate and frustrate our group. The frustration occurred in depositions, discovery, hearings, mediation, personal meeting, phone calls, etc. The most obvious attempt however came on the Thursday before the Summary Judgment Hearing, on March 18, 2013, when we learned the State hired the local Butte Law Firm of Corrett, Black, Carlson, and Mickelson to assist them with the case.**
   It was extremely disappointing and frustrating due to the fact at the Mediation Hearing held in Helena just a month earlier, on February 7, 2013, the State was represented in the five hour session by five attorneys and the Director of Environmental Quality. Jim Goetz and Fritz Daily represented our group. Obviously the State, with their 'deep pockets' was committed to spend any amount of money to defeat us in our attempt to make Butte a better and more environmentally safe place to live!"

Bob Carlson was paid $13,224.80 and was not hired by Department of Environmental Quality until March 15, 2013. The Summary Judgment Hearing used by Judge Newman to make his decision was held on March 18, 2013. Bob Carlson did not participate in Discovery, Depositions, Mediation, any prior Hearings or the numerous phone calls and Meetings. Bill Kirley was the sole attorney representing the State and made the entire presentation at the Summary Judgment Hearing for the State. What information and assistance Mr. Carlson provided other than to use him to influence the Judge as having a local Butte presence in the lawsuit; I have no knowledge or information.

The "Opposition Motion To Our Motion for Summary Judgment by the State" in fact changed the purpose of the lawsuit from the name of the Creek to whether or not the Creek was in fact a "watercourse or not."

The lawsuit changed significantly following Judge Newman's Order denying the "States Motion to Dismiss". The State made a motion that the Plaintiff's did not have 'standing' to file the suit". Judge Newman denied that motion and ruled as citizens of Silver Bow County in fact we did have Standing!

Judge Newman denied our initial Motion for Summary Judgment, dated February 27, 2012. However, he issued a significant and important ruling that certain material facts were not genuinely contested. Specifically the Court ruled that; "{1} prior to the enactment of statutes in 1911, governing watercourse name changes, the Creek at issue in this case was named "Silver Bow Creek," and {2} since the enactment of such statutes the State of Montana has never successfully petitioned a court in this judicial district to change the Creek's name."

The State at that point in the "State of Montana's Brief In Opposition to the Plaintiff's Motion For Summary Judgment", on which the Judge had not yet ruled, raised the issue that Silver Bow Creek from Texas Avenue to Montana Street was in fact not a "watercourse" because it had been changed, altered, and rip rapped over the years thus it was no longer a Creek. The Judge then determined he wanted additional information on Montana law dealing with watercourse statutes and the case then changed from the name of the Creek to---is the Creek a watercourse or not a watercourse?

The case could have been easily settled at this point and Discovery, Depositions, Mediation and numerous meetings and phone conversations between the parties would not have been necessary. However, because of the State's insistence as they expressed to us on numerous occasions, to gain additional dollars {extort} from the Atlantic Richfield/British Petroleum Company to remove the Parrot and other tailings, the case continued.

As a result of the decision, and the State's refusal to settle, it resulted in the initiation of proceeding with Discovery, Depositions, Mediation and numerous meetings and phone conversations between the parties. Thus initiating the arduous prolonged and difficult legal task prolonging the eventually outcome of the Lawsuit.

Do the "rule of law" and the "Montana Constitution" mean nothing to the Environmental Protection Agency, State of Montana, Local government and the Atlantic Richfield/British Petroleum Company?

On August 18, 2015 Judge Brad Newman ruled in our favor!

Judge Newman confirmed in his decision that the Creek is a watercourse and a "creek" and not a "sewer" as claimed by the State of Montana and the Environmental Protection Agency and ruled that Silver bow Creek from Texas Avenue to Montana Street must be called---Silver Bow Creek!

He wrote; ***"The issue raised in the Complaint is*** **not what would happen to restoration of the creek should the State improperly change the name of the watercourse, but what already has occurred and will occur in the future as the result of the State's actions concerning the name of the creek without observing the statutory requirements to change its name."**

Information concerning our Lawsuit and the new proposed Record of Decision Amendment being proposed by the EPA, State, Local Government and Arco/BP

As we read and looked through the recent proposal for a "Record of Decision Amendment on Butte Priority Soils", my reaction is that this proposal is a direct "slap in the face" and made a mockery to the Silver Bow Creek Successful Lawsuit against the State of Montana. This bothers us greatly! I would hope Judge Newman would as well.

The only major change to the 2006 Record of Decision is to lower the water discharge standards to Silver Bow Creek. Unbelievable! The information deals strictly with the section of the Creek from where the Creek flows under Interstate 15, and totally ignores the stretch of the Creek from Casey Street {just below the Civic Center} to Texas Ave. Judge Newman refers to this section of the Creek often as part of the Contested stretch!

Legal Process 101

1. **When a dispute arises, a legal process exists to settle that dispute. The outcome of that legal dispute in the Judicial Process becomes president and has legal standing if no appeal is initiated to a higher Court.**
2. **An Appeal Process is available to the losing party if they disagree with the Judge's Order! {In the case of Silver Bow Creek Headwaters Coalition Successful Lawsuit against the State of Montana no Appeal was initiated!} We are confident the State did not appeal his ruling because of Jim Goetz' strong credibility and success on Appeals to the Montana Supreme Court and to the United States Supreme Court.**
3. **Elected officials take an "oath of office" to uphold the laws of the Federal and State Government and the Montana and Federal Constitution.**
4. **There are consequences for Elected Officials when taking that "oath of office".**

Please make the information provided in this email part of the official record!

Fritz Daily

[redacted]

April,15, 2020

Butte Silver Bow Council of Commissioners
Butte Silver Bow Courthouse
Public comments on the Butte Priority Soils Consent Decree
April 15 and May 1, 2020

Attachment for Fritz Daily Public Comments

Pat,
I will do my best, to explain my thoughts and the facts as I see them on the Record of Decision Amendment to Butte Priority Soils Operable Unit and the proposed Consent Decree. While I am not an expert, I have 35+ years of dealing with this issue and have a tremendous amount of Historical and valuable knowledge. Also, I'm assuming you asked the question as not a "got ya" or "set up" question of me and I will proceed to answer using that thought.

During my normal 3 to 4 hour wake up at 2am and applying medicine to my broken out skin while scratching caused by my concern over this inferior decision, this was my thought for you---This situation reminds me of the old proverbial comment of the three greatest lies in the world---I'm here from the government and I am here to help you and that the check's in the mail! You figure the third. It also reminds me of the great Judge Skiff Sheehy comment---"Once again the State gets the gold mine and Butte gets the shaft!" Only this time it is the Atlantic Richfield/British Petroleum Company gets the gold mine and Butte once again gets the shaft!
FYI---I have attended more meetings, given more public testimony, written more letters and emails, given more TV and radio interviews, been involved in numerous National publications, than you can imagine. I have also made more presentations as well to service clubs and schools and made a annual presentation to the Montana History Class at the University of Montana where the professor believed that the Butte cleanup and in particular the Berkeley Pit are a chapter in Montanan's History---I totally agree!
I will do that by using portions for emails/letters/and public comments I have written and presented in the past couple of years to explain my position. Keep in mind I have never received one penny of compensation for that effort.
Since you asked for my opinion and thoughts, I am going to be direct/honest and if my responses sound like I am angry/disillusioned/frustrated with the current proposed Consent Decree---Well yes I am!
As you know, the Consent Decree itself is a 1400 page document so I will try to be as concise as possible as I write this response to you.
Also keep in mind I am not alone on my thoughts. David McCumber comments;
"***The EPA has asked Butte citizens what they think about it {their plan} and the answers it has received at two public hearings have been resoundingly negative.... And a plan that has little popularity among many of the townspeople who are paying attention won a 10 to 1 endorsement from the commissioners who represent them."***

Standard view: County's refusal to allow comments taints Superfund process!

"Fritz Daily is a warrior, and in our view one who is owed our gratitude in heaping portions. He fights for the right thing on behalf of Butte. Always has. One of the things Fritz says frequently is ringing in our ears as we approach the next phase of the Superfund cleanup of the Butte Hill.

It's no secret, what needs to be done. Everybody knows what needs to happen. We need to get the cleanup Butte deserves, and that means a free-flowing, meandering stream in the Upper Silver Bow Creek corridor. We believe he's right.

Section 3. Water rights. **Article IX Section 3 o the Montana Constitution States---"All waters within the boundaries of the State are the property of the State, held in trust, for the use of its people."**

Section 3. Inalienable rights. All persons are born free and have certain inalienable rights. They include the right to a clean and healthful environment…

Section 2. Reclamation. (1) All lands disturbed by the taking of natural resources shall be reclaimed. The legislature shall provide effective requirements and standards for the reclamation of lands disturbed

Section 9. Right to know. No person shall be deprived of the right to examine documents or to observe the deliberations of all public bodies or agencies of state government and its subdivisions, except in cases in which the demand of individual privacy clearly exceeds the merits of public disclosure.

Pat here's my thoughts for you;

- The major shortcoming of the Consent Decree is that the Atlantic Richfield Company/British Petroleum Company has been released of their legal responsibility for cleanup and restoration of Silver Bow Creek from its Headwaters at Texas Avenue to where the Creek flows under Casey Street. That is unconscionable!
- The Atlantic Richfield Company/British Petroleum Company is totally responsible for the entire cleanup. It is wrong for them to be relieved of their legally required Superfund obligation on what is known as the "last first mile!" Texas Avenue to Montana Street---The most important section of the cleanup.
- It is totally wrong to use Butte's Natural Resource Damage Restoration dollars for cleanup work and to remove the Parrot tailings and relocate the County Shops. These funds are specifically designed to return the cleaned area to productive use and not for cleanup.
- In the successful Silver Bow Creek Headwaters Coalition Lawsuit, Judge Brad Newman has ruled that Silver Bow Creek is a Creek and protected as "Water of the State of Montana" in the Montana Constitution. In his Powerful public comments he states---"Can they {Butte Silver Bow Local government and the State} agree to a solution that ignores the law of Montana?"
- **Recently through the research of a private concerned citizen, we learned of plans to locate a repository to bury contaminated Digging East/Northside Tailings in a local neighborhood. Next to a park where our children play little guy football and other sports. According to the Bureau of Mines these tailings are so contaminated with copper and zinc that if left as waste in place they are likely to continue leaching into groundwater for tens of thousands of years to come.**
- **If this does not raise a "giant red flag" bigger than the Perkins flag for the commissioners and every Butte resident about the inferior Consent Decree I don't know what would---** Recently through the research of a private concerned citizen, we learned of plans to locate a repository to bury contaminated Digging East/Northside Tailings in a local neighborhood---Next to a park where our children play little guy football and other sports. **This very critical and important fact of a new repository was not disclosed during the so called roll out, in the four-page Arco/BP Montana Standard Add, or in the 190+ page public document on the roll out. If this concerned citizen through their due diligence did not discover this fact that repository would have been used. Unbelievable!** FYI--- According to the Bureau of Mines

these tailings are so contaminated with copper and zinc that if left as waste in place they are likely to continue leaching into groundwater for tens of thousands of years to come. **The question we must all ask is--What else has not been disclosed? And most importantly what is not in the document that is also critical for us to know?**

- As I have written and expressed to Doug Benevento, Andrew Wheeler, the Butte Silver Bow Council of commissioners, State agencies and interested Butte residents---**Everyone involved knows using proper science that is now available because of research by the Butte Natural Resource Damage Council, that was not available prior to the 2006 Record of Decision, what needs to be accomplished to have a responsible cleanup of Butte's Silver Bow Creek under Superfund law, State Law and the Montana Constitution.**
- **In Addition--- Two basic premises were used in making this incompetent decision on the cleanup of Silver Bow Creek at its headwaters. #1 it was based on the fact that Silver Bow Creek flowing through Butte was sewer, and #2 it was based on the fact that it was technically impracticable to responsible clean and restore the Creek and its corridor, and to leave contaminated "waste in place". Both of these premises have now been proven to be totally false and inaccurate!**

I believe the three major misunderstood issues in dealing with these issues is #1. Who is responsible for that cleanup---There is absolutely no question that is the Atlantic Richfield/ British Petroleum is 100% responsible. #2.The difference between cleanup {remediation} and restoration. #3. Now that it is Butte turn for cleanup and restoration, why has cost become the major issue?

Pat here's what needs to be accomplished in order for Butte to receive the quality cleanup and restoration of the Butte Hill, Silver Bow Creek, the Montana Pole Site, the Berkeley Pit and Butte proper to receive the quality cleanup and restoration we are guaranteed under Superfund, State law and the Montana Constitution. Anything less is unconscionable and borders on criminal!

- There is a contaminated groundwater plume from the Parrot Plume flowing under Butte homes and under the Columbus Plaza where elderly retirees and disabled residents live. It must be addressed! As documented by the State; T**he plume contains 15 times more copper, five times more lead, twice as much cadmium, and it contains the same amount of arsenic and zinc as the Berkeley Pit. It is the most toxic body of water in the State and probably the Nation.**
- **The agreement does not include a clean and restored Silver Bow Creek flowing through our town!**
- **It is wrong to create giant retention ponds, that I call mosquito/Zika Ponds, to deal with storm water because we did not properly clean the Butte Hill. We already have a 51 billion gallon Zika Pond a half a mile away at the Berkeley Pit!**
- **It is wrong to create a waiver to decrease water quality standards on the Creek when Judge Newman ruled it is a CREEK and thus Waters of the State of Montana protected by the Montana Constitution! Is the solution to pollution dilution?**
- **It is wrong to not remove the Reverse French Drain when the State of Montana adamantly states it is not working!**
- **It is wrong to use Butte's Natural Resource Damage Restoration money for cleanup work and to remove the Parrot Tailing. These funds are designed to return the cleaned area to productive use and not for cleanup.**
- **Missoula is not required to use their restoration money for cleanup. Missoula now has a beautiful park in the Milltown Dam area where children can play and fish and we in Butte are begging for pennies to complete a responsible cleanup.**

- **It creates a system that requires treatment in perpetuity for several areas. Including: Pumping and treating Berkeley Pit water, cleaning the mosquito/Zika ponds, jetting the Reverse French Drain and cleaning the Colorado Tailings Ponds.**
- *Butte Priority Soils area is a five-mile square area. It consists of the entire Butte Hill, Walkerville, Butte's section of Silver Bow Creek, the Parrott Tailings, Butte's Storm Sewer system, and Lower Area One that includes the area West of Montana Street including the Colorado Tailings area and the Metro Sewer area. EPA is the lead agency.*
- **The established or created lead level in Butte is 1200 ppm. The National Standard is 400 ppm how crazy is that?**

Superfund Law consists of two parts:

#1. Superfund can be defined as cleanup! The goal of all Superfund cleanups is to responsibly clean an area to protect the health of the residents of a community and to assure a safe environment for its citizens.
#2. Natural Resource Damage can be defined as restoration! Its goal is to restore the cleaned Superfund sites to a responsible and meaningful purpose and to compensate residents of a Superfund area for the lost use of the natural resources caused over the years from the contamination of the Superfund site.

Three main criteria in filing the original 765 million lawsuit that basically was settled for $118 million in addition to the $80 million settlement to clean Silver Bow Creek and the $18 million paid to the Salish Cooutini Indians;

- **#1. To compensate residents of the State for lost use of the resource. #2. Was to compensate residents for damage to the resource. #3. And Most important---Was for the destruction of the Butte Aquifer.**

Areas of responsibility of cleanup;

- The State of Montana Natural Resource Damage Program is responsible for the removal of the Parrott Tailings and cleanup and restoration of Silver Bow Creek from Texas Ave. to Casey Street, primarily using Natural Resource Settlement dollars.
- **Arco/BP is responsible for the removal of the Digging East and Northside Tailing, as we learned Tuesday night to accommodate the Zika/mosquito ponds.**
- **The State of Montana Department of Environmental Quality is responsible for the removal of the Blacktail Berm and related area around the Chamber of Commerce---That is why the Blacktail Berm in not mentioned in the EPA documents on the proposed Record of Decision Amendment!**

Who is going to pay for all of this is the "sixty four thousand dollar question"?

The reality is Butte has not been cleaned properly.

- **Butte deserves the best cleanup possible and not the cheapest as is now being proposed by the agencies.**
- **Using the best technology available with current and accurate data.**
- **We need a ROD and Consent Decree that is not "etched in stone"! One that provides for contingences that may develop as the process continues.**
- **We should absolutely not be using restoration dollars for remediation as we are doing with the Parrot Tailings Area! You are not asking Missoula to use the restoration settlement monies from the Clark Fork River Settlement Restoration dollars to do remediation cleanup in Missoula.**

- **It is wrong to create a waiver to decrease water quality standards of the Creek!**
- **It is wrong that Arco/BP has been relieved of their Superfund required obligation of the cleanup and restoration of the Silver Bow Creek corridor from Casey Street to the Headwaters at Texas Ave.**
- **The contaminated groundwater plume from the Parrot Plume that is flowing under homes in Butte and under a Housing Facility where elderly retirees and disabled residents live in the Columbus Plaza must be addressed.**
- **The Berkeley Pit and the Montana Pole Site need to be responsibly addressed. Doug, the Pole Plant is a frigging disaster!**
- **Remember---The Superfund decisions made today are forever decisions and have forever consequences!**

We need a comprehensive plan. Including:

- **A Solid financial commitment addressing total cleanup and restoration**
- **Total removal of all tailings---Parrot, Diggings East and Northside Tailings, Blacktail Berm and remaining Silver Bow Creek contaminates.**
- **Creating a quality meandering Creek flowing through the town**
- **Responsibly addressing the inefficient French Drain and Storm Sewer issue.**
- **Addressing the cleanup on the Hill that was basically completed under what EPA calls Time Critical Removal and not proper science.**
- **Retention Ponds, of as I call them mosquito or Zika Ponds, should not be used a means of capturing storm water. Strom water should be diverted and pumped to the Berkeley Pit for treatment before discharge to the Creek.**
- **Using the Restore Our Creek Vision Statement as guide to complete the cleanup and restoration. As I and others have always promoted, restoration and remediation can and should take place simultaneously.**

When the original 2006 Record of Decision on Butte Priority Soils was reached it was reached based on the premise that a "technically improbable waiver" was issued stating that it was impossible to remove the Parrot Tailing and the clean the contaminated ground water in the area. We now know that is absolutely false!

1. **It was made believing the Parrot Plume was standing still and was not moving.**
2. **It was made not knowing the groundwater in the Parrott Tailings Area is more toxic than Berkeley Pit water.**
3. **It was made not knowing that substantially more water flowing to Silver Bow Creek than originally projected.**
4. **It was made believing the water was flowing at a much slower rate that we now know is actually happening.**
5. **And we now know because of the removal of the first phase of Parrot removal---!"The Parrot plume contains 15 times more copper, 5 times more lead, and twice as much cadmium as the Berkeley and it contains the same amount of arsenic and zinc as the Berkeley. And is the most heavily contaminated mine water in the State and probably the entire United States.**

While I can go on and on, In the final analysis if we do not have a quality clean and restored Silver Bow Creek flowing through Butte where children can play and fish and the adults of the community can enjoy the amenities of a responsible cleanup and restoration as well, along with addressing the Berkeley Pit, Butte Hill and Montana Pole Site, then we have all failed. That includes me!

- **And yes we can have a real creek flowing through our town connected to the groundwater, as required of a Creek. You absolutely can! As Judge Newman Ordered in the successful Silver Bow Creek Headwaters Coalition Lawsuit, Silver Bow Creek from Texas Avenue to Montana Street is a Creek and protected in the Montana Constitution as Waters of the State of Montana.**
- **For the record--- Silver Bow Creek from Texas Ave to Montana Street is a Creek and a watercourse and not a sewer, a storm drain or a "water feature"! Judge Brad Newman confirmed this in his decision in the successful Silver Bow Creek Headwaters Coalition Lawsuit against the State of Montana!**
- **The "stakeholders" in this critical decision are not the EPA/State representatives, the Atlantic Richfield British Petroleum Company and the contractors as claimed by the EPA here tonight. The true stakeholders are the folks from Butte and the Clark Fork and Columbia River Basins and most importantly the future of our great town---our kids and grandkids!**
- **The most important issue I always stress in my presentations and in my writing and meeting with EPA, State and Local folks is the importance of Butte Montana in the shaping and creating of this great nation.**

What I believe needs to be accomplished for butte to receive the quality cleanup and restoration of Silver Bow Creek, the Butte Hill, Berkeley Pit, and Montana Pole can be summed up in the Silver Bow Creek Headwaters Coalition's successful lawsuit------*"We care, and we just wanted to improve the economy of the town and make Butte a better and more environmentally safe place to live. We wanted to achieve that goal by recreating a quality clean and restored meandering Silver Bow Creek flowing through the middle of our town where the children could play and fish and the adults of the community could enjoy the amenities of the cleanup and restoration as well!"That includes; Removing all contaminated tailings, restoring the area to productive use, building a quality responsible treatment and polishing plant, properly cleaning the Butte Hill, dealing responsibly with the storm water issue, and removing all Montana Pole condiments.*

Fritz Daily

[redacted]

July 15, 2020

United States Department of Justice, Please make the following probably final attached letter I will ever write to the EPA, State of Montana and Butte Silver Bow Local Government titled---

The End---Butte Deserves Better---**and summary comments part of the official record/comment and my strong opposition to the proposed Consent Decree Butte Priority Soils Operable Unit.**

As I write probably my last letter and comments on the Butte Priority Soils Operable Unit Consent Decree, I'm sad and concerned that the quality comments submitted by me and other quality Butte residents to make Butte a better and environmentally safe place to live will not be seen or read by Judge Hadden! Unconscionably, Superfund law allows the EPA and State to summarize public comments and keep important facts and information from the Judge and basically tell the Judge what they want him to hear!

My greatest disappointment was the failure of the Butte Silver Bow Government and the State of Montana to not follow State Laws and the Montana Constitution and their Sacred Oath of Office to take Judge Brad Newman's decision on the successful Silver Bow Creek Headwaters Coalition's lawsuit seriously. I'm concerned that their decision will be used by out of state landowners in the future on the Ruby and other rivers to weaken Montana's Stream Access Law! It will also be used to weaken Montana watercourse laws protecting rivers and creeks in the Montana Constitution---"All waters within the boundaries of the State are the property of the State, held in trust, for the use of its people."

The fact of the matter is as a community we had a tremendous opportunity to receive a quality cleanup and restoration as guaranteed by Superfund/State laws and the Montana Constitution. For whatever reason, for which I will never know why, our elected leaders and "trustees of our future" have chosen not to provide that quality cleanup and restoration! I'm concerned our great community will remain a town of 30,000 people, with half of them retired, and our community will be left with little, if any chance for economic recovery! What a tragedy!

In my heart, as I have said and written probably well over a hundred times, Butte just deserves Better!

One must always ask the question why? As I wrote to a Quality Butte resident Pat Prendergast---**This situation reminds me of the old proverbial comment of the three greatest lies in the world---I'm here from the government and I am here to help you, the checks in the mail and you figure the third for yourself. It also reminds me of the great Judge Skiff Sheehy comment---"Once again the State gets the gold mine and Butte gets the shaft!" Only this time it is the Atlantic Richfield/British Petroleum Company getting the gold mine and Butte once again gets the shaft!**

When the Superfund Law was enacted back in 1980 it had one main purpose---It was initiated to clean up contaminated waste sites in the United States! Primarily sites like Three Mile Island, Love Cannel and sites like Butte and Anaconda Montana that had been left with hundreds of

thousands of tons of contaminated waste left over from the hundreds of years of mining making the United States the great Nation it is today.

A question that has been asked many times over the years and actually brought forward as a legal issue and probably discussed at length in secret meetings---Is the United States Government also responsible for the cleanup and restoration as the Potentially Responsible Party? The answer to the Butte and Anaconda situations is resoundingly YES! Butte miners were required by the United States government in WWI and WWII to mine the ore to provide the materials necessary to defend this country during times of war and to electrify the country. The ladies of Butte also "rose to the occasion" to help in that quest as well.

On April 23, 2019, I presented Public Testimony at Montana Tech on my thoughts and concerns with the proposed Consent Decree. Sadly during that testimony I was "cut off" from completing my testimony by Chris Wardell of the EPA.

This is short synopsis of that testimony and the complete testimony is attached

- **I believe the cleanup and restoration of Silver Bow Creek, the Butte Hill, the Montana Pole Site, and the cleanup and restoration of the Berkeley Pit are the most important issues facing this community. I believe if we do not get a responsible resolution to these issues this community is going to fail. Environmentally, Economically and Socially.**
- There is absolutely no question under Superfund and State Laws and the Montana Constitution that the Atlantic Richfield now British Petroleum Company is totally responsible for the cleanup.
- They made the decision to close the Butte Mines, to close the Anaconda Smelter, to close the Berkeley Pit, shut off the underground pumps in the Kelley Mine that caused the Berkeley Pit and Butte mine flooding that now contain over 100 billion gallons of contaminated water, and finally they closed the East Continental Pit that ended mining in Butte as was known for 100 years.
- Everyone involved including the agencies and Arco/Bp knows using proper science that is now available because of research by the Butte Natural Resource Damage Council, that was not available prior to the 2006 Record of Decision, what needs to be accomplished to have a responsible cleanup of Butte's Silver Bow Creek under Superfund law, State Law and the Montana Constitution. No more deals, no more "band aids! Let's do what is right.
- **Anyone who tells you we cannot have a creek flowing through our town connected to groundwater at this point is not telling you the truth! The truth of the matter is the mines in Butte have been dewatered for the past 100 years. They have been pumped down to 1000 feet above sea level. What is happening now is the water is returning to its original state and there will eventually be the same amount of water that has flowed down Silver Bow Creek for hundreds of years!**
- **I still believe we have a tremendous one time opportunity to do what is right, and that is to---re-create a quality Silver Bow Creek flowing through the middle of our town and give Butte and the Clark Fork River Basin the quality cleanup and restoration of the Butte Hill, the Berkeley Pit and the Montana Pole Site, making Butte a better and more environmentally safe place to live. The time however is passing and may have already passed.**

I closed my testimony by using quotes I use in my writings and public testimony;

- *No matter how far you go down the wrong road, it is never too late to turn around!*
- *Orwellian Theory as pointed out in our first Lawsuit Brief by Jim Goetz." Tell a lie often enough and they will begin to believe it"!*
- *Never take your heel off the head of a snake while the snake is still trying to bite you! Brian Schweitzer quote*
- *"It's far better to walk alone, than walk with a crowd going in the wrong direction!"—Diane Grant*
- *Be careful when you follow the masses, sometimes the M is silent!*
- *A man owned a little piece of Heaven and a little piece of Butte, he sold the little piece of Heaven and moved to Butte.*
- *A woman on her "death bed"---Father it is not the thought of dying that bothers me it's the thought of leaving Butte!*

Finally, God bless everyone who participated. If I offended you I apologize! The only reason I do what I do and did is because I care and just wanted to make Butte a better and more environmentally safe place to live. As I know many of you did the same!

APPENDIX F – SITE INSPECTION CHECKLISTS

OU1: SSTOU

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Silver Bow Creek/Butte Area: Streamside Tailings Operable Unit (SSTOU)	**Date of Inspection: 9/17/2020**
Location and Region: Butte, MT Region 8	**EPA ID: MTD980502777**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 80's, hazy.**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☐ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

☒ Report attached: Sitewide interviews were conducted and are included in Appendix E

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☒ Readily available	☐ Up to date	☐ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A

☐ Contingency plan/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☐ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☒ SSTOU is not yet remedial action complete. Therefore, it has not yet entered the O&M phase.

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

   Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

   Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

   Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

   Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

   Type of monitoring (e.g., self-reporting, drive by): _____

   Frequency: _____

   Responsible party/agency: State

   Contact _____ _____ mm/dd/yyyy _____

   Name Title Date Phone no.

   Reporting is up to date ☐ Yes ☐ No ☐ N/A

   Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

   Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

   Violations have been reported ☐ Yes ☒ No ☐ N/A

   Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

   Remarks: ICs are not yet in place to prohibit activities that would disturb capped areas. The majority of capped areas are on properties owned by the state.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

   Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

   Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

   Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

   Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

   Area extent: _____ Depth: _____

   Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

   ☐ Performance not monitored

   Frequency: _____ ☐ Evidence of breaching

   Head differential: _____

   Remarks: _____

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☐ Applicable ☒ N/A

D. Monitoring Data

1. **Monitoring Data**

   ☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

   ☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

   ☐ All required wells located ☐ Needs maintenance ☒ N/A

   Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The SSTOU remedial action has been completed and the remaining areas are expected to be completed in the next year. The stream appears well contoured and the covered areas are well vegetated.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The SSTOU has not yet entered the O&M phase.

C. Early Indicators of Potential Remedy Problems

	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None noted.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None noted.

OU3: BMFOU

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Silver Bow Creek/Butte Area	**Date of Inspection:** 9/15/2020
Location and Region: Butte, MT 8	**EPA ID: MTD980502777**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** 80s/hazy

Remedy Includes: (Check all that apply)

- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☒ Surface water collection and treatment
- ☐ Landfill cover/containment
- ☐ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☐ Other: _____

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

☒ Report attached: Sitewide interviews were conducted and are included in Appendix E.

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☒ Readily available	☐ Up to date	☐ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: New Polishing Plant discharges to Silver Bow Creek

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☒ Water (effluent)	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached
From: _____ Date	To: _____ Date	_____ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☐ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Access is restricted and security is high.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Appropriate signs are posted at mine area access points.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: Every five years

Responsible party/agency: EPA

Contact _____ _____ _____ _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☒ Yes ☐ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

	Remarks: _____		
2.	**Cracks**	☐ Location shown on site map	☐ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☐ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Area extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Area extent: _____
	☐ Ponding	☐ Location shown on site map	Area extent: _____
	☐ Seeps	☐ Location shown on site map	Area extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Area extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable ☐ N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay

Remarks: _____

C. Letdown Channels ☐ Applicable ☐ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ No evidence of settlement
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation
   Material type:_____ Area extent: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ No evidence of erosion
   Area extent: _____ Depth: _____
   Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting
   Area extent: _____ Depth: _____
   Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions
   ☐ Location shown on site map Area extent: _____
   Size: _____
   Remarks: _____

6. **Excessive Vegetative Growth** Type: _____
   ☐ No evidence of excessive growth
   ☐ Vegetation in channels does not obstruct flow
   ☐ Location shown on site map Area extent: _____
   Remarks: _____

D. Cover Penetrations ☐ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☐ Passive
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
   Remarks: _____

2. **Gas Monitoring Probes**
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition
   ☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A
   Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)
   ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs maintenance ☐ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☐ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☐ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☐ N/A

1. **Siltation** Area extent: _____ Depth: _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

☐ Erosion not evident

Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

Remarks: _____

H. Retaining Walls ☐ Applicable ☐ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

Horizontal displacement: _____ Vertical displacement: _____

Rotational displacement: _____

Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☐ Functioning ☐ N/A

Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Groundwater Extraction Wells, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing and Electrical**

☒ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A

Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Collection Structures, Pumps and Electrical**

☒ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☒ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

☐ Quantity of groundwater treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☒ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy includes water management to ensure that contaminated water does not migrate from the Berkeley Pit into surrounding groundwater and Silver Bow Creek. Significant work has been done during this FYR period including a Pilot Discharge Project and construction of the Polishing Plant.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The water treatment plants and system are operating in accordance with plans and maintenance is conducted as needed to ensure the system is maintaining the elevation targets in the Pit and other points of compliance.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

None noted.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

None noted.

Site Inspection Participants:
Nikia Green, EPA
Treat Suomi, Skeo
Loren Burmeister, *Atlantic Richfield*

Jeremy Fleege, Montana Resources
Mark Thompson, Montana Resources

OU4 and OU12: WSPOUs

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Silver Bow Creek/Butte Area: Warm Springs Ponds Active and Inactive Operable Units (WSPOU)	**Date of Inspection: 9/17/2020**
Location and Region: Butte, MT Region 8	**EPA ID: MTD980502777**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 80's and hazy.**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other: _____
- ☐ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

☒ Report attached: Sitewide interviews were conducted and are included in Appendix E

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ Readily available	☐ Up to date	☒ N/A
☐ As-built drawings	☒ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☒ Readily available	☐ Up to date	☐ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A
   ☐ Contingency plan/emergency response plan ☒ Readily available ☐ Up to date ☐ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☐ Up to date ☐ N/A

Remarks: _____

4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1.	**O&M Organization**	
	☐ State in-house	☐ Contractor for state
	☐ PRP in-house	☐ Contractor for PRP
	☐ Federal facility in-house	☐ Contractor for Federal facility
	☒ WSPTOU has not yet entered the O&M phase.	

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	
From: mm/dd/yyyy	To: mm/dd/yyyy	_____	☐ Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: .

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☒ N/A

Remarks: _____

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: _____

Responsible party/agency: State

Contact _____ _____ mm/dd/yyyy _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: The property is leased and managed by the state for use as a wildlife management area.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

2. **Performance Monitoring** Type of monitoring: _____

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

B. Surface Water Collection Structures, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Collection Structures, Pumps and Electrical**

☒ Good condition ☐ Needs maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**

☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☐ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☐ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water treated annually: _____

☐ Quantity of surface water treated annually: _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☐ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The overall property and the remedial features appear in good condition.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The WSPOU has not yet entered the O&M phase.

C. Early Indicators of Potential Remedy Problems

	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. None noted.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None noted.

OU7: Rocker OU

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST	
I. SITE INFORMATION	
Site Name: Silver Bow Creek/Butte Area: Rocker Timber Treating and Framing (Rocker) OU7	**Date of Inspection: 9/16/2020**
Location and Region: Butte, MT Region 8	**EPA ID: MTD980502777**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 80's and hazy**
Remedy Includes: (Check all that apply) ☒ Landfill cover/containment ☒ Access controls ☒ Institutional controls ☐ Ground water pump and treatment ☐ Surface water collection and treatment ☐ Other: _____	☒ Monitored natural attenuation ☒ Ground water containment ☐ Vertical barrier walls
Attachments: ☒ Inspection team roster attached	☐ Site map attached
II. INTERVIEWS (check all that apply)	
☒ Report attached: Sitewide interviews were conducted and are included in Appendix E	

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)				
1.	**O&M Documents**			
	☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
	☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
	☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
2.	**Site-Specific Health and Safety Plan**	☒ Readily available	☒ Up to date	☐ N/A
	☐ Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
3.	**O&M and OSHA Training Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: mm/dd/yyyy (Date) To: mm/dd/yyyy (Date) _____ (Total cost) ☐ Breakdown attached

Remarks: _____

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: _____

C. Institutional Controls (ICs)

. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by): Check of deed records during the FYR process.

Frequency: Every five years

Responsible party/agency: EPA

Contact _____ _____ mm/dd/yyyy _____

Name Title Date Phone no.

Reporting is up to date ☒ Yes ☐ No ☐ N/A

Reports are verified by the lead agency ☒ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☒ Report attached

Remarks: _____

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: See section X of the current FYR for further discusion of ICs.

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☒ N/A

Remarks: _____

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. **Roads Damaged** ☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident

Arial extent: _____ Depth: _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☒ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☒ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☒ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☒ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

D. Cover Penetrations ☐ Applicable ☒ N/A

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

F. Cover Drainage Layer ☐ Applicable ☒ N/A

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

H. Retaining Walls ☐ Applicable ☒ N/A

I. Perimeter Ditches/Off-Site Discharge ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A

B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☐ Applicable ☒ N/A

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: .

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).
EPA is reviewing a revised draft CSM. After review, EPA will determine if additional response actions are warranted to address remaining contamination.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
No issues noted.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.
As noted in the 2014 ESD and prior FYRs, elevated arsenic conentrations and potential downgradient contaminant increases are being investigated. . EPA is reviewing a revised draft CSM and will pursue appropriate action.

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
None noted.

OU8: BPSOU

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Silver Bow Creek/Butte Area: Butte Priority Soils Operable Unit (BPSOU) OU8	**Date of Inspection: 9/15/2020**
Location and Region: Butte, MT Region 8	**EPA ID: MTD980502777**
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature: 80 degrees Fahrenheit, Overcast and hazy.**

Remedy Includes: (Check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Ground water pump and treatment
- ☒ Surface water collection and treatment
- ☒ Other: Residential Metals Abatement Program (RMAP)
- ☐ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

☒ Report attached: Sitewide interviews were conducted and are included in Appendix E

III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)

1. **O&M Documents**

☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☒ As-built drawings	☒ Readily available	☒ Up to date	☐ N/A
☒ Maintenance logs	☒ Readily available	☒ Up to date	☐ N/A

Remarks: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☒ Up to date ☐ N/A

☒ Contingency plan/emergency response plan ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

3. **O&M and OSHA Training Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

4. **Permits and Service Agreements**

☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A

Remarks: _____

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

6. **Settlement Monument Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

7. **Ground Water Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

8. **Leachate Extraction Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

9. **Discharge Compliance Records**

☐ Air ☐ Readily available ☐ Up to date ☒ N/A

☒ Water (effluent) ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

10. **Daily Access/Security Logs** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: _____

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state

☐ PRP in-house ☒ Contractor for PRP

☐ Federal facility in-house ☐ Contractor for Federal facility

☐ _____

2. **O&M Cost Records**

☐ Readily available ☐ Up to date

☒ Funding mechanism/agreement in place ☒ Unavailable

Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: mm/dd/yyyy (Date) To: mm/dd/yyyy (Date) _____ (Total cost) ☐ Breakdown attached

Remarks: O&M costs were not available for review during this FYR.

3. **Unanticipated or Unusually High O&M Costs during Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing Damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Fencing around the water treatment plant at Lower Area One was secure and in excellent condition.

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: Appropriate signs are posted at restricted areas such as the Lower Area One treatment plant.

C. Institutional Controls (ICs)

1. **Implementation and Enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☐ No ☒ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☐ No ☒ N/A

Type of monitoring (e.g., self-reporting, drive by): _____

Frequency: _____

Responsible party/agency: _____

Contact _____ _____ mm/dd/yyyy _____

Name Title Date Phone no.

Reporting is up to date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☒ No ☐ N/A

Violations have been reported ☐ Yes ☒ No ☐ N/A

Other problems or suggestions: ☒ Report attached

Remarks: _____

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: _____

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land Use Changes On Site** ☐ N/A

Remarks: The BPSOU includes active areas of Walkerville and Butte. No land use changes have been noted or are expected, although there is continual contstruction and developemnt at areas included in the Site.

3. **Land Use Changes Off Site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

1. **Roads Damaged** ☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks: _____

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident

Arial extent: _____ Depth: _____

Remarks: _____

2.	**Cracks**	☐ Location shown on site map	☒ Cracking not evident
	Lengths: _____	Widths: _____	Depths: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☒ Erosion not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Holes**	☐ Location shown on site map	☒ Holes not evident
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☒ Cover properly established
	☐ No signs of stress	☐ Trees/shrubs (indicate size and locations on a diagram)	
	Remarks: _____		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☒ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Arial extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent: _____
	☐ Ponding	☐ Location shown on site map	Arial extent: _____
	☐ Seeps	☐ Location shown on site map	Arial extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Arial extent: _____		
	Remarks: _____		

B. Benches ☐ Applicable ☒ N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

C. Letdown Channels ☐ Applicable ☒ N/A

(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

D. Cover Penetrations ☐ Applicable ☒ N/A

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

F. Cover Drainage Layer ☐ Applicable ☒ N/A

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

H. Retaining Walls ☐ Applicable ☒ N/A

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☒ Siltation not evident
   Area extent: _____ Depth: _____
   Remarks: _____

2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A
   ☒ Vegetation does not impede flow
   Area extent: _____ Type: _____
   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident
   Area extent: _____ Depth: _____
   Remarks: _____

4. **Discharge Structure** ☒ Functioning ☐ N/A
   Remarks: _____

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

IX. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water Extraction Wells, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing and Electrical**
   ☒ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A
   Remarks: _____

2. **Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances**
   ☒ Good condition ☐ Needs maintenance
   Remarks: _____

3. **Spare Parts and Equipment**
   ☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided
   Remarks: _____

B. Surface Water Collection Structures, Pumps and Pipelines ☒ Applicable ☐ N/A

1. **Collection Structures, Pumps and Electrical**
   ☒ Good condition ☐ Needs maintenance
   Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances**
   ☒ Good condition ☐ Needs maintenance
   Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☐ Carbon adsorbers

☐ Filters: _____

☒ Additive (e.g., chelation agent, flocculent): _____

☐ Others: _____

☒ Good condition ☐ Needs maintenance

☒ Sampling ports properly marked and functional

☒ Sampling/maintenance log displayed and up to date

☒ Equipment properly identified

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☒ Proper secondary containment ☐ Needs maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☒ Good condition (esp. roof and doorways) ☐ Needs repair

☒ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs maintenance ☐ N/A

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ All required wells located ☐ Needs maintenance ☒ N/A

Remarks: _____

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).
The remedy is expected to function as intended by the 2006 BPSOU ROD, the 2011 BPSOU ESD, and the 2020 ROD Amendment once complete. In the interim, ongoing remedial activities continue.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
remedy design and implementation are continuing.

C. Early Indicators of Potential Remedy Problems

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.
None Noted

D. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.
None Noted.

APPENDIX G – SITE INSPECTION PHOTOS

OU1: SSTOU

SSTOU: Restored area of Subarea 3

SSTOU: Creek and vegetation

SSTOU: Area of Subarea 3 to be addressed

SSTOU: Railroad line in Subarea 3, looking into Subarea 4

OU3: BMFOU

Bird observation shack

Berkeley Pit

Horseshoe Bend Capture System

Capture system pump house

Continental pit

HsBWTP

Sludge accumulation at HsBWTP

Polishing Plant

Product tank and effluent filter in Polishing Plant

New Granite Mountain well

Entrance to lime treatment facility

Lime treatment silo

Pond 3 inlet structure

Berm from Pond 3 to Pond 2

Pond 1 dry closure area

Recreational signage

Public access boat ramp

Honeybee hives

OU7: Rocker OU

Locked entrance to Rocker repository

RH22 and RH21 monitoring wells

Rocker repository and adjacent rail line

Rocker repository, looking east

View of Town Pump area from atop Rocker repository

Rocker repository south fenceline

Silver Bow Creek/MSD

Butte Reduction Works

Parrot Tailings removal area

Dredging operation at Butte Treatment Lagoons

Lime treatment at Butte Treatment Lagoons

BRES Site, Rising Star East

BRES site with stormwater management features, Alice diversion ditch

Green Mountain Catch Basin

BRES site, Alice Dump

BRES site with stormwater management features, Buffalo South

Northside Tailings with Silver Bow Creek in background

Source material in West Side Soils OU

Additional material throughout the West Side Soils OU

APPENDIX H – BPSOU SCREENING-LEVEL RISK EVALUATION

This FYR reviewed toxicity values and changes in risk assessment methods since the 2006 ROD to evaluate if the ROD soil and dust cleanup goals remain valid.

This FYR reviewed the toxicity values for arsenic and mercury. The noncancer and carcinogenic-based toxicity values have not changed since the 2006 ROD, as shown in Table H-1 and Table H-2, respectively.

Table H-1: Evaluation of Noncancer Toxicity Values used in the 2006 BPSOU ROD Cleanup Levels

COC	2006 ROD Toxicity Values[a]		Current Toxicity Values[b]		Change
	Oral Reference Dose (RfD_o) mg/kg/day	Inhalation RfD_i (mg/kg/day)	Oral Reference Dose (RfD_o) mg/kg/day	Inhalation RfD_i (mg/kg/day)	
Arsenic	3E-04	-	3E-04	-	None
Mercury	3E-04	8.6E-05	3E-04	8.6E-05[b]	None

Notes:

a. Toxicity values from the 2003 Walkerville Human Health Risk Assessment (HHRA) Table 4-1 and the 1997 BPSOU HHRA for Arsenic, Table 5-16 (cancer slope values) and Table 5-23 (RfDs).

b. Toxicity values obtained from EPA's May 2020 Regional Screening Level Table and converted the listed noncancer reference concentration (RfC) to a reference dose (RfD) as follows:
RfD_i= RfC (mg/kg/day) x ($20 m^3$/day inhalation rate/70-kilogram body weight)
3E-04 mg/m^3 x (20/70) = 8.6E-05 mg/kg/day.

Table H-2: Evaluation of Carcinogenic Toxicity Values Used in the 2006 BPSOU ROD Cleanup Levels

COC	2006 ROD Toxicity Values[a]		Current Toxicity Values[b]		Change
	Oral Cancer Slope Factor (CSF_o) mg/kg/day	Inhalation Cancer Slope Factor (CSFi) mg/kg/day	Oral Cancer Slope Factor (CSF_o) mg/kg/day	Inhalation Cancer Slope Factor (CSFi) mg/kg/day	
Arsenic	1.5E+00	1.51E+01	1.5E+00	1.51E+01	None
Mercury	NA	NA	NA	NA	None

Notes:

a. Toxicity values from the 2003 Walkerville HHRA Table 4-1 and the 1997 BPSOU HHRA for Arsenic, Table 5-16 (cancer slope values) and Table 5-23 (RfDs).

b. Toxicity values obtained from EPA's May 2020 Regional Screening Level Table and converted the listed cancer unit inhalation unit risk value (IUR) to a CSF_i as follows: CSF_i = IUR ($\mu g/m^3$)$^{-1}$ x (70 kilogram body weight/($20 m^3$/day inhalation rate) x 1,000 µg/mg
4.3E-03 x (70/20) x 1,000 = 1.51E+01 mg/kg/day.

Risk assessment methods associated with evaluating lead exposures have changed since the previous FYR. Historically, EPA has used the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK model) as a risk assessment tool to support environmental cleanup decisions at residential sites. The 2006 ROD established lead cleanup goals using EPA's IEUBK model. Since 2006, additional data have become available from the CDC's National Health and Nutrition Examination Survey (NHANES) to show that blood lead levels continue to decline in the U.S. population. EPA has periodically updated several model input parameters in the IEUBK to reflect the most current blood lead data from NHANES. Since 2006, EPA has updated the IEUBK several times with the latest version released in 2021 (Version 2) that reflects new data on food lead concentrations from the Food and Drug Administration's 2010 market basket survey and NHANES and updated the age ranges for running the model. Version 2 of IEUBK model also incorporates EPA guidance released in May 2017 that provides a recommended value for the IUEBK input parameter, mother's blood lead concentration at childbirth, based on the analysis of the NHANES 2009-2014 data. In addition, the May 2017 guidance recommends that the IEUBK model be used for the 12-71 month age range.

The lead action level for residential areas included in the 2006 ROD of 1,200 mg/kg was originally developed by the EPA in a technical memorandum prepared in 1993. The action level was derived using version 0.61 of the IEUBK model using many default assumptions and several site-specific assumptions. The three site-specific assumptions were based on site-specific studies (e.g., the contribution of soil lead to indoor household dust, the bioavailability of lead in soil and the geometric standard deviation of blood lead). The remaining input variables were model default assumptions recommended by EPA guidance and the EPA toxicologist, to define the reasonably maximum exposed individual. The ROD cleanup goal reflects the EPA's risk reduction goal for contaminated sites to limit the probability of a child's blood lead concentration exceeding 10 µg/dL to 5 percent or less after cleanup.

To determine if the ROD residential action level remains valid, the most current IEUBK model (Version 2, Build 1.64) was run using the current model defaults reflecting current EPA guidance and site-specific assumptions and then compared to the action level developed in March 1993 technical memorandum. Table H-3 shows the current model predicts a higher value (1458 mg/kg) based on the EPA's current policy of ensuring a blood-lead level of 10 µg/dl .

The EPA has been reviewing a number of lead toxicity and exposure studies to determine if the current lead cleanup policy and the IEUBK require revisions. Until policy work is revised and finalized, the EPA's current policy remains in effect. However, if a new lead policy is issued prior to the next FYR, the risk-based action levels for lead may be re-evaluated at that time.

Table H-3: Assumptions Used in the IEUBK Model Based on 2006 BPSOU ROD and Current EPA Guidance

Description	Units	1993 IEUBK Model[a]	Current IEUBK Model[b]
Maternal blood lead concentrations	µg/dL	1	0.6 (default)
Indoor lead concentration (percentage of outdoor)	%	30 (default)	30 (default)
Concentration in outdoor air	$\mu g/m^3$	0.2 (default)	0.1 (default)
Geometric standard deviation of blood lead	Unitless	1.68 (site-specific)	1.68 (site-specific)
Total daily dust and soil intake	Grams/day	1993 model defaults	2021 model defaults
0-1 yr old		0.043	0.086
1-2 yr old		0.108	0.094
2-3 yr old		0.108	0.067
3-4 yr old		0.108	0.063
4-5 yr old		0.085	0.067
5-6 yr old		0.075	0.052
6-7 yr old		0.070	0.055
Dietary lead intake	µg/day	1993 model defaults	2021 model defaults
0-1 yr old		5.88	2.66
1-2 yr old		5.92	5.03
2-3 yr old		6.79	5.21
3-4 yr old		6.57	5.38
4-5 yr old		6.36	5.64
5-6 yr old		6.75	6.04
6-7 yr old		7.48	5.95
Ventilation rate	m^3/day	1993 model defaults	2021 model defaults
0-1 yr old		2	3.22
1-2 yr old		3	4.97
2-3 yr old		5	6.09
3-4 yr old		5	6.95
4-5 yr old		5	7.68
5-6 yr old		7	8.32

Description	Units	1993 IEUBK Model[a]	Current IEUBK Model[b]
6-7 yr old		7	8.89
Drinking water intake	L/day	1993 model defaults	2021 model defaults
0-1 yr old		0.2	0.4
1-2 yr old		0.5	0.43
2-3 yr old		0.52	0.51
3-4 yr old		0.53	0.54
4-5 yr old		0.55	0.57
5-6 yr old		0.58	0.6
6-7 yr old		0.59	0.63
Concentration in water	µg/L	4	0.9 (default)
Bioavailability	%		
Soil bioavailability		12 (Site-specific)[a]	12 (Site-specific)[a]
Dust bioavailability		30 (default)	30 (default)
Groundwater and diet bioavailability		50 (default)	50 (default)
Contribution of soil lead to indoor household dust weighting factor	Unitless	0.24 Site-specific	0.24 Site-specific
Contribution of outdoor airborne lead to indoor household dust lead	Unitless	100 (default)	100 (default)
Soil to dust weighting factor	%	45 (default)	45 (default)
Cutoff blood lead level	µg/dL	10 (default)	10 (current EPA policy)
Age group	Months	0-6 years or 0-72 months	1-7 years or 12-72 months
Risk-based concentration	mg/kg	1,175 mg/kg	1,458mg/kg

Notes:

a. Based on the 1993 Technical Memorandum. Butte Priority Soils Development of Preliminary Remediation Goals for Lead in Soil. March 15, 1993.

b. The most current version of the IEUBK model was released in May 2021 and obtained at: https://www.epa.gov/sites/production/files/2021-06/ieubkwin_2_build1-source.66_fordownload.zip.

c. Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters. Office of Land and Emergency Management Directive 9285, 6-56. May 2017.

The cleanup goal for child exposures to the non-residential areas (e.g., open space/recreational) of 2,300 mg/kg was also based on the IEUBK model, thus cleanup goal remains valid since the IEUBK review for residential areas was deemed valid based on the EPA's current lead policy.

The EPA has not yet updated its lead policy on evaluating lead cleanup at Superfund sites, thus, the RMAP is in place to abate unacceptable health risks associated with exposure to lead, as required by the ROD. The RMAP is a multi-pathway program to abate soil lead and other hazards (attic dust, interior dust and paint) associated with lead and other site COCs. In addition to the abatement activities, a clinical and educational intervention program is also completed each year. Blood lead screening is available to all Butte-Silver Bow residents through Butte's WIC Program administered through the Butte-Silver Bow Health Department. In addition to blood testing, families are educated about potential lead exposures in and around their homes. Based on the most recent (2019) medical monitoring report, blood lead (PbB) levels in the Butte community are decreasing. The health department utilizes a more stringent target blood lead level of 5 µg/dL[20] when evaluating child PbB levels. The RMAP results show that the number of children with PbB levels above 5 µg/dL has dropped dramatically. In addition, elevated PbB levels cannot be attributed solely to mine waste (i.e., lead paint likely is an important contributor).

[20] Prior to 2013, the health department used the Centers for Disease Control and Prevention (CDC) recommended 10 micrograms per deciliter (µg/dL) as a blood lead "level of concern." Based on a review of several studies, the CDC revised this level to 5 µg/dL. The health department adopted the 5 µg/dL level in 2013 as part of the RMAP health studies as a risk management tool to identify children who might have elevated lead exposures so that actions could be taken to reduce such exposures.

APPENDIX I – SSTOU DATA TABLES

Table I-1. Difference in Average Groundwater Arsenic Concentrations Between Background and Monitoring Wells of the Streamside Tailings Operable Unit, 2015-2019.

Subarea	Well Cluster	Well Pair	Average Dissolved Concentration (mg/L)			Proportional Difference (%)
			Background Well	Monitoring Well	Difference	
1	Colorado Tailings	MW-1010R^ and GW-WG-NS	0.002	0.009	0.007	400
		MW-1010R^ and GW-WG-SS	0.002	0.009	0.007	400
	Rocker	GW-RK-BG^ and MW-10	0.006	0.014	0.007	1,200
		GW-RK-BG^ and MW-01	0.006	0.013	0.007	110
	Nissler	GW-1003R^ and GW-1004A	0.011	<0.001	-0.010	-97
		GW-1003R^ and P-58A	0.011	0.001	-0.010	-90
2	Silver Bow	P-114^ and P-37A	0.003	0.009	0.006	230
		P-114^ and P-39R	0.003	0.011	0.008	390
	Miles Crossing	GW-MC-BG^ and GW-MC-NS	0.037	0.002	-0.035	-96
		GW-MC-BG^ and GW-MC-SS	0.037	0.002	-0.035	-96
4	Fairmont	GW-FM-BG^ and GW-FM-ES	0.002	0.002	0.000	13
		GW-FM-BG^ and GW-FM-WS	0.002	0.002	0.000	25
	Crackerville	GW-CR-BG^ and GW-CR-ES	0.035	0.001	-0.034	-98
		GW-CR-BG^ and GW-CR-WS	0.035	0.012	-0.023	-66
	Stuart	GW-ST-BG^ and GW-ST-ES	0.002	0.000	-0.002	-79
		GW-ST-BG^ and GW-ST-WS	0.002	0.002	0.000	0
	Frontage Road	GW-FR-BG^ and GW-FR-ES	0.009	0.002	-0.007	-80
		GW-FR-BG^ and GW-FR-WS	0.009	0.008	-0.001	-11

^ Background well.

Exceeds DEQ [2019] human health groundwater standard.

Average monitoring well concentration exceeds background concentration by more than double but less than an order of magnitude.

Table I-2. Difference in Average Groundwater Cadmium Concentrations Between Background and Monitoring Wells of the Streamside Tailings Operable Unit, 2015-2019.

Subarea	Well Cluster	Well Pair	Average Dissolved Concentration (mg/L)			Proportional Difference (%)
			Background Well	Monitoring Well	Difference	
1	Colorado Tailings	MW-1010R^ and GW-WG-NS	0.00002	0.00006	0.00004	280
		MW-1010R^ and GW-WG-SS	0.00002	0.00006	0.00005	330
	Rocker	GW-RK-BG^ and MW-10	0.00002	0.00346	0.00345	23,000
		GW-RK-BG^ and MW-01	0.00002	0.00124	0.00122	8,100
	Nissler	GW-1003R^ and GW-1004A	0.00002	0.00228	0.00226	15,100
		GW-1003R^ and P-58A	0.00002	0.01072	0.01071	71,400
2	Silver Bow	P-114^ and P-37A	0.00004	0.01269	0.01265	30,900
		P-114^ and P-39R	0.00004	0.00011	0.00007	170
	Miles Crossing	GW-MC-BG^ and GW-MC-NS	0.00002	0.02704	0.02702	135,100
		GW-MC-BG^ and GW-MC-SS	0.00002	0.01015	0.01013	50,700
4	Fairmont	GW-FM-BG^ and GW-FM-ES	0.00041	0.00015	-0.00027	-64
		GW-FM-BG^ and GW-FM-WS	0.00041	0.00003	-0.00039	-93
	Crackerville	GW-CR-BG^ and GW-CR-ES	0.00003	0.00195	0.00192	6,900
		GW-CR-BG^ and GW-CR-WS	0.00003	0.02200	0.02197	78,500
	Stuart	GW-ST-BG^ and GW-ST-ES	0.00157	0.02050	0.01893	1,200
		GW-ST-BG^ and GW-ST-WS	0.00157	0.02692	0.02535	1,600
	Frontage Road	GW-FR-BG^ and GW-FR-ES	0.00005	0.00008	0.00003	70
		GW-FR-BG^ and GW-FR-WS	0.00005	0.00004	0.00000	-9

^ Background well.

Exceeds MDHES [1994] and DEQ [2019] human health groundwater standards.

Average monitoring well concentration exceeds background concentration by more than double, but less than an order of magnitude.

Average monitoring well concentration exceeds background concentration by 1-2 orders of magnitude.

Average monitoring well concentration exceeds background concentration by 2-3 orders of magnitude.

Average monitoring well concentration exceeds background concentration by at least 3 orders of magnitude.

Table I-3. Difference in Average Groundwater Copper Concentrations Between Background and Monitoring Wells of the Streamside Tailings Operable Unit, 2015-2019.

Subarea	Well Cluster	Well Pair	Average Dissolved Concentration (mg/L)			Proportional Difference (%)
			Background Well	Monitoring Well	Difference	
1	Colorado Tailings	MW-1010R^ and GW-WG-NS	0.001	0.001	0.000	6
		MW-1010R^ and GW-WG-SS	0.001	0.001	0.000	25
	Rocker	GW-RK-BG^ and MW-10	<0.001	0.056	0.056	13,200
		GW-RK-BG^ and MW-01	<0.001	0.067	0.067	15,900
	Nissler	GW-1003R^ and GW-1004A	<0.001	0.181	0.181	42,000
		GW-1003R^ and P-58A	<0.001	0.350	0.349	81,200
2	Silver Bow	P-114^ and P-37A	0.001	0.060	0.059	6,000
		P-114^ and P-39R	0.001	0.033	0.032	3,300
	Miles Crossing	GW-MC-BG^ and GW-MC-NS	<0.001	0.230	0.230	47,900
		GW-MC-BG^ and GW-MC-SS	<0.001	0.020	0.020	4,100
4	Fairmont	GW-FM-BG^ and GW-FM-ES	0.001	0.002	0.001	230
		GW-FM-BG^ and GW-FM-WS	0.001	0.002	0.001	190
	Crackerville	GW-CR-BG^ and GW-CR-ES	0.003	0.004	0.001	20
		GW-CR-BG^ and GW-CR-WS	0.003	0.031	0.028	9,300
	Stuart	GW-ST-BG^ and GW-ST-ES	0.001	1.128	1.127	112,700
		GW-ST-BG^ and GW-ST-WS	0.001	0.167	0.166	16,600
	Frontage Road	GW-FR-BG^ and GW-FR-ES	0.003	0.001	-0.002	-64
		GW-FR-BG^ and GW-FR-WS	0.003	0.002	-0.001	-41

^ Background well.

Exceeds MDHES [1994] human health groundwater standard.

Average monitoring well concentration exceeds background concentration by more than double, but less than an order of magnitude.

Average monitoring well concentration exceeds background concentration by 1-2 orders of magnitude.

Average monitoring well concentration exceeds background concentration by 2-3 orders of magnitude.

Average monitoring well concentration exceeds background concentration by at least 3 orders of magnitude.

Table I-4. Difference in Average Groundwater Lead Concentrations Between Background and Monitoring Wells of the Streamside Tailings Operable Unit, 2015-2019.

Subarea	Well Cluster	Well Pair	Average Dissolved Concentration (mg/L)			Proportional Difference (%)
			Background Well	Monitoring Well	Difference	
1	Colorado Tailings	MW-1010R^ and GW-WG-NS	0.0001	0.0002	0.0002	160
		MW-1010R^ and GW-WG-SS	0.0001	0.0001	0.0000	-14
	Rocker	GW-RK-BG^ and MW-10	0.0001	0.0001	0.0000	24
		GW-RK-BG^ and MW-01	0.0001	0.0001	0.0000	3
	Nissler	GW-1003R^ and GW-1004A	0.0001	0.0087	0.0086	8,900
		GW-1003R^ and P-58A	0.0001	0.0001	0.0000	0
2	Silver Bow	P-114^ and P-37A	0.0001	0.0001	0.0000	-3
		P-114^ and P-39R	0.0001	0.0001	0.0000	6
	Miles Crossing	GW-MC-BG^ and GW-MC-NS	0.0001	0.0001	0.0000	3
		GW-MC-BG^ and GW-MC-SS	0.0001	0.0001	0.0000	0
4	Fairmont	GW-FM-BG^ and GW-FM-ES	0.0001	0.0001	0.0000	-14
		GW-FM-BG^ and GW-FM-WS	0.0001	0.0004	0.0003	2,600
	Crackerville	GW-CR-BG^ and GW-CR-ES	0.0004	0.0001	-0.0002	-69
		GW-CR-BG^ and GW-CR-WS	0.0004	0.0002	-0.0002	-55
	Stuart	GW-ST-BG^ and GW-ST-ES	0.0001	0.0009	0.0008	880
		GW-ST-BG^ and GW-ST-WS	0.0001	0.0004	0.0003	310
	Frontage Road	GW-FR-BG^ and GW-FR-ES	0.0002	0.0001	-0.0001	-47
		GW-FR-BG^ and GW-FR-WS	0.0002	0.0002	0.0000	19

^ Background well.

Average monitoring well concentration exceeds background concentration by more than double, but less than an order of magnitude.

Average monitoring well concentration exceeds background concentration by 1-2 orders of magnitude.

Table I-5. Difference in Average Groundwater Zinc Concentrations Between Background and Monitoring Wells of the Streamside Tailings Operable Unit, 2015-2019.

Subarea	Well Cluster	Well Pair	Average Dissolved Concentration (mg/L)			Proportional Difference (%)
			Background Well	Monitoring Well	Difference	
1	Colorado Tailings	MW-1010R^ and GW-WG-NS	0.003	0.955	0.952	33,800
		MW-1010R^ and GW-WG-SS	0.003	0.003	0.000	-1
	Rocker	GW-RK-BG^ and MW-10	0.003	4.406	4.403	143,900
		GW-RK-BG^ and MW-01	0.003	0.184	0.181	5,900
	Nissler	GW-1003R^ and GW-1004A	0.003	6.848	6.845	229,700
		GW-1003R^ and P-58A	0.003	6.762	6.759	226,800
2	Silver Bow	P-114^ and P-37A	0.004	0.790	0.786	22,100
		P-114^ and P-39R	0.004	0.007	0.003	89
	Miles Crossing	GW-MC-BG^ and GW-MC-NS	0.003	7.414	7.411	239,100
		GW-MC-BG^ and GW-MC-SS	0.003	3.036	3.033	97,800
4	Fairmont	GW-FM-BG^ and GW-FM-ES	0.008	0.353	0.345	4,300
		GW-FM-BG^ and GW-FM-WS	0.008	0.076	0.068	850
	Crackerville	GW-CR-BG^ and GW-CR-ES	0.005	0.437	0.433	920
		GW-CR-BG^ and GW-CR-WS	0.005	0.251	0.246	530
	Stuart	GW-ST-BG^ and GW-ST-ES	0.945	3.006	2.061	220
		GW-ST-BG^ and GW-ST-WS	0.945	4.116	3.171	340
	Frontage Road	GW-FR-BG^ and GW-FR-ES	0.003	0.003	0.000	13
		GW-FR-BG^ and GW-FR-WS	0.003	0.003	0.000	0

^ Background well.

Exceeds DEQ [2019] human health groundwater standard.

Average monitoring well concentration exceeds background concentration by more than double, but less than an order of magnitude.

Average monitoring well concentration exceeds background concentration by 1-2 orders of magnitude.

Average monitoring well concentration exceeds background concentration by 2-3 orders of magnitude.

Average monitoring well concentration exceeds background concentration by at least 3 orders of magnitude.

APPENDIX J – WARM SPRINGS PONDS OUS DATA TABLES

Table J-1 Warm Springs Ponds Influent and Effluent Concentrations, 2015-2019

Minimum, Maximum, and Average Concentration of Regulated Constituents Entering and Leaving the Warm Springs Ponds, January 2015 through December 2019. (mg/L)

Constituent	Date	SS-1			SS-5		
		Min.	Max.	Avg.	Min.	Max.	Avg.
pH	2015	7.6	9.2	8.5	7.8	10.4	8.9
	2016	7.6	9.2	8.4	7.5	10.0	8.9
	2017	7.3	9.1	8.2	7.6	10.4	8.9
	2018	7.5	8.5	8.1	7.3	10.3	8.8
	2019	7.7	9.1	8.1	7.7	10.5	8.9
TSS	2015	<6.24	121.00	11.38	<6.24	22.00	<6.24
	2016	<6.24	177.00	8.80	<6.24	14.00	3.81
	2017	<5.00	58.00	14.34	<5.00	16.00	<5.00
	2018	<5.00	242.00	22.76	<5.00	15.00	<5.00
	2019	<5.00	105.00	16.77	<5.00	80.00	<5.00
Arsenic	2015	0.0032	0.0203	0.0075	0.0051	0.0522	0.0206
	2016	0.0039	0.0233	0.0070	0.0049	0.0415	0.0171
	2017	0.0041	0.0169	0.0074	0.0065	0.0370	0.0191
	2018	0.0052	0.0200	0.0087	0.0082	0.0320	0.0166
	2019	0.0048	0.0190	0.0075	0.0081	0.0380	0.0159
Cadmium	2015	0.00009	0.00107	0.00032	<0.00003	0.00062	0.00010
	2016	<0.00003	0.00237	0.00033	<0.00003	0.00030	0.00010
	2017	0.00006	0.00120	0.00031	<0.00003	0.00034	0.00011
	2018	0.00013	0.00240	0.00039	0.00005	0.00052	0.00015
	2019	0.00020	0.00120	0.00038	0.00004	0.00036	0.00013
Copper	2015	0.0127	0.1030	0.0235	0.0041	0.0405	0.0085
	2016	0.0068	0.1760	0.0214	0.0028	0.0196	0.0073
	2017	0.0130	0.0726	0.0235	0.0030	0.0180	0.0077
	2018	0.0150	0.2500	0.0325	0.0053	0.0350	0.0110
	2019	0.0130	0.1200	0.0253	0.0046	0.0240	0.0088
Iron	2015	0.125	2.940	0.480	0.026	1.140	0.199
	2016	0.084	6.990	0.512	<0.022	0.581	0.165
	2017	0.110	2.660	0.525	<0.022	0.510	0.141
	2018	0.066	7.100	0.853	0.032	1.200	0.190
	2019	0.120	3.000	0.590	0.025	0.690	0.163
Mercury	2015	<0.0000440	0.0001410	<0.0000440	<0.0000440	0.0001080	<0.0000440
	2016	<0.0000440	0.0003350	<0.0000440	<0.0000440	<0.0000440	<0.0000440
	2017	<0.0000037	0.0000710	0.0000222	<0.0000037	0.0000330	0.0000152
	2018	<0.0000037	0.0007320	0.0000341	<0.0000037	0.0003500	0.0000089
	2019	<0.0000039	0.0001500	0.0000177	<0.0000032	0.0000170	0.0000047
Lead	2015	0.00107	0.02120	0.00300	0.00025	0.00905	0.00123
	2016	0.00057	0.03700	0.00287	0.00029	0.00677	0.00106
	2017	0.00059	0.01230	0.00295	0.00010	0.00600	0.00088
	2018	0.00040	0.04400	0.00425	0.00014	0.01600	0.00132
	2019	0.00060	0.01800	0.00262	0.00016	0.00430	0.00085
Selenium	2015	<0.0007	0.00172	<0.0007	<0.0007	0.00146	<0.0007
	2016	<0.0007	0.00210	0.00080	<0.0007	0.00197	0.00072
	2017	0.00022	0.00080	0.00043	<0.00013	0.00073	0.00030
	2018	0.00029	0.00065	0.00041	<0.00014	0.00036	0.00018
	2019	0.00024	0.00095	0.00051	0.00016	0.00045	0.00028
Silver	2015	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
	2016	<0.0004	0.00074	<0.0004	<0.0004	<0.0004	<0.0004
	2017	<0.00017	0.00059	<0.00017	<0.00017	0.0004	<0.00017
	2018	<0.00015	0.00044	<0.00015	<0.00015	0.000085	<0.00015
	2019	<0.000077	0.00017	<0.000077	<0.000077	<0.00015	<0.00015
Zinc	2015	0.039	0.268	0.113	<0.022	0.141	0.039
	2016	<0.022	0.474	0.093	<0.022	0.108	0.020
	2017	0.033	0.231	0.084	0.0022	0.042	0.014
	2018	0.021	0.580	0.108	0.0055	0.082	0.020
	2019	0.042	0.310	0.102	0.0028	0.062	0.017

Figure J-1. Warm Springs Ponds Influent and Effluent Flow, 2015-2020

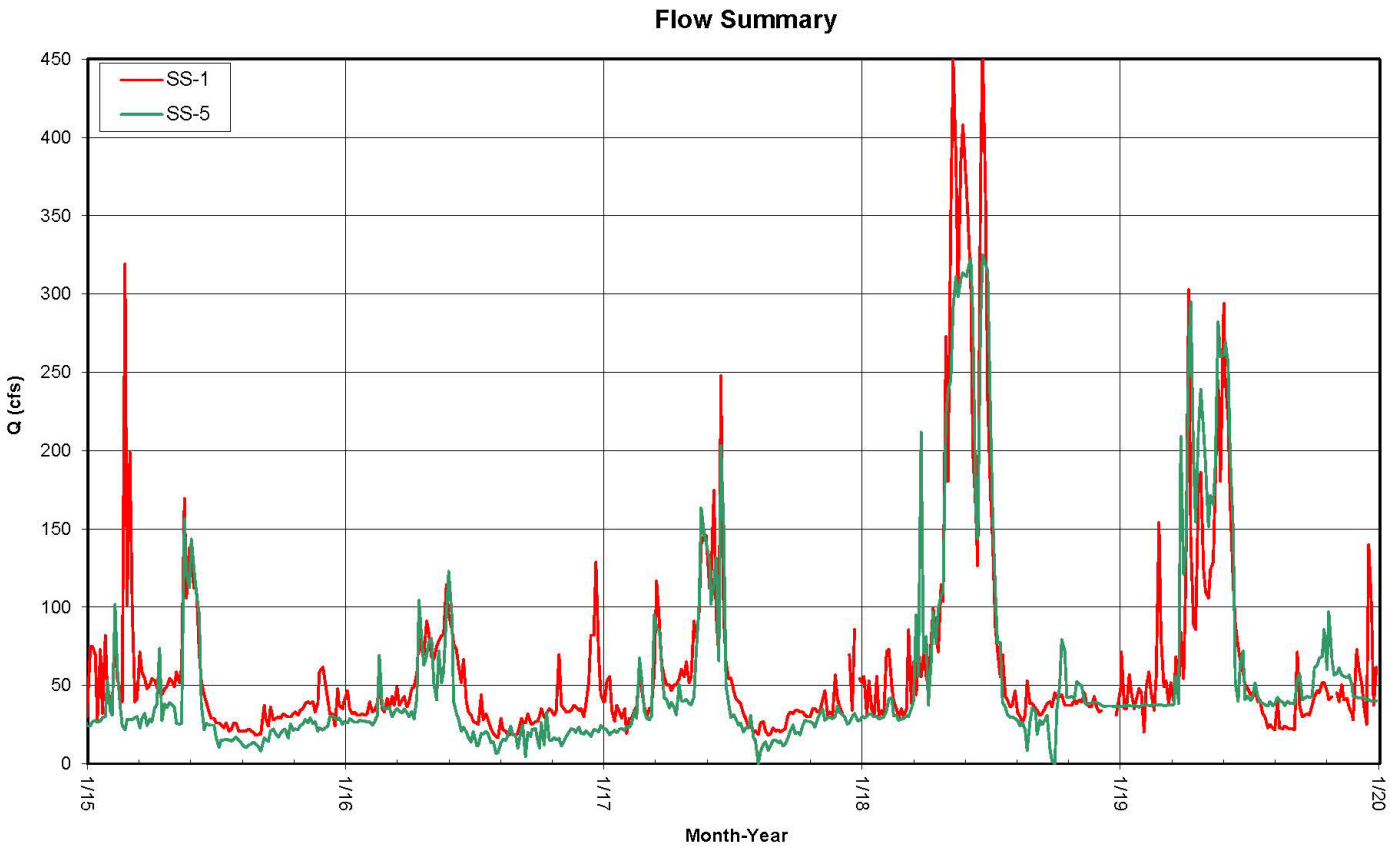

Figure 1. Comparison of influent (SS-1) and effluent (SS-5) hydrographs for time span shown.

Note: Inlet channel was froze during periods in December 2017, December 2018, and October 2019 causing false readings. The readings were removed from the dataset.

Figure J-2. Warm Springs Ponds Influent and Effluent Arsenic Concentrations, 2015-2020

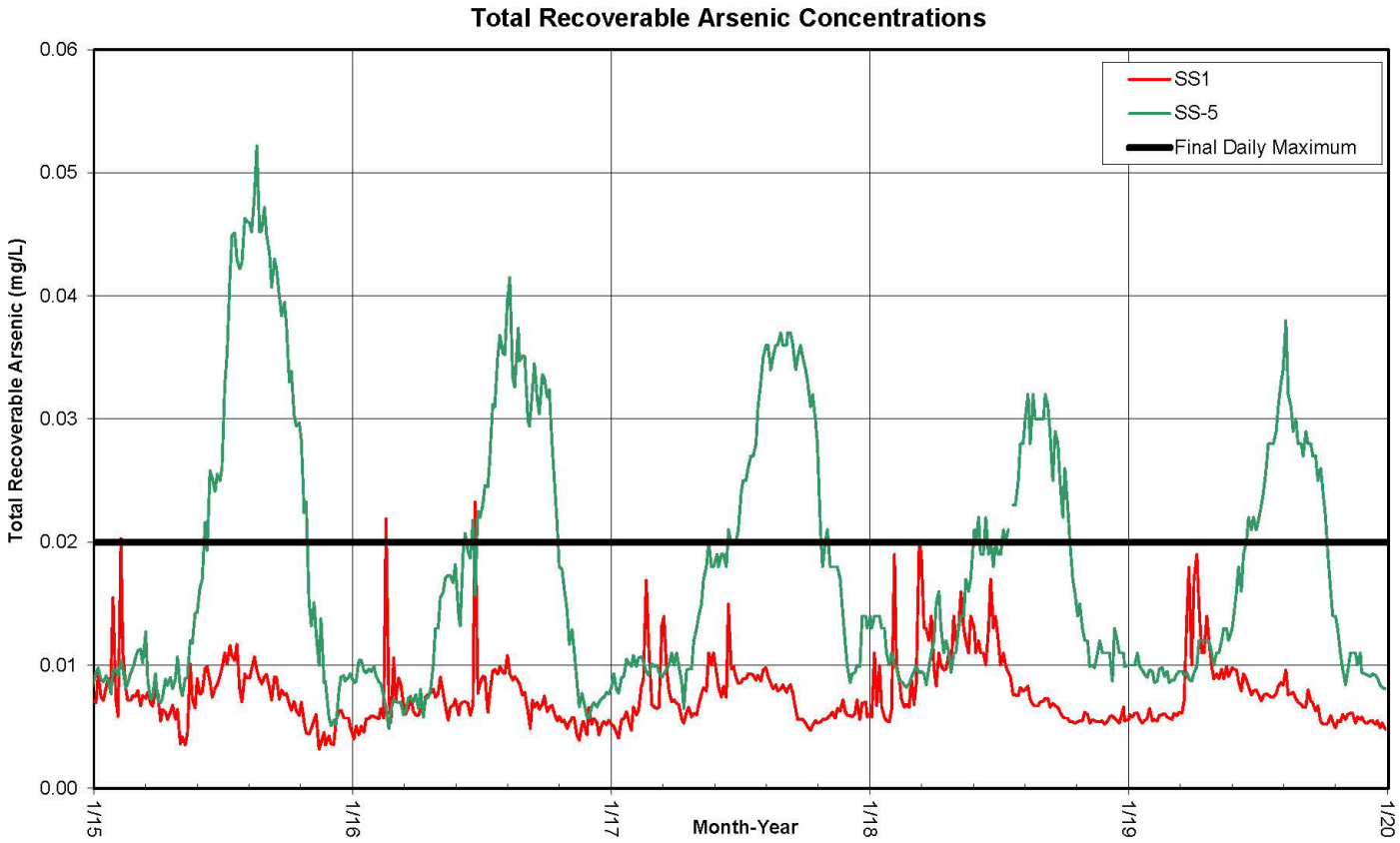

Figure 2. Comparison of influent (SS-1) and effluent (SS-5) total recoverable arsenic concentrations for time span shown with final daily perfomance

Figure J-3. Warm Springs Ponds Influent and Effluent Cadmium Concentrations, 2015-2020

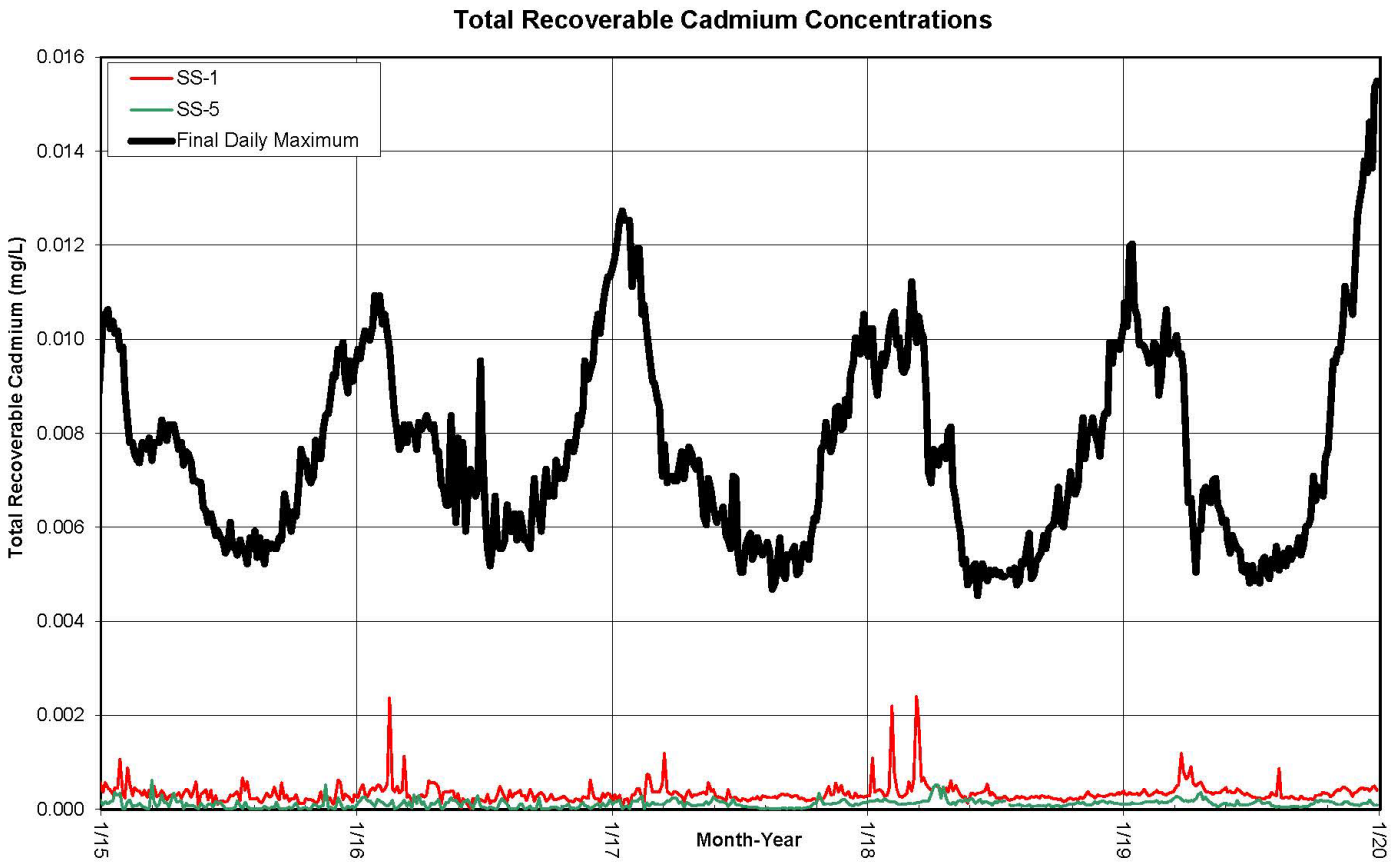

Figure 3. Comparison of influent (SS-1) and effluent (SS-5) total recoverable cadmium concentrations for time span shown with final daily performance standard.

Figure J-4. Warm Springs Ponds Influent and Effluent Copper Concentrations, 2015-2020

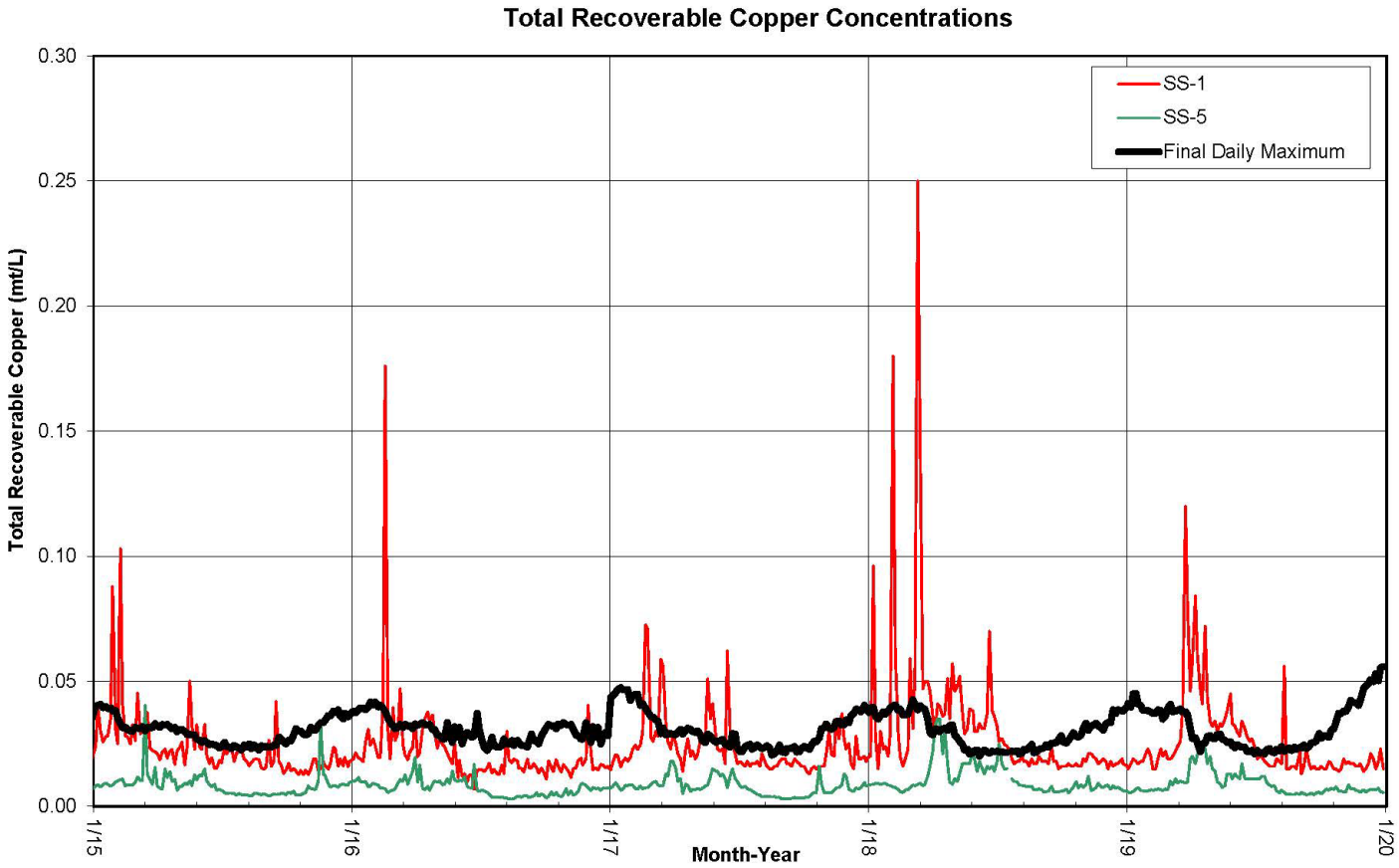

Figure 4. Comparison of influent (SS-1) and effluent (SS-5) total recoverable copper concentrations for time span shown with final daily performance standard.

Figure J-5. Warm Springs Ponds Influent and Effluent Iron Concentrations, 2015-2020

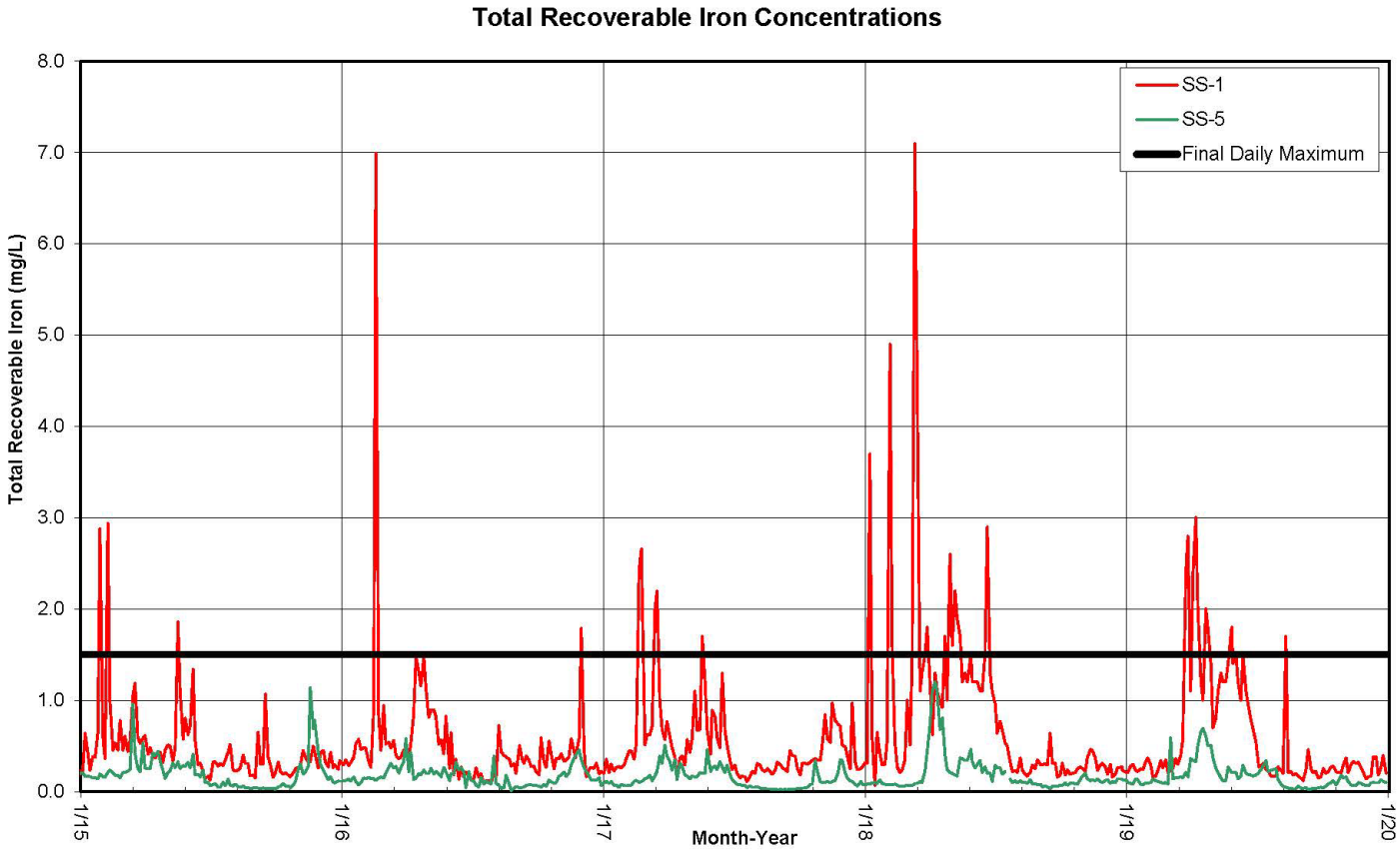

Figure 5. Comparison of influent (SS-1) and effluent (SS-5) total recoverable iron concentrations for time span shown with final daily performance standard.

Figure J-6. Warm Springs Ponds Influent and Effluent Lead Concentrations, 2015-2020

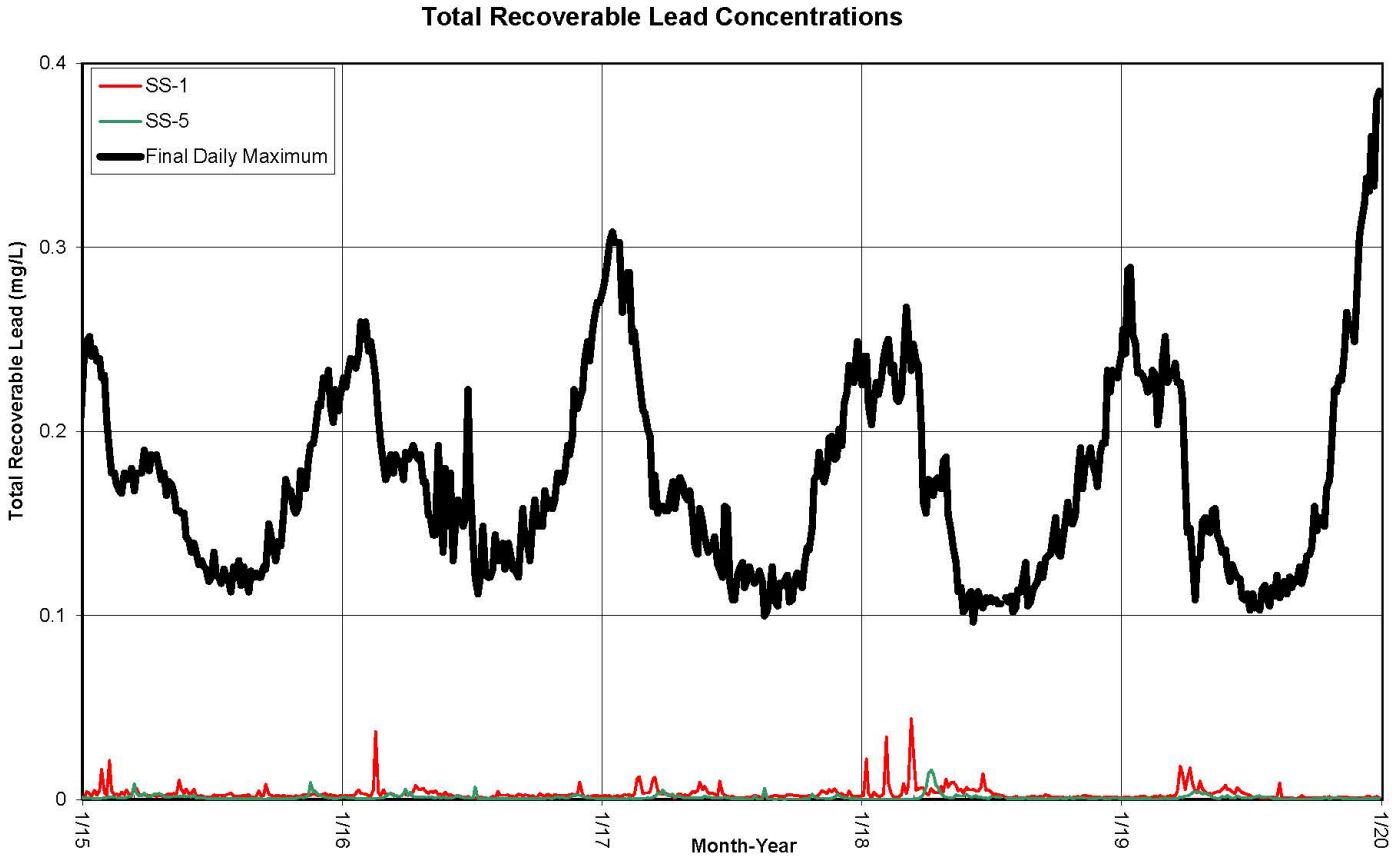

Figure 6. Comparison of influent (SS-1) and effluent (SS-5) total recoverable lead concentrations for time span shown with final daily performance standard.

Figure J-7. Warm Springs Ponds Influent and Effluent Mercury Concentrations, 2015-2020

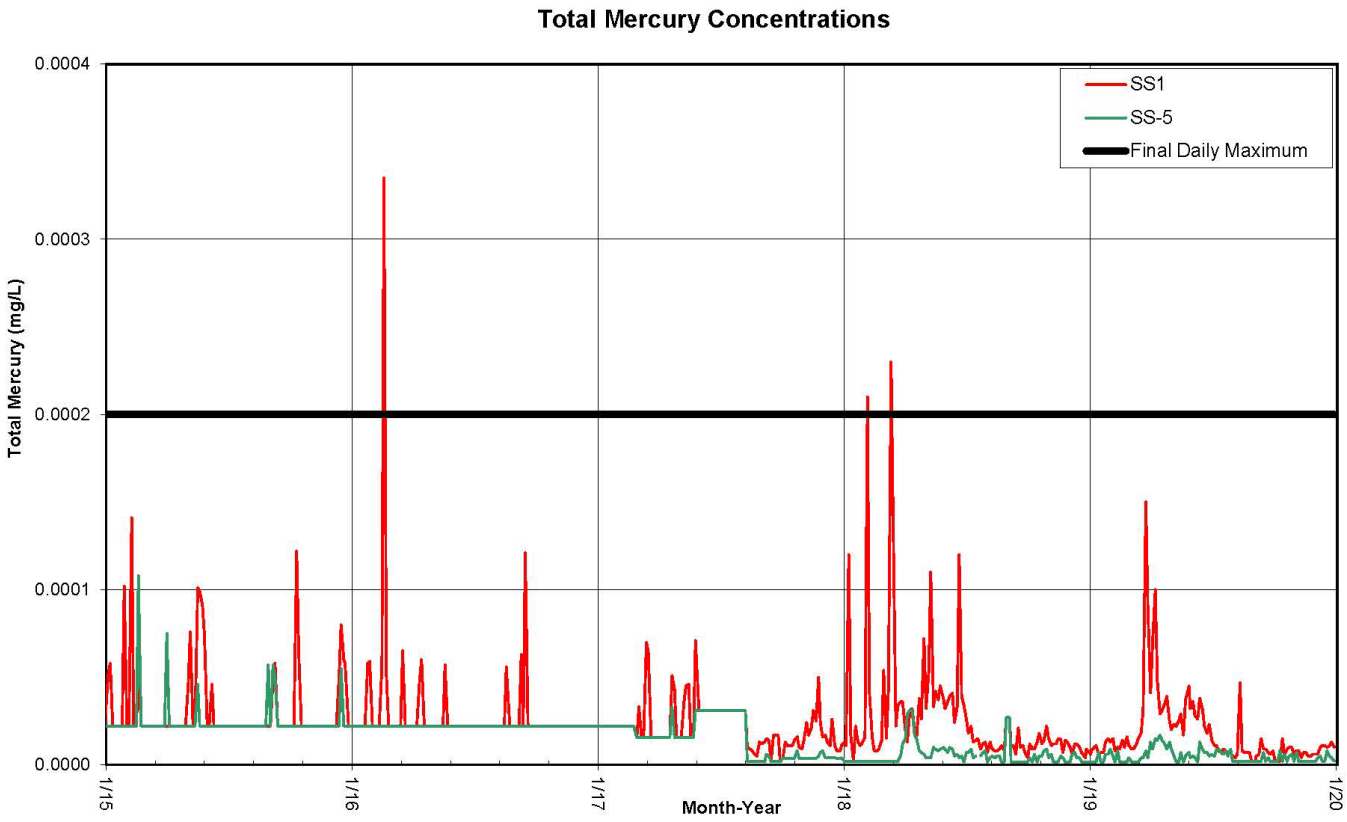

Figure 7. Comparison of influent (SS-1) and effluent (SS-5) total mercury concentrations for time span shown with final daily performance standard.

Figure J-8. Warm Springs Ponds Influent and Effluent Selenium Concentrations, 2015-2020

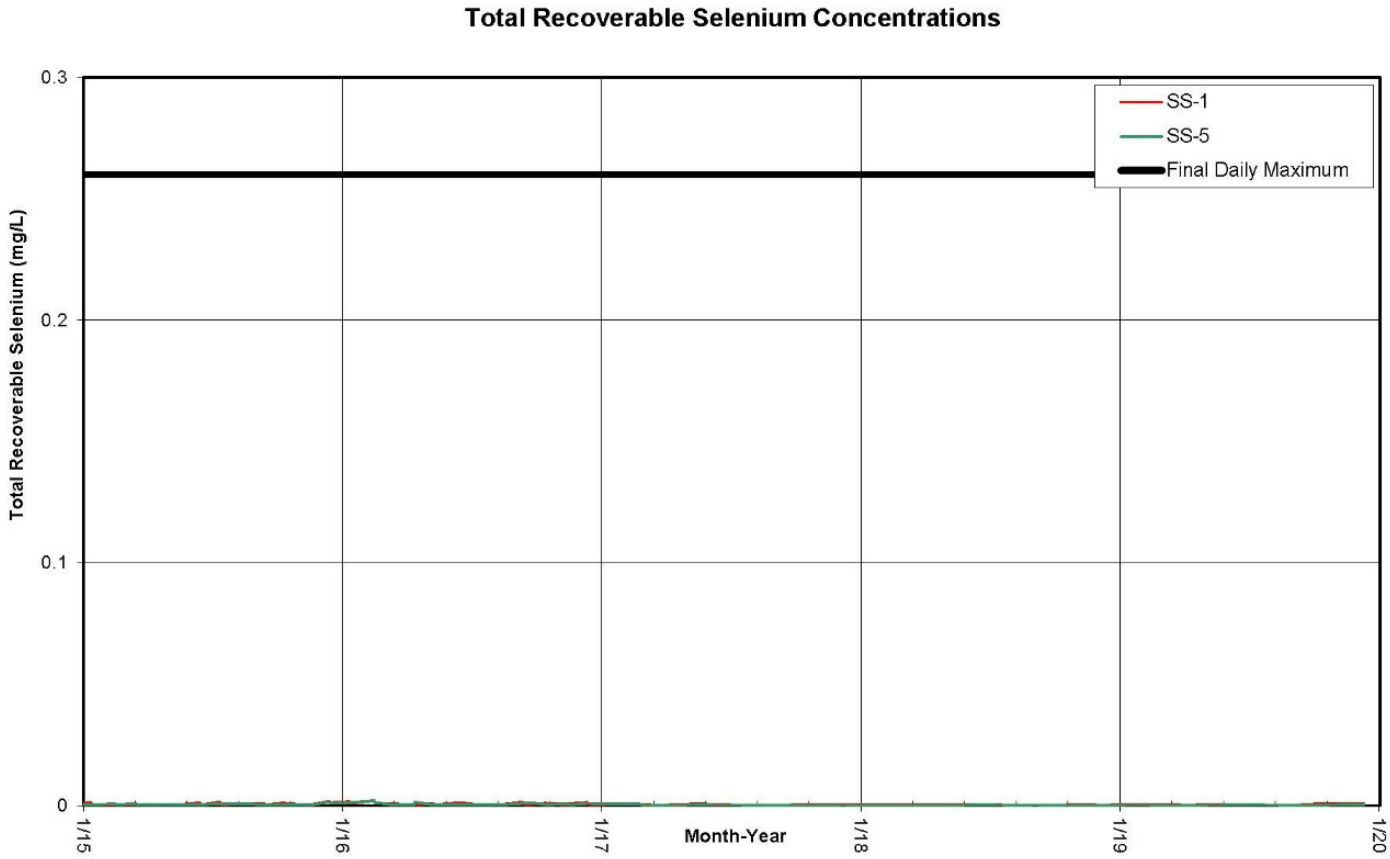

Figure 8. Comparison of influent (SS-1) and effluent (SS-5) total recoverable selenium concentrations for time span shown with final daily performance

Figure J-9. Warm Springs Ponds Influent and Effluent Silver Concentrations, 2015-2020

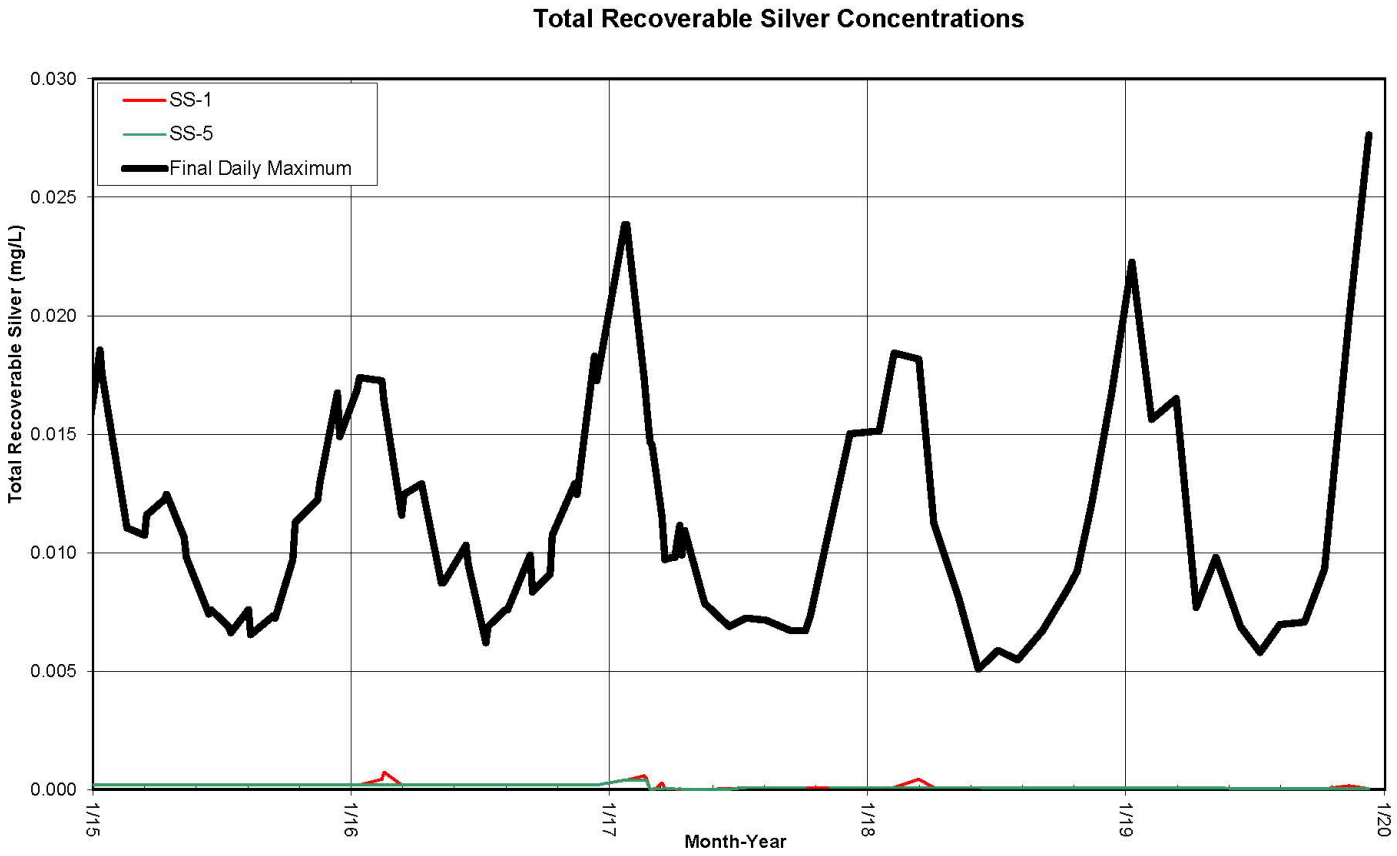

Figure 9. Comparison of influent (SS-1) and effluent (SS-5) total recoverable silver concentrations for time span shown with final daily performance standard.

Figure J-10. Warm Springs Ponds Influent and Effluent Zinc Concentrations, 2015-2020

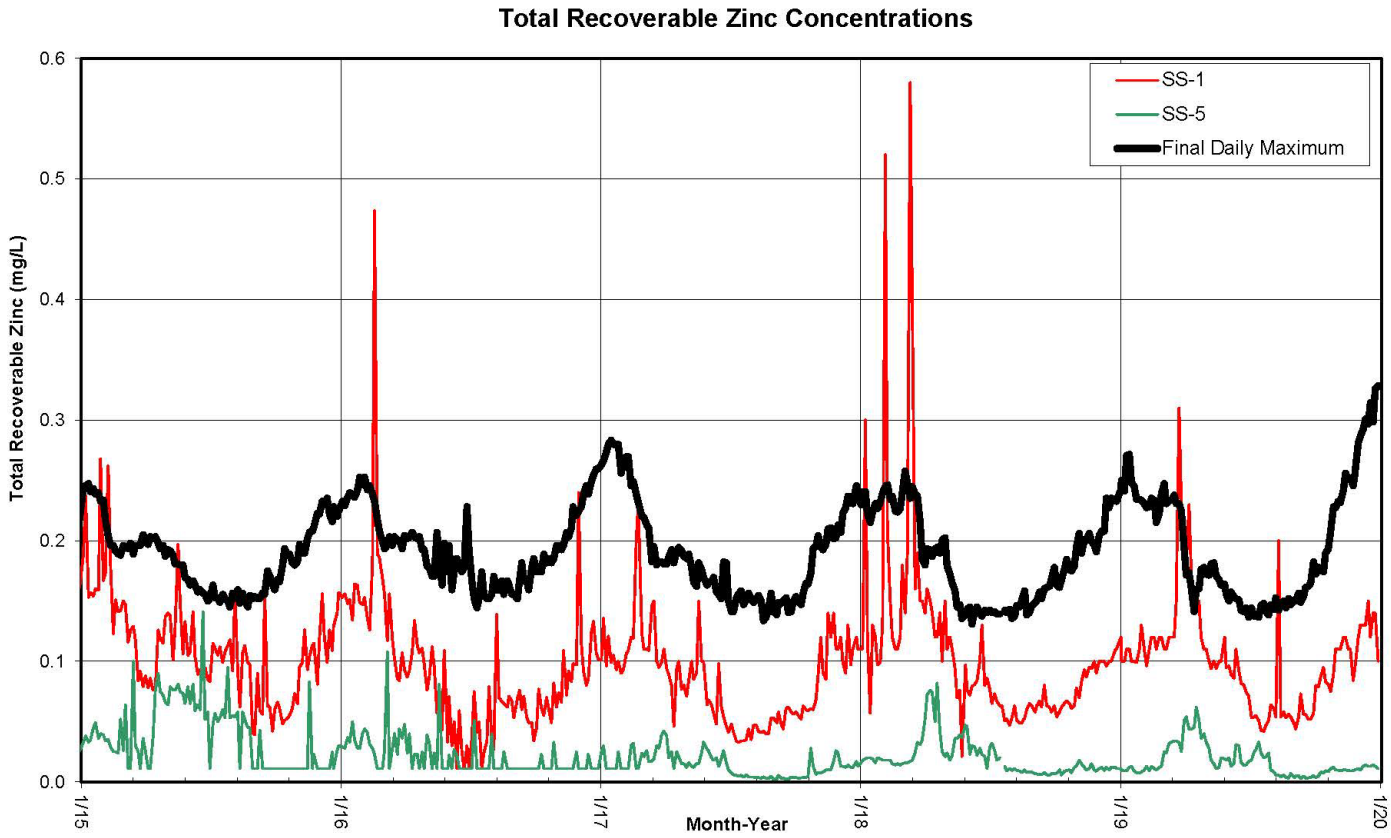

Figure 10. Comparison of influent (SS-1) and effluent (SS-5) total recoverable zinc concentrations for time span shown with final daily performance standard.

Figure J-11. Warm Springs Ponds Influent and Effluent Total Suspended Solids Concentrations, 2015-2020

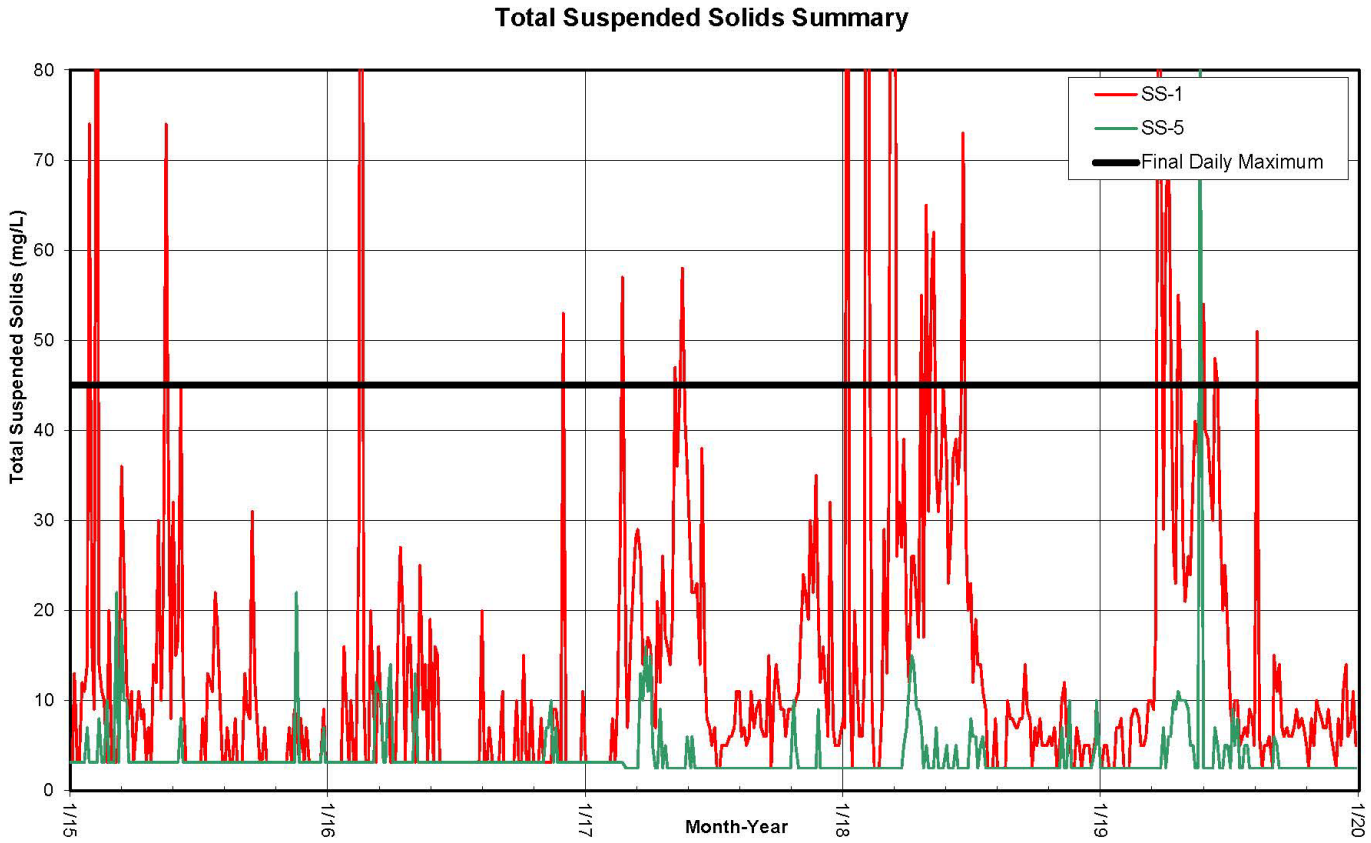

Figure 11. Comparison of influent (SS-1) and effluent (SS-5) total suspended solids concentrations for time span shown with final daily performance standard.

Figure J-12. Warm Springs Ponds Influent and Effluent pH, 2015-2020

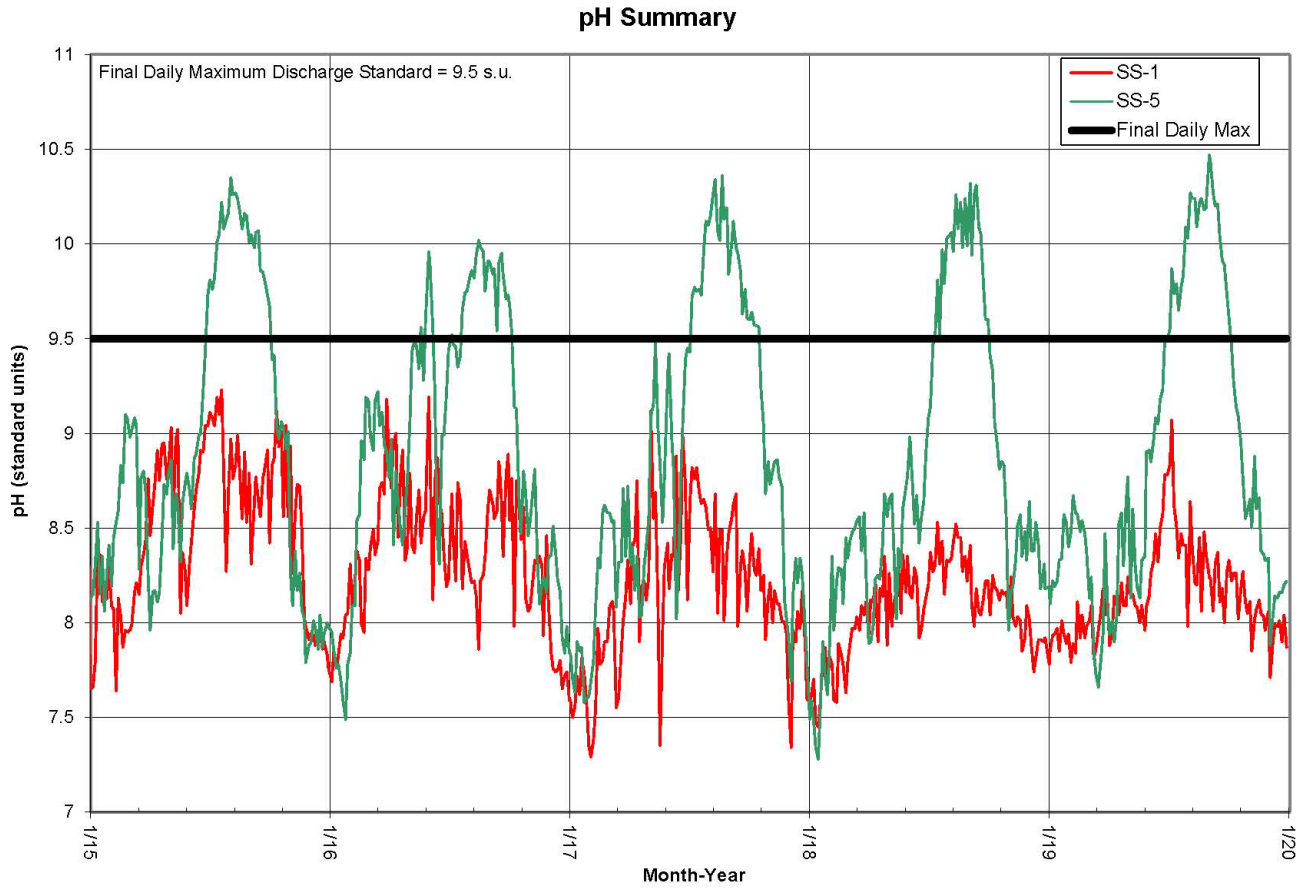

Figure 12. Comparison of influent (SS-1) and effluent (SS-5) pH values for time span shown with final daily performance standard.

Table J-2. Warm Springs Ponds 2019 Groundwater Monitoring Data

Warm Springs Ponds Groundwater Monitoring Piezometers
Water Quality Summary

Side of Trench	Piezo. Number	Date Sampled	Time Sampled	Nitrate/ Nitrite-N (mg/L)	Sulfate (mg/L)	Metals (dissolved)				
						Arsenic (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Lead (mg/L)	Mercury (mg/L)
MCL				10.00	N/A	0.0500	0.010	0.0500	0.050	0.002
E	P-01	6/18/19	10:00	0.330	113	0.0035	0.00004	0.0012	0.00005	< 0.0000039
N	P-02	6/18/19	13:25	< 0.095	115	0.0098	0.00011	0.0007	0.00190	< 0.0000039
N	P-04	6/18/19	14:03	< 0.095	283	0.0009	0.00005	0.0002	< 0.00005	< 0.0000039
N	P-06	6/18/19	14:27	0.350	142	0.0056	0.00004	0.0006	< 0.00005	0.0000130
N	P-08	6/19/19	10:45	0.130	206	0.0022	0.00022	0.0003	< 0.00005	< 0.0000039
S	P-03	6/18/19	10:38	< 0.095	59	0.0450	0.00076	0.0005	< 0.00005	0.0000080
S	P-05	6/18/19	11:13	< 0.095	115	0.0240	0.00004	0.0003	< 0.00005	0.0000040
S	P-07	6/18/19	11:50	< 0.095	258	0.0056	0.00010	0.0004	< 0.00005	< 0.0000039
S	P-09	6/18/19	12:45	< 0.095	275	0.0015	0.00012	0.0004	< 0.00005	< 0.0000039
	P-12	6/19/19	11:52	0.250	88	0.0016	0.00060	0.0003	< 0.00005	0.0000080
	P-14	6/19/19	12:12	0.390	196	0.0009	0.00062	0.0005	< 0.00005	0.0000070

Note: Standards must be met immediately **north** of the groundwater interception trench (P-02, P-04, P-06, and P-08) and at P-10, P-12, and P-14.

Table D-1. Groundwater Monitoring Summary

APPENDIX K – ROCKER OU GROUNDWATER DATA

Table K-1. Rocker OU Groundwater Concentrations

TABLE H-1. ROCKER OU Groundwater Arsenic Results (mg/L)

Well	Hydro-Stratigraphic Unit	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	May-99	Aug-99	Nov-99	Feb-00	May-00	Aug-00	Nov-00	Feb-01	May-01	Aug-01	Nov-01	Feb-02	May-02	Aug-02	Nov-02	Feb-03	May-03
RH-60[1]	Gravel	0.131	0.047	0.17	0.107	0.15	0.11	0.117	0.25	0.22	0.29	0.35	0.39	0.22	0.22	0.267	0.343	0.369	0.393	0.289	0.209	0.164	0.148
RH-61	Gravel	5.14	8.12	3.71	3.44	3.94	3.05	2.62	3.26	2.87	3.5	1.7	2.9	2	2.7	1.9	1.88	2.7	2.41	2.11	1.81	2.36	2.14
RH-62	Gravel	4.31	2.97	5.08	4.76	6.06	7.73	6.22	7.99	10.9	10.3	7.8	10.6	10.9	9.2	10	8.12	17.1	17.8	4	7.84	12.2	7.86
RH-63	Gravel	0.43	0.5	0.71	0.31	0.35	0.46	0.57	0.56	0.462	0.39	1.4	0.83	0.86	0.52	1.4	1.22	1.27	1.17	2.09	3.62	1.71	1.1
RH-64	Gravel	0.66	0.8	0.88	0.61	0.44	0.43	0.5	0.9	0.691	0.73	0.77	0.95	0.74	0.53	0.68	1.16	1.11	0.907	1.14	1.89	1.62	0.904
RH-65	Gravel	3.35	3.43	5.39	6.19	9.83	9.64	6.17	7.41	9.08	10.1	7.3	9.1	9	9.8	7.9	6.44	6.88	6.67	7.49	4.26	2.8	3.06
RH-66	Gravel	1.33	3.69	4.81	2.05	3.06	4.18	3.26	5.09	3.63	4.4	2.4	3	1.9	2.1	2.9	2.05	2.01	1.93	2.15	1.46	2.04	1.67
DP-03	Shallow		3.8	4.47	3.32	3.98	3.61	4.23	3.69	3.66	3.4	3.4	3.1	2.7	2.7	3.8	3.06						
MW-01																							
RH-05	Shallow	0.029	0.027	0.25	0.086	0.17	0.15	0.22	0.26	0.257	0.35	0.52	0.82	0.68	0.64	1.1	1.37	0.881	0.718	0.722	0.736	1.03	0.896
RH-07	Shallow	0.021	0.029	0.025	0.023	0.024	0.028	0.039	0.023	0.02	0.018	0.02	0.018	0.013	0.018	0.014	0.014	0.014	0.014	0.016	0.014	0.011	0.012
RH-15	Shallow	0.115	0.114	0.12	0.163	0.123	0.131	0.146	0.145	0.18	0.14	0.15	0.25	0.134	0.14	0.119	0.127	0.141	0.133	0.18	0.192	0.152	0.155
RH-17	Shallow	0.045	0.058	0.099	0.102	0.071	0.11	0.23	0.063	0.064	0.15	0.13	0.26	0.071	0.1	0.091	0.104	0.046	0.05	0.031	0.024	0.036	0.041
RH-19	Shallow	0.045	0.012	0.044	0.048	0.043	0.044	0.08	0.037	0.041	0.048	0.042	0.04	0.041	0.053	0.033	0.063	0.035	0.048	0.015	0.016	0.02	0.019
RH-41	Shallow	5.95	5.49	5.22	4.69	4.22	3.87	3.64	3.69	3.5	3.1	3.6	3.5	3	3	3.6	4	3.68	3.12	2.94	3.31	2.81	2.47
RH-44	Shallow	0.56	0.56	0.72	0.37	0.34	0.39	0.27	0.61	0.265	0.31	0.58	0.42	0.34	0.18	0.196	0.317	0.217	0.224	0.278	0.258	0.144	0.145
RH-47	Shallow	0.014	0.009	0.016	0.012	0.013	0.005	0.011	0.014	0.01	0.004	0.012	0.015	0.012	0.012	0.01	0.01	0.009	0.007	0.006	0.008	0.009	0.007
RH-52R[2]	Shallow	0.009	0.004	0.005	0.01	0.006	0.005	0.008	0.006	0.007	0.005	0.006	0.008	0.005	0.003	0.002	0.003	0.003	0.002	0.006	0.002	0.002	0.002
RH-75	Shallow														0.009	0.01		0.012	0.009	0.015	0.013	0.011	0.012
RH-12R[2]	Deep	0.01	0.008	0.011	0.012	0.009	0.01	0.01	0.008	0.009	0.007	0.009	0.01	0.007	0.009	0.008	0.007	0.008	0.007	0.008	0.008	0.007	0.007
RH-14R	Deep	1.03	1.21	1.33	1.33	1.51	1.86	1.64	1.79	1.64	1.8	2.1	2.1	1.7	1.7	1.7	2.02	2.04	1.84	1.96	2.24	1.88	1.68
RH-16	Deep	0.011	0.011	0.01	0.013	0.01	0.012	0.01	0.009	0.011	0.009	0.011	0.01	0.009	0.012	0.01	0.01	0.009	0.008	0.013	0.01	0.01	0.009
RH-18	Deep	0.012	0.012	0.011	0.01	0.013	0.013	0.011	0.011	0.014	0.01	0.012	0.011	0.011	0.013	0.011	0.011	0.011	0.012	0.008	0.011	0.011	0.01
RH-20	Deep	0.012	0.029	0.013	0.011	0.009	0.012	0.011	0.01	0.015	0.01	0.011	0.012	0.01	0.013	0.011	0.011	0.011	0.012	0.012	0.01	0.01	0.009
RH-51[2]	Deep	0.009	0.007	0.008	0.005	0.008	0.008	0.008	0.007	0.008	0.006	0.006	0.007	0.006	0.008	0.006	0.006	0.006	0.006	0.01	0.005	0.005	0.006
RH-55	Deep														0.011	0.01	0.009	0.005	0.008	0.015	0.01	0.01	0.012
RH-76[2]	Deep														0.006	0.004	0	0.004	0.003	0.009	0.003	0.003	0.004
Ayers[2,3]	Tertiary	0.009	0.012	0.012	0.02	0.012	0.011	0.013	0.011	0.011	0.011	0.011	0.012	0.01	0.012	0.01	0.011	0.012	0.008	0.016	0.009	0.01	0.01
PALMERS[2]	Tertiary	0.003	0.003	0.005	0.004	#VALUE!	0.005	0.004	0.006	0.004	0.003	0.003	0.004	0.003	0.004	0.002	0.005	0.004	0.003	0.007	0.003	0.004	0.003
RH-06	Tertiary	1.24	0.96	1.13	0.79	0.75	0.7	0.77	0.76	0.456	0.71	0.58	0.59	0.41	0.4	0.282	0.326	0.396	0.138	0.224	0.094	0.104	0.065
RH-36R[2]	Tertiary	0.012	0.009	0.012	0.014	0.01	0.011	0.013	0.009	0.014	0.013	0.01	0.011	0.008	0.011	0.01	0.008	0.01	0.011	0.009	0.009	0.009	0.009
RH-43	Tertiary	0.02	0.009	0.013	0.011	0.014	0.009	0.017	0.009	0.013	0.008	0.01	0.011	0.008	0.012	0.009	0.007	0.009	0.008	0.005	0.008	0.007	0.009
RH-46[2]	Tertiary	0.01	0.011	0.013	0.011	0.008	0.01	0.012	0.009	0.013	0.008	0.01	0.01	0.008	0.012	0.009	0.008	0.007	0.007	0.007	0.008	0.008	0.008
RH-48	Tertiary	0.11	0.116	0.2	0.137	0.18	0.177	0.142	0.104	0.161	0.092	0.032	0.087	0.082	0.068	0.046	0.042	0.036	0.027	0.023	0.023	0.024	0.025
RH-53[2]	Tertiary	0.012	0.011	0.011	0.011	0.014	0.013	0.011	0.012	0.01	0.01	0.01	0.013	0.011	0.013	0.011	0.013	0.016	0.01	0.016	0.012	0.01	0.01
RH-72	Tertiary																						
Town Pump[2,4]	Tertiary	0.012	0.012	0.01	0.013	0.009	0.012	0.011	0.012	0.012	0.01	0.011	0.012	0.01	0.01	0.012	0.01	0.011	0.009	0.017	0.011	0.009	0.011
Town Pump Treated[5]	Tertiary																						

[1]August 2010 erroneous value, rejected
[2]Contingency Well
[3]Not sampled since 3QTR17,well not in use
[4]Inaccessible 1QTR19. Inadvertently sampled municipal water 2QTR19.
[5]Treated water sampled

TABLE H-1. ROCKER OU Groundwater Arsenic Results (mg/L)

Well	Hydro-Stratigraphic Unit	Aug-03	Nov-03	Feb-04	May-04	Aug-04	Nov-04	Feb-05	May-05	Aug-05	Nov-05	Feb-06	May-06	Aug-06	Nov-06	Feb-07	May-07	Aug-07	Nov-07	Feb-08	May-08	Aug-08	Nov-08	Feb-09	May-09
RH-60[1]	Gravel	0.229	0.453	0.231	0.228	0.245	0.303	0.316	0.283	0.261	0.337	1.8	0.941	0.821	1.28	0.501	0.457	0.551	0.588	0.47	0.707	0.37	0.5	0.61	0.47
RH-61	Gravel	1.46	1.99	2.29	1.42	1.648	1.37	1.7	2.09	1.69	1.87	3.93	2.16	2.86	3.51	3.81	2.34	2.99	2.75	2.23	1.55	1.5	1.1	1.7	1.4
RH-62	Gravel	11.9	6.98	13.9	10.1	10.2	9.18	15.2	11.8	10.4	7.88	18.6	13.8	9.09	7.15	8.64	9.75	8.46	3.77	8.9	8.44	8.3	4.2	7	8.4
RH-63	Gravel	2.23	2.96	0.684	1.46	2.68	2.57	1.01	1.49	1.76	2.97	1.24	2.99	0.819	1.93	2.38	1.33	0.968	1.63	1.65	1.91	0.7	1.9	1.5	1.1
RH-64	Gravel	0.937	1.97	1.41	1	1.15	1.61	1.34	1.39	0.907	1.84	1.2	1.11	0.924	1.22	1.53	0.982	0.933	1.23	1.67	1.22	0.83	1.3	1	0.98
RH-65	Gravel	5.43	4.38	5.55	5.98	6.06	4.3	5.01	4.78	5.66	4.82	5.79	4.76	5.78	5.68	5.61	5.55	5.51	4.25	5.47	4.64	4.9	4.1	5.1	3.4
RH-66	Gravel	1.39	2.17	2.62	2.08	1.96	1.84	2.36	2.21	1.44	1.97	2.53	2.09	1.46	1.51	1.8	1.78	1.54	1.52	2.12	2.1	1.3	1.5	2.3	1.9
DP-03	Shallow																								
MW-01																									
RH-05	Shallow	1.03	1.9	1.61	1.24	1.84	2.07	2.06	1.67	2.25	2.57	2.44	1.75	2.55	3.38	2.71	1.75	2.44	2.33	2.12	1.84	1.9	2.1	1.9	1.6
RH-07	Shallow	0.011	0.014	0.012	0.011	0.011	0.013	0.012	0.01	0.011	0.012	0.011	0.009	0.0107	0.0119	0.0109	0.00872	0.0109	0.00981	0.00877	0.00847	0.0085	0.0094	0.01	0.0086
RH-15	Shallow	0.159	0.189	0.159	0.151	0.163	0.168	0.154	0.145	0.167	0.162	0.143	0.154	0.144	0.153	0.144	0.134	0.145	0.135	0.123	0.128	0.14	0.14	0.13	0.13
RH-17	Shallow	0.041	0.038	0.026	0.032	0.019	0.037	0.022	0.025	0.055	0.026	0.02	0.038	0.0482	0.0394	0.0345	0.0344	0.0779	0.062	0.0346	0.0606	0.055	0.062	0.076	0.038
RH-19	Shallow	0.017	0.023	0.031	0.026	0.018	0.032	0.028	0.021	0.014	0.02	0.012	0.01	0.0203	0.0198	0.0226	0.0177	0.0218	0.0194	0.0214	0.024	0.012	0.022	0.014	0.011
RH-41	Shallow	2.28	2.98	2.82	2.48	2.76	2.48	2.59	2.65	2.33	2.84	2.3	2.35	2.28	2.6	2.28	1.92	2.21	2.01	2.28	2.02	1.7	1.9	2.1	1.7
RH-44	Shallow	0.097	0.314	0.163	0.122	0.182	0.317	0.159	0.16	0.145	0.188	0.146	0.09	0.143	0.16	0.119	0.213	0.232	0.288	0.21	0.255	0.25	0.29	0.28	0.3
RH-47	Shallow	0.008	0.009	0.009	0.008	0.005	0.007	0.009	0.005	0.008	0.01	0.007	0.007	0.00578	0.00588	0.00468	0.00449	0.00514	0.00589	0.00347	0.00309	0.0033	0.0061	0.0037	0.0027
RH-52R[2]	Shallow	0.003	0.003	0.003	0.002	0.002	0.003	0.003	0.003	0.003	0.005	0.004	0.003	0.00342	0.00446	0.00449	0.0033	0.00405	0.00401	0.0035	0.00359	0.0025	0.0024	0.0024	0.0024
RH-75	Shallow	0.012	0.019	0.014	0.014	0.014	0.017	0.017	0.014	0.017	0.019	0.018	0.015	0.0168	0.0164	0.0172	0.014	0.0182	0.0168	0.0157	0.0169	0.016	0.016	0.017	0.014
RH-12R[2]	Deep	0.007	0.008	0.007	0.007	0.007	0.007	0.008	0.007	0.007	0.009	0.009	0.008	0.00753	0.00773	0.00791	0.00701	0.00765	0.00699	0.00729	0.00747	0.007	0.0069	0.0072	0.0073
RH-14R	Deep	1.4	2.11	1.81	1.51	1.85	1.47	1.65	1.78	1.52	1.7	1.57	1.28	1.26	1.24	1.21	1.12	1.4	1.05	0.989	1.44	0.92	0.92	1.2	0.99
RH-16	Deep	0.009	0.011	0.01	0.009	0.009	0.01	0.01	0.008	0.01	0.011	0.011	0.01	0.0108	0.0103	0.0104	0.00997	0.0104	0.0097	0.00956	0.0103	0.0099	0.0097	0.0098	0.01
RH-18	Deep	0.01	0.013	0.011	0.011	0.011	0.011	0.012	0.011	0.011	0.011	0.011	0.012	0.0114	0.0107	0.0113	0.0107	0.0108	0.00971	0.01	0.0106	0.01	0.01	0.01	0.01
RH-20	Deep	0.009	0.012	0.007	0.009	0.01	0.01	0.01	0.008	0.01	0.01	0.01	0.01	0.0101	0.0098	0.0101	0.0098	0.0102	0.009	0.00933	0.00933	0.0092	0.009	0.0096	0.0099
RH-51[2]	Deep	0.005	0.006	0.005	0.006	0.005	0.006	0.006	0.005	0.006	0.006	0.006	0.006	0.00577	0.00601	0.00631	0.0054	0.00611	0.00524	0.00536	0.00592	0.0054	0.0052	0.0055	0.0054
RH-55	Deep	0.012	0.015	0.011	0.013	0.012	0.014	0.015	0.013	0.014	0.016	0.015	0.014	0.014	0.0143	0.0138	0.0117	0.0144	0.0126	0.0121	0.0139	0.012	0.012	0.013	0.013
RH-76[2]	Deep	0.004	0.005	0.002	0.004	0.004	0.004	0.004	0.004	0.004	0.005	0.004	0.004	0.00428	0.00422	0.0046	0.00404	0.00456	0.00409	0.00362	0.00418	0.0041	0.0036	0.0037	0.0037
Ayers[2,3]	Tertiary	0.009	0.013	0.012	0.01	0.01	0.011	0.012	0.011	0.012	0.011	0.012	0.01	0.0106	0.0115	0.0111	0.0103	0.0105	0.0094	0.0101	0.0109	0.01	0.01	0.0099	0.01
PALMERS[2]	Tertiary	0.006	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.004	0.007	0.00461	0.0039	0.00425	0.00482	0.00495	0.00319	0.00298	0.0043	0.0031	0.0027	0.0027	0.0028
RH-06	Tertiary	0.107	0.121	0.124	0.085	0.092	0.068	0.174	0.14	0.136	0.142	0.145	0.11	0.162	0.148	0.17	0.115	0.112	0.106	0.112	0.126	0.11	0.12	0.13	0.11
RH-36R[2]	Tertiary	0.009	0.012	0.01	0.01	0.01	0.01	0.01	0.007	0.01	0.009	0.01	0.01	0.00951	0.01	0.0104	0.00912	0.00916	0.00887	0.00917	0.0108	0.0091	0.0086	0.0094	0.0096
RH-43	Tertiary	0.009	0.012	0.009	0.009	0.009	0.009	0.01	0.008	0.009	0.01	0.009	0.009	0.0105	0.0102	0.0104	0.0091	0.00986	0.00819	0.00771	0.00851	0.0087	0.0086	0.0089	0.0096
RH-46[2]	Tertiary	0.008	0.011	0.009	0.009	0.008	0.009	0.009	0.009	0.009	0.01	0.01	0.009	0.00937	0.0095	0.00968	0.00822	0.00911	0.00813	0.00814	0.00919	0.0083	0.0082	0.0084	0.0083
RH-48	Tertiary	0.018	0.03	0.025	0.021	0.019	0.023	0.024	0.015	0.02	0.023	0.016	0.012	0.0161	0.0165	0.0168	0.0155	0.0121	0.0151	0.0121	0.0144	0.011	0.016	0.013	0.012
RH-53[2]	Tertiary	0.011	0.014	0.012	0.012	0.011	0.013	0.013	0.012	0.012	0.014	0.013	0.015	0.0128	0.0129	0.0136	0.0111	0.0132	0.0112	0.0108	0.0123	0.011	0.011	0.012	0.011
RH-72	Tertiary																								
Town Pump[2,4]	Tertiary	0.01	0.014	0.012	0.012	0.011	0.013	0.012	0.009	0.013	0.013	0.013	0.011	0.0117	0.0125	0.012	0.0113	0.0118	0.01	0.0103	0.0125	0.011	0.011	0.011	0.011
Town Pump Treated[5]	Tertiary																								

[1]August 2010 erroneous value, rejected
[2]Contingency Well
[3]Not sampled since 3QTR17,well not in use
[4]Inaccessible 1QTR19. Inadvertently sampled municipal water 2QTR19.
[5]Treated water sampled

TABLE H-1. ROCKER OU Groundwater Arsenic Results (mg/L)

Well	Hydro-Stratigraphic Unit	Aug-09	Nov-09	Feb-10	May-10	Aug-10	Nov-10	Feb-11	May-11	Aug-11	Nov-11	Feb-12	May-12	Aug-12	Nov-12	Feb-13	May-13	Aug-13	Nov-13	Feb-14	May-14	Aug-14
RH-60[1]	Gravel	0.48	0.52	0.57	0.73		0.36	0.16	0.58	0.36	0.42	0.52	0.67	0.32	0.4	0.29	0.33	0.3	0.65	1.2	0.52	0.79
RH-61	Gravel	1.3	1.3	1.2	1	0.89	1.1	1.5	1.5	1.8	1.8	2.3	3.8	2.9	1.5	1.6	1.3	1.3	1.3	1.5	1.1	1.2
RH-62	Gravel	8.9	4.7	5.2	7	8.2	4.2	4.7	8.5	7.4	5	7.4	9.5	7.2	2.3	7.2	6.7	4	2.7	8.4	11	8.9
RH-63	Gravel	1.1	1.3	1.9	1.3	0.64	0.87	1.3	1.3	0.74	0.95	1.2	1.4	0.87	1.6	0.89	0.84	1.5	1.8	0.58	0.67	0.8
RH-64	Gravel	0.81	1.1	1.6	1.3	0.71	0.75	0.99	0.89	0.63	0.68	0.88	0.77	0.88	1.2	1.4	1.1	0.94	1.2	1.3	0.9	0.74
RH-65	Gravel	5.3	4.1	4.7	5	3.9	4	4.1	4.5	3.7	4.1	4	3.8	4	3.2	3.3	3.2	4.3	3.4	3.5	3.2	4.5
RH-66	Gravel	1.4	1.5	1.7	1.9	1.5	1.1	1.4	1.8	1.2	1.1	1.7	1.7	1.2	1.5	1.8	2	1.4	1.6	2.1	1.9	1.3
DP-03	Shallow																					
MW-01																						
RH-05	Shallow	2.2	2.3	2.7	1.6	1.7	2.1	2.1	1.9	1.1	2.2	1.9	1.5	2.1	1.6	1.8	1.6	1.8	2.2	1.7	1.7	2
RH-07	Shallow	0.0098	0.0088	0.0088	0.0078	0.01	0.0091	0.0091	0.0086	0.012	0.0099	0.0089	0.0083	0.0094	0.0095	0.0087	0.0088	0.0085	0.01	0.0083	0.0079	0.0088
RH-15	Shallow	0.14	0.13	0.12	0.12	0.12	0.12	0.11	0.12	0.12	0.11	0.11	0.11	0.12	0.12	0.12	0.11	0.12	0.13	0.13	0.12	0.12
RH-17	Shallow	0.048	0.057	0.082	0.047	0.055	0.045	0.062	0.04	0.035	0.043	0.044	0.045	0.058	0.048	0.029	0.034	0.071	0.039	0.023	0.055	0.054
RH-19	Shallow	0.015	0.027	0.016	0.026	0.027	0.017	0.022	0.032	0.011	0.019	0.029	0.023	0.014	0.024	0.021	0.019	0.018	0.03	0.028	0.02	0.015
RH-41	Shallow	1.8	1.8	1.7	1.7	1.6	1.7	1.6	1.7	1.6	1.7	1.6	1.5	1.6	1.5	1.4	1.5	1.5	1.6	1.4	1.4	1.5
RH-44	Shallow	0.37	0.36	0.34	0.32	0.36	0.37	0.33	0.32	0.38	0.43	0.4	0.4	0.41	0.44	0.54	0.55	0.49	0.56	0.54	0.55	0.62
RH-47	Shallow	0.0038	0.0042	0.0023	0.002	0.0034	0.0032	0.0039	0.0037	0.0033	0.0039	0.0038	0.0038	0.0039	0.0044	0.0043	0.0047	0.0042	0.0052	0.0035	0.0036	0.0042
RH-52R[2]	Shallow	0.0025	0.0027	0.0021	0.002	0.0022	0.0023	0.0022	0.0024	0.0022	0.0021	0.0022	0.0021	0.0021	0.0021	0.0022	0.0023	0.002	0.0023	0.0018	0.0023	0.0019
RH-75	Shallow	0.017	0.016	0.014	0.014	0.014	0.013	0.013	0.013	0.014	0.014	0.014	0.013	0.016	0.015	0.015	0.016	0.015	0.016	0.016	0.015	0.016
RH-12R[2]	Deep	0.0076	0.007	0.0068	0.0067	0.0066	0.0069	0.0067	0.0069	0.0067	0.0066	0.0067	0.0065	0.0068	0.0067	0.0067	0.0072	0.0069	0.0074	0.0068	0.0066	0.0069
RH-14R	Deep	1	0.9	0.92	0.89	0.89	0.88	0.87	0.93	0.88	0.81	0.87	0.82	1.1	0.71	0.77	0.79	0.75	0.8	0.8	0.73	0.73
RH-16	Deep	0.01	0.01	0.01	0.0098	0.0094	0.0093	0.0094	0.01	0.0096	0.0092	0.0094	0.0099	0.0092	0.0088	0.0096	0.0089	0.0099	0.01	0.01	0.01	0.0092
RH-18	Deep	0.011	0.01	0.01	0.0097	0.0096	0.0099	0.0094	0.01	0.0098	0.0098	0.0099	0.01	0.0099	0.0092	0.0097	0.01	0.01	0.01	0.01	0.0099	0.0093
RH-20	Deep	0.0099	0.0096	0.0092	0.0087	0.0088	0.0085	0.0088	0.0089	0.0087	0.0089	0.0092	0.0093	0.0087	0.0087	0.0089	0.0093	0.0089	0.0096	0.0092	0.0088	0.0086
RH-51[2]	Deep	0.0057	0.0053	0.005	0.005	0.0051	0.0051	0.0051	0.0054	0.0053	0.0051	0.0055	0.0048	0.0051	0.0051	0.005	0.0055	0.0053	0.0054	0.0048	0.0051	0.0052
RH-55	Deep	0.013	0.012	0.011	0.011	0.011	0.012	0.011	0.012	0.012	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.013	0.012	0.012	0.012
RH-76[2]	Deep	0.004	0.0038	0.0036	0.0036	0.0037	0.0038	0.0037	0.0038	0.0037	0.0037	0.0039	0.0037	0.0038	0.0035	0.0037	0.0041	0.0038	0.004	0.0036	0.0039	0.0037
Ayers[2,3]	Tertiary	0.01	0.01	0.0094	0.0098	0.0094	0.0098	0.0093	0.01	0.0092	0.0094	0.0098	0.0092	0.0095	0.0089	0.0088	0.0087	0.0091	0.0098	0.01	0.01	0.0091
PALMERS[2]	Tertiary	0.0028	0.0028	0.0024	0.0028	0.0026	0.0026	0.0026	0.0027	0.0024	0.0024	0.0027	0.003	0.0029	0.0026	0.0022	0.0024	0.003	0.0028	0.0028	0.0027	0.0026
RH-06	Tertiary	0.05	0.099	0.1	0.11	0.12	0.11	0.15	0.14	0.15	0.16	0.26	0.21	0.19	0.15	0.15	0.16	0.14	0.13	0.11	0.13	0.11
RH-36R[2]	Tertiary	0.0099	0.0094	0.0091	0.0088	0.0084	0.0092	0.0085	0.0094	0.0086	0.0088	0.0097	0.0085	0.0087	0.0087	0.0089	0.0088	0.0085	0.0094	0.0087	0.0086	0.0078
RH-43	Tertiary	0.0089	0.0094	0.0086	0.0081	0.0083	0.0075	0.0077	0.0088	0.0083	0.0086	0.0091	0.0089	0.0083	0.0086	0.0086	0.009	0.0095	0.0094	0.0095	0.0088	0.0078
RH-46[2]	Tertiary	0.0086	0.0082	0.0083	0.0076	0.0077	0.0081	0.0077	0.0079	0.008	0.0081	0.0078	0.0077	0.0079	0.0074	0.0077	0.0081	0.0079	0.0081	0.0074	0.0072	0.0073
RH-48	Tertiary	0.011	0.012	0.013	0.01	0.01	0.011	0.013	0.0096	0.011	0.011	0.014	0.014	0.015	0.014	0.014	0.014	0.015	0.011	0.011	0.013	0.0094
RH-53[2]	Tertiary	0.012	0.011	0.01	0.01	0.011	0.011	0.0097	0.011	0.011	0.011	0.011	0.01	0.011	0.01	0.01	0.011	0.011	0.012	0.01	0.017	0.01
RH-72	Tertiary																				0.22	
Town Pump[2,4]	Tertiary	0.011	0.011	0.01	0.0097	0.0097	0.01	0.0097	0.01	0.01	0.0097	0.011	0.01	0.011	0.0095	0.0098	0.0097	0.01	0.011	0.011	0.01	0.01
Town Pump Treated[5]	Tertiary																					

[1]August 2010 erroneous value, rejected
[2]Contingency Well
[3]Not sampled since 3QTR17,well not in use
[4]Inaccessible 1QTR19. Inadvertently sampled municipal water 2QTR19.
[5]Treated water sampled

TABLE H-1. ROCKER OU Groundwater Arsenic Results (mg/L)

Well	Hydro-Stratigraphic Unit	Nov-14	Feb-15	May-15	Aug-15	Nov-15	Feb-16	May-16	Aug-16	Nov-16	Feb-17	May-17	Aug-17	Nov-17	Feb-18	May-18	Aug-18	Nov-18	Feb-19	May-19	Aug-19	Nov-19	MEAN	STD DEV
RH-60[1]	Gravel	0.41	0.88	0.77	0.9	1.2	2.2	1.6	0.69	2.2	1.1	1.2	0.74	0.74	0.63	0.62	0.33	1.4	0.23	0.5	0.50	0.8	0.55	0.43
RH-61	Gravel	1.4	1	2.3	0.85	2.5	2.1	2.2	1.3	1.1	2.2	1.3	1.8	2	2.5	1.9	3.5	2.9	2	2.9	2.3	8.7	2.3	1.3
RH-62	Gravel	9.6	9	9.7	8.5	5	7.1	10.4	5.8	4.4	8.3	9	9.9	7.9	4.3	8.7	6.2	9.4	9.9	5.0	8.3	11.1	8.3	3.1
RH-63	Gravel	0.81	0.96	1.2	1.1	1.4	1	1.4	1.8	2.8	0.53	1.6	0.55	2	0.86	0.55	0.7	0.76	0.8	0.35	0.67	0.86	1.3	0.70
RH-64	Gravel	0.89	0.94	1.1	0.91	1.2	1.5	1.1	1.2	1.4	1.7	0.98	1.1	1	1.1	0.7	0.72	0.72	0.68	0.57	0.55	0.58	1.0	0.34
RH-65	Gravel	4.8	4.3	4.6	4.8	4.5	3.3	4.4	6.1	3.7	3.7	4.2	6.4	5.2	8.2	4.2	4.6	5	7.4	4.0	7.1	6.7	5.3	1.7
RH-66	Gravel	1.4	1.4	1.4	1.1	1.4	1.6	1.8	1.4	1.9	1.8	1.7	1.5	1.8	1.4	1.5	1.3	1.4	1.1	1.6	1.8	1.6	1.9	0.79
DP-03	Shallow																						3.5	0.51
MW-01													0.021	0.023	0.019	0.018	0.026	0.018	0.016	0.0	0.031	0.023	0.022	0.00445
RH-05	Shallow	2.4	2.2	2	2	2.3	2	1.8	2.2	2.3	1.7	1.6	1.5	2.3	1.9	1.5	0.8	1.4	1.6	0.9	1.1	1.5	1.6	0.74
RH-07	Shallow	0.0099	0.0089	0.0085	0.0095	0.0082	0.0074	0.0092	0.0087	0.0086	0.0086	0.0082	0.0092	0.0091	0.0086	0.024	0.015	0.013	0.01	0.0210	0.0130	0.0140	0.013	0.00572
RH-15	Shallow	0.12	0.12	0.12	0.12	0.14	0.12	0.12	0.13	0.13	0.13	0.12	0.12	0.12	0.11	0.11	0.11	0.13	0.11	0.11	0.12	0.12	0.13	0.02285
RH-17	Shallow	0.058	0.059	0.076	0.074	0.051	0.03	0.067	0.055	0.087	0.051	0.053	0.066	0.064	0.033	0.051	0.082	0.07	0.029	0.057	0.049	0.067	0.059	0.03747
RH-19	Shallow	0.032	0.025	0.017	0.013	0.024	0.02	0.019	0.018	0.029	0.018	0.024	0.025	0.027	0.023	0.032	0.028	0.028	0.021	0.038	0.036	0.016	0.026	0.0123
RH-41	Shallow	1.6	1.6	1.5	1.5	1.7	1.5	1.6	1.6	1.6	1.4	1.5	1.6	1.6	1.3	1.5	1.5	1.6	1.3	1.5	1.2	1.5	2.3	1.02
RH-44	Shallow	0.65	0.61	0.64	0.61	0.15	0.21	0.19	0.23	0.29	0.27	0.26	0.34	0.38	0.37	0.45	0.56	0.51	0.55	0.65	0.62	0.70	0.35	0.164
RH-47	Shallow	0.0051	0.005	0.004	0.0025	0.0046	0.0047	0.0034	0.0035	0.0056	0.0066	0.0047	0.0061	0.0065	0.0048	0.0047	0.0062	0.0066	0.006	0.0063	0.0068	0.0120	0.0064	0.0032
RH-52R[2]	Shallow	0.0025	0.0023	0.0024	0.002	0.0021	0.0024	0.003	0.0024	0.0028	0.0026	0.0027	0.0026	0.0029	0.0028	0.003	0.0029	0.0032	0.0031	0.0033	0.0029	0.0034	0.0033	0.00165
RH-75	Shallow	0.016	0.016	0.015	0.015	0.014	0.016	0.017	0.016	0.016	0.016	0.014	0.015	0.017	0.016	0.014	0.013	0.015	0.015	0.012	0.012	0.015	0.015	0.00205
RH-12R[2]	Deep	0.0068	0.007	0.007	0.0066	0.006	0.0062	0.0075	0.0067	0.0066	0.007	0.0067	0.0068	0.0072	0.0074	0.0071	0.0069	0.0071	0.0069	0.0067	0.0065	0.0072	0.0074	0.00107
RH-14R	Deep	0.78	0.76	0.76	0.77	0.85	0.74	0.95	0.76	0.78	0.81	0.82	0.78	0.8	0.82	0.77	0.78	0.73	0.71	0.76	0.65	0.66	1.2	0.456
RH-16	Deep	0.0092	0.0099	0.01	0.0096	0.01	0.009	0.0096	0.0098	0.01	0.01	0.0097	0.0091	0.0099	0.01	0.0096	0.0096	0.0099	0.009	0.010	0.0098	0.0099	0.010	0.00083
RH-18	Deep	0.0096	0.01	0.0096	0.0096	0.0091	0.0092	0.01	0.01	0.01	0.01	0.01	0.0094	0.01	0.01	0.011	0.0099	0.01	0.010	0.010	0.0098	0.010	0.010	0.0010
RH-20	Deep	0.0091	0.0091	0.0096	0.0087	0.0085	0.0085	0.0092	0.0093	0.0092	0.0092	0.0087	0.0087	0.0095	0.0091	0.009	0.0092	0.009	0.0089	0.0093	0.0084	0.0097	0.010	0.0024
RH-51[2]	Deep	0.0053	0.0054	0.0055	0.0052	0.0046	0.0046	0.0066	0.005	0.0051	0.0053	0.0053	0.0053	0.0052	0.0055	0.0055	0.0054	0.0057	0.0055	0.0054	0.0056	0.0060	0.0058	0.0010
RH-55	Deep	0.012	0.012	0.012	0.012	0.011	0.011	0.013	0.012	0.011	0.013	0.011	0.012	0.012	0.013	0.012	0.012	0.012	0.012	0.012	0.011	0.012	0.012	0.00161
RH-76[2]	Deep	0.0039	0.004	0.004	0.0037	0.0032	0.0036	0.0043	0.004	0.0038	0.0039	0.0041	0.0038	0.0042	0.0042	0.0041	0.0041	0.0041	0.0041	0.0041	0.0039	0.0043	0.0040	0.00078
Ayers[2,3]	Tertiary	0.0096	0.0098	0.01	0.0094	0.0086	0.0089	0.011	0.0096	0.0097	0.0095	0.0094	0.0094										0.010	0.00166
PALMERS[2]	Tertiary	0.0025	0.0026	0.0026	0.0029	0.0027	0.0025	0.0027	0.0026	0.0027	0.0025	0.0024	0.0033	0.0027	0.0026	0.0027	0.0029	0.0028	0.0024	0.0024	0.0024	0.0026	0.0032	0.0010
RH-06	Tertiary	0.12	0.14	0.17	0.12	0.11	0.13	0.23	0.18	0.16	0.19	0.29	0.22	0.18	0.17	0.29	0.76	0.36	0.43	0.51	0.77	0.55	0.27	0.25568
RH-36R[2]	Tertiary	0.0092	0.0091	0.0093	0.009	0.0081	0.0085	0.0086	0.0085	0.0095	0.0088	0.0087	0.0085	0.0094	0.0088	0.0091	0.0089	0.0088	0.0087	0.0087	0.0083	0.0091	0.009	0.00126
RH-43	Tertiary	0.01	0.0094	0.0092	0.0084	0.0079	0.0081	0.0085	0.0086	0.0086	0.0088	0.0086	0.0083	0.009	0.009	0.0085	0.0084	0.0088	0.0088	0.0087	0.0092	0.0092	0.009	0.0019
RH-46[2]	Tertiary	0.0078	0.008	0.0082	0.0076	0.0072	0.0073	0.0082	0.0073	0.0075	0.0076	0.0071	0.0078	0.0079	0.0081	0.0077	0.0081	0.0083	0.0082	0.0079	0.0081	0.0086	0.009	0.00125
RH-48	Tertiary	0.011	0.013	0.012	0.0086	0.0081	0.0086	0.0089	0.0083	0.01	0.012	0.0086	0.011	0.0084	0.008	0.011	0.022	0.017	0.017	0.021	0.029	0.019	0.033	0.04322
RH-53[2]	Tertiary	0.011	0.011	0.011	0.01	0.0095	0.01	0.011	0.01	0.01	0.01	0.011	0.01	0.011	0.011	0.01	0.01	0.011	0.010	0.01	0.010	0.011	0.011	0.00152
RH-72	Tertiary	0.23																					0.15	0.13
Town Pump[2,4]	Tertiary	0.01	0.01	0.011	0.011	0.0097	0.0099	0.011	0.011	0.01	0.01	0.011	0.011		0.01000	0.01000	0.01100	0.01100			0.010	0.010	0.011	0.00128
Town Pump Treated[5]	Tertiary													0.0050									NA	NA

[1]August 2010 erroneous value, rejected
[2]Contingency Well
[3]Not sampled since 3QTR17,well not in use
[4]Inaccessible 1QTR19. Inadvertently sampled municipal water 2QTR19.
[5]Treated water sampled

Figure K-1. Rocker OU RH-62 Arsenic Concentrations

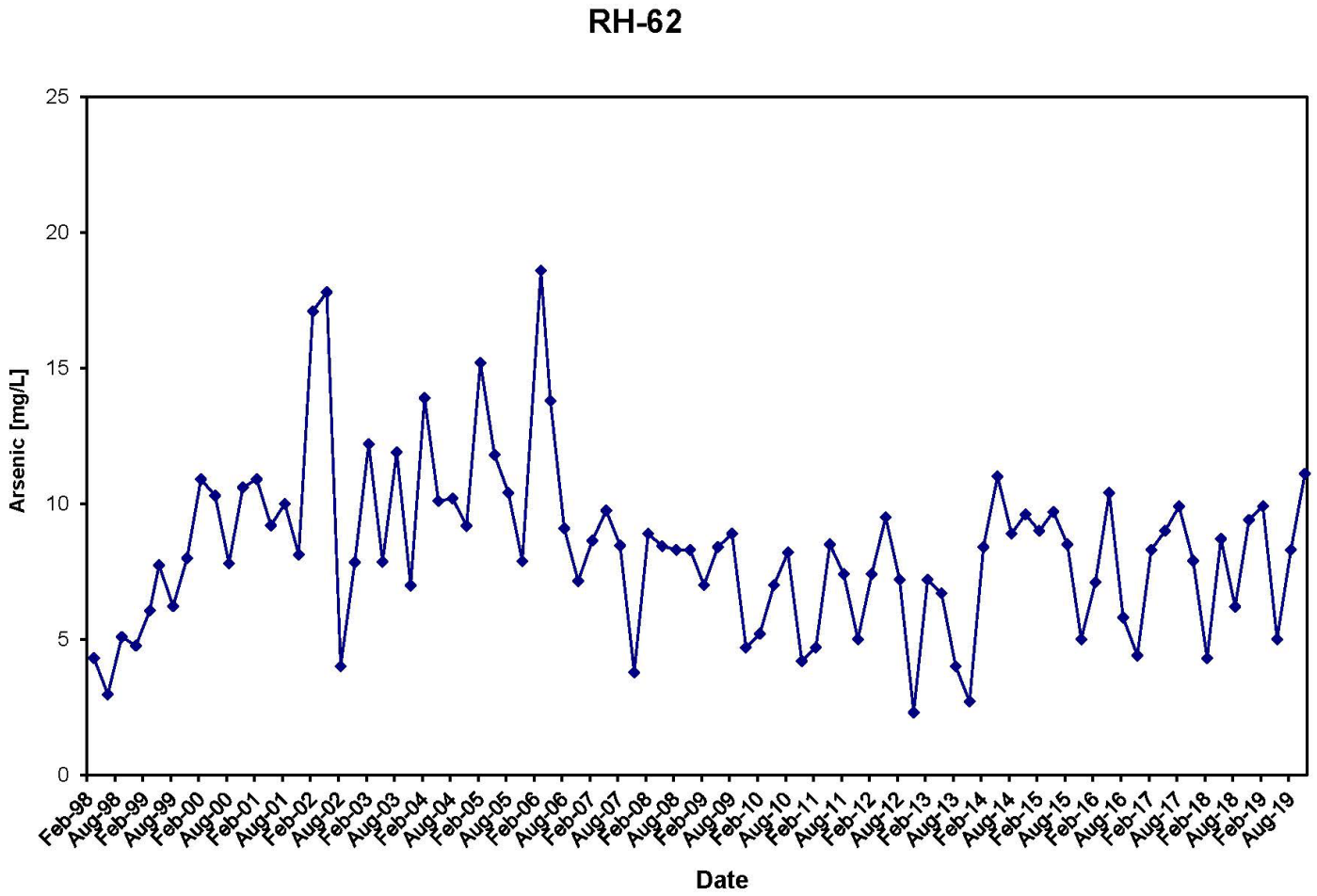

Figure K-2. Rocker OU RH-65 Arsenic Concentrations