# Record of Decision Amendment for the Anaconda Regional Water, Waste & Soils Operable Unit

# Anaconda Smelter National Priorities List Site

# Anaconda – Deer Lodge County, Montana

Photo: Ben Simpson, CDM Smith

**June 2020**

**U.S. Environmental Protection Agency**
**Montana Department of Environmental Quality**

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# Part 1 – Declaration

## Site Name and Location

Anaconda Smelter National Priorities List (NPL) Site, Anaconda Regional Water, Waste & Soils (ARWW&S) Operable Unit (OU), OU 4, CERCLIS ID Number: MTD093291656, SSID: 0818. The ARWW&S OU is located within the southern Deer Lodge valley and surrounding uplands and surrounds the communities of Anaconda and Opportunity.

## Statement of Basis and Purpose of this Amendment

This document amends the 1998 Record of Decision (ROD) (1998 ARWW&S OU ROD) (EPA 1998), as amended by the 2011 ARWW&S OU ROD Amendment. The amended remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, 42 U.S.C. Section 9601 et seq. and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Section 300.400 et seq. This document is issued by United States Environmental Protection Agency (EPA), the lead agency, with the concurrence of the Montana Department of Environmental Quality (DEQ), the supporting agency.

The selected remedy is based on the administrative record for the 2020 ARWW&S OU ROD Amendment and will become part of that administrative record per the NCP, 40 CFR Section 300.825(a)(2). The administrative record (on electronic disk) and copies of key documents are available for public review at the joint Deer Lodge County/Arrowhead Foundation Superfund Document Repository at 118 East Seventh Street in Anaconda. The administrative record also is maintained at the EPA – Montana Office at 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed during normal business hours by appointment.

## Assessment of the ARWW&S OU

As documented in the administrative record, many exposure pathways at the ARWW&S OU create unacceptable risks to human health and the environment. The remedial actions selected in the 1998 ROD were modified by the 2011 Amendment (EPA 2011). The ROD, together with the 2011 Amendment, is hereinafter referred to as the Original, or the 1998/2011 ROD. Those actions, as modified by this ROD Amendment, are necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment at the ARWW&S OU.

## Description of the ROD Amendment

This ROD amendment provides for several changes to the Original ROD.

1. First, this ROD amendment provides for a fundamental change to the Original ROD consisting of an expansion of the amount of work to be completed in the upland areas north, west, and south of Anaconda; a period of monitoring of surface water in that area after completion of the additional work; and waiver of certain state of Montana total recoverable surface water standards if those standards are not met after the technically

practicable additional work is completed.

2. Second, this ROD amendment provides for a significant change to the Original ROD consisting of an alternative institutional control (IC) program to support the remedy if Anaconda – Deer Lodge County is unable to perform its IC program.

3. Finally, this ROD amendment includes four minor modifications that clarify components of the Original ROD (Appendix A). As required by the NCP, the changes to the Original ROD are documented in this ROD amendment.

## Statutory Determinations

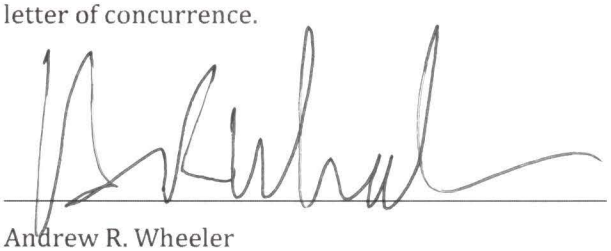
The Original ROD, as amended, meets the mandates of CERCLA Section 121 and the NCP. It is protective of human health and the environment, complies with all federal and state requirements that are applicable or relevant and appropriate to the remedial action or appropriately waives these requirements, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the technically practicable additional response actions.

This decision does not satisfy the statutory preference for treatment as a principal element of the remedy. Active treatment of mining waste would be significantly more expensive because of the large quantities of materials impacted. Although they are present in large volumes, the solid materials within the ARWW&S OU are generally low in toxicity and can be reliably removed or contained.

Because the selected remedy, as amended, will continue to result in mining contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, statutory 5-year reviews have been initiated at the ARWW&S OU and will continue to ensure that remedies remain protective of human health and the environment. The 5-year reviews will continue to focus on areas where waste has been left in place or where remaining concentrations of site-related contamination do not allow for unlimited use of the property.

## Authorizing Signature

This 2020 ARWW&S OU ROD Amendment, along with unaltered portions of the 1998/2011 ROD, documents the selected remedy for OU 4, the Anaconda Regional Water, Waste & Soils Operable Unit of the Anaconda Smelter National Priorities List Site. This remedy was selected by EPA with the concurrence of the State of Montana, as authorized by the EPA signatory below and the DEQ letter of concurrence.



6-12-2020

Andrew R. Wheeler
Administrator
United States Environmental Protection Agency

Date

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# Part 2 – Decision Summary

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# List of Acronyms

| | |
|---|---|
| ADLC | Anaconda-Deer Lodge County |
| agencies | EPA and DEQ |
| ARAR | applicable or relevant and appropriate requirement |
| ARWW&S OU | Anaconda Regional Water, Waste & Soils Operable Unit Atlantic Richfield Atlantic Richfield Company |
| BLM | Biotic Ligand Model |
| BMP | best management practice |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act, as amended |
| CFR | Code of Federal Regulations |
| COC | contaminant of concern |
| CPMP | Community Protective Measures Program |
| CS OU | Community Soils Operable Unit |
| DEQ | Montana Department of Environmental Quality |
| DPS | Development Permit System |
| Circular DEQ-7 | State of Montana's water quality standards |
| EPA | United States Environmental Protection Agency |
| IC | institutional control |
| LRES | Land Reclamation Evaluation System |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NPL | National Priorities List |
| NRD | natural resource damages |
| O&M | operations and maintenance |
| OM&M | operations, monitoring and maintenance |
| OW/EADA OU | Old Works/East Anaconda Development Area Operable Unit |
| ROD | Record of Decision |
| SWMP | surface water management plan |
| TI | technical impracticability |
| U.S.C. | United States Code |
| USGS | United States Geological Survey |

# Section 1
# Introduction and Statement of Purpose

## 1.1 Site Name and Location

Site Name: Anaconda Smelter Site

CERCLIS ID Number: MTD093291656

Operable Unit: Anaconda Regional Water, Waste & Soils Operable Unit (OU) (ARWW&S), OU4

Original ROD: September 29, 1998 (EPA 1998)

ROD Amendment: September 29, 2011 (EPA 2011)

## 1.2 Purpose for the Amendment

Since the 1998 ROD (EPA 1998) and 2011 ROD amendment (EPA 2011) were issued, the principal responsible party, the Atlantic Richfield Company (Atlantic Richfield), has implemented significant portions of the ARWW&S OU remedy. In order to complete the remaining work at the Site, EPA, DEQ, and Atlantic Richfield identified technical issues and conducted evaluations necessary for completing this work.

Over 20,000 acres have been remediated to date, yet certain streams still do not meet several State of Montana acute and chronic aquatic life standards (Circular DEQ-7) (DEQ 2019) for surface water at certain times of the year. Anticipating this, the 1998/2011 ROD identified contingency actions for surface water if it was determined—after completion of remedial actions—that applicable water quality standards could not be achieved.

The contingency actions for this circumstance were identified as:

1. Analysis of the technical impracticability (TI) of achieving further contaminant reduction and the potential waiver of the water quality standard
2. Reevaluation of remedial technologies for treatment of surface water
3. Consideration of additional best management practices (BMPs)

With this in mind, EPA and DEQ directed Atlantic Richfield to complete a TI evaluation to determine if the acute and chronic standards could be achieved with additional remedial work. That evaluation resulted in the *ARWW&S OU Surface Water Technical Impracticability Evaluation Report* (Atlantic Richfield 2017). The report concluded that achieving the standards may be difficult or impossible, even with the implementation of all additional, technically practicable remediation.

The possibility of surface water treatment had been assessed in previous surface water TI evaluations (summarized in the 2011 ROD amendment) and was determined to be impracticable because of cost and high environmental impacts (construction of water treatment plants, conveyance channels, and large holding ponds). Thus, surface water treatment alternatives were again dismissed from further consideration. Additional large-scale removal of contaminated soil was ruled out based on the results of the 2017 TI evaluation and visual inspections of the Site by EPA and DEQ. Such aggressive actions to address what are low-level contaminated soils would destroy extensive stands of mature vegetation, causing unnecessary and potentially irreparable harm to the environment for relatively low benefit.

With active water treatment and large-scale removal or treatment of soils ruled out, the 2017 TI evaluation focused on additional engineered controls, stormwater BMPs, and steep slope reclamation. Additions to existing steep slope reclamation remedies include aerial application of seed or fertilizer or both to improve vegetation cover on moderately vegetated to barren steep slopes. (Note: steep slopes as defined under this ROD amendment are steeper than 3 horizontal run to 1 vertical rise (3H:1V) where conventional agricultural tillage equipment can be operated safely).

Based on the results of the TI evaluation and the mutual desire of stakeholders to expeditiously complete the remaining remedial actions at the Site, EPA, DEQ, and Atlantic Richfield initiated development of a surface water management plan (SWMP) that sets forth steps to expand the existing remedy, complete remaining remedial actions, monitor surface water quality, and determine remedy compliance. If the SWMP monitoring process indicates that compliance with certain Circular DEQ-7 standards for specific contaminants of concern (COCs) in a receiving stream cannot be achieved, then this ROD amendment provides that the standard will be waived. Under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended, applicable or relevant and appropriate requirement (ARAR) standards that initially apply to cleanup can be waived and, if necessary, replaced by other protective standards, where appropriate, if it is technically impracticable from an engineering perspective to meet the initial standards[1]. This potential waiver of standard(s) is a fundamental change to the 1998/2011 ROD and necessitates this ROD amendment.

This ROD amendment presents a brief overview of the ARWW&S OU and prior enforcement activities for implementation of ARWW&S OU response actions. It also includes the basis for and specific components of the amendment based on new information, evaluation of alternatives, description of the selected remedy, and statutory determinations. The 1998/2011 ROD remedial components that are not specifically removed or modified in this document remain in effect.

EPA is the lead agency and DEQ is the support agency. EPA is issuing this ROD amendment as part of its responsibilities under of Section 117 of CERCLA as amended and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR Section 300.435 (c)(2)(ii).

## 1.3 Administrative Record

This ROD amendment is part of the administrative record for the Site, along with significant documents prepared since the 1998/2011 ROD that contributed to the modification of the original surface water remedy. The complete administrative record for the 2020 ARWW&S OU ROD

[1] See Section 121(e) of CERCLA, 42 U.S.C. Section 9621(e) and 40 CFR Section 300.430(f)(ii)(C)(3).

Amendment is housed at the Deer Lodge County/Arrowhead Foundation Superfund Document Repository at 118 East Seventh Street in Anaconda. The administrative record also is maintained at EPA's Montana Office at 10 West 15th Street, Suite 3200, in Helena, Montana and can be viewed there by appointment.

The following key documents are among the documents available in the administrative record, and their contents support the need for this amendment and the conclusions presented herein:

- *EPA Superfund Record of Decision: Anaconda Company Smelter (ARWW&S) OU, Anaconda, MT, 9/29/1998*. PB98-964406. November 1998. (EPA 1998)
- *Record of Decision Amendment, Anaconda Regional Water Waste and Soils Operable Unit, Anaconda Smelter National Priorities List Site, Anaconda-Deer Lodge County, Montana.* September 2011. 1211311-R8 SDMS (EPA 2011)
- *ARWW&S OU Surface Water Technical Impracticability Evaluation Report*. April 2017. (Atlantic Richfield 2017)
- *Proposed Plan for Modifications to the Remedy, Anaconda Regional Water Waste and Soils, Anaconda Smelter Superfund Site*, June 2017 (EPA 2017)
- *Proposed Plan to Amend the 1998/2011 Record of Decision, Anaconda Regional Water Waste and Soils Operable Unit, Anaconda Smelter NPL Site*, September 2019, 1917242-R8 SDMS (EPA 2019)

## 1.4 Terms Important to Understanding the ROD Amendment

Certain terms are useful for understanding the changes made to the 1998/2011 ROD in this ROD amendment. Terms described below are used in a manner that is consistent with Superfund activities throughout the nation.

- **Dissolved metals analysis**. Analysis of water after it has been filtered (typically a 0.45-micron filter). The filtered (dissolved) concentration is always less than or equal to the unfiltered (total) concentration described below. Most federal water quality criteria are based on dissolved metals analysis because, in EPA's view, a dissolved metal is more bioavailable to aquatic life. Dissolved metals analysis is considered protective of surface water when there are no contaminated sediments present in a surface water body.
- **Total recoverable metals (or total metals)**. Analysis of an unfiltered water sample, including any solid undissolved sediments, visible or microscopic. Montana bases its numeric standards on the federal water quality criteria but applies them to a total recoverable sample instead of a filtered sample, thus making the state standards more conservative than the federal criteria. The State of Montana applies these total recoverable metals results to surface water to incorporate the uncertainty of risk to aquatic environments in water bodies that also have contaminated sediments that currently do not have state or federal protectiveness standards. There are also minor correction factors and other nuances between the state and federal standards.

- **Base flow.** Base flow is defined as times when groundwater inflow comprises the greatest percentage of flow within surface water. Both surface water and groundwater vary seasonally, but base flow generally occurs in late summer and winter when surface water conditions are fairly stable (i.e., not rising or falling and stormwater or snowmelt runoff is not occurring). For compliance evaluations, chronic aquatic life and human health water quality standards apply to base flow conditions.

- **Normal high flow.** Normal high flow is defined as normal flow that increases above base flow when the regional winter mountain snowpack melts and there is no local wet weather event. In general, the highest concentrations of contaminants are associated with normal high flows and wet weather event flows. For compliance evaluations, metals concentrations at normal high flow are compared to chronic aquatic life and human health performance standards.

- **Storm event flow.** Storm event flow is defined as flow that increases for a short period of time above base flow due to a local wet weather event. For compliance evaluations, metals concentrations during storm event flow are compared to acute aquatic life performance standards.

- **Watershed**. A geographic area that includes all land and water in a particular drainage system, including the mainstem stream and all permanent and ephemeral tributaries flowing into the mainstem stream(s) that drain(s) that area.

# Section 2
# History, Contamination, and the 1998/2011 Remedy

Per EPA ROD guidance (EPA 1999), the introductory sections of the previous ROD and amendment are addressed only briefly in this ROD amendment. A more detailed summary of previous investigations, site conditions, and unacceptable risks is presented in the 1998/2011 ARWW&S OU ROD. The following focuses on site background relevant to the ARWW&S OU surface water remedy modified by this ROD amendment.

## 2.1 Site Description

The Anaconda Smelter Site (the Site) represents one of four contiguous Superfund sites on EPA's National Priorities List (NPL) in the upper Clark Fork River Basin (Figure 2-1). The other Clark Fork River Basin Superfund Sites are the Silver Bow Creek/Butte Area Site, Clark Fork River/Milltown Reservoir Site, and Montana Pole Site. The footprint of the four sites extends 140 miles from an area north of Butte to the Milltown Reservoir near Missoula, Montana.

The Site is in the Deer Lodge Valley in southwestern Montana, in and around the city of Anaconda (population 8,487). For nearly a century The Anaconda Company and its predecessors conducted milling and smelting activities at the Anaconda Site. Milling and smelting activities began in 1884 and ended in 1980, when the smelter closed. The facilities were dismantled by Atlantic Richfield, the successor by merger to The Anaconda Company and its predecessors. The nearly 100 years of mining and smelting activity in the area resulted in the contamination of soils, surface water, and ground water, primarily through airborne emissions and disposal practices from smelting. The primary COCs are arsenic, cadmium, copper, lead, and zinc.

The Site was added to the NPL in 1983, with Atlantic Richfield identified as the primary potentially responsible party. Since then, Atlantic Richfield has been actively involved in the investigation and cleanup under the direction and authority of EPA and Montana DEQ. The Site consists of five OUs, listed below by the date of their ROD. They are in various stages of remedial action.

- **Mill Creek OU (1987 ROD).** Cleanup involved relocating residents from Mill Creek and stabilizing soils.
- **Flue Dust OU (1991 ROD).** Cleanup addressed flue dust on Smelter Hill through removal, treatment, and containment. At the same time, Arbiter and beryllium wastes were similarly addressed through removal, treatment and/or containment. Wastes are contained within the Smelter Hill Repository Complex.
- **Old Works/East Anaconda Development Area OU (1994 ROD).** Cleanup addressed waste sources within the Old Works smelter facility.
- **Community Soils OU (1996 ROD, 2013 ROD amendment**). Ongoing cleanup addresses residential and commercial soils contaminated with arsenic and lead in Anaconda, Opportunity, and the surrounding area.

- **ARWW&S OU (1998 ROD, 2011 ROD amendment).** Provides for cleanup of all remaining contamination, including large volumes of wastes, slag, tailings, debris, and contaminated soil, ground water, and surface water spread over 170 square miles of agricultural, pasture, rangeland, forests, and riparian and wetland areas in nine subareas.

This ROD amendment focuses exclusively on the ARWW&S OU.

## 2.2 Nature and Extent of Contamination at ARWW&S OU

The 1998 ROD separated the ARWW&S OU into five subareas (Figure 2-2) to facilitate the screening of potential remedial technologies and the evaluation of alternatives. These subareas are Opportunity Ponds, North Opportunity, South Opportunity, Old Works/Stucky Ridge, and Smelter Hill. The 1998 ROD also identified cleanup requirements for Mill, Willow, and Warm Springs Creeks and the 2011 ROD amendment added cleanup requirements for Lost Creek and California Creek.

Figure 2-3 shows these streams and their drainages and identifies the TI evaluation area, which is approximately 170 square miles.

Surface water monitoring has been conducted since the early 1990s, resulting in a database of nearly 2,000 samples that have been analyzed for metals. Under the TI evaluation, high-flow, storm-flow, and sediment sampling was conducted in 2013. In 2014, additional soil sampling based on vegetation condition was performed to better understand the source of metals loading to streams during runoff events.

State of Montana water quality standards—which are based on total recoverable analysis—have been and continue to be occasionally exceeded in all streams and tributaries during high-flow and storm events. Standards exceeded are copper, lead, and (to a lesser extent) cadmium. Tributaries generally have higher exceedance rates than main streams and, under base flow conditions, copper only periodically exceeds the state standard.

A conceptual site model was developed under the TI evaluation to help understand how and why water quality varies across seasonal flow patterns in the streams. The model indicates that:

- Surficial soils are contaminated with metals from aerial deposition of past smelter emissions.
- Runoff from the uplands is contaminated with these metals during spring snowmelt and periodic storm events, resulting in higher concentrations of suspended sediment and total recoverable metals (copper, lead, and [less often] cadmium).
- Water hardness decreases during wet weather events and, because both state and federal water quality standards are hardness-based, this results in lower calculated standards and more frequent exceedances.
- Exceedances are less frequent during base flow when ground water recharge supplies most surface water flow.

The model also suggests that sediment runoff is the most important pathway of metals to surface water. That runoff occurs during base flow and normal high flow (see Section 1.4 for definitions of flow regimes).

## 2.3 Summary of ARWW&S OU Risks

The COCs identified in the 1998/2011 ROD are arsenic, lead, cadmium, copper, and zinc. Human health risk from exposure to impacted surface water is minimal because concentrations of cadmium, copper, lead, and zinc are below human health standards in area streams. Although arsenic concentrations in surface water exceed the drinking water standard, the standard was waived in the 2011 ROD amendment and these streams are not used for drinking water. The arsenic aquatic life standards remain applicable.

The 1998/2011 ARWW&S OU ROD identified potential ecological risks to aquatic receptors based on contaminant concentrations and exposure criteria. Acute and chronic ambient water quality criteria for both total recoverable and dissolved metals were evaluated in surface water. These criteria provide the range of acceptable risk from metals in surface water, with total recoverable metals being more conservative than dissolved. The primary ecological risk to surface water and sediment at the Site is the periodic exceedance of acute and chronic ambient water quality criteria.

## 2.4 Previous ARWW&S OU Cleanup Activities

Atlantic Richfield has completed or is completing remedial designs and implementing remedial actions throughout the nearly 170 square miles of land impacted by smelter emissions and milling and smelting waste deposition in the ARWW&S OU. Remedial actions to address contaminants have been implemented on more than 21,000 acres. Sparsely vegetated soils and mining wastes have been treated or covered and revegetated, and controls to manage stormwater runoff have been constructed. Remedial actions have been completed in the most contaminated areas of the ARWW&S OU (waste management areas and surrounding valley lowlands) and where heavy equipment can be readily used. Remedial actions are still required in the lesser-contaminated upland areas where steep slopes will limit the use of heavy equipment for construction.

## 2.5 ARWW&S OU Acreage Remediated since the 2011 ROD Amendment

Since 2011, over 21,000 acres of contaminated land at the ARWW&S OU have been remediated. The acreage per reclamation design unit is shown in Table 2.1. This work was done under several CERCLA Section 106 unilateral administrative orders issued by EPA. These orders left the full implementation of the surface water component of the remedy open, pending further evaluation of Site conditions and additional analysis.

**Table 2-1. Summary of Remedial Action Complete Acres at ARWW&S OU**

| Remedial Design Unit (RDU) | | Remedial Action Completed Acres | | Remedial Design Unit (RDU) | | Remedial Action Completed Acres |
|---|---|---|---|---|---|---|
| 1 | Stucky Ridge | 1,037 | | 9 | Fluvial Tailings | 1,455 |
| 2 | Lost Creek | 121 | | 10 | Warm Springs Creek | 98 |
| 3 | Smelter Hill Uplands | 271 | | 11 | Cashman Pile | 1 |
| 4 | Anaconda Ponds | 678 | | 12 | Slag | 0 |
| 5 | Blue Lagoon/Active RR | 135 | | 13 | Old Works WMA | 1,266 |
| 6 | South Opportunity Upland | 367 | | 14 | Smelter Hill Facilities | 1,367 |
| 7 | North Opportunity Upland | 807 | | 15 | Mt. Haggin | 0 |
| 8 | Opportunity Ponds | 7,422 | | | West Galen Expansion | 6,389 |

## 2.6 Surface Water Remedial Action Objectives and Remedial Goals

Remedial action objectives presented in the 1998/2011 ROD for contaminated surface water remain generally unchanged for this ROD amendment, except for the need to waive certain Circular DEQ-7 standards (DEQ 2019), which will be replaced by federal water quality criteria.

The remedial action objectives are:

- Minimize source contamination to surface waters that would result in exceedances of State of Montana water quality standards. This remedial action objective is modified to recognize the ARAR waivers and replacement standards in Section 4.
- Return surface water to its beneficial use by reducing loading sources of COCs.

## 2.7 Summary of the Original Remedy for Surface Water

Major components of the current remedy for surface water identified in the 1998/2011 ROD are as follows:

- Reclamation of contaminated soils and engineered stormwater management options to control overland runoff into surface waters.
- Selective source removal and stream bank stabilization to minimize transport of COCs from fluvially deposited tailings into surface waters. Removed material will be placed in a designated waste management area.

These requirements led to the development of specific remedial technologies for the ARWW&S OU:

- Soil removal
- Soil remediation (in situ treatment and revegetation)
- Steep slope reclamation (revegetation and on-slope BMPs)

- Stormwater BMPs (check dams and erosion controls in drainages)
- Engineered stormwater controls (retention/detention basins)

There are several in-stream ARARs related to surface water and storm water control for the ARWW&S OU. A main remedial goal in the 1998/2011 ROD is that water quality in surface water complies with Circular DEQ-7[2] and a main remedial action objective is for sources of contaminants to surface water to be controlled. Circular DEQ-7 standards are as stringent as, or more stringent than, the corresponding federal water quality criteria enacted by EPA and therefore were selected as the surface water quality performance standard in the 1998/2011 ROD. When determining compliance with the chronic performance standards, the most stringent of the human health or aquatic water quality criterion is applied. Acute performance standards for storm event flow and wet weather conditions are based on acute aquatic water quality criteria.

[2] ARARs referenced in the 1998/2011 ROD are from Circular WQB-7, which was the predecessor to Circular DEQ-7. For clarity, this ROD amendment refers to Circular DEQ-7 (June 2019).

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# Section 3
# Basis for Revisions to the 1998/2011 ROD Remedy

The basis for revising the 1998/2011 ROD is twofold:

1. Despite ongoing remedial action construction, analysis of surface water quality monitoring data indicates that compliance with State of Montana acute and chronic aquatic life standards (Circular DEQ-7) for copper, cadmium, lead, and zinc that have been adopted as surface water performance standards may not be achievable for certain parameters in specific stream reaches.

2. EPA's community interviews of local government and the general public revealed that people desire an expeditious end to remedial actions that will bring the Site to closure and eventual delisting. EPA also prioritized the Site in 2017 for immediate and intense attention.

## 3.1 Impracticability of Meeting Some Surface Water Standards

As discussed in Section 2, Atlantic Richfield has been completing remedial designs and implementing remedial actions throughout the ARWW&S OU since 2000 under the direction and authority of EPA and Montana DEQ. The OU footprint covers an area of nearly 200 square miles of land impacted by smelter emissions and milling and smelting waste deposition. Surface water monitoring is also being conducted by the United States Geological Survey (USGS) at two locations on each of the four major streams that drain the Site (Mill Creek, Lost Creek, Willow Creek, and Warm Springs Creek). The USGS began monitoring Warm Springs Creek at the lower and upper stations in 1989 and 1997, respectively. Three other stream-monitoring locations were established in the early 2000s as part of the ARWW&S OU surface water remedy.

To date, remedial actions to address contaminants have been implemented on more than 20,000 acres. Barren/denuded and sparsely vegetated soils and milling/smelting wastes have been treated or covered and revegetated and BMPs and engineered controls to manage storm water runoff have been constructed. Despite this work, sporadic exceedances of State of Montana acute and chronic aquatic life standards (Circular DEQ-7) for copper, cadmium, lead, and zinc in surface water are detected during monitoring events conducted by the USGS at eight stations along the four streams of concern. Additional exceedances have been documented in California Creek.

Additional TI evaluations were conducted to evaluate meeting the human health drinking water standard for arsenic in groundwater and surface water, which led to the 2011 ROD amendment that waived the human health arsenic standard for significant portions of the Site. In 2012, Atlantic Richfield informed EPA and DEQ that planned remedial actions identified in approved remedial action work plans were not expected to result in compliance with the Circular DEQ-7 aquatic life standards for all streams at all times. EPA and DEQ then directed Atlantic Richfield to complete a TI evaluation to determine if those standards could be achieved with additional work utilizing technically practicable cleanup measures.

A technical work group was established that included EPA, DEQ, the Montana Department of Justice

– Natural Resource Damage (NRD) Program, Atlantic Richfield, and their contractors. The work group began meeting in late 2012 to scope the TI evaluation. Existing data were compiled, and a data gaps assessment was performed.

The first data gap that the technical work group identified was the lack of existing data concerning surface water quality in tributaries, and in main stems of streams during storm events. In 2002, Atlantic Richfield had attempted to collect storm water data; however, 2002 was a drought year and too few summer/fall storm events occurred. Atlantic Richfield developed a sampling and analysis plan to collect additional storm water samples during the 2013 field season, and that sampling event confirmed and improved the previous site characterization. Analysis of the 2013 data also showed a correlation between COC concentrations in storm water samples and seasonally high-flow events. This is further discussed in Section 4.

Following this data analysis, the technical work group decided to implement further soils and stream corridor sediment sampling in 2014 in tributary drainages that were determined by the previous data to be the most significant sources of COC loading to the mainstem of streams, most specifically to upper Mill Creek. Data analysis of these headwaters resulted in the classification of the drainage basin into polygons that were designated as "well-vegetated, moderately vegetated, or poorly vegetated." Rock outcrops were also identified and eliminated from further analysis during this evaluation.

The analysis of the newly acquired data, coupled with the older data, indicated the following:

- Metals loading to Mill Creek, Lost Creek, and Warm Springs Creek was occurring in areas beyond the surface water TI evaluation area of concern (although all exceedances were within the area of concern). Willow Creek's headwaters are totally within the area of concern. Areas upstream of the area of concern are generally described as pristine and are on national forest lands or other protected areas.
- The highest concentrations of contaminants in soils in the tributary watersheds targeted as high COC loaders were found in well-vegetated areas. The lowest concentrations were found in the barren steep slopes. This is likely caused by the fact that surficial smelter emission deposits on barren slopes have been transported through storm water and snow melt runoff for years.
- A statistical comparison of the concentration of COCs between the storm water and the high flow water quality sampling data showed a high correlation. The highest concentrations of COCs occur when flow rates are highest for both storm water and normal high-flow scenarios.

The work group determined that these additional data provided sufficient reason to proceed with developing alternatives for a TI evaluation. As required under the 1998/2011 ROD, the evaluation was to include additional technologies that could be used in each creek watershed to improve water quality as one component of the potential additional remedy. Additional technologies included those that may have emerged since the 1998/2011 ROD (such as active water treatment), enhancements to existing approved designs (such as new approaches to steep slope reclamation), and remediation applied in new locations outside of the approved work plan remedy areas.

The active water treatment options were reviewed by the work group, with a focus on new technologies other than those analyzed during the arsenic TI evaluations and summarized in the2011 ROD amendment. None of the new technologies were determined to be practicable for the Anaconda uplands for the same reasons identified in the previous TI evaluations.

Those reasons are:

- Exceedances occur during high-flow and storm events. This would require capture of large flow rates for storage in suitable sized large storage ponds for treatment.
- As a result of water storage and treatment, the treated water would have a warmer temperature and an altered chemistry, potentially impacting aquatic life, including threatened bull trout in the Clark Fork River.
- The process of capturing and retaining water for treatment during spring and early summer when high flows occur also would potentially impact water rights of downstream users.

The TI evaluation identified additional remedial action beyond the current approved remedy, including aerial fertilization and seeding. Additional new storm water BMPs based on lessons learned during previous work were selected, and the previous steep slope reclamation toolbox was updated to include different technologies. Storm water engineered controls also were identified in selected drainages where there was adequate space to construct such features.

The cumulative results of work group discussions and data evaluation resulted in the *ARWW&S OU Surface Water Technical Impracticability Evaluation Report* (Atlantic Richfield 2017), completed in April 2017. Modeling results in that report show that achieving some acute and chronic surface water standards would likely be impracticable from an engineering perspective. At the same time, the TI evaluation identified additional remedial measures that could be implemented to reduce metals loading to receiving streams. Figure 3-1 shows the surface water TI evaluation area, existing work identified by the previous remedial design unit land reclamation evaluation system, and new remedy work areas delineated by the TI evaluation.

## 3.2 Public Participation in the CERCLA Process

Based on the analysis of the surface water TI evaluation, EPA issued a proposed plan for a ROD amendment in June 2017 (EPA 2017). The proposed plan included additional work to address contaminant runoff and proposed waiving the Circular DEQ-7 surface water standards in limited tributaries of upper Mill Creek and upper Willow Creek. The proposed plan included certain up-front waivers for standards that would be granted before any of the additional work would be completed, as well as a waiver if the Circular DEQ-7 standard was not met after this additional work was complete.

Most public comments on the June 2017 Proposed Plan were against these limited upfront waivers. Commenters generally believed the technically practicable work should be completed before any waivers were granted. EPA's response to the public comments to the 2017 proposed plan is provided in the attached responsiveness summary. Based on that response, the proposed plan was reevaluated.

In December 2017, the Site was placed on the Administrator's Emphasis List, a list of Superfund sites targeted by EPA for immediate and intense action. The EPA Region 8 Regional Administrator began regular visits to the Site to conduct listening sessions with local government, the community, and other stakeholders. Local government and community advocates asked EPA to expeditiously complete the Superfund work in the community. Based on this input and after discussions with DEQ, an aggressive schedule to complete the majority of the work at the Site by 2025 has been identified as a goal of all major stakeholders. The contingency approach, as identified in the 1998/2011 ROD, does not meet this desired outcome. While the original surface water remedy stated in the 1998 ARWW&S OU ROD is a valid approach for an extremely large site, all parties (EPA, DEQ, and Atlantic Richfield) have agreed on a new approach to complete the technically practicable remediation now, as opposed to waiting years for monitoring data to suggest locations for additional remediation. The proposed plan (EPA 2019) was revised and released to the public in September 2019 without the up-front waivers of ARARs. The specifics of the revised proposed plan are addressed in Section 4.

# Section 4
# Description of the Fundamental Change to the Remedy

The 2017 ARWW&S OU TI evaluation report identified a process for completion of the surface water remedy that may result in future waivers of existing State of Montana water quality standards for specific COCs for specific streams. This is the sole fundamental change for this ROD amendment.

The change includes three primary components:

- Expand the remedy to complete the technically practicable work in the uplands of the Lost Creek, Mill Creek, and Warm Springs Creek drainages. This work is described in Section 4.1 and outlined in Table 4.1 below. Completion of this work is described in Section 4.2.
- Once the technically practical uplands work is complete, a six-year sampling period will begin. This is described in Section 4.3, below. Downstream compliance locations in each mainstem stream in each watershed will be sampled for COCs, including arsenic, lead, cadmium, copper, and zinc, as will be provided for in the SWMP. Under the SWMP, these sampling results will be compiled and compared to Circular DEQ-7 acute and chronic ambient water quality criteria. The SWMP will specify monitoring requirements and define exceedances.
- If certain Circular DEQ-7 standards are not met, as defined by and evaluated under the SWMP, then this ROD amendment provides that those standards are waived on the basis that it is technically impracticable to meet them. Where a standard is waived, federal water quality criteria will be applied.

Each component of the fundamental change to the 1998/2011 ROD amendment is discussed below.

## 4.1 Expand Existing Remedy to Technically Practicable Remedy

The 2017 ARWW&S OU TI evaluation report analyzed additional reclamation technologies beyond the existing remedy in the uplands, as well as expanding the remedy to new areas of concern identified from surface water and soil sampling. The evaluation considered additional storm water engineered controls and focused on enhancing the current steep slope reclamation techniques that were identified in previously approved remedial design unit (RDU) remedial action work plans. The surface water TI evaluation report identified an alternative remedial strategy that included these new technologies and enhancements, new sediment ponds in tributary drainages, and additional steep slope reclamation and BMPs in new areas where moderate or sparsely vegetated conditions were identified.

A TI evaluation identifies a feasibility study level of remedial alternative assessment. Consequently, the alternative remedial strategy presented in the 2017 TI evaluation report represents a

conceptual level design. Since the 2017 report was approved, Atlantic Richfield and the State of Montana have been conducting additional design evaluations to further define the remaining remedial requirements, under the direction of EPA and DEQ. The following additional work reflects these design evaluations.

Additional work for the Lost Creek, Warm Springs Creek, and northwestern Mill Creek drainages is summarized in Figures 4-1, 4-2 and 4-3, respectively. The work identified in these figures includes up to six sediment ponds within the Lost Creek and Warm Springs Creek drainages, and slope reclamation in the Mill Creek, Lost Creek and Warm Springs Creek drainages. The 2017 TI evaluation report identified barren vegetated and moderately vegetated slopes in these drainages for additional erosion controls to reduce the transport of sediment and COCs. Table 4-1 summarizes the remedial work selected in this ROD amendment for the drainages.

**Table 4-1. Existing Conditions and Selected Actions by Watershed**

| | Unit | Specific Creek | | | | |
|---|---|---|---|---|---|---|
| | | Lost | Mill | Warm Springs | Willow | California |
| **Existing Conditions** | | | | | | |
| Undisturbed | Acres | 16,918 | 13,558 | 16,268 | 15,608 | 8,175 |
| Remediation Areas | Acres | 8,905 | 5,202 | 8,089 | 2,724 | 0 |
| Stormwater Retention | Acres | 0 | 1,236 | 9,985 | 0 | 0 |
| Stormwater Detention | Acres | 1,798 | 4,391 | 1,184 | 0 | 0 |
| **Proposed Action**[6] | | | | | | |
| Steep Slope Reclamation | Acres | 143 | 781 | 0 | 141 | 149 |
| Stormwater BMPs: | | | | | | |
| Rock Grade Controls | Each | 6 | 4 | 3 | NA | NA |
| Riprap outlet protection structures | Each | 0 | 6 | 0 | NA | NA |
| Stone check dams | Each | 142 | 32 | 148 | NA | NA |
| Log check dams | Each | 73 | 840 | 227 | NA | NA |
| Geo-bag check dams | Each | 135 | 295 | 935 | NA | NA |
| Rill treatment | Acres | NA | 73 | NA | 36 | 44 |
| Hand-installed BMPs | Feet | NA | 38,179 | NA | 10,066 | 18,329 |
| Mechanized BMPs | Acres | NA | 71 | NA | 6 | 3 |
| Stormwater Detention | Each | 3 | 0 | 3 | 0 | 0 |

Notes
1. Watershed acreage is that identified as the Surface Water Area of Concern under the 2017 Surface Water Technical Impracticability Evaluation.
2. Undisturbed acreage includes moderate to well vegetated areas, rock outcrops, facilities such as gravel pits and irrigated cropland, and other areas not identified for remediation.
3. Remediation areas are those areas targeted for remediation under the original remedial design units of the ARWW&S OU.
4. Stormwater retention areas are designed to retain the 24-hour, 25-year storm event and are primarily limited to the Old Works and Smelter Hill/Opportunity Ponds Waste Management Areas.
5. Steep slope reclamation includes aerial seeding and fertilization.
6. All Proposed Action quantities shown are approximate. Quantities for Warm Springs Creek, Willow Creek, and California Creek include work to be performed by the State (as discussed in Section 4.1 above, and as outlined in the Clark Fork CD and the State-AR 2008 CD). Some features may be substituted or replaced with those of like kind based on design refinements and field conditions (e.g. rock check dams replaced with geo-bag check dams).

Additional work for California Creek, southeastern Mill Creek and its tributaries (Cabbage, Muddy, and Joiner Gulches), and Willow Creek drainages is summarized in Figures 4-4 through 4-13. Table 4-2 provides a summary of the categories and subtypes of steep slope reclamation selected in this ROD amendment for the California Creek, Mill Creek and its tributaries (Cabbage, Muddy, and Joiner Gulches), and Willow Creek drainages.

**Table 4-2. Types of Steep Slope Reclamation[1]**

| Type | Title | Description |
|---|---|---|
| SSR-1a | Broadcast seeding | Typically broadcast by ground crews. |
| SSR-1b | Broadcast seeding with fertilization | Fertilization can be slow-release organic or Nitrogen-Phosphorous-Potassium, typically helicopter applied over large area. |
| SSR-1c | Soil scarification/trenching | Hand-dug trenches and broadcast application of seed, fertilizer, and other amendment and a coir blanket. |
| SSR-1d | Woody plant establishment | Can include live willow stakes and/or container plants. |
| SSR-1e | Other soil amendment | Lime, compost, and other soil amendments. |
| SSR-2a | Slope stabilization | Stabilize bare slopes and form rills. Can include coffee bags, slash, coir/straw wattles, and downed logs. |
| SSR-2b | In-stream check structures | Brush and straw bales to slow water, capture sediment, and enhance wetlands. |
| SSR-2c | Gully slash filters | Available conifer material used to fill gully bottom. |
| SSR-2d | Gully check dams | Keyed-in structures made of rock, log, geobag, and/or coir fabric. |
| SSR-2e | Anchored brush bundles/boxes | Bundles of slash anchored to ground or gully side slope to capture sediment. |
| SSR-3a | Slope pitting and roughing | Can include dozer pits, “rough and loose” surfacing, and addition of woody debris. |
| SSR-3b | Earthen sediment retention | Large berms constructed to divert and/or capture sediment flow. Can include native sod and shrug transplants. |
| SSR-3c | Gully grading and filling | Can include clearing/grubbing, filling of gullies, and channel construction. |
| SSR-3d | Engineered rock check dams | Lined earth berms topped with boulders |
| SSR-3e | Hydroseeding | Limited roadside polygons. Can include amendments, seed, fertilizer. |
| SSR-4a | Slope grading | Land-forming to control runoff. |
| SSR-4b | Compost tillage | Slope grading plus incorporation of compost to soil. |
| SSR-4c | Lime tillage | Slope grading plus incorporation of compost and lime to soil. |
| SSR-4d | Sediment detention pond | Lined catchment basin with outlet. |
| SSR-4e | Soil and earth removal | Remove soil from location. |

Notes

1. Remedy designations (Type and Title) are specific to work that will be performed by the State pursuant to the Clark Fork CD and the State-AR 2008 CD.

For slope reclamation work associated with the expanded surface water remedy, an erosion control scoring system introduced by the Bureau of Land Management in U.S. Department of the Interior - Bureau of Land Management. Erosion Condition Classification System, Ronnie Clark. October 1980 (Clark 1980) shall be used as a landscape stability performance standard. A Bureau of Land Management erosion score less than or equal to 45 is required for reclaimed slope areas to meet performance standards.

For the slope reclamation work specifically included within the expanded surface water remedy and addressed in this ROD amendment, the landscape stability performance standard is modified from

the 1998/2011 ROD in this ROD amendment to allow areas to pass to completion if the standard cannot be achieved after three attempts to construct and maintain the remedy. This modification is based on a consideration of several factors, including remote locations and highly erosive parent geology.

Certain tributaries to the Clark Fork River and the mainstem of the Clark Fork River have been identified as critical bull trout habitat. EPA has consulted with the United States Fish & Wildlife Service to address any potential adverse effects that would result from the modified remedy and will continue to consult with the service when considering the waiving of standards.

## 4.2 Development of a Surface Water Management Plan for the Anaconda Smelter Site

After the 1998 ROD was issued, the agencies and Atlantic Richfield agreed that a pathway to implement the surface water remedy and meet remedial action objectives and performance standards would best be achieved through development of a SWMP. In the early 2000s, Atlantic Richfield prepared and submitted several drainage-specific, draft SWMPs before determining that one sitewide plan would be more suitable. It was determined by EPA that it was necessary to complete the surface water TI evaluation before the development of a SWMP. The TI evaluation was completed and approved by EPA and DEQ in 2017.

The objectives of the SWMP are:

- Establish the surface water monitoring network, monitoring schedules, and sampling and analytical parameters and procedures for surface water quality monitoring;
- Identify the surface water performance standards and methodology for verifying compliance or modifying compliance targets;
- Assess the effectiveness and protectiveness of the remedial actions (RAs);
- Establish the process for a waiver to federal water quality standards ifcurrent standards cannot be met after completion of the RA;
- Identify contingent remedial measures relative to long-term monitoring results

Each of these objectives, and how the SWMP will meet them, is described below.

### 4.2.1 Surface Water Monitoring Plan

The 1998/2011 ROD required development of a long-term surface water quality monitoring plan that would be consistent with the *Upper Clark Fork Basin Long-Term Monitoring Plan*, currently implemented by the USGS. The SWMP will meet this requirement by continuing sampling at USGS stations established in Lost, Mill, Warm Springs, and Willow Creeks (Figure 4-14). An additional sampling station has been established by the Montana Department of Justice – NRD program in California Creek.

Each of the four tributaries of the Clark Fork River has two monitoring stations: an upper station where the stream exits the uplands into the southern Deer Lodge valley and a lower station at the

end of the operable unit before the stream flows into the Clark Fork River. Upper stations are designated as performance monitoring stations, while lower stations are compliance monitoring stations.

Samples will be collected at each station eight times per year and will be analyzed for the five Site COCs, arsenic, lead, cadmium, copper, and zinc, common cations and anions, hardness, and other parameters. Sampling at the upper Clark Fork River tributaries will continue until determined unnecessary under the SWMP. Further details on sampling and analysis will be provided in the SWMP.

### 4.2.2 Performance Standards and Contingent Replacement Standards

The current surface water performance standards were established in the 2011 ROD amendment and are shown in Table 4-3 along with the contingent replacement standards that are based on the current federal dissolved standards adopted under this ROD amendment.

Whether these standards have been met will be evaluated under the SWMP. The SWMP will follow current DEQ guidance (June 2019) for allowable exceedances. One exceedance is allowed for every three years, so one exceedance is allowed every 24 sampling events (8 samples collected every year) without triggering the contingent replacement performance standard for a given contaminant of concern. If a particular standard for a particular watershed has not been met in samples collected from the downstream compliance point, then this ROD amendment provides that the particular standard for the particular watershed is waived on the basis that it is technically impracticable to meet that standard in that watershed. The SWMP will define a six-year window to determine if a compliance location is meeting the criteria. This window begins after all remedial action work (excluding operations and maintenance (O&M)) within the particular watershed has been completed and the applicable performance requirements have been met. More than two exceedances in the six-year monitoring period will trigger the contingent replacement performance standard for a given contaminant of concern.

Where a standard is waived, except for copper, the waived to standard will be the federal standard in place at the time of this ROD amendment (see footnote 2 in Table 4-3 below). The waived to standard for copper will be the Biotic Ligand Model (BLM) in place at the time of the compliance determination (i.e. at the time the waiver is granted). The hardness adjusted aquatic life standards for cadmium, copper, lead, and zinc are calculated from the water hardness concentration measured in each discrete surface water sample. Table 4-4 summarizes the current equations and parameters for the hardness dependent aquatic life standards.

**Table 4-3. Performance Standards for Surface Water Compliance in ARWW&S OU Streams**

| COC | Performance Standard[1] | | Contingent Replacement Standard[2] | |
|---|---|---|---|---|
| | Fraction | Chronic Standard | Fraction | Chronic Standard |
| Arsenic | Total Recoverable | 150 µg/L | Dissolved | None – achieving compliance |
| Cadmium | | 0.26 µg/L | | 0.25 µg/L |
| Copper | | 2.85 µg/L | | BLM |
| Lead | | 0.545 µg/L | | 0.541 µg/L |
| Zinc | | 37 µg/L | | 36.5 µg/L |

Notes:

Compliance standards are Circular DEQ-7 (June 2019) Total Recoverable Chronic Aquatic Life Standards. If compliance standards are not met at a point-of-compliance during the compliance monitoring period, the compliance standard will be waived to the contingent replacement standard through the process established in this ARWW&S OU ROD amendment and the SWMP.

Except for copper, contingent replacement standards are based on current (i.e., 2020) published federal water quality criteria issued pursuant to Section 403(a) of the Federal Clean Water Act, 33.U.S.C. Section 1314(a). See footnote 6 for further discussion of contingent replacement standard for copper. https://www.epa.gov/wqc/national-recommended-water- quality-criteria-aquatic-life-criteria-table.

Performance standards for cadmium, copper, lead, and zinc are hardness dependent. Values shown are calculated at a hardness of 25 mg/L.

The arsenic compliance standard in lower Warm Springs Creek (at compliance station 12323770) is the arsenic human health criterion (10 µg/L).

The performance standard for cadmium is updated to reflect the June 2019 DEQ-7 standard. The contingent replacement standard for cadmium is the federal ambient water quality criteria updated March 2016.

Biotic Ligand Model in place at the time of the waiver. For every sample collected, the water quality parameters for BLM calculation will be input into the BLM to generate an Instantaneous Water Quality Criterion (IWQC) for compliance comparisons.

**Table 4-4. Parameters for Calculating Hardness Dependent Chronic Aquatic Life Standards**

| COC | Total Recoverable Chronic Standard (µg/L)[1] = exp.{mc[ln(hardness)]+bc} | | Dissolved Conversion Factor[2] |
|---|---|---|---|
| | mC | bC | |
| Cadmium | 0.7977 | –3.909 | 1.101672– [(lnhardness)(0.041838)] |
| Lead | 1.273 | –4.705 | 1.46203– [(lnhardness)(0.145712)] |
| Copper | 0.8545 | 1.702 | N/A |
| Zinc | 0.8473 | 0.884 | 0.986 |

Notes:

Equations for chronic standards are from Circular DEQ-7 (August 2010) Total Recoverable Chronic Aquatic Life Standards except cadmium which is revised to the June 2019 version of DEQ-7.

Dissolved conversion factors are from https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life- criteria-table. Dissolved replacement standards are calculated by multiplying the total recoverable standard by the dissolved conversion factor.

Dissolved copper replacement standard is based on BLM adjustment in place at the time of the waiver, so the dissolved conversion factor is not applicable.

### 4.2.3 Contingency Measures

Compliance monitoring shall begin at the four compliance monitoring locations (Figure 4-12) after either of the following occurs:

- All remedial areas within a watershed have met vegetation and landscape stability performance standards.
- Landscape stability performance standards have been waived after a maximum of three remedial action attempts in expanded remedy areas.

The waiver process from state to federal standards is discussed in Section 4.3. If compliance monitoring results show that the waived-to federal standards are exceeded, the SWMP will identify a process to be followed to identify and implement contingency remedial measures. These include data analysis, review of operations, monitoring, and maintenance records, and potential diagnostic monitoring of surface water quality. Based on these analyses, corrective actions, as defined in the SWMP, may be identified and implemented.[3] If the specified corrective actions fail to achieve the replacement standards, a new TI evaluation may be requested to assess any additional waivers. Any waivers of federal replacement standards are not addressed in this ROD amendment.

## 4.3 Future Waivers to Contingency Replacement Standards

A report summarizing ongoing surface water monitoring results shall be prepared annually. Once the compliance monitoring period is initiated, up to two exceedances of chronic or acute Circular DEQ-7 aquatic life standards—based on a total recoverable (unfiltered) sample— may occur in a particular watershed in a six-year period. If the report documents more than two exceedances of a Circular DEQ-7 parameter in a six-year period, this ROD amendment provides that the standard is waived, and replaced with the federal acute aquatic life standard based on a dissolved (filtered) sample as shown in Table 4-2, which becomes the new standard. The waiver occurs when the report is approved by EPA in consultation with DEQ.[4]

If EPA, in consultation with DEQ, approves the report and the waiver becomes active, that decision will be documented for the record. The waiver will apply only to the watershed where the documented exceedances occurred, and only for the parameters that have been exceeded.

[3] The process will be further described in Section 8 of the SWMP.
[4] This process will be further described in Section 6 of the SWMP

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# Section 5
# Evaluation of Modification

CERCLA requires that any fundamental change to a ROD be evaluated using the nine criteria specified in the NCP and used for all remedial decisions under the Superfund program. The evaluation ensures the remedy can meet EPA's mission of protecting human health and the environment. Accordingly, the ROD amendment's selected remedy for surface water remediation was first evaluated against the two threshold criteria, which must be met for an alternative to move forward. The five primary balancing criteria were then used to compare the 1998/2011 ROD remedy to the modified selected remedy. Evaluation against the two modifying criteria was made after the public comment period ended. Results of the evaluation are presented below.

## 5.1 Threshold Criteria

### 5.1.1 Overall Protection of Human Health and the Environment

This criterion assesses the ability of the modified remedy to protect human health and the environment, in both the short- and long- term. Protection is from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the Site by eliminating, reducing, or controlling exposures to levels established during development of remediation goals consistent with 40 CFR Section 300.430(e)(2)(i).

The 1998/2011 ROD and the modified remedy are both protective of human health and the environment. Both will continue to meet federal or state standards for surface water (based on total recoverable or dissolved). The modified remedy will increase overall protection of the environment through expansion and enhancement of the current remedy. The modified remedy will include biological monitoring to assess the protectiveness of the remedy to the environment.

Implementing the technically practicable remedy as a first step, rather than as an iterative process, speeds up the remedial process without impacting overall protectiveness. If anything, it has the potential to provide more protection, as incremental remedies are not tried before proceeding to the technically practicable remedy. Should waivers be necessary, federal replacement standards are based on the dissolved (filtered) sample fraction and are national surface water quality criteria promulgated by EPA pursuant to the Clean Water Act. While not as conservative as Montana standards, they are protective of aquatic life. The potential replacement aquatic standards are also more stringent than the human health standards.

### 5.1.2 Compliance with ARARs

This criterion assesses the ability of the modified remedy to comply with ARARs or provide grounds for invoking one of the waivers under paragraph 40 CFR Section 300.430 (f)(1)(ii)(C). The potential waiver of certain in-stream surface water standards and use of federal replacement standards is compliant with the CERCLA statute and its waiver provisions. The CERCLA statute allows ARARs to be waived based on an evaluation that they are technically impracticable from an engineering perspective.

The modified remedy will ultimately comply with ARARs (either state or federal chronic/acute surface water standards). Through the SWMP, the modified remedy includes a process to evaluate TI waivers for the State of Montana water quality standards (Montana Numeric Water Quality Standards, DEQ-7, total recoverable fraction) for cadmium, copper, lead, and zinc. For a potential waiver, compliance with ARARs would mean compliance with the federal surface water standards. Replacement performance standards are based on the dissolved (filtered) sample fraction and are national surface water quality criteria enacted by EPA pursuant to the Clean Water Act and are protective of aquatic life. Because in-stream human health standards must also be met, and the replacement standards are more stringent than the human health standards, human health is protected.

## 5.2 Primary Balancing Criteria

### 5.2.1 Long-term Effectiveness and Permanence

This criterion assesses the long-term effectiveness and permanence and certainty that the alternative will prove successful. Surface water waivers do not impact remedy performance.

The modified remedy will provide greater long-term effectiveness through implementation of enhanced stormwater controls and greater permanence through the implementation of enhanced soil treatment and vegetation techniques. Vegetative growth from the current remedy indicates that the vast majority (over 90 percent) of remediated soils support adequate vegetation and have been doing so for up to 20 years in some locations. Thus, it is expected that the revegetation of the preferred alternative will also be permanent in the long-term and effective in reducing loading to area streams. The engineered controls inspection and maintenance plan will ensure that storm water engineered controls continue to be effective.

Remedial technologies used to date at the ARWW&S OU are: soil removal, soil remediation (in-situ treatment and revegetation), steep slope reclamation (revegetation and on-slope BMPs), stormwater BMPs (check dams and erosion controls in drainages), and engineered stormwater controls (retention/ detention basins). As with the protectiveness criterion, implementing the technically practicable remedy using these proven techniques, rather than taking an iterative approach, may also increase long-term effectiveness and permanence and reduce long-term O&M. The remedial technologies used were thoroughly evaluated for the 1998/2011 ARWW&S OU ROD and were found to be effective and permanent and data gathered since further supports that conclusion.

### 5.2.2 Reduction of Toxicity, Mobility, or Volume

This criterion assesses the degree to which the modification uses recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the Site. There is no significant difference in reduction of toxicity, mobility, or volume of solid wastes between the interactive approach to cleanup as stated in the 1998/2011 ARWW&S OU ROD and the technically practicable approach of the 2020 amended remedy. Neither the original nor the amended remedy satisfy the statutory preference for treatment as a principal element of the remedy. Active treatment of mining waste would be significantly more expensive because of the large quantities of materials impacted. Although they are present in large volumes, the solid materials within the ARWW&S OU are generally low in toxicity and can be reliably removed or contained.

### 5.2.3 Short-term Effectiveness

This criterion assesses short-term impacts of the selected remedy during implementation, including potential risks to the community, impacts on workers, environmental impacts, and time until protection is achieved. The most significant difference in short-term effectiveness between the 1998/2011 ARWW&S OU ROD remedy and the selected modified remedy is that the disturbance to the area will occur over a shorter period. The modified remedy would essentially speed up that process by implementing contingency actions concurrent with the remedy.

Construction activities will use standard equipment, such as excavators and trucks. This type and scale of construction is common locally and poses low risks to workers and the community. Other risks, such as those from dust and storm water runoff during construction, can be mitigated.

### 5.2.4 Implementability

This criterion assesses the ease or difficulty of implementation, including technical and administrative feasibility and availability of services and materials. Implementability of the ROD amendment's selected remedy is not significantly different than the existing remedy under the 1998/2011 ARWW&S OU ROD. The remedial technologies are the same, with some notable improvements, although the schedule has been accelerated. Materials and services needed are readily available nearby and construction techniques are the same as those currently used at the Site and at other Superfund sites in the area.

### 5.2.5 Cost

The suite of activities to be conducted under the ROD amendment's selected remedy are within the scope of those detailed in the 1998/2011 ROD. An accelerated implementation schedule is anticipated to reduce future costs and to offset the increase in costs presented by expansion and enhancement of the current remedy.

Preliminary estimates of capital and operations, maintenance, and management costs (OM&M) for the remedy were provided by Atlantic Richfield. These include capital costs for remedial work yet to be done, and then maintained into the future, as well as OM&M costs. These totals, however, do not include the cost of actions to be completed that are within the scope of the original 1998/2011ROD. EPA estimates that the modified remedy (including work to be completed by Atlantic Richfield and the State) is anticipated to cost approximately $20 million over 50 years and is within the acceptable cost range (-30 percent to +50 percent) of cost estimated in the original 1998/2011 ROD. The 1998/2011 ROD estimated the cost of the entire remedy to range from $89,973,000 to $162,555,000 and addressed nearly 25,000 acres of reclamation in the four watersheds (including work conducted under the OW/EADA OU). The supplemental work in this ROD amendment adds an additional 124 acres of steep slope reclamation, as well as additional stormwater BMPs, sediment ponds, and enhanced reclamation in the existing 1998/2011 ROD remedy areas.

## 5.3 Modifying Criteria

### 5.3.1 State Acceptance

This criterion discusses the State's position and key concerns related to the modification to the original remedy provided for in the ROD amendment. The State of Montana, acting through DEQ,

agrees with the process for the surface water TI waiver provided that the technically practicable measures are implemented. The State of Montana further agrees that the 1998/2011 ROD should be modified to include these technically practicable measures as elements of the remedy.

### 5.3.2 Community Acceptance

Community acceptance was assessed based on comments received on the 2019 proposed plan. These limited comments were generally supportive of the proposed plan. Many of the comments received identify issues that can be addressed during the remedial design. Community comments on both the 2017 and 2019 proposed plans were carefully considered by the agencies and specific responses to comments are provided and addressed in Part 3, the Responsiveness Summary.

# Section 6
# Statutory Determinations

The types of actions to be completed under the selected remedy presented in this ROD amendment are essentially the same as the remedy presented in the 1998/2011 ROD. The time frame for implementation of the amended remedy is compressed to meet a completion goal of 2025 and the extent or scale of action is somewhat larger and is enhanced, but the applicability to statutory determination is unchanged. Therefore, the statutory determination section presented in the 1998/2011 ARWW&S OU ROD is still accurate. The following summarizes those determinations.

The selected remedy presented in this ROD amendment for the ARWW&S OU satisfies CERCLA Section 121 requirements, as it is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and uses permanent solutions and alternative treatment technologies to the maximum extent possible.

As is true at most large Superfund sites contaminated with vast amounts of mining, milling, or smelting waste, the selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment). Surface water treatment alternatives are considered technically impracticable.

Because the remedy results in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action and every five years thereafter to ensure that the remedy is, or will be, protective of human health and the environment.

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# Section 7
# Description of the Significant Change to the Remedy

The 1998/2011 ROD provided for several different institutional control (IC) elements. Anaconda Deer-Lodge County (ADLC), under agreements with the responsible party, has been and is implementing these requirements. If this implementation stops or becomes ineffective, this ROD amendment establishes an alternate IC program to support the remedy.

## 7.1 Current IC Requirements

ICs in the 1998 ROD and 2011 ROD amendment include the following goals:

- Assure that future land use at the Site is consistent with EPA's determination of health and environmental risk posed by contaminants at the Site.
- Provide for the preservation and maintenance of Superfund remedial structures on the Site, including but not limited to caps, berms, waste repositories and vegetated areas.
- Require that future development at the Site employ construction practices that are consistent with the protection of public health and the environment, as determined by Superfund remedial actions.
- As end land use development occurs at the Site, soil arsenic (and lead) concentrations to levels appropriate for the intended use, as determined by Superfund remedial actions, shall be obtained through further remedial action.
- Provide for implementation of other laws applicable to development, such as subdivision and floodplain requirements.
- Take "additional measures" if the ADLC ICs program is not fully effective in monitoring and protecting the implemented remedy.

The ROD, as amended, identified various IC programs to achieve these requirements: Development Permit System (DPS) and Community Protective Measures Program (CPMP) which have been and will be implemented by ADLC.

## 7.2 Implementation of ICs By Parties Other Than ADLC

Although the 1998 ROD identified the potential for contingency measures if IC programs fail to achieve the above requirements, it did not recognize that alternative ICs could be implemented by parties other than ADLC. This significant change identifies the following alternate ICs to be implemented by parties other than ADLC as the "additional measures" required pursuant to the ROD in the event that ADLC fails or ceases to perform the DPS and other primary ICs programs:

- Materials Handling Program. This would allow for continued delivery of the services provided under the DPS for identifying, tracking, and assisting with certain development projects within the Superfund Overlay. These would include: education and outreach;

monitoring of a public notification process for development projects (such as 811 "call-before-you-dig"); an element in the geographic information system (GIS) mentioned below for tracking development projects; pre-development and post-development sampling; instruction on appropriate measures for soil removal, treatment, or covering; and protection or replacement of existing protective covers and storm water controls within a proposed development area.

- Domestic Well Program. This program would identify, track, and assist with the drilling and use of new domestic wells and the replacement or conversion of existing wells for drinking water use within the Superfund Domestic Well Overlay. Eligible wells would be identified through education of well drillers, 811 "call-before-you-dig" services, and public education. Eligible wells would be sampled in accordance with the Domestic Well Monitoring Plan. Sampling results would be used to determine what additional remedial action should be done, as specified in the Domestic Well Monitoring Plan. Designation and enforcement of a Controlled Groundwater Area by the Montana Department of Natural Resources and Conservation (under Mont. Code Ann. Section 85-2-501 et seq.) could be used instead of or in addition to the domestic well program described above.

- Interior Dust Program. This program would include education; cleaning, hygiene, and diet guidance; HEPA Vacuum Cleaner Loaner Program and renovation starter kits; and home inspections.

- Community Protective Measures Program. This would provide for a health education program to inform residents within the Superfund Overlay of the potential risks from arsenic and lead and recommendations for reducing exposure to lead; track information and data on arsenic and lead concentrations/locations in the ADLC database/GIS for public access to be used by regulators, prospective home buyers, lenders, contractors, and others; and prior to soil remediation, coordinate with landowners so they have the opportunity to address deteriorating exterior lead paint from homes/garages/fences that may have the potential to re-contaminate remediated soil areas.

    - Soil Swap Program. An element of the CPMP, this would provide for removing soil from certain vegetable gardens, designated play areas, or excavation areas, and replacing it with clean soil.

EPA will allow the performing entity(ies) a reasonable period of time to implement the alternate ICs and demonstrate that they effectively protect the remedy. No other ICs or additional measures will be required beyond the alternate ICs described above unless EPA, in consultation with DEQ, determines the alternate ICs are not protective. Nothing in this ROD amendment alters EPA's authority under the 1998 ROD to require additional contingency remedial measures if initial and alternate ICs (implemented by ADLC and/or other parties) fail to protect an engineered remedy or human health or the environment.

# Section 8
# Description of the Minor Changes to the Remedy

Four minor modifications to the original remedy for the ARWW&S OU are presented below for the purpose of documenting them in the administrative record.

## 8.1 Partially Cover the Main Granulated Slag Pile

The 1998 ARWW&S OU ROD allowed the Main Granulated Slag Pile to be developed as a resource and included specific remedial requirements that included preventing off-site migration of the slag material through implementation of BMPs. Since 1998, only limited development of the slag has occurred. While wind and water erosion BMPs have been implemented, off-site wind erosion of the slag pile continues to occur as evidenced by photographs of dust-blown slag in the annual reports (Atlantic Richfield 2020).

Based on these concerns, a partial soil cover over the north and west facing slopes of the Main Granulated Slag Pile shall be required. The slag pile will be graded on those slopes to 3.5:1 ratio of horizontal to vertical to allow the placement of a 12-inch thick soil cover. The soil cover will be seeded with a grass mix. Development of the slag as a resource will be allowed to continue provided it does not result in an unacceptable human health risk. All the remedial requirements identified in Section 9.3.1 of the 1998 ARWW&S OU ROD for the Main Granulated Slag Pile, including the requirement for full closure of the Main Granulated Slag Pile following resource development, shall remain in effect.

## 8.2 Allow Continued Waste Consolidation into the Opportunity Ponds Waste Management Area

The 1998/2011 ROD allows fluvially deposited mining waste and contaminated soil from the adjacent Silver Bow Creek/Butte Area and Milltown Reservoir/Clark Fork River NPL Sites to be disposed of in the Opportunity Ponds Waste Management Area. Additional waste and impacted soil materials from both the Clark Fork River OU and Silver Bow Creek (Rocker and Ramsay areas) which are removed from those sites shall be allowed to be disposed into the waste management area. Ongoing construction activities will continue to meet transportation safety and dust control requirements as identified in the remedial action work plans that have been or will be approved by EPA in consultation with DEQ as part of ongoing remedial actions at those NPL sites. Final closure of these waste disposal areas at the Opportunity Ponds Waste Management Area will meet the requirements established for waste management areas set forth in Section 9.1 of the 1998 ARWW&S OU ROD.

## 8.3 Clarify Stormwater Monitoring Requirements

The 1998 ARWW&S OU ROD required that a stormwater performance monitoring program be established as part of the site wide surface water remedial actions. As stated in Section 9.6.3 of that document:

- *Establish a storm water management performance monitoring program. The ability of revegetation and engineering controls to improve and protect surface water quality will be evaluated by a storm water performance monitoring program. The performance monitoring program will specify location, frequency, and type of samples and measurements necessary to evaluate remedy performance. Performance monitoring will continue as long as contamination remains above required cleanup levels.*

  *Prior to construction of the remedies, a mass balance waste load analysis will be conducted within each of the watersheds to assess storm water contaminant contribution to receiving water bodies. An initial three-year monitoring program will begin at construction completion with sample measurements taken at the final downgradient discharge point and within receiving water bodies. An evaluation of the performance of the remedy will be provided during each of the five-year Site reviews.*

Mass balance load analyses for low flow and high flow events were conducted in both Mill and Willow Creeks shortly after the 1998 ROD was issued. In 2002, Atlantic Richfield conducted storm water sampling in the uplands to evaluate potential stormwater loading contributions from tributary streams. Atlantic Richfield and the Montana Bureau of Mines and Geology conducted additional storm water sampling in 2012, 2013, and 2014 as part of the 2017 TI evaluation report.

The sitewide storm water sampling events provided incomplete data in the efforts to quantify storm water loading sources. The TI evaluation area is approximately 140 square miles. Storms that pass through the area often had highly variable precipitation amounts. Antecedent conditions significantly affected the volume of storm water runoff. EPA and Atlantic Richfield scientists compared the storm water quality data to the high and low flow data collected at the USGS monitoring locations. Data analysis in the TI evaluation report showed that the highest concentrations of metals in surface water occurred at the highest flow rates for both storm water and high flow data. Based on this correlation, EPA and DEQ have determined that the water quality data from the high flow surface water sampling provides a reasonable surrogate for storm water monitoring sampling data, and the three-year storm water performance monitoring post-remedial action identified in the 1998 ARWW&S OU ROD will no longer be required.

## 8.4 Determination of Final Remedial Action Completion for OUs 9, 11, and 12

Early in the remedial investigation screening process that began shortly after the Anaconda Smelter NPL Site was listed in 1983, several principal threat waste sources were identified at the Site. These were identified as Arbiter OU 12, Beryllium OU 9, and Flue Dust OU 11. In 1991, EPA issued a ROD for the Flue Dust OU. In 1991, EPA issued an Action Memorandum for the Arbiter and Beryllium OUs using CERCLA's removal authority.

The Flue Dust OU remedial action and the Arbiter and Beryllium OUs removal actions both required removal and placement of waste materials into an engineered repository complex located on Smelter Hill. The Arbiter wastes were located at the former Arbiter Plant. The beryllium wastes were located at two disposal locations: a cell within the Opportunity Ponds tailings impoundment; and a concrete bunker located at Weather Hill. The flue dust was stored at nine piles on Smelter Hill. The locations of the former principal threat wastes and the engineered repository complex are

shown on Figure 8-1.

The flue dust materials were treated with a cement/silicate-based additive to pass the toxicity characteristic leaching procedure criteria for non-hazardous waste. Each repository was lined with impermeable membrane liners and contained a leachate collection system.

Most of the requirements identified in the Flue Dust OU ROD and the Arbiter and Beryllium OUs Action Memorandum were completed years ago. However, the final long-term O&M requirements for these actions was deferred to the ARWW&S OU (OU 4). These three repositories were grouped together as the Smelter Hill Repository Complex. The complex has been operating under interim O&M plans, the most recent having been completed in 2004 (Atlantic Richfield 2004). Prior to the remediation of RDU 8 Opportunity Ponds and RDU 14 Smelter Hill Facilities, leachate from the repository complex would be land-applied for evaporation onto the contaminated soils of the waste management area.

With the completion of the remedial actions, land application was no longer an option. Complicating the completion of a final long-term O&M plan has been the unexpected generation of leachate from the flue dust repository, and to a lesser degree from the Arbiter repository. After several Site investigations and actions designed to minimize leachate production, a leachate management work plan was completed in 2017 (Atlantic Richfield 2017). The work included in this plan included pumping of the leachate to an enhanced evaporation area, leachate treatment, and fencing to keep wildlife out. A long-term Smelter Hill Repository Complex O&M Plan reflecting these actions shall be developed, approved and implemented. Until that plan is approved, current operations, monitoring and maintenance will continue under the EPA-approved 2004 O&M Plan.

With the completion and implementation of a long-term O&M Plan, these three OUs will achieve all the remedial requirements for the ARWW&S OU. Specifically, the removal actions for the Arbiter and Beryllium OUs are now considered final remedial actions consistent with the ARWW&S OU remedy.

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# Section 9
# Public Participation

Under CERCLA Section 117(c), 42 U.S.C. Section 9617(c), and the NCP, 40 CFR Section 300.435(c)(2)(ii), EPA must publish proposed changes to existing remedies that fundamentally alter the basic features of a selected remedy with respect to scope, performance, or cost and provide the public an opportunity for comment on the proposed changes. Changes proposed for the ARWW&S OU fundamentally alter the basic features of the 1998/2011 remedy, prompting the issuance of a proposed plan for ROD amendment.

As documented below, the public participation requirements set out in the NCP have been met through the proposed plan and public comment process:

- EPA issued a proposed plan that highlighted proposed changes to the original surface water remedy on June 21, 2017.
- A public notice regarding issuance of the plan, start of the public comment period, and information about the public meeting was placed in the *Anaconda Leader* (June 21and 23 and July 14 and 19, 2017) and also ran in the *Montana Standard* (in Butte) (June 25 and 28 and July 16 and 19, 2017) .
- A 45-day public comment period ran from June 21 to August 4, 2017.
- EPA hosted a public meeting at the Metcalf Senior Center in Anaconda from 6:00– 8:00 p.m. on July 20, 2017. Copies of the proposed plan and a fact sheet were provided at the meetings.
- A 30-day extension to the comment period was requested, and it was extended through September 4, 2017. Public notice of the extension was published in the *Anaconda Leader* (August 2, 2017) and the *Montana Standard* (August 6, 2017).
- EPA issued a revised proposed plan that highlighted proposed changes to the original surface water remedy on September 4, 2019.
- A public notice regarding issuance of the plan, start of the public comment period, and information about the public meeting was placed in the *Anaconda Leader* (September 4 and 13, 2019) and the *Montana Standard* (September 1 and 16, 2019).
- A 30-day public comment period ran from September 4, 2019 to October 4, 2019.
- EPA hosted a public meeting at the Metcalf Senior Center in Anaconda from 6:00– 8:00 p.m. on September 17, 2019. Copies of the proposed plan, a proposed plan fact sheet, and a surface water TI fact sheet were provided at the meetings and made available on the EPA website.
- In both 2017 and 2019, the proposed plan and the supporting administrative record were available throughout that period on the EPA website and at the joint Deer Lodge

County/Arrowhead Foundation Superfund Document Repository at 118 East Seventh Street in Anaconda. The administrative record is also maintained at the EPA - Montana Office at 10 West 15th Street, Suite 3200, in Helena, Montana.

- Public comment was received and evaluated prior to finalization of the ROD amendment.
- EPA received comments from 32 separate comment submissions in total on both versions of the proposed plan during the two public comment periods, 26 in 2017 and 6 in 2019. A responsiveness summary, which includes each comment, criticism, or new relevant information submitted, followed by a response to each, is included as Part 3 of this ROD amendment.
- EPA will publish a notice of the availability of the amended ROD in the *Anaconda Leader*.
- This ROD amendment is a part of the administrative record for the ARWW&S OU ROD amendment and the administrative record and this ROD amendment are available at the information repository for public review prior to the commencement of the remedial action described herein. A list of the most relevant documents to this amendment is provided in Section 1.3.

# Section 10
# References


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EPA 1998. *EPA Superfund Record of Decision: Anaconda Company Smelter (ARWW&S) OU, Anaconda, MT, 9/29/1998*. PB98-964406. November 1998.

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EPA 2017. *Proposed Plan for Modifications to the Remedy, Anaconda Regional Water Waste and Soils, Anaconda Smelter Superfund Site, June 2017.*

EPA 2019. *Proposed Plan to Amend the 1998/2011 Record of Decision, Anaconda Regional Water Waste and Soils Operable Unit, Anaconda Smelter NPL Site*, September 2019, 1917242-R8 SDMS.

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# Figures

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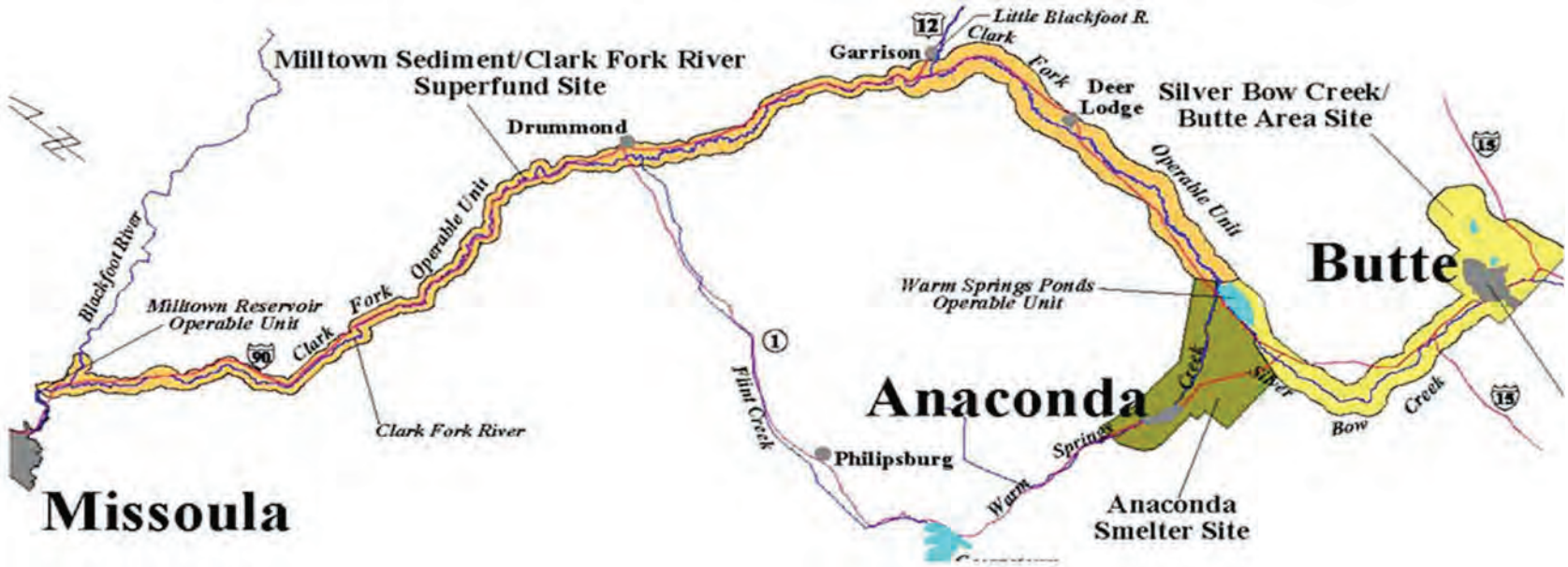


**Figure 2-1. Clark Fork River Basin Superfund Sites**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

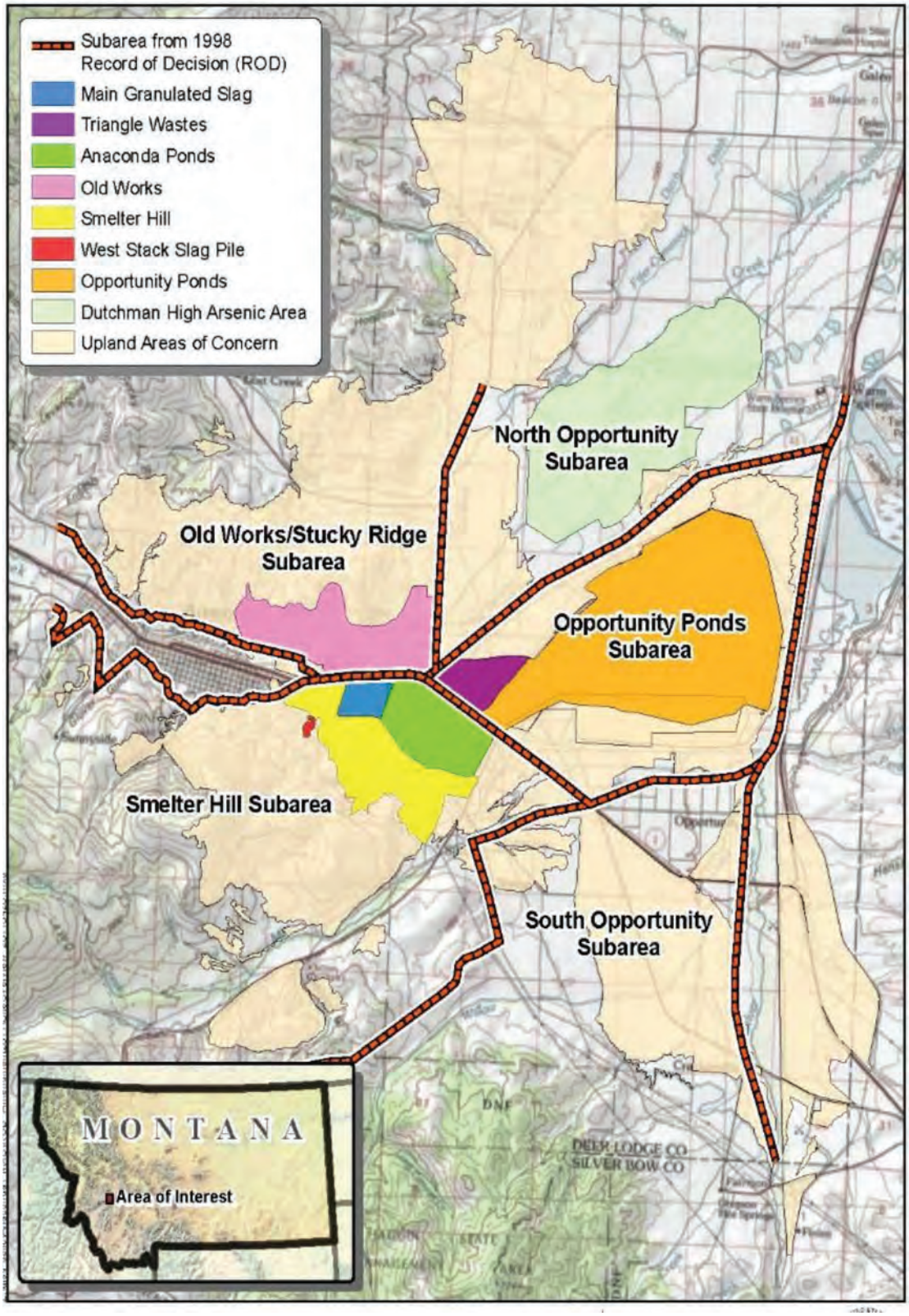


**Figure 2-2. Five Subareas within the ARWW&S OU**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

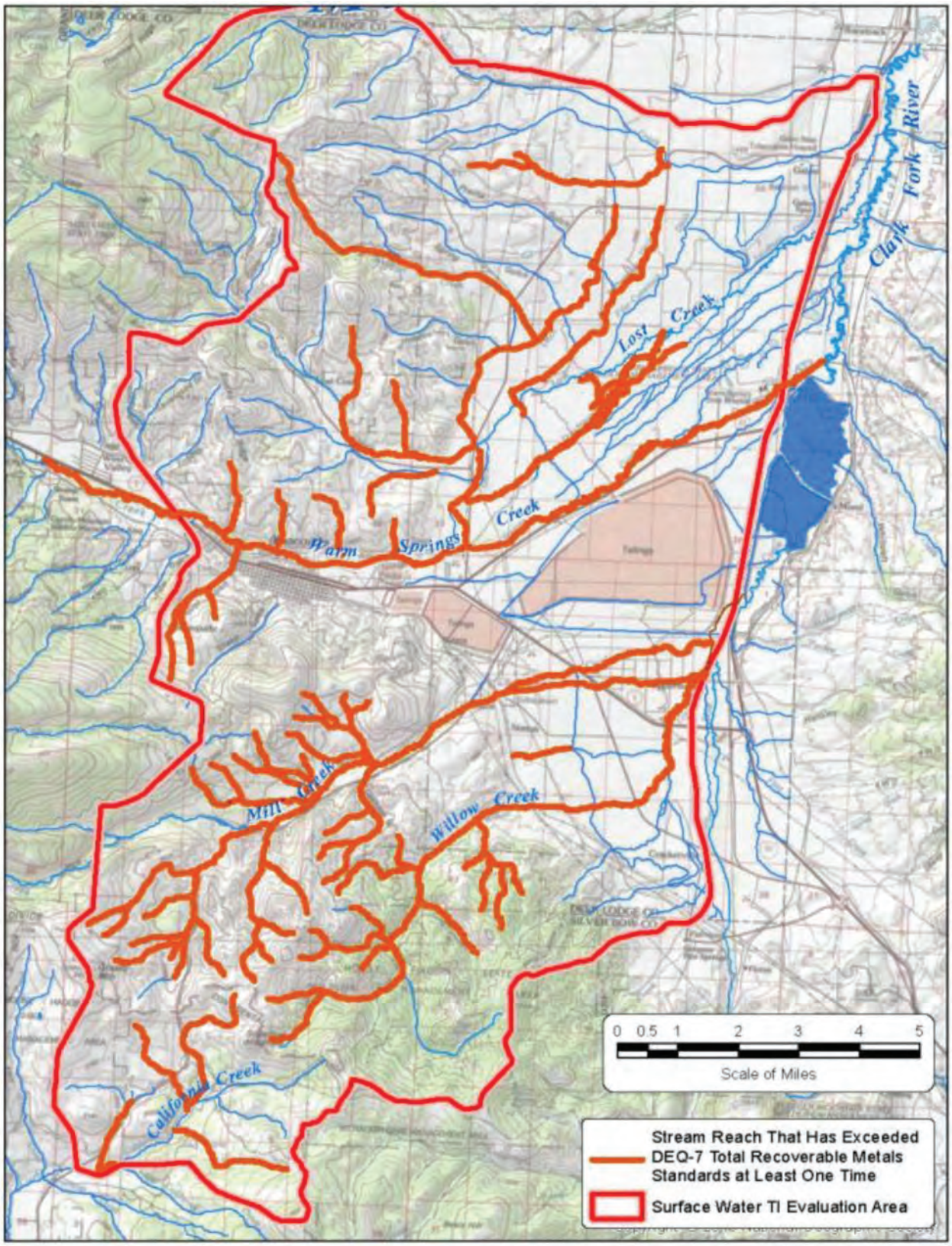


**Figure 2-3. Stream Reaches That Have Exceeded Water Quality Standards One or More Times**

**Anaconda Regional Water, Waste, and Soils OU**

**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

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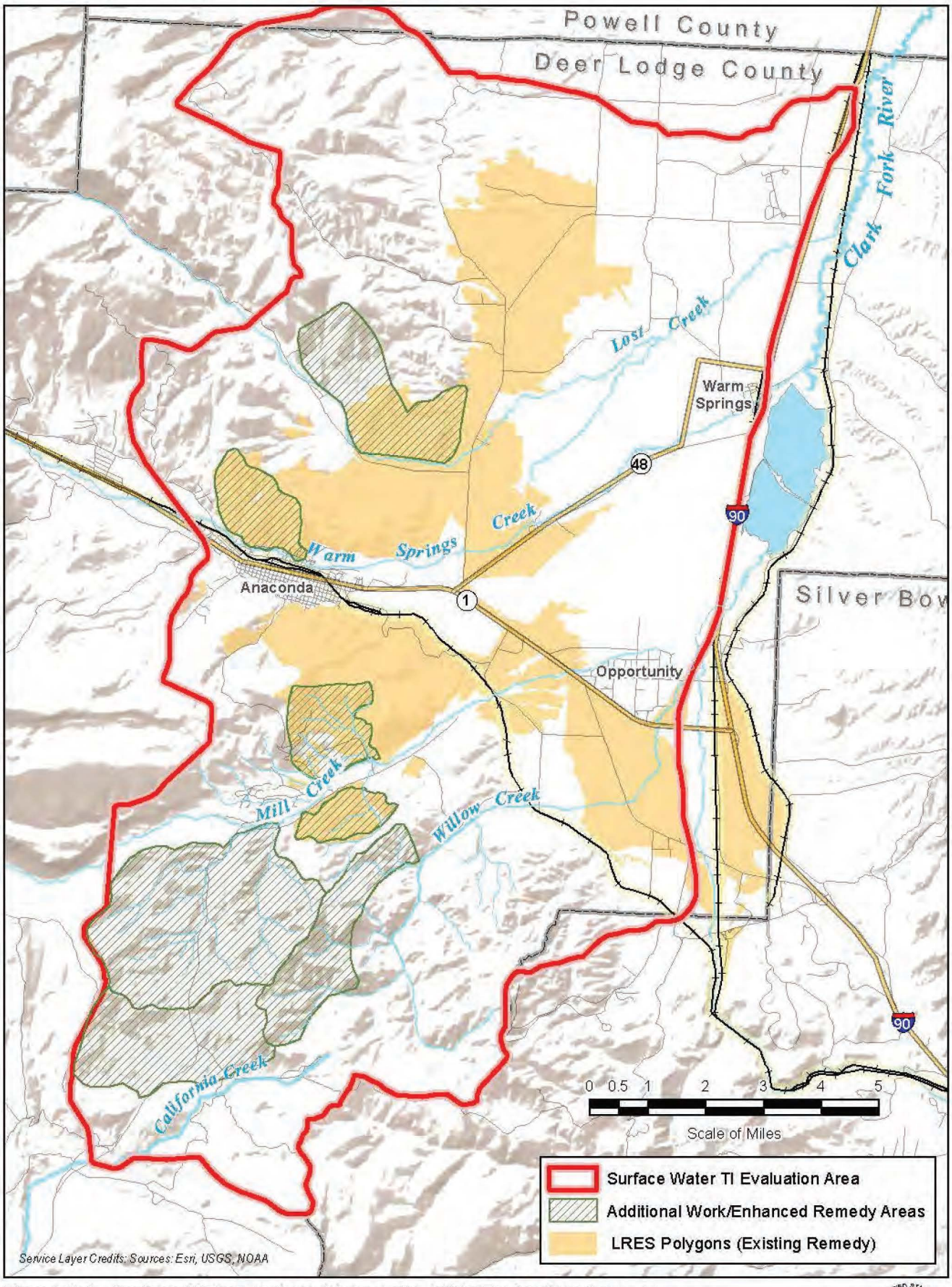



**Figure 3-1. Surface Water Technical Impracticability Evaluation Area**

Anaconda Regional Water, Waste, & Soils OU
Anaconda Smelter NPL Site, Montana

N

Montana Department of Environmental Quality

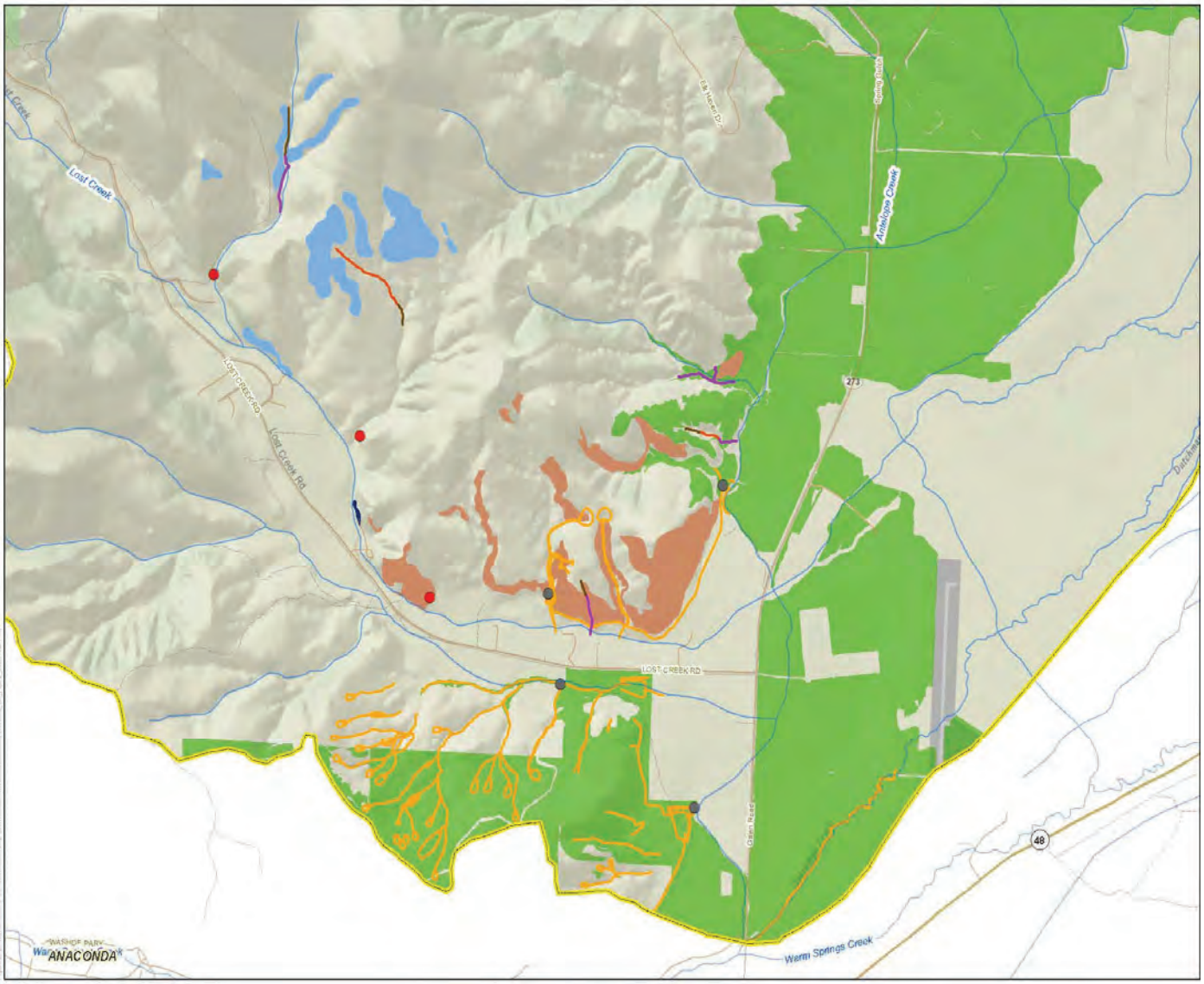
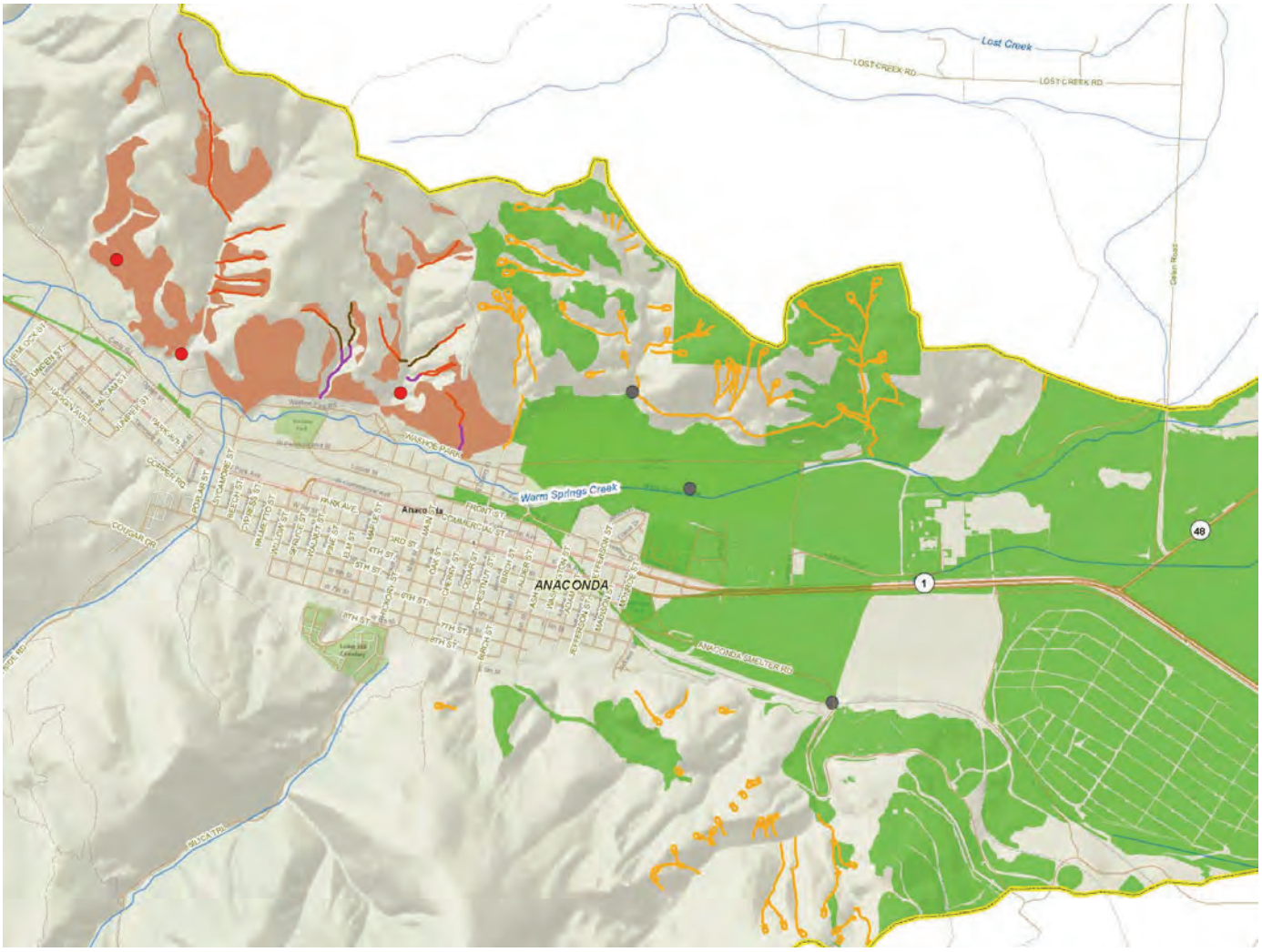



**Figure 4-1. Lost Creek South Proposed Remedial Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**




N

0 2,000 4,000
Feet

**Legend**

- Warm Springs Creek Drainage Basin
- Remediated Areas
- Barren Areas
- Moderately Vegetated Areas (MV)
- Steep Slope Areas Investigated for Enhancement
- Proposed Sediment Ponds
- Proposed Log Check Dams
- Proposed Soil-Filled Geobag Check Dams
- Proposed Stone Check Dams
- Designed Channel BMP's
- Designed Engineered Controls

**Figure 4-2. Warm Springs Creek Proposed Remedial Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

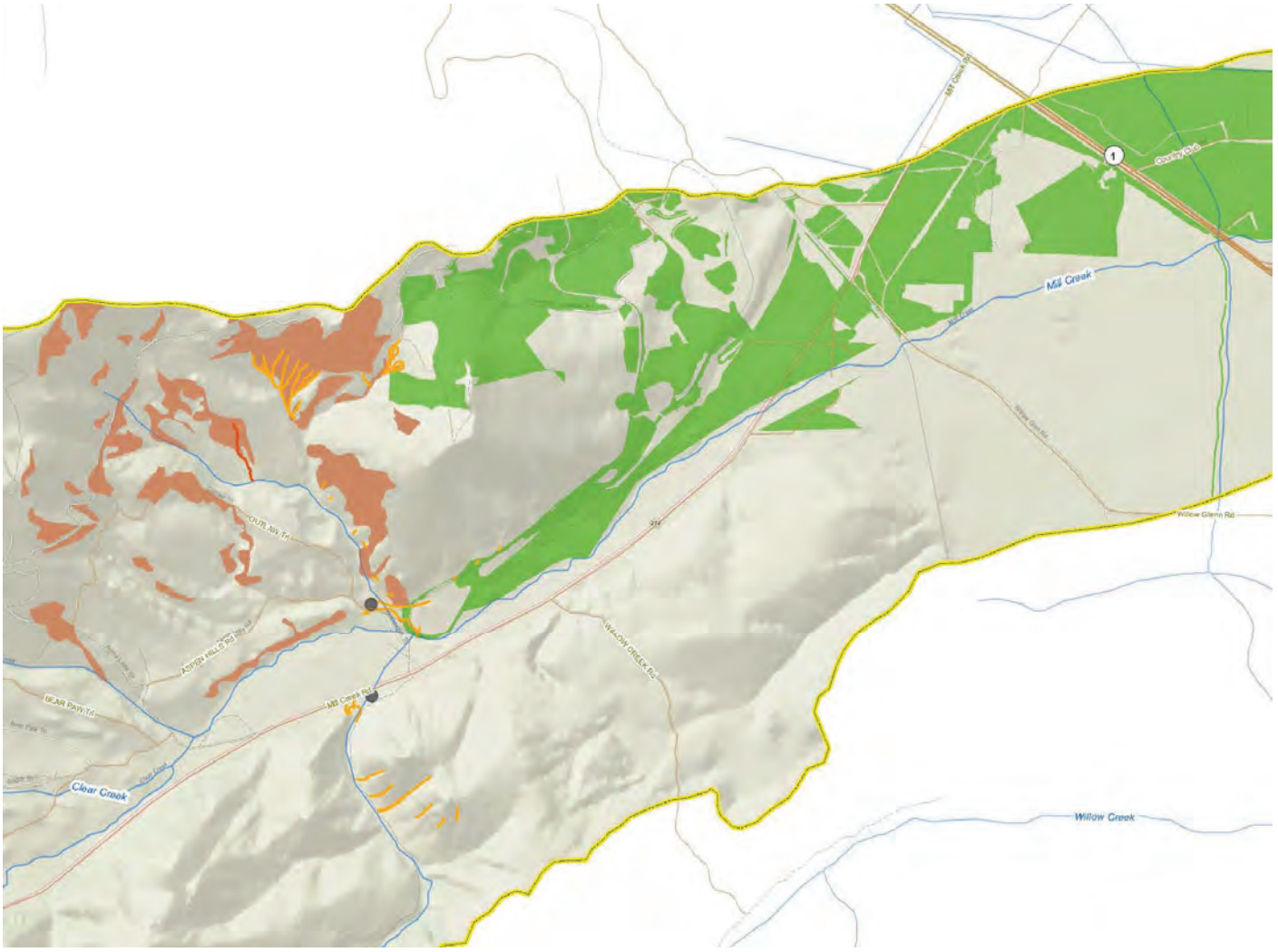



**Figure 4-3. Mill Creek East Proposed Remedial Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality


**Proposed Treatment**

- SSR-1b
- SSR-1c
- SSR-1d
- SSR-2a
- SSR-2b
- SSR-2c/2d
- SSR-2e
- SSR-3a
- SSR-3a/3b
- SSR-3b
- SSR-3b/3d
- SSR-3d
- SSR-3e
- Conditional on weed intensity

N

1:24,000

**Figure 4-4. California Creek Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

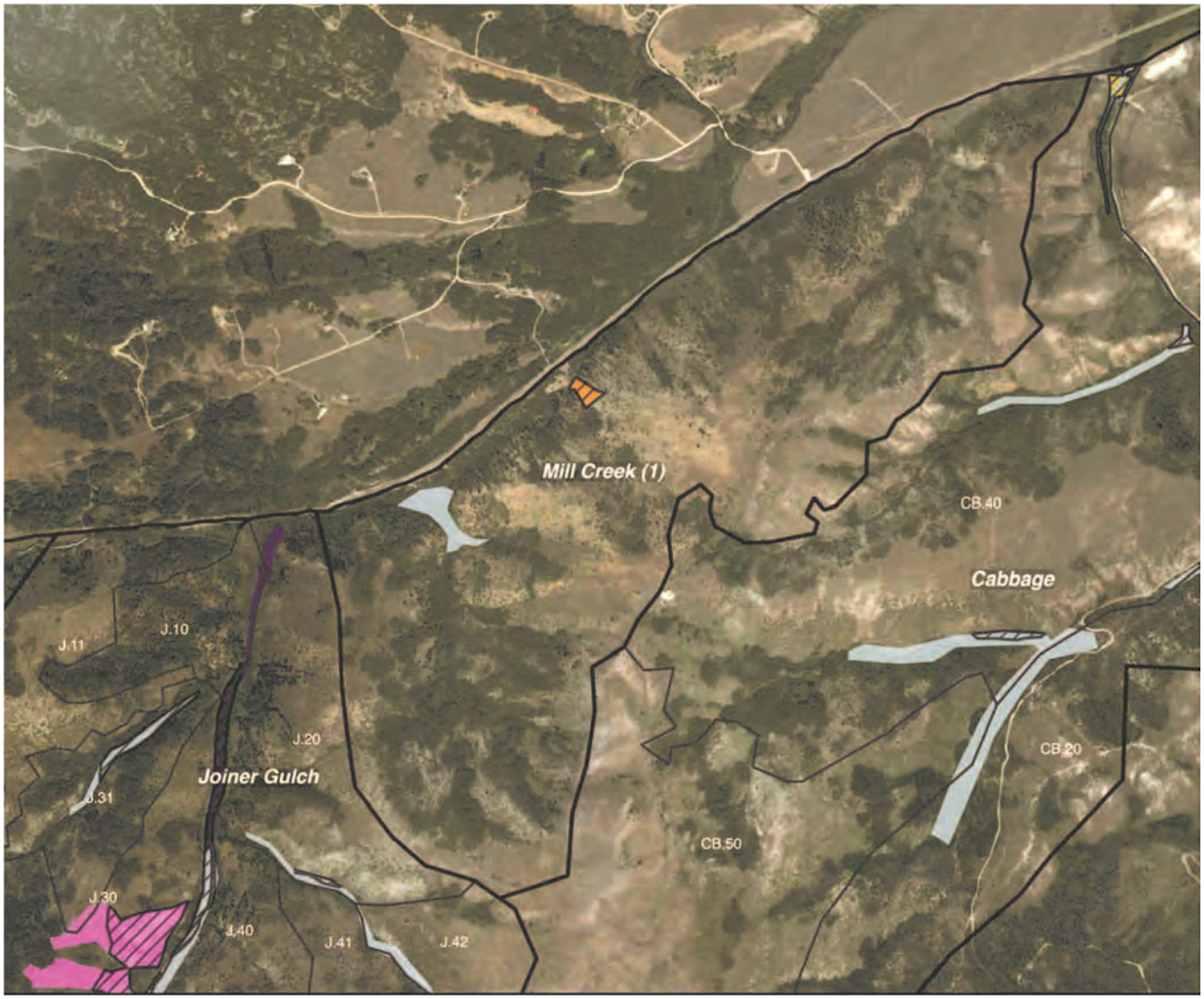



**Figure 4-5. Mill Creek 1 Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

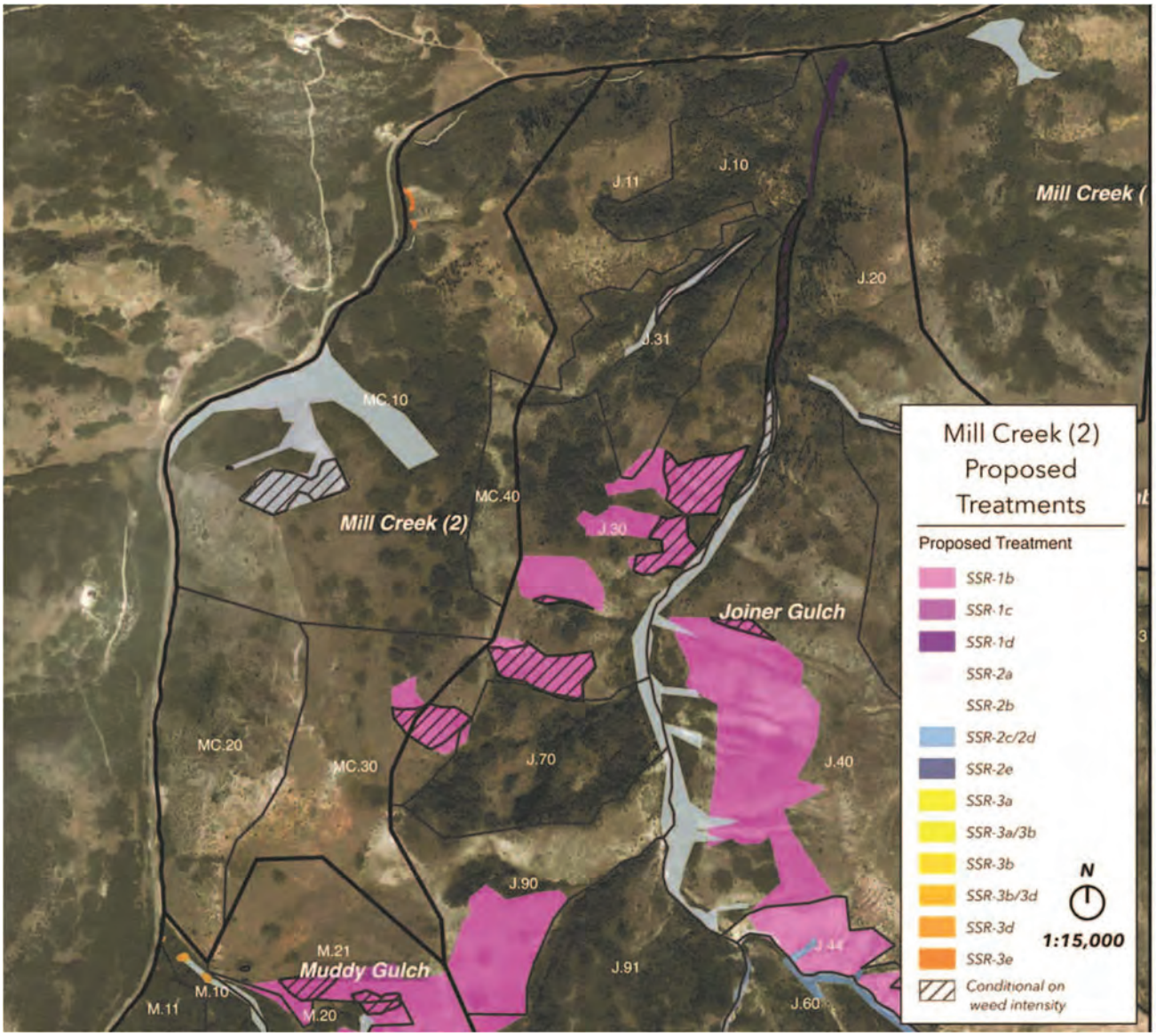



**Figure 4-6. Mill Creek 2 Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

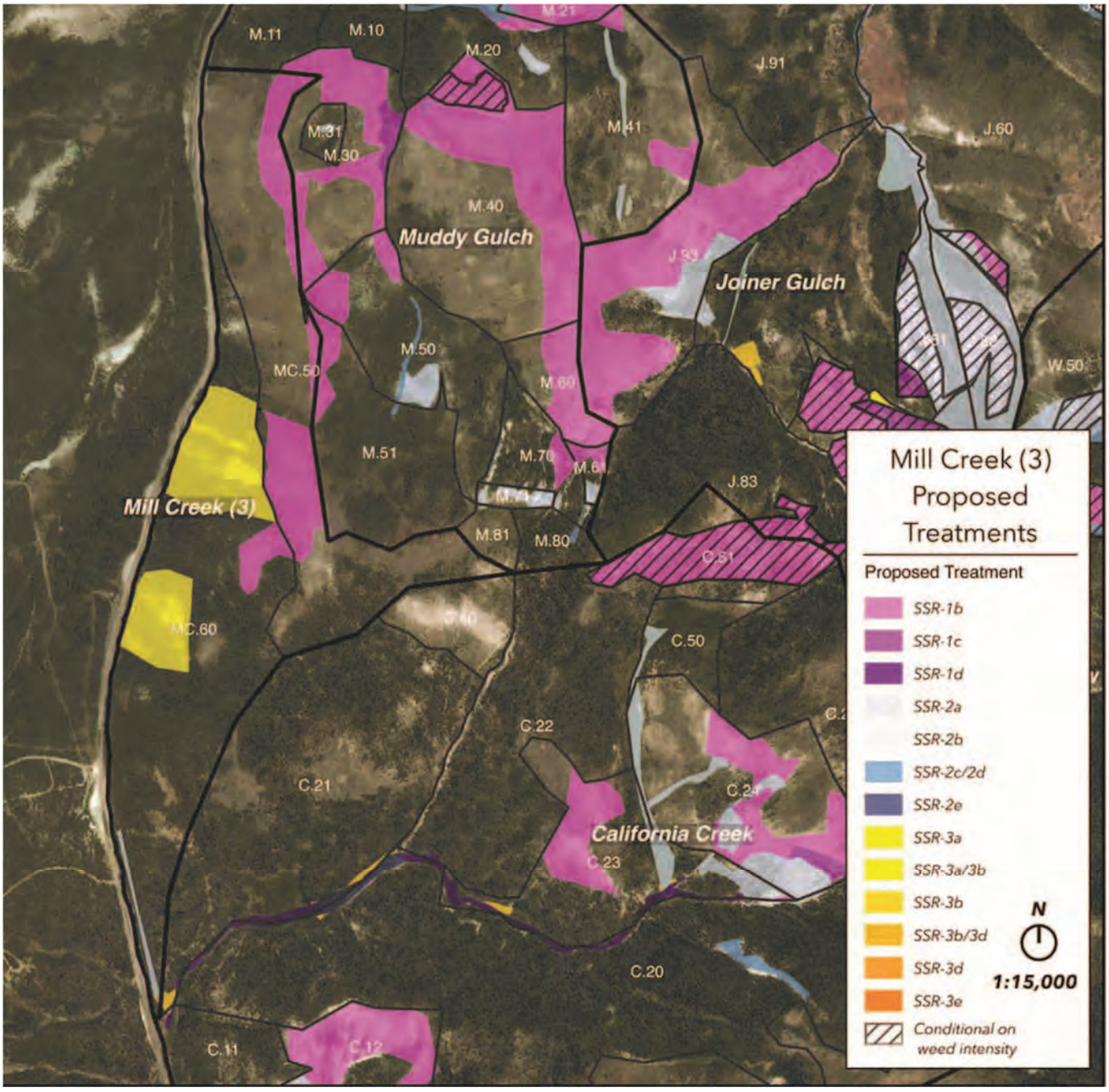



**Figure 4-7. Mill Creek 3 Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality


Cabbage Gulch
Proposed Treatments

Proposed SSR-1
Proposed SSR-2
Proposed SSR-3

N

Projection: NAD 83(HARN) / Montana

**Figure 4-8. Cabbage Gulch Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

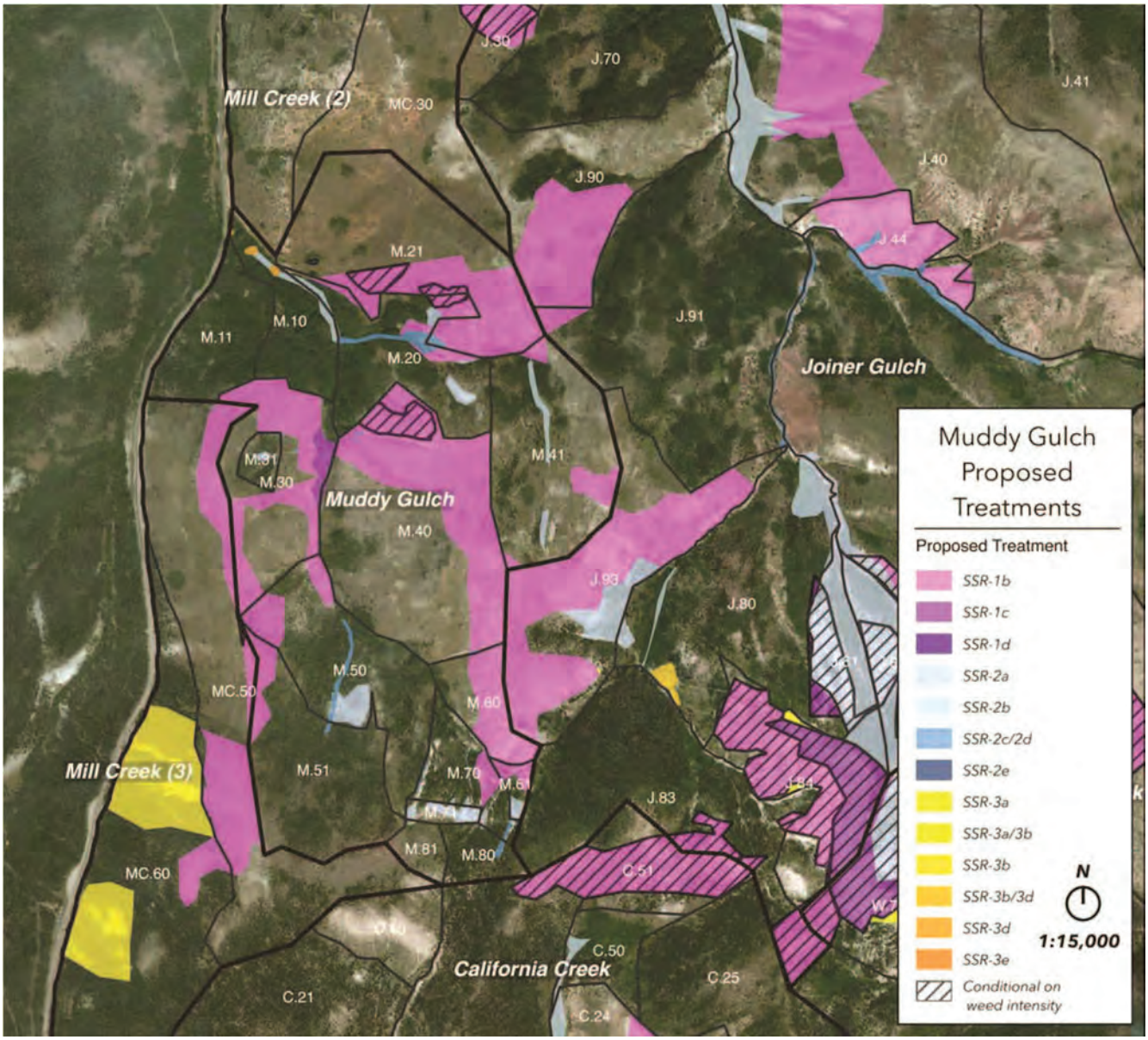



**Figure 4-9. Muddy Gulch Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

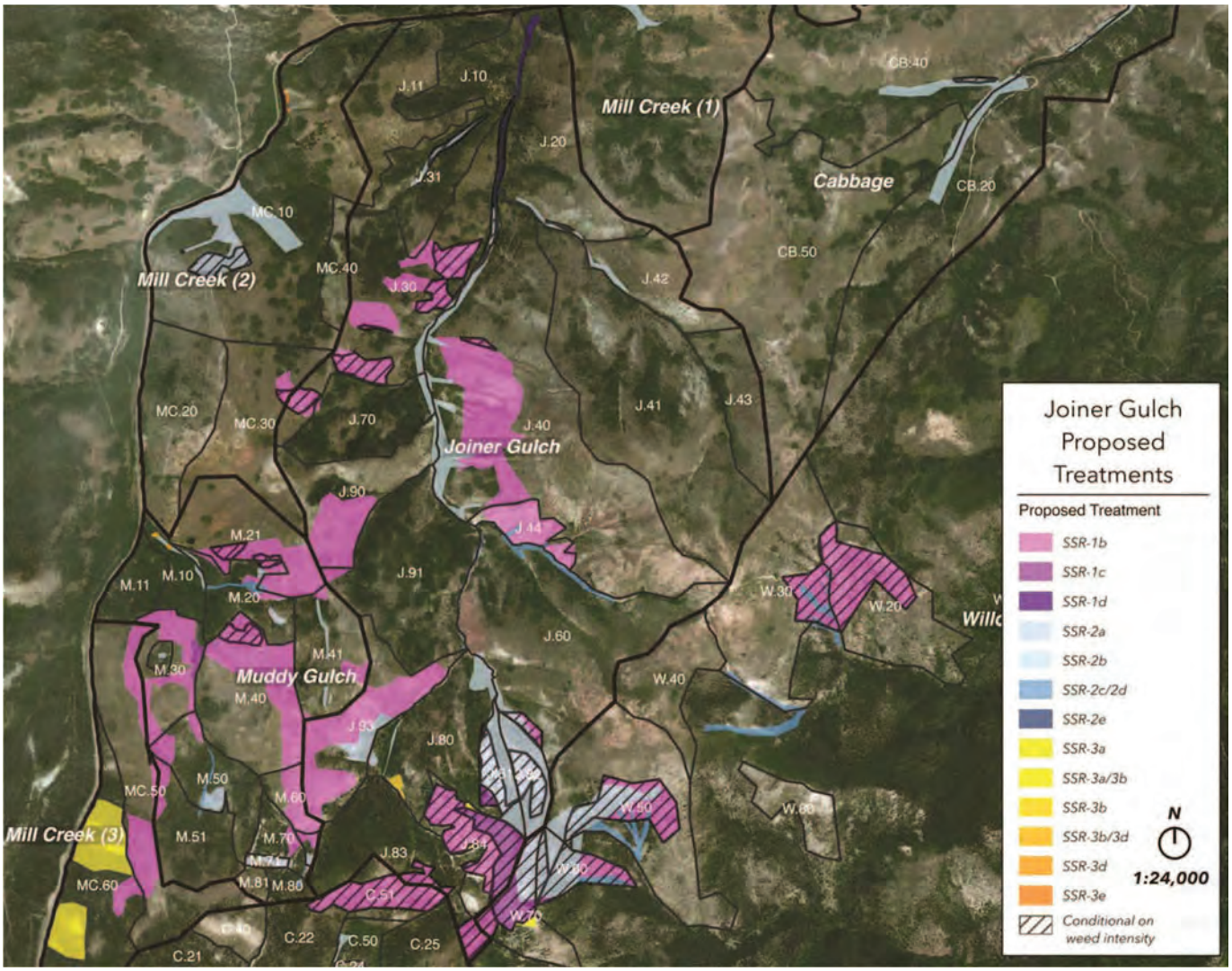



**Figure 4-10. Joiner Gulch Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

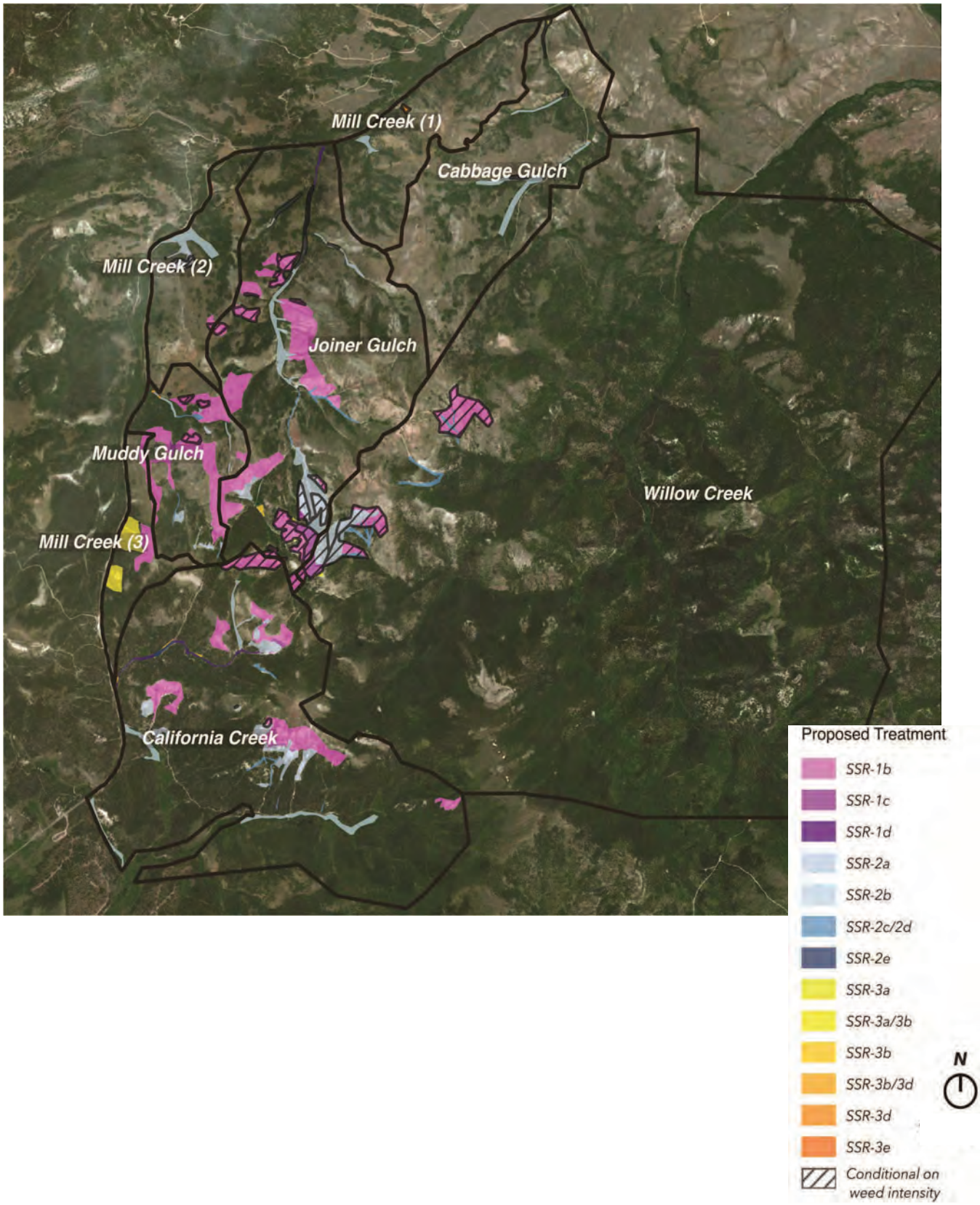



**Figure 4-11. Willow Creek Proposed Treatment Summary**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

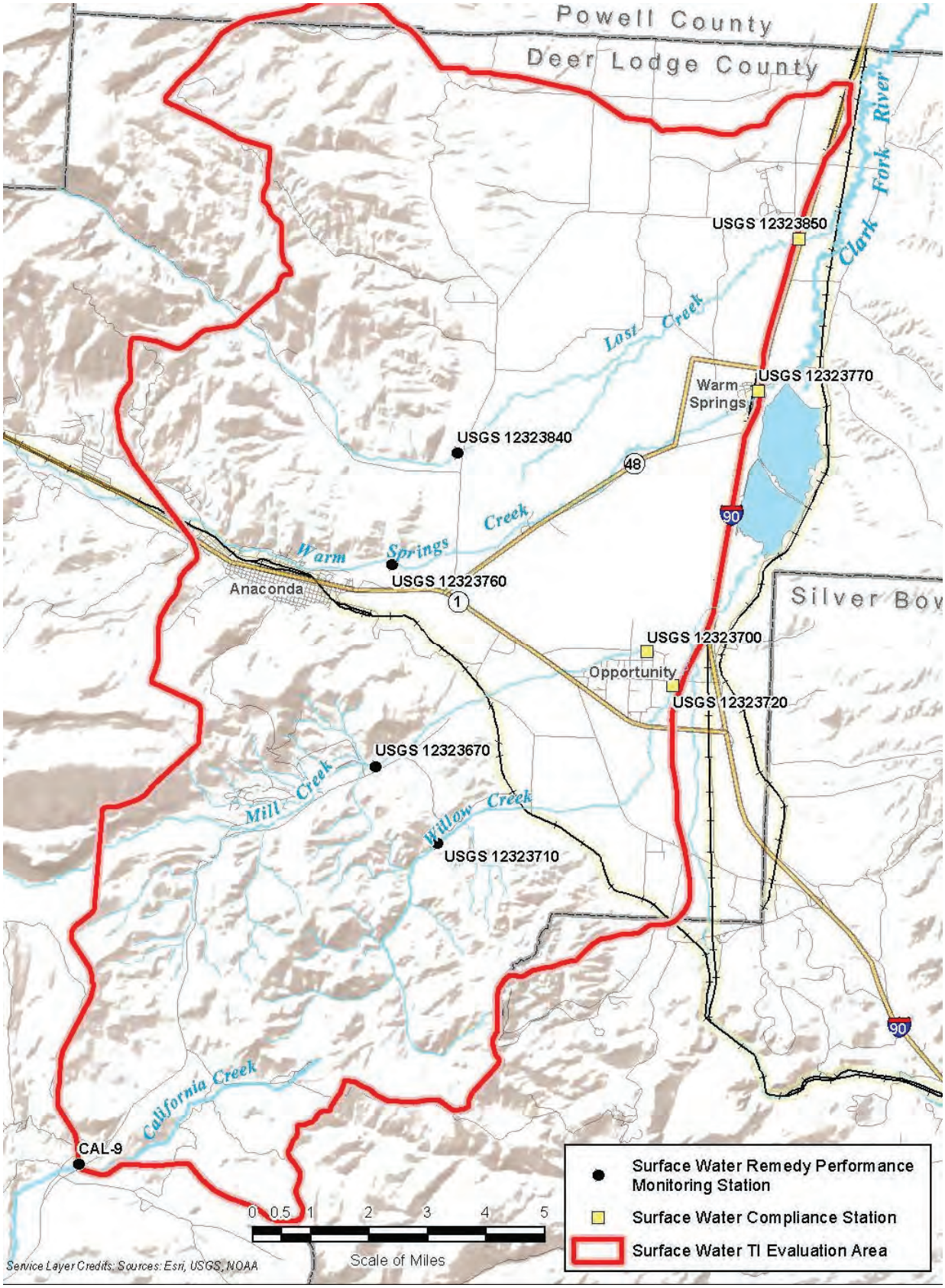



**Figure 4-12. Surface Water Monitoring Stations**
**Anaconda Regional Water, Waste, and Soils OU**
**Anaconda Smelter NPL Site, Montana**

Montana Department of Environmental Quality

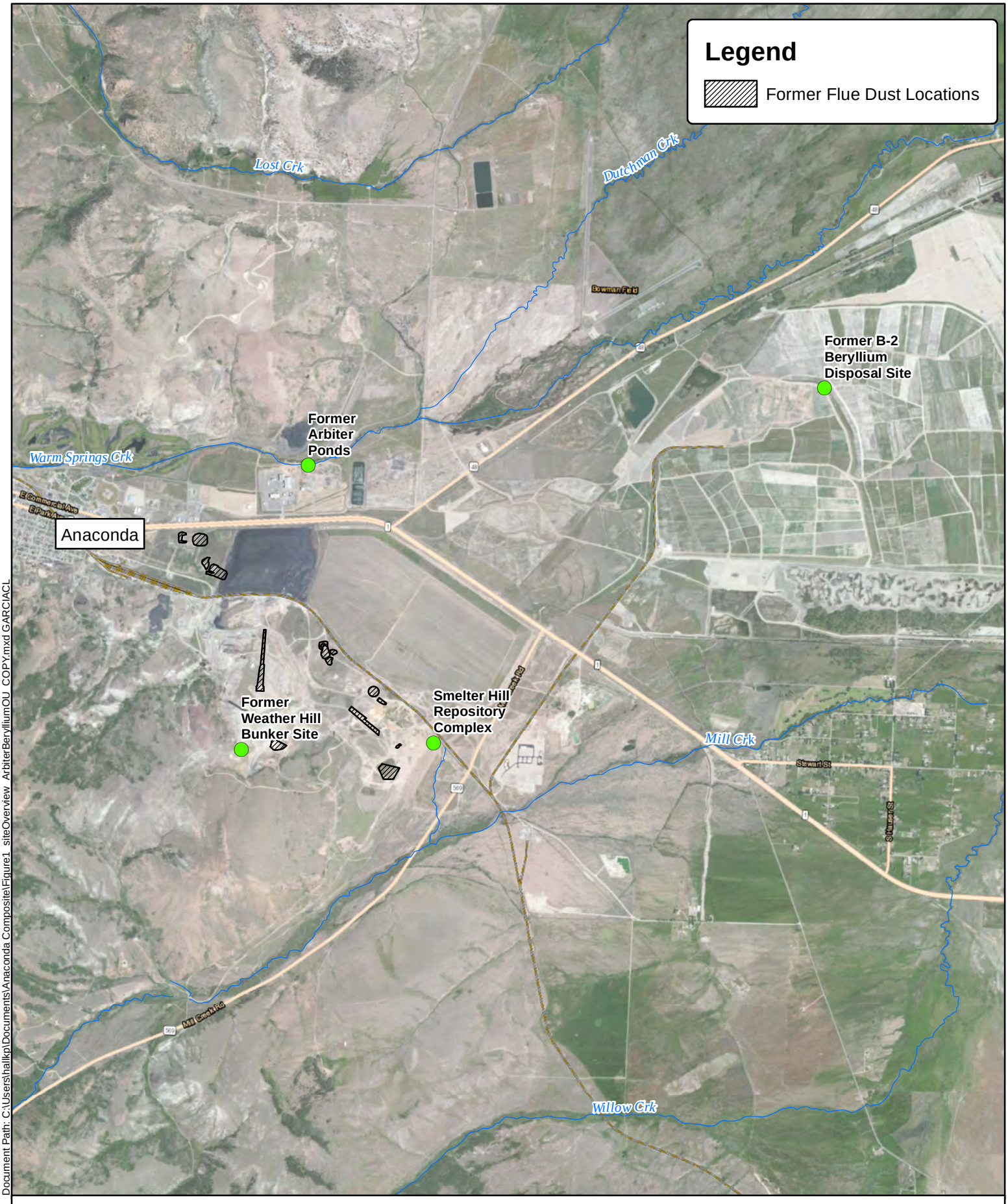



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**Figure 8-1.**
Arbiter, Beryllium and Flue Dust Operable Units
Anaconda Smelter NPL Site

0 0.25 0.5 1 1.5 2 Miles

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# Part 3 – Responsiveness Summary

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# Table of Contents

# List of Tables



# Appendices

# Acronyms

| | |
|---|---|
| ADLC | Anaconda Deer Lodge County |
| ARARs | applicable relevant and appropriate requirements |
| ARWW&S | Anaconda Regional Water Waste and Soils |
| AWQC | Ambient Water Quality Criteria |
| BMPs | best management practices |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CH | critical habitat |
| DEQ | Montana Department of Environmental Quality |
| EPA | U.S. Environmental Protection Agency |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NRD | Natural Resource Damage Program |
| OU | operable unit |
| OU4 | Operable Unit 4 |
| RD/RA | remedial design/remedial action |
| ROD | record of decision |
| RUSLE | Revised Universal Soil Loss Equation |
| SSR | steep slope reclamation |
| SWMP | surface water management plan |
| TI | technical impracticability |
| USLE | Universal Soil Loss Equation |
| WEPP | Water Erosion Prediction Project |

# Section 1
# Introduction

## 1.1 Process Overview

In June 2017, the U.S. Environmental Protection Agency (EPA) released the *Proposed Plan for the Anaconda Regional Water, Waste and Soils Operable Unit (OU4) of the Anaconda Smelter Superfund Site* (EPA 2017). The plan outlined proposed modifications to the remedy for the *Anaconda Regional Water, Waste and Soils Operable Unit (ARWW&S OU)* that had been selected by EPA in a 1998 record of decision (ROD) (EPA 1998) and modified in a 2011 ROD amendment (EPA 2011). A ROD amendment is required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 Code of Federal Regulation (CFR) § 300.430(f)(3)(F) when fundamental changes to an approved ROD are made by EPA.

The main components of the 2017 proposed plan were:

- Waive the State of Montana's acute and aquatic life surface water criteria for cadmium, copper, lead and zinc for upper Willow Creek and its tributaries and the tributaries of upper Mill Creek
- Maintain federal water quality criteria as the applicable surface water standard
- Expand and enhance the current upland remedies to minimize source contamination to surface waters that would result in exceedances of water quality standards

The proposed plan release marked the start of a public comment period that ran from June 21 to August 4, 2017. EPA presented the proposed plan at a public meeting on July 20, 2017. Based on comment received during the comment period, EPA, in consultation with the Montana Department of Environmental Quality (DEQ), decided to pull the proposed plan and reconsider the up-front waiver of surface water standards. After careful deliberation, the decision was made to remove the up-front waiver of standards. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) ROD guidance would have allowed EPA to proceed directly to a ROD amendment at that point. However, in the interest of full transparency, EPA chose to issue a revised proposed plan for public comment.

EPA issued the *Proposed Plan to Amend the 1998/2011 Record of Decision, Anaconda Regional Water, Waste and Soils Operable Unit Anaconda Smelter Superfund Site, Anaconda, MT* (EPA 2019) in September 2019. The public comment period ran from September 4 to October 4, 2019 and a public meeting was held on September 17, 2019.

In the 2019 proposed plan, EPA did not immediately waive state total recoverable metals standards on certain stream segments. Instead, the remaining remedial action work, and additional work identified under the *ARWW&S OU Surface Water Technical Impracticability Evaluation Report* (Atlantic Richfield 2017), must be completed before potential waivers will be considered through a process that will be documented in the forthcoming surface water management plan (SWMP). The SWMP will identify performance and compliance monitoring locations, frequency of monitoring, process to certify compliance determination with water quality performance standards, and consideration of waivers of standards if all work that is technically practicable has been completed under the 2020 ARWW&S ROD Amendment.

As required by the NCP, the responsiveness summary (this document) provides a summary of the public comments submitted to EPA regarding the proposed plan. EPA's responses to those comments are also provided. The document is organized as follows:

- Section 1 – Introduction
- Section 2 – Public Comments and Responses
- Section 3 – References Cited

## 1.2 Public Comment Received

EPA has worked closely with community members and other stakeholders throughout the Superfund process at the ARWW&S. That cooperation continued into the ROD amendment process. Community participation played an essential role in the development of the proposed plan and the ROD amendment.

EPA received 26 comments in 2017 and 6 in 2019. Comments were in the form of testimony at the July 20, 2017 and September 17, 2019 public hearings and as written comments, emails, and telephone calls. Most commenters were residents of Anaconda or Butte. Comments were also received from Atlantic Richfield, Alliance for the Wild Rockies, Clark Fork Coalition, Mom's Clean Air Force, and Anaconda Deer Lodge County (ADLC).

Each submission was given a sequential individual comment identification number. For each number assigned, basic identification information (date received, commenter name, and comment method) was tracked on a master spreadsheet using identification numbers for the submission and its subcomments (e.g., 5.1, 5.2, 5.3, etc.). Names of individuals who submitted comments were recorded and tracked but are not available to the public due to EPA's Privacy Policy and commitment to protect personally identifiable information.

The comments are addressed in the following subsections by EPA in consultation with DEQ. A synopsis of the comments on a topic is provided, followed by EPA's response.

Opposition to the 2017 proposed plan centered around the proposal to waive the state total recoverable metals standards in Upper Willow Creek and its tributaries and the Upper Mill Creek tributaries. In contrast, there were only six comments on the 2019 proposed plan and the centered mainly on technical details or were not relevant to the proposed plan itself.

# Section 2
# Comments and Responses

Public comments are presented below by topic (arranged alphabetically) (Table 2-1) along with EPA's response.

**Table 2-1. Public Comment Organized by Topic**

| Section Number and Topic | |
|---|---|
| 2.1 Adaptive Management | 2.12 Jobs Program |
| 2.2 Additional Monitoring | 2.13 Modification of the ROD |
| 2.3 Aquatic Biological Effects | 2.14 Removals from Well-Vegetated Areas |
| 2.4 Barren Slopes | 2.15 Soil Removal |
| 2.5 Beaver Ponds and Sediment Basins | 2.16 Surface Water Standards |
| 2.6 Best Management Practices | 2.17 Text Changes Relevant to the 2020 ROD Amendment |
| 2.7 Bull Trout | 2.18 TI Report |
| 2.8 Environmental Impact Statement | 2.19 TI Waiver |
| 2.9 Fire Potential | 2.20 Total Metals Versus Dissolved Metals |
| 2.10 Flue Dust | 2.21 Water Treatment |
| 2.11 Irrigation Impacts | 2.22 Watershed Functionality |

## 2.1 Adaptive Management

### 2.1.1 Comment Summary

Four commenters advocated for an adaptive management approach that completes remedial actions, monitoring, and completing additional work based on knowledge gained from experience on what works and what doesn't. The approach would adopt new technologies, as needed.

- **Comment 1.2 (2019).** "The steep slope areas eligible for additional BMPs are difficult to access by machinery and existing conditions often make vegetation establishment difficult. These on-the-ground conditions are consistent with those faced by the NRDP and MFWP in the Injured Areas of RDU 15, just across the Mill Creek highway. We have demonstrated techniques that effectively achieve the goals of the additional proposed BMPs, namely, the sequestration of sediment on the landscape to prevent the mobilization of metals-contaminated sediments into waterways. Operating in these difficult conditions requires a project design that blends ecology and engineering in order to kickstart natural recovery processes that become self-sustaining and increase in resilience over time. As natural recovery improves, long-term maintenance needs decrease. In our collective experience, "one and done" approaches are insufficient for true remedy of these lands. The following recommendations were developed over 7 years of trial and error and should be adhered to in the implementation of the proposed BMPs, particularly in the Mill Creek watershed, where we have substantial experience

to offer in this process. Efforts that fall short of these recommended minimum standards are not likely to achieve sufficient results.

"Mechanized access to steep slopes is possible, however care should be taken to minimize impacts to established riparian and wetland areas in developing access roads. The implementation of the proposed BMPs often requires hand labor crews with some knowledge of ecological restoration, working in concert with mechanized equipment. In our experience, mechanical efforts accompanied by hand-labor have produced some of the best outcomes on the landscape."

- **Comment 18.1 (2017).** EPA should not stop encouraging the development and deployment of BMPs to improve the capture of these metals under storm and a full range of conditions. Storm water flow treatment is in its infancy of development. The state standards should remain in place as a continued encouragement to do more and continually seek better and more protective metal capture/removal options and best management practices (BMPs). Technical impracticability (TI) is presented in the PowerPoint. What is technically impracticable for a county or local government is much different than for a premier energy company with a large and high quality staff of engineers and scientists who are, over a broad geographic area, solving similar challenges. The experience gained by the company across the globe should continue to be applied for the benefit of the Anaconda Regional Water, Wastes and Soils Operating Unit. Please do not lower the bar for water quality improvement in the suggested watershed areas of Anaconda/Deer Lodge County. After all, we are talking about impacts for hundreds and hundreds of years in the future. These impacts just don't go away on their own, they have to be continually and actively worked and will benefit from technology yet to be developed."

- **Comment 27.2 (2017).** "I just have three or four points. I'll try to get to them quickly. As a starting point, we feel that all work outlined in the Record of Decision should be accomplished before a TI waiver is granted in this case. Given the nature of the contamination here, there needs to be a combined process of reclamation and monitoring over time until it can be conclusively demonstrated that no further progress toward meeting Montana's water quality standards are possible. In our view, granting a TI waiver in advance, based on modeling, is premature until we have more of a concrete sense of how often these standards will be exceeded.

  Lastly, here, because I'm running out of time, we've already proposed waived standards. We've always believed, along with the State of Montana, that our more-protective water quality standards for aquatic life are best for our state precisely because of the nature of the contamination in the Clark Fork's Superfund complex, where toxic metals are bound to sediment, as was raised by this gentleman. Again, it's been demonstrated that aquatic life in the Clark Fork suffers from this sediment-bound metal. Finally, I'd just like to point out that federal law and policy dictate a forward-thinking approach to water protection where, as technology gets better and changes, so does our ability to effectively eliminate water pollution. For all these reasons, the coalition would advocate for clear timelines for the agencies and the potentially responsible parties to reevaluate remedial technology and best management practices as it applies to contamination."

- **Comment 32 (2017)**. "Steep Slope Reclamation (SSR). The TI evaluation recognized the importance of expanding and enhancing the existing remedy for steep slope

reclamation as these often barren, or sparsely vegetated areas are recognized as the main source of sediment and total recoverable COCs to Anaconda's streams. The connections between stable vegetation cover, erosion and stream sediment are intuitive. The connection between barren, steep slopes and exceedance of water quality standards during storm and snow-melt conditions is well documented and to some degree quantified in the TI evaluation.

"However, reclaiming vast acreage of barren and poorly vegetated steep slopes, often in areas that are hard to access, has long been and remains a bugaboo at the Smelter Site. At this time there is a paucity of proven techniques. The exception is dozer basins, but those cannot be applied to very steep slopes. The reclamation techniques established at ARWW&S for non-steep slopes rely on heavy equipment for tilling, fertilizing and seeding – those techniques have limited application or completely untenable on steep slopes.

"The final Vegetation Management Plan (AR, 2013) defines a reclamation management program for non-steep slope reclamation that is founded on years of successful re-vegetation. It includes performance standards as defined by the Land Reclamation Evaluation System (LRES), a 10-year period of performance, long-term inspection and maintenance and a contingency of adding six inches of topsoil if performance standards have not been met after 10 years. The VMP does not define vegetation performance standards for SSR and the contingency for non-steep slope reclamation does not apply to SSR. Instead of a vegetation performance standard, the VMP established a landscape stability (erodibility) performance standard based on the Bureau of Land Management Erosion Condition Classification System (Clark, 1980).

"Specifically, the standard requires "a stability of less than or equal to 45." Additionally, areas where there is evidence of soil movement –solid deposition greater than 3 inches over more than 10% of the area, require maintenance. Areas exhibiting greater than 25% coarse fragment movement over more than 10% of the area require maintenance. Areas exhibiting rills greater than 2 inches deep and at intervals of 10 feet or less within the inspection area require maintenance. All active gullies require maintenance. But maintenance is not practical in most steep slope areas because they are remote and have limited access.

"It will be hard to get all stakeholders to agree to a program based on uncertain techniques, have an unspecified period of performance and may require long-term annual inspection and maintenance. The SSR program inferred by the Preferred Alternative and only partially defined by the VMP may prove to be impracticable. I recommend a program based on adaptive management, a standard approach to environmental management where outcomes are uncertain. It's an iterative approach consisting of applying remedy, monitoring and evaluating outcomes, then applying effective remedy measures in the next iteration. The program I suggest consists of testing SSR techniques annually on demonstration areas. The amount of work required each year could be set by acreage or cost. Three years after a demonstration area is completed it should be evaluated for effectiveness.

"At each five-year review, the SSR program should be evaluated and revised as necessary. With a better understanding effective SSR and its limitation, the revisions might include revised performance standards and contingencies. With a better

understanding of what is achievable on steep slopes, it may be more effective to establish a vegetation performance standard and discard the slope stability standard. A greater than or equal to 20% vegetative coverage has been suggested elsewhere.

"The final remedial design/remedial action work plan, which will be attached to the consent decree for the site, will need a specific plan and program for SSR including a performance schedule. The period of performance should be specified by a number of three year cycles and an evaluation of the effectiveness of continuing or terminating the program. The RD/RA work plan or CD will likely include language allowing the PRPs to request management mediation to determine if the polygon(s) in question can be moved beyond the active stage without meeting performance standards.

"The Montana Natural Resource Damage Program has conducted several steep slope reclamation and erosion BMPs demonstrations in Cabbage Gulch and California Creek drainages. Those demonstrations have included some heavy equipment work where it was feasible, but have also demonstrated hand work. Assessing the effectiveness of those demonstration should be the first step in a long-term program.

"As required by the VMP, SSR designs, monitoring and evaluations must be overseen and performed by qualified ecologists or reclamation scientists. To the extent practicable, the vegetation should consist of local native species, including grasses, shrubs and trees to conform to the ROD ARARs and to a strategy to establish self-sustaining vegetative cover."

### 2.1.2 EPA Response

An adaptive management strategy was adopted in the 1998 ARWW&S OU ROD (EPA 1998) as the Selected Remedy for surface water. That strategy is acceptable but would take decades to implement. The community of Anaconda and local government has requested that EPA make it a priority to complete remedial actions and move the site towards completion. That was the intent of the 2017 and 2019 proposed plans and is the intent of this 2020 ARWW&S OU ROD Amendment.

The proposed waiver was limited to a very small area where access to equipment is limited. However, EPA acknowledges that there is a significant amount of variability in estimates of sediment reductions and consequential metals reduction loading in the modeling conducted to support the technical impracticability evaluation. Given public concern over modeling and the wish that work be implemented before standards are waived, EPA is electing not to waive standards at this time, but rather, outline a process through which the standards will be waived. The Selected Remedy for surface water set forth in the 1998 ARWW&S OU Record of Decision, as modified by the 2011 ARWW&S OU ROD Amendment (EPA 2011), remains unchanged.

The supplemental work to be conducted by Atlantic Richfield requires a minimum of three attempts over at least five years to meet erosion control performance standards. This approach does allow some flexibility in applying successful reclamation techniques as the site moves towards completion.

# 2.2 Additional Monitoring

## 2.2.1 Comment Summary

Three comments were received that requested additional monitoring be conducted to support the effectiveness of the ROD modification.

- **Comment 7.2 (2017).** "Will the EPA test fish to see how the new cleanup plan would be affecting the aquatic life in the creeks? How will the new cleanup plan affect wildlife? ... We request a careful analysis of the impacts to fisheries and water quality, including considerations of sedimentation, increases in peak flow, channel stability, risk of rain-on-snow events, and increases in stream water temperature. Please disclose the locations of seeps, springs, bogs and other sensitive wet areas, and the effects on these areas of the project activities. Where livestock are permitted to graze, we ask that you assess the present condition and continue to monitor the impacts of grazing activities upon vegetation diversity, soil compaction, stream bank stability and subsequent sedimentation. Livestock grazing occurs in the Project area and causes sediment impacts, trampled or destabilized banks, increased nutrient loads in streams, and decreased density, diversity, and function of riparian vegetation that may lead to increased stream temperatures and further detrimental impacts to water quality."

- **Comment 30.1 (2017)**. "I've been involved in Anaconda surface water and ground water since 1990. And I was involved as a DEQ employee in this TI. And I've been involved in other TIs in this area. And this was fairly conservatively done. And it's not a matter of is it hard. It gets back to is it a matter -- it's a matter of is it practicable. And the reason I say it was conservatively done is it started out with just the tributaries, and it required a certain amount of work to be done. We won't exactly know what that requirement is until there's a Statement of Work of what that's going to require. But I would also -- I'd like to add in that I noticed that there was a -- in the TI itself called for, now, additional biomonitoring. And I'd like to add to that. I think more than just macro invertebrate population biodiversity studies, I think there's a couple of other studies that should be added in. One would be Michelle Hornberger with the USGS has, for a long time, studied metal body burden on certain cattle fly. I think that would be a great addition to the biomonitoring. And, additionally, I think Fish, Wildlife and Parks actually do a fish count and possibly cage fish studies."

- **Comment 32.5 (2017).** "Waiving DEQ-7 Standard – Need for Additional Monitoring. The TI clearly defined the need to waive aquatic life standards. Montana's DEQ-7 hardness based standard for the metals, which uses the total recoverable fraction, will be replaced with the less protective Federal hardness based standard, which uses the "dissolved" fraction. The specific waive-to standard for copper is vague and warrants additional discussion below. Montana's standards are being waived under federal CERCLA jurisdiction, with Montana DEQ consent. It is a site-specific waiver that only applies to the four ARWW&S streams.

  "Throughout Montana, under state jurisdiction, DEQ-7 still applies. Montana has a well-founded rationale for maintaining the more protective total recoverable standard. The total recoverable fraction consists of both metals attached to suspended sediment and dissolved metals. EPA has been unable to develop water quality criteria for contaminated sediments and has made little progress since publishing the draft

Developing Water Quality Criteria for Suspended and Bedded Sediments (SABS) – Potential Approaches (EPA, August 2003).

"The state still recognizes that contaminated sediment likely affects aquatic life through diet and the food chain. Waiving the total recoverable fraction leaves Montana without the tools to regulate contaminated sediment and raises the need to expand the current USGS water quality monitoring program to include both bed sediment biological monitoring.

"Silver Bow Creek and the Clark Fork have long-term biomonitoring and bed sediment monitoring programs in place that should be incorporated into the long-term monitoring plan for ARWW&S. The programs consist of the following monitoring elements:

- Aquatic insect diversity coupled with biotic indices conducted by consultants (Rhithron, Dan McGuire)
- Aquatic insect metal body burden targeting hydropsyche conducted by USGS (Michele Hornberger)
- Fish population surveys conducted by FWP
- Caged fish studies conducted by FWP
- Fish tissue studies conducted by FWP
- Bed sediment conducted by USGS and consultants (Respec)

"In addition to these suggested monitoring components, synoptic water quality monitoring events should be included in the program in preparation for the five-year reviews. Synoptic monitoring, conducted during spring runoff, should be used to gauge the effectiveness of remedy.

"The Proposed Plan infers that copper standards will be a special case. According to Exhibit 4 of the Proposed Plan – the waived-to standard will be determined under the forthcoming Surface Water Management Plan. Apparently the Agencies are considering two options. As with the other COCs, they may require a hardness based standard, using the dissolved fraction. But they are likely also considering the Biotic Ligand Model (BLM). The EPA recognizes the BLM based standard for copper and only copper. It has not been adopted by any state, but is used selectively in some states on a site-specific basis. The BLM is an empirically based model used to examine the bioavailability of copper in the aquatic environment and the affinity of copper to accumulate on gill surfaces of organisms that at some concentration has a toxic effect. The model uses the specific stream chemistry at the time a sample is collected to derive both chronic and acute standards. There is some uncertainty that the acute BLM standard is protective. The acute standard is applied to storm events, when aquatic life can endure higher concentrations for a short interval. It would be prudent for the Agencies to take a cautious approach to selecting the copper standard and require the hardness and dissolved based standard be written into the forthcoming Surface Water Management Plan. They should hold out the BLM until it is further validated with a well-established biomonitoring dataset."

### 2.2.2 EPA Response

A biomonitoring program will be developed for future monitoring under the forthcoming SWMP. This will likely consist of benthic macroinvertebrate monitoring, as biologists are largely in agreement that these organisms provide excellent indicators of localized stream impairment.

## 2.3 Aquatic Biological Effects

### 2.3.1 Comment Summary

- **Comment 21.3 (2017)**. "3. Executive Summary Page xxi of xxii addresses Remedy Enhancements and Long Term Monitoring that are planned as a result of this Tl evaluation. Comment: ADLC's position on this matter is that it is conspicuously evident that aquatic biological effects have received little to no focus in the TI evaluation. No remedy enhancements address the aquatic ecosystem and only annual benthic invertebrate monitoring is touched on in the long term monitoring proposed. Have any aquatic bioassay/bioconcentration/bioaccumulation studies been performed to date on fish and benthic invertebrates in the watersheds addressed in this study? Will relaxation of water quality standards result in restrictions on fish consumption from these watersheds?"

### 2.3.2 EPA Response

The *1996 Baseline Ecological Risk Assessment* (EPA 1996b) addressed ecological risks to aquatic life, which was summarized in the 1998 ARWW&S OU ROD. The Selected Remedy for surface water in the 1998 ROD set goals to meet Montana's total recoverable standards which are protective of aquatic life. Those goals remain in effect.

Macroinvertebrate monitoring has been conducted sporadically at the site since the mid-1980s. A 2012 biomonitoring study provided biointegrity scores that indicated that the Anaconda tributaries to the Clark Fork River were classified as either non-impaired or slightly impaired. Montana Fish, Wildlife, and Parks (FWP) conducted copper and zinc analysis of fish tissue (brown trout) from several sites in the Clark Fork River basin in 2013 and 2014, including Warm Springs Creek and the Mill-Willow Bypass. To date, FWP has not issued any warnings about consumption of fish from Anaconda streams.

## 2.4 Barren Slopes

### 2.4.1 Comment Summary

- **Comment 24.6 (2017). "**BARREN SLOPES**.** I can guarantee that fiddling with barren slopes will have no measurable effect for two major reasons:

  1. Only a very tiny fraction of dissolved metals originate there, with a tinier fraction entering surface water.

  2. Lacking is the sort of database, preferably a century or more, linking TDM to flows. Even if it existed, it would not be static but show continual improvement. In comparison, even the most optimistic hopes for "remedy" would be undetected or inconsequential.

  "The predominantly barren slopes are usually the cleanest and often unconnected to flowing water, so erosional deposition ends up relatively isolated. I am fairly certain

that working on relatively barren slopes will have no measurable effect on exceedances because they are not an important source, much less the root cause. This is an idiosyncratic remedy, meaning that other persons with the same information would have selected something else. Someone obviously likes it. Maybe they hope it will bolster their career, but it's unrelated to TDMs."

### 2.4.2 EPA Response

Data collected and analyzed during the TI evaluation demonstrated that although barren slopes do have the least amount of metals concentrations compared to moderately and well-vegetated areas, they remain a significant loading source of total recoverable metals to streams due to their high degree of erosion. That noted, little on-slope work is proposed for barren slopes due to concerns over exacerbating erosion. Most of the proposed work for these slopes consists of aerial applications of seed and fertilizer.

## 2.5 Beaver Ponds and Sediment Basins

### 2.5.1 Comment Summary

Four comments were received that requested that the use of beaver dams be considered in the proposed plan. One of the commenters believed that sediment basins on steep slopes were inherently unstable and likely to fail.

- **Comment 1.10 (2019).** "Existing wetlands and beaver ponds should be considered assets to the proposed remedy as sediment catchment areas and should be protected and enhanced where possible. In-stream woody structures (beaver mimicry) should be implemented to promote overbank deposition of sediments during high flows, particularly in incised stream reaches."

- **Comment 7.3 (2017)**. "Please consider an alternative which would ensure that there are stable beaver populations. They do a better job of capturing sediment than any engineer."

- **Comment 24.5 (2017)**. "FLUVIAL WORKS and the NATURE OF FLOODS. Those who watched the floods in Norway last week, or the California dam overflow, which required evacuation last spring, or those who have seen the photos/movies of the 1964 floods in northwest Montana, take a dim view of channel obstructions. On Sun River, Gibson Dam was breached in June 1964. "Flood waters inundated areas far beyond the Flathead River channel near Kalispell. Similar broad swaths of flood waters also inundated parts of the Blackfeet Indian Reservation, Great Falls, Choteau, and St. Mary. The 1964 floods on the Flathead, Sun, Teton, and Marias Rivers are the largest in recorded history. Floods bigger than the "100-year" event have occurred, and likely will occur again." (See https://wy-mt. water.usgs.gov/floodwatch/floods1964jun.html.) Thirty people died, and many bridges were swept away. Good stuff to remember when prescribing sediment basins to protect the Clark Fork.

  "Nor do I have much faith in small-scale stream work, from mountainous check dams to so-called "beaver mimicry." This fails to take the long view, and the long view assuredly involves gully-washers. I have watched beavers build a series of dams along stretches of High Rye Creek (east of Willow Creek), and several years later they washed out with most of the sediment moving on. And those were real beaver dams that held some volume of both water and sediment. If copying beavers where beavers won't build, yes,

there may be a lack of woody plants, but also topography is wrong. Do not expect this work to have any enduring benefit.

"The only reasonable way to view sediment basins and small ponds, especially in steep terrain, is temporary. A gully-washer, they're gone. The narrower the drainage, the steeper the side slope, and the greater the stream gradient, the more assured the future transport of sediments. Beavers have dammed the best sites – the ones likely to retain sediment when breached. It's important to recognize this. Now a treatment facility has limitations too, and it won't treat a 100-year flood, but I want to point out that most proposed stream work is short-term, enough to probably escape with your career intact. But not a solution."

- **Comment 30.2 (2017)**. "The other thing I would just add in is part of the remedy looks at retention and detention ponds. In some of those cases, we're talking about tributaries that are on wildlands and truly wildlands. And it may be better to try and ensure that there are stable beaver populations which can probably do a better job than any engineer of capturing sediments and restoring it."

### 2.5.2 EPA Response

EPA agrees that beaver dam complexes are effective in reducing sediment transport from the tributaries to the mainstems of the creeks. The additional design conducted in the *Supplemental Surface Water Controls RD/RA Report* (Atlantic Richfield 2020) has less engineered sediment ponds than the alternative strategy presented in the 2017 TI evaluation report, as further analysis determined that many of the areas targeted for ponds were unsuitable for a variety of factors.

The Natural Resource Damage (NRD) Program recently submitted a Request for Change to eliminate the need for engineered sediment basins in the Cabbage, Joiner and Muddy Gulch drainages, providing the rationale that their on-slope and in-channel revegetation and BMP efforts effectively captured a similar amount of sediment.

Beaver dams play a significant role in capturing metals-laden sediment in the Anaconda uplands and EPA believes they should be encouraged to supplement current and future work. However, EPA cannot dictate how Montana FWP manages local beaver populations. Further, EPA cannot require Atlantic Richfield or private landowners to manage beavers under Superfund, as this exceeds EPA's CERCLA authority.

## 2.6 Best Management Practices

### 2.6.1 Comment Summary

Three comments were received regarding best management practices (BMPs). The first outlines recommended design specifications. The remaining comments request independent evaluation of the effectiveness of storm water BMPs to supplement modeling and analytical data collected to date.

- **Comment 1.1 (2019).** "We support the additional BMPs proposed in the plan to amend the 1998/2011 Record of Decision. We have developed the restoration and remedy techniques highlighted in the example documents provided by EPA, and collectively have substantial knowledge of and experience with the restoration and remediation of degraded ecosystems under Superfund, particularly on steep slopes. By adhering to these minimum design standards, we are confident that ARCO/BP and the EPA will be

able to achieve substantial remedy of the degraded uplands in the Mill Creek watershed and other areas in this plan and leave the landscape in a better condition to recover to fully functioning conditions.

- "Organic fertilizer products outperform inorganic fertilizers in promoting vegetation growth on bare slopes and should be used exclusively in the first few years of revegetation on bare and mostly-bare slopes. These products applied at high rates without the addition of seed activates the native seed bank and have shown increases in vegetation cover of up to 40% over 3 years.

- "Inorganic, NPK {agricultural) fertilizers, lack micronutrients typically missing from the barest slopes and should not be used until 40-60% vegetation cover has been achieved. Organic fertilizer products, if used, should be applied at the high recommended rates. {1500-2000 lbs/acre). We found that organic fertilizer products applied at high rates with the addition of a native, locally adapted seed mixes, produce up to 60% vegetation cover increases in 3 years.

- "Due to high winds and adverse climatic conditions, the highest, most bare slopes should be treated with mechanized slope roughening where possible prior to addition of seed and fertilizer. Where not possible, these slopes should be treated by hand with trenches filled with organic fertilizer and a native seed mix, and covered with fully bio-degradable erosion control blankets. This technique has produced vegetation cover of 100% within the trenches."

- **Comment 6.1 (2019). "**ADLC seeks to independently evaluate the effectiveness of storm water best management practices implemented in this watershed and understand how the determination of "Technical infeasibility" was made by developing an understanding of how modeling work associated with this decision was conducted and validated in the field. It is my professional opinion that relaxing water quality standards applicable to these watersheds without first fully validating model assumptions and results is premature. ADLC is opposed to such action."

- **Comment 21.1 (2017)**. "1. Executive Summary Page xv of xxii states that "To date, the remedy has been partially constructed, primarily in lowlands and waste management areas (WMAs) where heavy equipment can be readily used." Comment: ADLC's position on this matter is that credible efforts to implement appropriate storm water best management practices (BMPs) are needed before a decision is made that it is technically infeasible to address contaminant source term areas in the upper reaches of the watersheds evaluated in the TI report (i.e., Mill Creek, Willow Creek, California Creek, Warm Springs Creek and Lost Creek). Modeling and data analysis of low lying areas and WMAs alone form an insufficient basis to address whether mountainous terrain BMPs will be successful at reducing contaminant mobilization. Have any test plots been installed and evaluated in the upper watershed areas to implement mountainous terrain BMPs, and has any attempt been made to validate the results of modeling efforts performed to date?

  "2. Executive Summary Page xix of xxii under Water Quality Improvement Predictions states that "...implementation of all of the additional work would result in a 16% to 46% reduction in metals concentrations in various Anaconda streams." Comment: ADLC's position on this matter is that with proper design, implementation, monitoring and

maintenance of mountainous terrain BMPs, significant reductions in contaminant loading to the watersheds evaluated is possible. While it may be difficult to implement, it is premature to relax water quality standards until modeling performed in the evaluation is validated by demonstrating that water quality improvement cannot be achieved by direct examination of BMP effectiveness.""

### 2.6.2 EPA Response

Storm water BMPs and revegetation are part of both currently approved work plans and supplemental work being developed by both Atlantic Richfield and the Montana Department of Justice – NRD Program. Storm water BMPs and revegetation demonstration plots and remediation have been constructed at the site for more than 20 years. These efforts include Atlantic Richfield and NRD work on Stucky Ridge, Atlantic Richfield work on Smelter Hill, and NRD work in Cabbage Gulch, Muddy Creek, and California Creek.

## 2.7 Bull Trout

### 2.7.1 Comment Summary

One comment was received that cited concerns regarding the impact of the 2017 proposed plan on bull trout and bull trout habitat. It requested that a formal consultation be made with the U.S. Fish and Wildlife Service.

- **Comment 7 (2017).** "How will the proposed changes affect bull trout and bull trout critical habitat? Please formally consult with the U.S. Fish and Wildlife Service on how the proposed changes will impact bull trout and bull trout critical habitat. ... On July 10, 1998 bull trout (*Salvelinus confluentus*) were listed as a Threatened Species, within the Columbia River Basin, by the United States Fish and Wildlife Service (USFWS). Section 7(a) (2) of the Endangered Species Act (ESA) of 1973 as amended requires all federal agencies to review actions authorized, funded, or carried out by them to ensure such actions do not jeopardize the continued existence of listed species. Bull trout were listed under ESA primarily due to habitat threats. Habitat conditions are important in the recovery and conservation of bull trout. Spawning usually occurs in third and fourth order streams, in low gradient areas (less than 2 percent) with gravel cobble substrate. Proximity of cover for the adult fish before and during spawning is an important habitat component. Successful incubation of bull trout embryos requires water temperatures below 8o C, spawning gravels with low amounts of fine sediment and high gravel permeability. Mortality of eggs or fry can be caused by scouring during high flows, freezing during low flows, or deposition of fine sediments.

  "On September 30, 2010, the U.S. Fish and Wildlife Service designated critical habitat (CH) for bull trout throughout their U.S. range. Critical habitat includes those areas occupied by the species, on which are found physical and biological features that are essential for conservation of an ESA listed species and which may require special management considerations or protection. The proposed changes to the Anaconda cleanup plan do not recover bull trout. It is an extinction plan, not a plan that will contribute to bull trout recovery. Please see the attached comments by Christopher A. Frissell, Ph.D on The 2014 Draft Recovery Plan. He said the recovery plan for bull trout for bull trout implies (and in a backhanded way specifies) that the USFWS assumes there is flexibility to make management choices deliberately allowing some core area populations of bull trout to go into decline or extinction, on the expectation others will appear from scratch, or disperse from severely depressed relict populations elsewhere

in the Recovery Unit to arise in new locations. However this Draft Plan, the previous listing and recovery planning record, and the published literature present virtually no evidence to substantiate that new populations of bull trout have established in contemporary times, either at the Core Area scale or the next smaller scale of breeding populations. In this regard bull trout are the biological polar opposite of vagile species like wolves, which are demonstrated to be amenable to reintroduction and are proficient colonizers of new territory at the regional scale. On the other hand, we do have evidence that even small, so- called "relict" bull trout populations can rapidly re-establish migratory life histories, or expand extant spawning areas when changing habitat conditions allow it. But we do not know that they can establish new populations in previously unoccupied streams or watersheds under contemporary prevailing conditions. Hence from a scientific perspective, existing populations of bull trout, no matter how small and far-flung, must be viewed as the sole seed sources for future recovery."

"Please formally consult with the USFWS on the impacts of this project on candidate, threatened, or endangered species and plants. Please disclose whether you have conducted surveys in the Project area for bull trout and westslope cutthroat trout. Would the habitat be better for bull trout and bull trout critical habitat if the cleanup plan is changed? Will all WQLS streams in the project area have completed TMDLs before a decision is signed? Does the proposed cleanup plan comply with the TMDLs? Would it be better for bull trout and bull trout critical habitat if state water quality regulations and laws are followed?"

### 2.7.2 EPA Response

EPA disagrees that the proposed changes to the remedy "is an extinction plan." EPA believes that the modified remedy will have no negative impacts on bull trout or bull trout habitat. In fact, modeling conducted under the TI evaluation (Atlantic Richfield 2017) suggests that area streams may see a 16 to 46 percent reduction in metals concentrations, which would also decrease metal concentrations in the Clark Fork River (where bull trout live). Remedial alternatives that would potentially be harmful to bull trout—such as construction and operation of water treatment plants which would increase stream water temperatures—were screened out of consideration in remedy modification. Overall, EPA sees the proposed changes as beneficial to bull trout critical habitat identified by U.S. Fish & Wildlife Service (Warm Springs Creek and the Clark Fork River).

EPA has previously formally consulted with U.S. Fish & Wildlife Service on remedial design/remedial actions being conducted on Warm Springs Creek, which is identified as bull trout critical habitat. EPA has initiated informal consultation for non-critical habitat streams (Lost Creek, Mill Creek and Willow Creek) with U.S. Fish & Wildlife Service as these streams are tributaries to the Clark Fork River. Formal consultation is not required as no waivers are proposed at this time. On April 8, 2020, EPA received a letter from U.S Fish & Wildlife Service that concurs with EPA's determination that the proposed surface water remedies identified in the proposed plan may affect but not likely to adversely affect bull trout or its designated critical habitat.

Under its CERCLA authority, EPA must identify remedies that protects human health and the environment from releases of hazardous substances. Studies and plans to recover bull trout are beyond EPA's CERCLA authority.

# 2.8 Environmental Impact Statement

## 2.8.1 Comment Summary

One comment was received that stated that an environmental impact statement was required for the work proposed.

- **Comment 7 (2017)**. "We believe that the National Environmental Policy Act requires that you write an Environmental Impact Statement for the EPA's proposed changes to Anaconda's cleanup."

## 2.8.2 EPA Response

EPA disagrees. Case law has established that the CERCLA decision making process is sufficiently protective of the environment and functionally equivalent to the National Environmental Policy Act decision making process. Thus, an environmental impact statement is not required for the 2020 ARWW&S ROD Amendment.

# 2.9 Fire Potential

## 2.9.1 Comment Summary

Two comments were received regarding the potential for fire to destroy vegetation in well-vegetated areas resulting in erosion and transport of contaminated soils.

- **Comment 15.1 (2017).** "I request that the deficiencies and biases in the report be addressed. Given the likelihood of a forest fire that will result in increased sediment releases, the idea of sediment basins cannot be dismissed. Active measures must be constructed to allow this greater sediment load to the controlled to some degree."

- **Comment 22.1 (2017).** "The report is grossly incomplete for not addressing increased erosion rates from currently "stable" areas once the vegetative cover is burned away from a forest fire. The report notes the elevated contamination in the vegetative areas, and seems to suggest that this is a sign that the contamination poses no harm to the environment. There is a significant risk that a forest fire will occur in the areas of concern within the next 50 – 100 years. The loss of vegetation will change the stable nature of the slope and an increase in erosion can be expected. Given this likely occurrence, the idea that filtration basins are not warranted, whatever their size, is a fatal oversight. The expected release of contaminants from such an event cannot be allowed to occur. It is astonishing that ARCO would produce and the EPA would accept a proposal dealing with stream sediment that does not once mention the risk of a forest fire and its effect on contaminant release from a denuded environment."

## 2.9.2 EPA Response

Since 2011, EPA has required evaluation of the effects of climate change on Superfund remedies as part of the remedial decision-making process and subsequent remedy reviews. After consideration of this comment, the consent decree will include a step for re-opening the remedy if waived-to standards cannot be achieved if catastrophic events such as forest fires or massive flooding occur at the site. Engineering design criteria places limits on the types of events that can be designed for. However, the Anaconda uplands are a natural open space environment, and most public comment as well as land management trustees comment indicate that they would like to keep the uplands as wild land, not a controlled engineered

environment which would be required to construct the stormwater control systems that the commenter requested.

# 2.10 Flue Dust

## 2.10.1 Comment Summary

One oral comment was received at the 2019 public meeting regarding flue dust.

- **Comment 3.1 (2019).** "I guess my issue is over this soot, all this... And so I do want it in the record that we have not been notified of all the flue dust that's been in the homes in Anaconda over the last 125 years. A lot of these homes have zero insulation in them, and the insulation that's been put in them, some of it was Zonolite, which is a contaminated substance. So, if that's in your attic space, you need to get ahold of the EPA and the Atlantic Richfield Company to deal with these kinds of things. And the reason why I'm here is because I live here, I've been raised here, and this is my family. And I honestly want -- and I don't know of any homes, except maybe in the west end of town, they call it --but, anyway, in the west end of town. But if they were cleaning up lawns at the Dwyer School, that means those houses that were built in the 50s probably have it, too.

  "So, I think it's advantageous for all of us to get a note out, whatever it takes, to get somebody in there to take a look at it. I understand we've got a system in Anaconda, and if I wanted to vacuum my mother-in-law's house out I would be welcome to the system. I didn't put the stuff there. I'm not taking it out. I worked on that smelter. I'm not going to do it again. So, my thinking is, if you guys are from Anaconda, take hold, it's your house, it's your family, make sure you get it cleaned up."

## 2.10.2 EPA Response

This issue is not relevant to the ARWW&S OU. It is addressed elsewhere as part of the Community Soils Operable Unit.

# 2.11 Irrigation Impacts

## 2.11.1 Comment Summary

Three comments touched on concerns with use of contaminated surface or groundwater for irrigation and the resultant potential to impact human health through uptake of metals by garden produce and other vegetation. An independent study of potential impacts was requested. The comments were part of larger comments expressing opposition to up-front waivers (Section 2.2.2)

- **Comments 16.1and 20.1 (2017).** "Irrigators and ranchers use water during non-baseflow conditions when limits are not being meet, allowing the Cu, Cd, and Pb to enter our food supply. Children play in the creeks as well and the sediment is allowed to accumulate along creek banks, irrigation ditches, fields and yards. The EPA's core mission is to protect human health and the environment, increasing the limits because they are not being meet is not protective."

- **Comment 19.1 (2017). "**The tributaries of concern, along with the toxic heavy metals they carry, are known to travel through a community where this exact water is regularly used for irrigation of agricultural lands and residential yards, and will seep into wells contaminating drinking water. Cutting these toxins off at the source in OU4 by

removing them from the environment would prevent the widespread contamination of local and distant communities from these heavy metals. Furthermore, Opportunity was intentionally designed to be an agricultural community from its inception. Many residents still depend on the income of their livestock or other crops for their livelihood. We would like to see the EPA, DEQ, and ARCO spearhead a study from an independent researcher to examine the effects of these mobile heavy metal toxins on livestock and food plants in this area, which can directly be impacting human health and the environment."

### 2.11.2 EPA Response

While the concentrations of copper in Mill Creek and Willow Creek are cause for concern for aquatic life, the concentrations (which are measured in parts per billion) have no discernable impact on livestock or food crops, as reported by the Montana State University Extension Water Quality Program (see http://waterquality.montana.edu/well-ed/files-images/Livestock_Suitability.pdf).

As for the need for an independent study to be conducted, results from review of scientific literature and a wildlife biomonitoring study conducted by Texas Tech University for the U.S. Fish and Wildlife Service previously concluded that there is minimal risk to terrestrial animals from arsenic and metals present in the concentrations found at the Anaconda smelter site (see https://www.fws.gov/montanafieldoffice/Environmental_Contaminants/ABR/ABR_Final_Report.pdf). Thorough washing of garden produce also minimizes the potential for metals ingestion. In 2018 EPA conducted a study of garden produce in the Anaconda area. EPA is presently summarizing the results of previous ecological assessments and conducting literature reviews to complete fact sheets to advise the public on risk to wildlife and livestock.

## 2.12 Jobs Program

### 2.12.1 Comment Summary

- **Comment 31 (2017).** "Historically, the "A" and "C" hills of Anaconda were not only contaminated from smelter operations, but were denuded of vegetation. While the "technical infeasibility" addressed in the proposed plan speaks to difficulty in getting heavy equipment to work on steep slopes, these hills were successfully revegetated using on-the-ground manpower. The same efforts need to be made in the watersheds covered in the proposed plan. The remedy designed for these watersheds needs to be fully implemented. A "jobs program" (tree planting) was instituted to accomplish revegetation of the "A" and "C" hills years ago, creating much needed jobs in addition to restoring these lands. The same conditions apply today. Without fully implementing the remedy designed for these watersheds and seeing the results of such efforts makes relaxing water quality standards premature. We oppose such action."

### 2.12.2 EPA Response

The Montana NRD program has been contracting with the Montana Conservation Corps to conduct steep slope reclamation, including tree planting, for the past several years in the Mount Haggin Wildlife Management Area. Other than to ensure protectiveness, CERCLA does not provide the agencies with the authority to dictate hiring practices to parties performing work.

# 2.13 Modification of the ROD

## 2.13.1 Comment Summary

Comments were received from two individuals that were against the modification of the ROD as described in the 2017 proposed plan.

- **Comment 12.1 (2017).** "Dear Sir, I would like to add my voice to Bill Everett and others who oppose the lowering of standards for the State of Montana's water criteria for heavy metals in the upper Willow Creek, Mill Creek and tributaries. Once again the citizen and the environment become the losers in this. I lived away from Montana for 15 years. I came back home to Anaconda thinking that the EPA had our back and was making sure things were being cleaned up and made livable and productive. Only to find that things have not been cleaned up but only covered up. All of the contaminants are still there but buried. We can't get new businesses to town because any land available for new construction is in the east valley which means any buyer of that property assumes the liability of what is underneath it. Who would want to assume such liability? Not ShopCo. New homes can't be built on that area because of the buried contamination. I am disheartened to see that the EPA has not had our back and has instead protected ARCO more than the environment they are commissioned to protect. Now our water quality is targeted to be compromised. How does this protect the environment? The standards for cleanup of Anaconda were set pretty low and now the EPA wants to further lower them so ARCO can get away with even less responsibility. Anaconda is being left with no chance of ever recovering our economy. With no ability to grow or attract bigger business', our surrounding environment is all we have left to attract dollars to help our distressed economy. Why would we ever agree to allow our environment to be further compromised so that ARCO can be let off the hook. The fact that this "clean up" has been going on for over 30 years and is little more than a band aid is a travesty in itself. We deserve and demand real solutions. Let's start with not lowering the water standards for the benefit of ARCO."

- **Comment 24.1 (2017).** "Have you even noticed how the big issues are glossed over as we quickly settle on minutia? You see it all the time. As soon as EPA found "surface water treatment to be impracticable due to cost and inordinate impact to the environment (construction of water treatment plants, conveyance channels, and large holding ponds). Treatment alternatives were considered to be technically impracticable," an AWQC waiver became a foregone conclusion. ARCO needn't have spent all that money showing how little could be accomplished because the most promising solution was ruled out a priori. With its focus on procedure and history, the remedy is hardly sketched in the 10-page https://semspub.epa.gov/work/08/1818033.pdf, although EPA found room for a photo of the remediated upper Clark Fork of all things, where someone just last week complained to me that the fishing in the Upper Clark Fork had been ruined, in his experience. I have no time to look at an 825-page ROD, nor I suppose does anyone else unpaid.

  "What I see as failures or inadequacies include:

  - The waiver replaced incentive to effectively reduce exceedances with procedure. ARCO's mission and incentive was to prove "impractability." To no one's surprise, they did.

- Vegetating barren slopes is a valid restoration goal but will have no measurable effect on TDMs in streams. Not just no effect on exceedances, no measurable effect whatever.

- Any actions damming streams are likely to be impermanent. Sooner or later, trapped contaminants will race downstream in a debris torrent. Permanent maintenance is a fiction.

- No mention of weeds and weed control or the role of natural recovery. Big omissions.

"I take issue with characterizing twice the proposed actions as "minimizing" exceedances. "Hopefully reducing but unmeasurably" would be more accurate. Maybe you need some fresh eyes to look at this? Thanks for considering my views. My comments are confined to Mill Creek, the only area I know."

### 2.13.2. EPA Response

The 2017 public comments have been largely addressed in the revised 2019 proposed plan through withdrawal of the upfront-front waiver proposal. No sediment basins are proposed in the Mill Creek drainage under this 2020 ROD Amendment. Vegetation performance standards include limitations on the percentage of noxious weeds; consequently, weed control is required. EPA acknowledges that natural recovery processes have been ongoing in the uplands for many decades. However, surface water quality standards are still exceeded in area streams, and an accelerated cleanup remedy is warranted.

## 2.14 Removals from Well-Vegetated Areas

### 2.14.1 Comment Summary

One comment was received that indicated that smelter-related metals should be removed from all areas, regardless of vegetative cover.

- **Comment 19.1 (2017).** The EPA proposed at the public meeting on July 20, 2017 that the terrain and vegetation in parts of OU4 are well vegetated and undisturbed, and therefore shouldn't be remediated, at the risk that remediation could cause even more contamination of the environment. However, the environment and terrain are already disturbed by the presence of toxic heavy metals that are contaminating our waters and our families. And even the well-vegetated areas have been established as leaching toxins into the water. Science supports the common-sense idea that we need to remove these toxins from the environment - even if it's challenging - in order to protect our families, aquatic life, and the environment.

### 2.14.2 EPA Response

The Agencies believe that the harm that would be caused to the environment though wide-scale removal actions in the uplands far outweighs the benefits from removing the metals. This is demonstrated in the TI evaluation report (Atlantic Richfield 2017).

## 2.15 Soil Removal

### 2.15.1 Comment Summary

- **Comment 27.3 (2017).** "Just as a note, the coalition recognizes that removal of all surface soil is impractical. In this case, it appears that, based on the record, additional

targeted removals could potentially be considered for removal. It is unclear whether additional targeted removals of contaminant soils has been considered."

### 2.15.2 EPA Response

Under the 2011 ARWW&S OU ROD Amendment, which waived the arsenic human health drinking water standard for certain ground water and surface water resources, point source waste and soil/waste mixtures in areas outside of waste management areas originally identified in the 1998 ROD and later characterized through remedial design, were targeted for removal. Most of this work has been completed. Under the 2017 TI evaluation report, additional source areas for removal were evaluated. The evaluation did not identify any specific loading sources to area streams. Instead, the evaluation presented and confirmed a conceptual site model of widespread low levels of metals from past smelter emission fallout. The more highly contaminated areas were also the most well vegetated.

## 2.16 Surface Water Standards

### 2.16.1 Comment Summary

One comment was submitted in 2019 regarding the use of Montana surface water quality standards as applicable or relevant and appropriate regulations (ARARs). An additional comment was submitted in 2017 regarding Atlantic Richfield's right to comment should EPA propose a different waived-to standard.

- **Comment 2.6 (2019). "**5. Surface Water ARARs & RAOs: The Proposed Plan calls for expansion and enhancement of remediation to reduce source contamination to surface water, including vegetation efforts, slope grading, and on-slope and drainage channel BMPs, among other things. Atlantic Richfield would be willing to complete these surface water remedial actions pursuant to mutually acceptable terms embodied in a CD, including the in-stream compliance framework set forth in the SWMP, and on that basis generally supports these elements of the Proposed Plan. However, Atlantic Richfield maintains that Montana DEQ-7 numeric surface water standards are not the applicable or relevant and appropriate requirements (ARARs) for the selected remedial action.

  "Under CERCLA and the NCP, EPA has authority to identify and require remedial action to the extent necessary to meet RAOs for surface water. See, e.g., 40 C.F.R. §300.430(e)(2)(i), (e)(9)(iii); Preamble to the National Oil and Hazardous Substances Pollution Contingency Plan, 53 FR 51394, 51426-27 (Dec. 21, 1988); EPA, Guidance for Conducting RI/FS Under CERCLA, §§ 4.2, 4.3.1.1 (Oct. 1988). The applicable RAO from the 1998 ROD is to "minimize source contamination to surface waters that would result in exceedances of State of Montana water quality standards" (except for the arsenic waiver granted in the 2011 ROD Amendment), which the Proposed Plan leaves unchanged. See Proposed Plan at 5. AR does not agree that State surface water quality standards are proper ARARs for surface water here because of the non-point source nature of stormwater impacts. Therefore, compliance with such standards is not a proper RAO for the surface water remedy."

- **Comment 26.4 (2017).** "3. Copper Standard: The Proposed Plan notes that the replacement standard for copper is "to be determined" under the forthcoming Surface Water Management Plan (SWMP). The appropriate replacement standard for copper should be EPA's Ambient Water Quality Criteria ("AWQC"), which is based on the biotic ligand model (BLM) and incorporates the latest scientific knowledge on metals

speciation and bioavailability. If EPA proposes a different replacement standard, then Atlantic Richfield reserves the right to comment on whether the waived-to standard identified in the SWMP is appropriate and consistent with the findings of the TI Evaluation."

### 2.16.2 EPA Response

EPA disagrees that state surface water quality standards do not apply to the ARWW&S OU because of the non-point source nature of stormwater impacts. Circular DEQ-7 does not identify such an exception. However, measurement of compliance with surface water quality standards will be conducted under the SWMP.

## 2.17 Text Changes Relevant to the 2020 ROD Amendment

### 2.17.1 Comment Summary and Embedded EPA Response

Atlantic Richfield submitted a number of editorial changes to the 2017 and 2019 proposed plans. As those plans are final and will not be reissued, only the comments relative to the text, tables, or figures for the 2020 ARWW&S ROD Amendment are shown and addressed below.

- **Comment 2.8 (2019)**.

  "1. Page 4, Exhibit 4 – Consistent with the TI Evaluation and Page 3, Paragraph 2 of the Proposed Plan, the "storm flow" regime (i.e., "wet weather" events) should be added to Exhibit 4 to define all flow regimes at the site, particularly since this is when total recoverable metals standards are routinely exceeded in the Anaconda mainstem streams and tributaries. Per the SWMP, these events represent acute conditions and should be excluded from compliance determinations for chronic standards.

  **EPA Response:** Exhibit 4 refers to the proposed plan. The suggested revisions were carried forward in the ROD amendment.

  "2. Page 5, "Why Modification is Needed," third paragraph, last sentence – This sentence states that the 2017 TI Evaluation report concluded that "it may be difficult to achieve these standards, even with additional remediation." This is an incorrect characterization. The TI Evaluation concluded that achieving standards was technically impracticable. This language should be revised in the ROD Amendment to state that the TI Evaluation concluded it would be technically impracticable to meet the standards, and therefore waivers are justified in this instance.

  **EPA Response:** EPA disagree with this assertion. While the modeling conducted under the TI evaluation indicates that compliance with state surface water quality standards is impracticable, the error bars surrounding these estimates suggest that compliance in the streams may be achievable after remedies have been implemented.

  "3. Page 6, "Why Modification Is Needed," last sentence of last paragraph – Enhancements to existing steep slope remedies can include additional treatments beyond aerial application of seed and/or fertilizer. For example, BMPs in eroded gullies are also proposed for enhancement areas, and additional treatments may be selected from the Slope Reclamation Toolbox, as outlined in the RD/RA Report. Atlantic Richfield requests that EPA include this clarification in the ROD Amendment.

  **EPA Response:** EPA concurs.

"4. Page 6, "EPA's Proposed Modification for Surface Water Remedy," box 2 of Exhibit 8 – Additional work and enhancements to existing work, as identified in the RD/RA Report, are held only to erosion standards (specifically, BLM) because these have the most bearing and control on surface water quality. Although vegetation is a contributing factor to meeting erosion standards, there are no stand-alone vegetation standards (such as LRES Scoring) that apply to slope reclamation work outlined in the RD/RA Report. See also Detailed Comment No. 9, below.

**EPA Response:** EPA concurs.

"5. Page 6, "Expand Remedy," first sentence of first paragraph; see also page 8, Exhibit 10 – The agency-approved TI Evaluation states that a "reasonable maximum level of practicable additional response actions" would be performed, not the "maximum extent practicable." See TI Evaluation, § 9.1. An element of reasonableness should be built into this standard. Atlantic Richfield requests that EPA include language in the ROD Amendment that is consistent with the TI Evaluation, replacing the phrase "maximum extent practicable" with "reasonable maximum level of practicable additional response actions."

**EPA Response:** This is addressed in the ROD Amendment.

"Page 6, "Expand Remedy," second sentence of first paragraph – The actual area of the existing remedy proposed for enhancement and the expanded area, as outlined in he RD/RA Report, are significantly smaller than the quantities listed here (23,852 and 12,417 acres, respectively), as also reflected in the Supplemental Surface Water Remediation Workplans Fact Sheet. EPA should clarify that only portions of the identified acreages will be remediated under the expanded remedy.

**EPA Response:** This is addressed in the ROD Amendment.

"7. Page 6, "Expand Remedy," second paragraph – The definition of "steep slopes" is not clear. Atlantic Richfield requests that EPA include language that clarifies this definition. In addition, "horizontal rise" should be replaced with "horizontal run."

**EPA Response:** This is addressed in the ROD Amendment.

"8. Page 7, "Expand Remedy," fourth bullet – The term "Slope grading" may be misleading as there is no major grading in the scope of work. Grading is limited to minor regrading to address rills and gullies, with no major recontouring. Atlantic Richfield requests that EPA qualify this language in the ROD Amendment consistent with this comment.

**EPA Response:** Atlantic Richfield has misinterpreted the term "slope grading." A discussion of steep slope reclamation categories has been included in this ROD amendment.

"9. Page 7, "Achieve Vegetation and Erosion Standards," first sentence – Consistent with the Vegetation Monitoring Plan and RD/RA Report, this section should explain the process for compliance with BLM standards. Although the goal of the Remedies in expanded areas includes increasing vegetation, especially on steep rocky slopes, success is not measured by the type or density of the vegetation established here. Success ultimately is measured by whether the remedy achieves erosion objectives.

Accordingly, the ROD Amendment should clarify that Remedies for slope work will be evaluated based on BLM erosion criteria only. Per the SWMP, if the BLM erosion criteria are not met after three attempts of remedial action, no additional remedial action will be required, and the remedy will be considered complete. The Proposed Plan and ROD Amendment should not suggest that specific "vegetation standards" will be applied.

**EPA Response:** The ROD amendment includes a discussion of the performance standards including the three attempts limitation.

"10. Page 7, "Determine Remedial Action Compliance" – This section addresses surface water compliance and would be more appropriately titled "Determine Compliance with Surface Water Standards." Atlantic Richfield requests that EPA make this change in the ROD Amendment.

**EPA Response:** The ROD amendment discusses vegetation, erosion, and surface water performance standards.

"11. Page 7, "Determine Remedial Action Compliance," first sentence of first paragraph –Per the SWMP Compliance Flowchart, the determination of whether remedial action is complete is made at the end of the Remedy Construction Monitoring Period. This determination does not necessarily occur after 6 years. Atlantic Richfield requests that EPA make this clarification in the ROD Amendment. More generally, Atlantic Richfield also requests that the ROD Amendment include a more detailed description of the SWMP and the agreed upon compliance framework.

**EPA Response:** Section 4 of the ROD amendment includes a detailed description of the SWMP.

"12. Page 7, "Determine Remedial Action Compliance," second sentence of first paragraph – The SWMP will determine "compliance with surface water standards" for each creek and watershed, not "remedy compliance." Atlantic Richfield requests that EPA make this change in the ROD Amendment.

**EPA Response:** The ROD amendment provides this clarification.

"13. Page 7, "Determine Remedial Action Compliance," sentence 3 of paragraph 1 – California Creek should be added to the list of creeks as the Proposed Plan is not limited to Atlantic Richfield's obligations. California Creek was included in the TI Evaluation, and the State's remedial obligations are summarized in the Supplemental Surface Water Remediation Workplans Fact Sheet. Atlantic Richfield requests that EPA include California Creek in the ROD Amendment.

**EPA Response:** California Creek is included in the ROD amendment.

"14. Page 7, "Determine Remedial Action Compliance," first paragraph – Per the SWMP and consistent with Atlantic Richfield's General Comments above, if the State standards are not met after the compliance monitoring period, the State standards will be automatically waived at that time to 2019 Federal AWQC (biotic ligand model criteria for copper), as documented in and approved through a SMP annual report. Post-construction waivers will not require any subsequent TI evaluation, ROD

amendment, or other formal decision-making process. As requested above, AR requests that EPA make this clear in the ROD Amendment.

**EPA Response:** The ROD amendment clarifies the process to future waivers. Note that any future waivers will not be considered "automatic" – the ROD Amendment provides a process to adopt and document potential waivers of State standards. This process will not require that EPA issue another decision document.

"15. Page 9, "Compliance with ARARs," second sentence of first paragraph – The Proposed Plan states that "the modified remedy, through the surface water management plan, includes a process to evaluate technical impracticability waivers …" (emphasis added). This is not correct. TI waivers will not be "evaluated" at that point. Rather, State surface water standards will be automatically waived to current (i.e. 2019) Federal AWQC without any subsequent TI evaluation, based on documentation provided in the SMP annual report.

**EPA Response:** Refer to the previous comment response.

"16. Page 9, "Compliance with ARARs," last sentence of second paragraph – Upon issuance of the 2019 ROD Amendment, concurrence from U.S. Fish and Wildlife Service would not be required for granting post-construction TI waivers. Atlantic Richfield requests that EPA change "… and will continue to consult when considering the waiver of standards…" to "…and will continue to consult with US Fish & Wildlife Service as needed to inform the Service of any post-construction TI waivers…" in the ROD Amendment.

**EPA Response:** The ROD amendment includes Atlantic Richfield's requested language concerning continued consultation with the U.S. Fish & Wildlife Service.

"17. Page 10, "Short-Term Effectiveness," final sentence – While construction completion may be anticipated by 2025, the actual amount of time required for completion is and uncertain and could be affected by a variety of factors and unanticipated contingencies. It is also unclear if "cleanup," as used in this sentence of the Proposed Plan, is limited to remedial action construction or is meant to include compliance with performance standards. Atlantic Richfield requests that EPA omit this language from the ROD Amendment.

"18. Page 10, "Cost" – A cost of $20 Million is not reflective of proposed remedy modifications or the currently approved remedy plus proposed modifications. Atlantic Richfield requests that EPA reevaluate remedy costs in the ROD Amendment.

**EPA Response:** The estimate of $20 million is based on the $17,167,000 estimate provided by Atlantic Richfield in the TI Evaluation Report (Atlantic Richfield 2017). The short-term effectiveness language has been modified to indicate a construction completion goal of 2025.

"19. Page 10, "Modifying Criteria," "State Acceptance" – This section fails to acknowledge that the TI Evaluation has been approved by EPA in consultation with the State. The State has been closely involved with the surface water compliance process for the ARWW&S OU, including support and development of the SWMP, which sets forth a direct pathway for waiver to federal standards through the 2019 Proposed

Plan and ROD Amendment. The ROD Amendment should identify the State's prior involvement in the TI Evaluation and waiver process.

**EPA Response:** State acceptance is included in the ROD amendment. State acceptance of the waivers outlined in this ROD Amendment is predicated on AR constructing and completing the technically practicable remedy elements outlined in the ROD Amendment.

"20. Page 10, "Non-Significant or Minor Modifications," bullet #2 – The heading should be changed to "Opportunity Ponds Waste Management Area," to be consistent with past regulatory documents and the 1998/2011 ROD. The reference to "BP" should be removed, since BP does not own the property."

**EPA Response:** BP is the parent company of Atlantic Richfield, which owns the property.

- **Comment 26.5 (2017).** "Specific Comments on ARWW&S Proposed Plan text

  "3. Page 4, Site Characterization, bullet list – Given current standards are hardness dependent, Atlantic Richfield requests that the text include discussion of the impact of changes in hardness on the expected frequency of exceedances during wet weather. During storm events and sustained high flows that occur during spring snowmelt events, water hardness decreases. This change in water hardness results in lower calculated numeric values for the hardness-dependent standards (i.e. cadmium, copper, lead, and zinc). The reality that exceedances could occur as hardness decreases without metals concentrations increasing should be recognized and explained. (See language in TI Executive Summary, Conceptual Site Model).

  **EPA Response:** The requested discussion has been included in the ROD Amendment.

  "4. Page 4, "What's the Difference between Total Recoverable and Total Dissolved Metals Box – Please revise the text to include the phrase "in the particulates of the water" after "metals present "in the first sentence. This will clarify that total recoverable metals concentrations are based on analysis of an unfiltered water sample following a "total recoverable" digestion process and therefore include both the dissolved fraction and the metals in the particulate (i.e., sediment) suspended in the water.

  **EPA Response:** The requested text additions were included in the 2019 Proposed Plan and the 2020 ROD Amendment.

  "5. Page 4, "What's the Difference between Total Recoverable and Total Dissolved Metals" Box, third sentence – text should be clarified to identify that the total recoverable digestion process results in an analysis of metals that are not available to aquatic life. This revision to the Proposed Plan and ROD Amendment text is required because total recoverable standards are not more protective. The application of total recoverable methods for laboratory analysis generates laboratory results that simply are more stringent (i.e., a higher concentration) than measurement of the dissolved fraction of metal(s) in the water column without providing measurable benefit in terms of protecting aquatic life in surface waters.

**EPA and DEQ Response:** The requested text modification was addressed in the 2019 Proposed Plan and the 2020 ROD Amendment. DEQ disagrees with the statement that "total recoverable standards are not more protective."

"6. Page 7, Preferred Alternative, bullet #4 – consistent with General Comment #2, Atlantic Richfield requests that EPA revise the text supporting the Preferred Alternative to acknowledge the response work to be completed will benefit drainages beyond those within the geographic area where EPA proposes to waive DEQ-7 standards. If the present waiver described in the ROD Amendment is not co-extensive with the geographic scope of the additional response work proposed in the planned ROD Amendment, then the ROD Amendment text must acknowledge that replacement standards, the same as those presently approved, will be adopted for those other surface waters if standards are not met post-construction. Also the Preferred Alternative description, as carried forward in the ROD Amendment, should recognize the limitations on the scope of the additional response work that are described in the Supplemental Surface Water Controls Remedial Design/Remedial Action Report and the Supplemental Surface Water Controls Slope/BMPs Tech Memo. Specifically, the text must clarify that additional response work is not required where compliance with DEQ-7 standards is demonstrated through monitoring conducted during the implementation period.

**EPA and DEQ Response:** EPA and DEQ have not concurred in any waivers beyond those outlined in the proposed plan and ROD Amendment. Any further waivers, in terms of the geographic scope of the waivers or further waiver of the federal waived to standards must be included in a petition for further waivers. EPA and DEQ will evaluate such request at that time.

# 2.18 TI Report

## 2.18.1 Comment Summary

One commenter provided extensive comments on the *Anaconda Smelter NPL Site, Anaconda Regional Water, Waste & Soils Operable Unit, Final Surface Water Technical Impracticability (TI) Evaluation Report* (Atlantic Richfield 2017) that was released to the public shortly before the 2017 proposed plan. The comment is excerpted here to include only the major technical points that may be relevant to the 2020 ARWW&S ROD amendment.

- **Comment 22 (2017)**. "The report may be acceptable for industry or a fully technical audience, but if the intent is really to facilitate public review and elicit public comments, additional effort must be made. The report should be modified and resubmitted to the public for comment, in tandem with additional public meetings. As it stands now, this report seems designed to be an incomprehensible tome, made to stymie public understanding and comment."

  "The hydrology model assumes that no beaver ponds are present and that differential timing of runoff does not occur (PDF page 761 of 914). The report does not discuss that this produces a biased result against the idea of filtration basins. Both assumptions will produce a greater and sooner peak flow, which will make a basin look more inefficient than in reality.

  "The report uses the Universal Soil Loss Equation (USLE). It does not use the more recent Revised Universal Soil Loss Equation (RUSLE) or the Water Erosion Prediction

Project (WEPP) model. From WEPP"s Wikipedia page: The model was developed by an interagency team of scientists to replace the Universal Soil Loss Equation (USLE) and has been widely used in the United States and the world. The WEPP model has been improved continuously since its public delivery in 1995, and is applicable for a variety of areas (e.g., cropland, rangeland, forestry, fisheries, and surface coal mining). WEPP is a very capable model that seems ideally suited to the area in question. The report should justify the use of USLE, and discuss why it was chosen over WEPP. WEPP should at least be used as a check, with a more detailed assessment of beaver ponds and differential runoff to see if WEPP provides similar results.

"PDF page 838 and 839 of 914 discuss that the filtration basin is assumed to have only a 24 hour holding time, and that based on an external reference for sediment removal, that 24 hours only provide 18% efficiency for silt/clay. It is therefore clear that this assumption, buried in the 914 page report, will provide results that appear inefficient or make a filtration basin remedy appear technically infeasible. The report does not show technical infeasibility. It shows relatively low efficiency from filtration basins based on a biased 24 hour standard, and using a biased assumption of no beaver ponds or differential runoff. The cost of a filtration basin remedy (at that low efficiency) is not exorbitant, and designs and cost estimates should be made that will provide greater efficiency and protection following a forest fire."

## 2.18.2 EPA Response

The final and approved TI evaluation report (Atlantic Richfield 2017) was provided for members of the general public to learn more about the scientific and engineering evaluation that was conducted to give the background for the proposed plan. EPA agrees that it is a complex technical document, and therefore created a fact sheet summarizing the findings of the TI report, which was made available on the EPA website with the release of the 2019 proposed plan.

The mountainous topography of the Anaconda uplands precludes construction of sediment ponds with capacities greater than the 24-hour storm event. Beaver ponds were excluded from the watershed runoff model as they are not engineered structures and are constantly evolving.

The commenter correctly identified the availability of public domain erosion estimation software products Revised Universal Soil Loss Equation and the Water Erosion Prediction Project model. These products are ever evolving and improving yet were not selected for use in the TI analysis as noted. The central reason for use of Universal Soil Loss Equation was to simplify the already complicated soil metal transport analysis by providing order of magnitude erosion predictions for TI evaluation areas as a basis for developing ballpark erosion rates and contrasting between pre-treatment/post-treatment erosion conditions resulting from remediation. Validation of the Universal Soil Loss Equation estimated erosion rates was made using literature references. Complicating the accurate prediction of erosion is the unique site-specific characteristic of the TI areas where: 1) erosion is accentuated compared to an agricultural or rangeland setting due to soil phytotoxicity and 2) extensive areas of highly erosive ephemeral gullies that are not well modeled by software. Furthermore, the erosion of contaminants may occur at a different rate than erosion of the bulk soil. Most of the TI areas were affected by smelter fallout of very small particles typically in the ~10 micron size fraction. The cumulative uncertainty of the erosion rates is unquantified, but

efforts were made to perform sensitivity analyses using a range of erosion rates estimated by Universal Soil Loss Equation to develop a best estimate in support of related TI analyses.

# 2.19 TI Waiver

## 2.19.1 Supports Up-Front Waiver

### 2.19.1.1 Comment Summary

- **Comment 2.2 (2019).** "Unfortunately, the Proposed Plan equivocates regarding the TI waiver process, stating that "waiver[s] and any necessary evaluations will be documented in a subsequent modification of this Record of Decision." Consistent with the *2017 Surface Water Technical Impracticability Evaluation Report* (TI Evaluation) and the ARWW&S SWMP, the ROD Amendment should clearly state that post-construction waivers will not require any subsequent TI evaluation, ROD amendment, or other formal decision-making process. o this point, EPA's presentation materials for the September 17, 2019 public meeting (Slide 22) stated: "If Montana acute and chronic aquatic life standards are still not consistently met after cleanup and monitoring, a TI waiver of state standards will be granted for identified contaminants and stream reaches, and replaced with aquatic life criteria" (emphasis added). EPA's materials did not suggest that further evaluation, decision-making, or administrative documentation would be required. Similar language should be included in the ROD Amendment.

  "2. Up-Front TI Waivers: Atlantic Richfield's support in these comments for future TI waivers depends on there being a clear and non-discretionary process articulated in the ROD Amendment for granting metals-specific and stream-specific waivers if post-construction monitoring shows that State standards are not being met. Atlantic Richfield continues to believe, however, that sufficient justification exists already, as documented in the TI Evaluation, to support up-front waivers for all ARWW&S surface waters that do not presently meet the DEQ-7 standards for cadmium, copper, lead and zinc. See TI Evaluation Figures 9-4 through 9-8 (identifying the streams where waivers of the standards are supported).

- **Comment 26.1 (2017).** "With this letter I am providing Atlantic Richfield Company's (Atlantic Richfield) comments on the Proposed Plan for Amendment of the Anaconda Regional Water, Waste and Soils (ARWW&S) Record of Decision (ROD Amendment) released by EPA in June 2017. Atlantic Richfield supports the EPA's proposed waiver of state acute and chronic aquatic life standards to federal Ambient Water Quality Criteria (AWQC) for upper Willow Creek and its tributaries and the tributaries of upper Mill Creek. The proposed waiver of state standards is fully supported by the approved Technical Impracticability Report (TI Evaluation) and monitoring of remedy actions that have already been implemented to date by Atlantic Richfield. In fact, those same analyses and lines of evidence support the waiver of state aquatic life standards for arsenic, cadmium, copper, lead and zinc over a broader geographic area where exceedances of state standards are recorded, and are expected to continue to occur after implementation of all practicable response work. Because the administrative record fully supports the waiver of state aquatic life standards to federal AWQC for surface waters within this broader geographic area, Atlantic Richfield requests that EPA revise the Preferred Alternative in in the ROD Amendment to expand the geographic area in which state aquatic life water quality standards are waived. This will make the ROD Amendment consistent with the TI Evaluation. If the proposed expanded waiver of additional elements over the broader geographic area is not implemented at this time,

then the Record of Decision Amendment should contain a clear process defining how and when these additional TI waivers will be adopted in the future, after all practicable response work has been implemented. The EPA should make a clear decision based on the available science in the TI evaluation now to allow the site to progress toward completion. The General Comments listed below describe the geographic scope of the waiver that is supported by site-specific studies in the record. We have also provided comments on specific sections of Proposed Plan text in the Specific Comments (below).

"1. Acute Water Standards: The available data and TI Evaluation both support waiver of acute state water quality standards (measured as total recoverable metals) for all ARWW&S surface waters that do not presently meet the DEQ-7 acute standards for arsenic, cadmium, copper, lead and/or zinc. Please refer to TI Figures 9-4 through 9-8 for the stream reaches where waiver of the acute standard is supported. At the July 20, 2017 public meeting, EPA commented that "modelling uncertainty" supported deferring a decision to waive state standards for these same metals outside of upper Willow Creek, its tributaries, and the tributaries of upper Mill Creek. EPA further commented that waiver of DEQ-7 standards for other surface waters would be considered after all remedy work is complete. It is unreasonable to defer the waiver decision based on concerns with the adequacy of EPA's modeling analysis. The TI Evaluation and monitoring of best management practices (BMP) technologies in place today has shown that compliance with the state's total recoverable standards is technically impracticable from an engineering perspective because compliance cannot be achieved through application of effective BMPs during wet weather events. The waiver of acute standards could also be accomplished by changing the manner in which storm water is monitored to be consistent with how storm water is typically regulated in the country and within Montana. Typically acute standards are applied to point sources rather than non-point sources at the base of watersheds. EPA could acknowledge that there is no legal requirement to apply acute aquatic life standards to non-point sources, and no practical way to achieve acute standards in a watershed where point sources are controlled, and the remaining impacts are from non-point sources.

"2. Chronic Water Standards: The TI Evaluation also supports a waiver of the DEQ-7 chronic standards (for arsenic, cadmium, copper, lead and zinc) for all ARWW&S surface waters that exceed state chronic standards after the completion of the planned additional actions described in the TI Evaluation (hereinafter "additional actions"). If General Comment #1 is not accepted, the TI Evaluation also supports a waiver of acute standards at that time. The TI Waiver of chronic standards for other surface waters should be anticipated and described in the ROD Amendment, including: (a) the approved replacement standards for such surface waters; and (b) the administrative steps EPA would complete to adopt those replacement standards if monitoring shows that total recoverable standards are exceeded after the "additional actions" are complete. The ROD Amendment issued by EPA should describe this process and acknowledge that replacement standards will be confirmed for areas where surface water quality exceeds DEQ-7 standards after "additional actions" are complete. Atlantic Richfield and Agency representatives have discussed an efficient process to review post-construction monitoring data and confirm replacement standards. Following Agency approval of the construction completion report(s) for the "additional actions", annual monitoring reports would

be prepared and submitted that: a) present the surface water monitoring test results for the year; and b) identify those surface waters that exceed DEQ-7 standards. Such reports would provide the technical basis for confirmation of replacement standards (i.e., AWQC) that are approved in the ROD Amendment for other, specific surface waters. There is no need for EPA to prepare more TI Evaluations and/or further ROD Amendments to implement the above process. The "additional actions" described in the TI Evaluation and detailed in future remedial design documents define the scope of technically practicable BMPs. The ROD Amendment should acknowledge this, and include a well-defined process for confirming the adoption of replacement standards in areas where they are supported by post-construction monitoring. This would benefit all parties by reducing resource demands and costs, and it should be described in the ROD Amendment, and should not require additional ROD modifications.

- **Comment 32.2 (2017).** "A TI evaluation and the subsequent decision to waive water quality standards is a complex, highly technical process that is often a necessary component of Superfund. The process requires finding pragmatic balance between protecting the environment, legally defined by meeting water quality standards, and determining the limits of what is truly achievable in an environmental cleanup. There are real limits to what can be achieved and in many cases proposed remedy measures can be counterproductive, causing "unnecessary and potential irreparable harm to the environment for relatively low benefit." Foremost among counterproductive potential remedy elements in this TI are the proposed retention/detention basins that would replace highly functional riparian reaches where numerous beaver ponds are already reducing metal concentrations. In the Proposed Plan, EPA and DEQ are proposing a cautious, step-wise approach toward waiving aquatic life standards. Cautious, because the proposed waivers are applied to a limited portion of the affected streams – only tributaries of upper Mill Creek and only upper Willow Creek. The waivers would not apply to mainstem Mill Creek, lower Willow Creek, California Creek, Warm Springs Creek or Lost Creek.

  "Step-wise because additional waivers are contingent on additional work – an "expanded and enhanced" remedy largely based on additional steep slope reclamation (SSR), storm water best management practices (BMPs) and constructing engineered retention/detention basins.

  "Although the Proposed Plan limits waivers at this time to Mill Creek tributaries and to upper Willow Creek, the TI Evaluation defined potential additional work elements in the remaining drainages and the Preferred Alternative holds out the requirement and promise that in the future, based on monitoring results "additional work and additional waivers will be considered."

  "The Proposed Plan and TI are a working framework for a rational path forward. However, detailed Remedial Design/Remedial Action (RDRA) work plans are not part of the Proposed Plan – those will be finalized in confidential consent decree negotiations. My overriding concern – the success of SSR is speculative; the techniques and SSR program are poorly defined. The Proposed Plan defines a contingent remedy founded on a wait and see what works strategy. The TI clearly defined the need to replace Montana's DEQ-7 standard for aquatic life, which is based on the total recoverable fraction, with the less protective Federal standard, which is based on the "dissolved"

fraction. But the success of the Preferred Alternative rests on the Agencies and the Settling Defendants negotiating a balance between protecting the environment and defining what is technically practicable.

"My comments and discussion focus on three major concerns with the Proposed Plan:

1. Beaver pond complexes versus engineered storm water ponds.

2. Steep slope reclamation.

3. Waiving standards – the need for biomonitoring."

#### 2.19.1.2 EPA Response

The Commenter's preference and argument for the upfront waivers is noted.

Regarding Comment 26.1, the uncertainties in the modeling suggest that State of Montana total recoverable standards could be met in Mill Creek after additional actions are implemented. There is no compelling reason to grant waivers at this time. Acute standards apply to all State waters. Water quality monitoring will be determined under the surface water management plan. Additionally, the Agencies have no plans for future TI evaluations to further address surface water. The 2020 ARWW&S ROD Amendment will outline the general approach to certifying that the work that is technically practicable to complete has been completed, and, based on the monitoring data, will determine where waivers are necessary. The detailed approach will be provided in the surface water management plan. As changing surface water quality performance standards. EPA, in consultation with DEQ, will determine the necessity of a ROD modification if the monitoring data collected and analyzed under the surface water management plan indicates that waiver should be granted at that time.

Comment 32.2 is noted.

### 2.19.2 Against Up-Front Waiver

#### 2.19.2.1 Comment Summary

Most comments received in 2017 opposed waiver of the state standards. Many commenters stated that it was premature to grant such waivers based on the results of modelling alone before the required remedial work had been completed. Several pointed out that Montana had adopted the more stringent total recoverable standard because EPA had not adopted cleanup criteria for sediment in streams. Two comments opposing a potential future waiver of state standards were received in 2019.

- **Comment 4.1 (2019).** "My complaint is to drop the state -- to drop the state standards to go to the federal, to me, is a big mistake. The federal standards, to me, are not adequate. We've got a thing around here, even in our pollution standards, that one -- 250 parts per million. Right? There's no place else, I think, in the country that has that. That's ridiculous. One time I asked Mr. Brockman from the EPA, "Why 250 parts per million?" And this was my answer in my kitchen, with the city manager standing there, he said, "I pulled that out of my butt." The EPA backs ARCO, not us. Sorry, Charlie, that's how it is."

- **Comment 5.1 (2019)**. "My question will be: If we're going to accept federal standards instead of state standards, what happens if the federal standards change, which could

happen under different administrations. Would that mean that we would have to change to the new federal standards, which could be even lower?"

- **Comment 8.1 (2017)**. "As a former Anaconda native, I and many people of opportunity, Anaconda and the state oppose this proposal to waive water standards. The EPA already gave Arco the gift it didn't deserve by granting them grossly higher cleanup standards for soil of 250ppm when it should have been 20 as in other cleanup sites across the nation. Water interception walls, or a treatment plant is called for here. Not the lessening of our states water quality standards."

- **Comment 9.1 (2017).** "I would like current state restrictions on mineral levels in the creeks near Anaconda to be kept AS IS. Federal standards are not strict enough."

- **Comment 10.1 (2017)**. "I am personally and professionally against the EPA's recommendation to waive the water quality standards. I live in Anaconda-Deer Lodge County and we favor outdoor recreation such as hunting and fishing and we value our water resources. We are tied to one of the largest Superfund Sites and the negative effects of contamination hits our community on a daily basis. Our community needs help in establishing remedies to restore and improve our water resources ... not waiving water quality standards. I respectfully ask that you take all comments from the citizens of Anaconda-Deer Lodge County into consideration. Thank you."

- **Comment 11.1 (2017)**. "Received phone message, on August 31, 2017, from Terry Galle indicating that he was not in favor of the proposed waiver of state standards."

- **Comment 13.1 (2017)**. "I do NOT want any reduction in the Montana state criteria for cadmium, copper, lead & zinc in Upper Willow Creek, Warm Springs Creek, Lost Creek, Mill Creek & their tributaries. Me & mine have hunted, fished, picnicked & played in that area for 100 years. Any relaxation of standards affects not only local recreation & commerce but the entire Columbia River drainage."

- **Comment 14.1 (2017).** "Dear Mr. Coleman: I am against the EPA's recommendation to waive the water quality standards. I live in Anaconda-Deer Lodge County and we favor outdoor recreation such as hunting and fishing and we value our water resources. We are tied to one of the largest Superfund Sites and the negative effects of contamination hits our community on a daily basis. Our community needs help in establishing remedies to restore and improve our water resources ... not waiving water quality standards. I respectfully ask that you take all comments from the citizens of Anaconda-Deer Lodge County into consideration."

- **Comment 15.1 (2017).** "I do not support the EPA or the State of Montana providing ARCO with an alternate water quality standard. I urge the EPA and DEQ to not provide a waiver of water quality standards."

- **Comment 16**.1 **(2017).** "I ... a resident of Opportunity Montana, strongly oppose waiving DEQ-7 surface water quality standards for upper Mill Creek and upper Willow Creek. Montana created the standard for Montana based on our unique geology and they should be used in the state. The change in standards to federal guidelines, would ignore the large amount of sediment that will be deposited downstream. Irrigators and ranchers use water during non-baseflow conditions when limits are not being meet, allowing the Cu, Cd, and Pb to enter our food supply. Children play in the creeks as well

and the sediment is allowed to accumulate along creek banks, irrigation ditches, fields and yards. The EPA's core mission is to protect human health and the environment, increasing the limits because they are not being meet is not protective. As technology improves the ability to clean the soils will as well and work should continue to meet the Montana surface water quality standards."

- **Comment 17.1 (2017)**. "I do not support the waiving of the State of Montana acute and aquatic life surface water criteria for cadmium, copper, lead and zinc for upper Willow Creek and its tributaries and the tributaries of upper Mill Creek. I believe it is premature to waive these standards at this time. It would seem that waiving these standards would eliminate any meaningful future clean-up. I recognize the problems that exist in a mountainous terrain and the difficulty of eliminating the contamination is this area. However, we will never be rid of the airborne emissions if we do not step back and reconsider the situation. I do not believe the Federal water quality standards will protect the population of Anaconda-Deer Lodge County. I look forward to continued efforts and information regarding this issue."

- **Comment 18.1 (2017)**. "Dear Mr. Coleman, These comments refer to the Proposed ROD Amendment for the Anaconda Regional Water, Wastes and Soils; more particularly waiver of the State of Montana Acute and Chronic Water Quality Standards for Copper, Cadmium, Lead and Zinc (and other contaminants as they apply, such as arsenic) in favor of Federal Water Quality Standards. Federal Water Quality Standards are developed with a nationwide perspective and under the knowledge that state standards will be developed that are more specific to local conditions, weather, soils, ground and surface water protection, plant and animal protection, use of open land and resources by the public, maintenance of historic background water quality and both rural or urban development. After much consideration State Standards, such as Montana's, are adopted. The effort to establish these standards has been greater and more wide spread (especially with diverse public input) than what has been presented here to set them aside. These standards should not be easily or cavalierly set aside due to cost or difficulty in meeting the standards. To do so suggests to the public that the state standards established are not important and even more serious, that the reduction in required standards means the public is safe to use fish and animals for personal consumption and to freely recreate in these waters and watersheds without fear of health impacts. In the PowerPoint presentation it is indicated that the listed heavy metals are mobilized by storm flows in the affected basins and streams. EPA should not stop encouraging the development and deployment of BMPs to improve the capture of these metals under storm and a full range of conditions. Storm water flow treatment is in its infancy of development. The state standards should remain in place as a continued encouragement to do more and continually seek better and more protective metal capture/removal options and best management practices (BMPs). Technical impracticability (TI) is presented in the PowerPoint. What is technically impracticable for a county or local government is much different than for a premier energy company with a large and high quality staff of engineers and scientists who are, over a broad geographic area, solving similar challenges. The experience gained by the company across the globe should continue to be applied for the benefit of the Anaconda Regional Water, Wastes and Soils Operating Unit. Please do not lower the bar for water quality improvement in the suggested watershed areas of Anaconda/Deer Lodge County. After all, we are talking about impacts for hundreds and hundreds of years in the future.

These impacts just don't go away on their own, they have to be continually and actively worked and will benefit from technology yet to be developed."

- **Comment 19.1 (2017)**. "On behalf of Moms Clean Air Force, a network of more than one million moms united against air pollution, we are writing to express our concern and opposition to the alternate proposed plan offered for the surface water remedy at the Anaconda Co. Smelter Superfund Site, Anaconda Regional Water, Waste and Soils Operable Unit (OU4). The Environmental Protection Agency (EPA) has a core mission to protect human health and the environment. Weakening the water quality by waiving Montana standards in favor of federal standards does not make these toxic waters safer for people and the environment. The EPA proposed at the public meeting on July 20, 2017 that the terrain and vegetation in parts of OU4 are well vegetated and undisturbed, and therefore shouldn't be remediated, at the risk that remediation could cause even more contamination of the environment. However, the environment and terrain are already disturbed by the presence of toxic heavy metals that are contaminating our waters and our families. And even the well-vegetated areas have been established as leaching toxins into the water. Science supports the common sense idea that we need to remove these toxins from the environment - even if it's challenging - in order to protect our families, aquatic life, and the environment.

  "The smelter is no longer active, but the waters that connect Western Montana still are, flowing downstream connecting OU4 via Mill Creek and Willow Creek - through many communities - to the rest of Western Montana. Heavy metals have been known to travel to as near as Opportunity to far as downstream as Milltown spreading contaminated and undrinkable drinking water for communities across the Clark Fork River. The tributaries of concern, along with the toxic heavy metals they carry, are known to travel through a community where this exact water is regularly used for irrigation of agricultural lands and residential yards, and will seep into wells contaminating drinking water. Cutting these toxins off at the source in OU4 by removing them from the environment would prevent the widespread contamination of local and distant communities from these heavy metals. Furthermore, Opportunity was intentionally designed to be an agricultural community from its inception. Many residents still depend on the income of their livestock or other crops for their livelihood. We would like to see the EPA, DEQ, and ARCO spearhead a study from an independent researcher to examine the effects of these mobile heavy metal toxins on livestock and food plants in this area, which can directly be impacting human health and the environment."

- **Comment 20.1 (2017)**. "I ... a resident of Opportunity Montana, strongly oppose waiving DEQ-7 surface water quality standards for upper Mill Creek and upper Willow Creek. Montana created the standard for Montana based on our unique geology and they should be used in the state. The change in standards to federal guidelines, would ignore the large amount of sediment that will be deposited downstream. Irrigators and ranchers use water during non-base-flow conditions when limits are not being meet, allowing the Cu, Cd, and Pb to enter our food supply. Children play in the creeks as well and the sediment is allowed to accumulate along creek banks, irrigation ditches, fields and yards. The EPA's core mission is to protect human health and the environment, increasing the limits because they are not being meet is not protective. As technology improves the ability to clean the soils will as well and work should continue to meet the Montana surface water quality standards."

- **Comment 22.1 (2017)**. "I ... disagree with the EPA proposal to waive State of Montana water standards and aquatic sampling methodology in leu of the less stringent federal water quality criteria (filtered sampling methodology). I attended the public meeting on Thursday July 20th at the Metcalf Senior Center in Anaconda. I came eager to learn about the topic and appreciate the time spent by the presenters. As a mother of two young boys I often look at the world with concern. I often wonder how we can make this world better for my boys, their wonderful friends, and all the children who will grow up with the weight of trying to care for our earth after we have damaged it so extensively on their shoulders. Keeping our world healthy and safe should be a priority to our community and government. Unfortunately, in today's busy world, health and safety are too often placed on the back burner with the idea that we as individuals, communities, government agencies or businesses will get to it later. Later often comes when there is an accident, health disparity, or tragedy.

  "My disagreement to waive the current State of Montana water standard stems not only from my concern for the health and safety of my community and family but for all communities and families downstream of these contaminated waters. The public meeting left me with more questions than answers. While I am not a hydrologist, geologist, or any other "ologist" I do have a Bachelor of Science and have attended many seminars, meetings, conferences and research presentation in my field. Maybe I am naïve but I expected the public meeting to include at least a small amount of information and comparison data between the two sampling methods. What I heard at the meeting was a presentation, that seemed like a sales pitch, addressing why we could not meet the current State of Montana water standards despite the fact that it hasn't been tried. I was left wondering, "Why not try?"

  "The people of Montana deserve the highest standards of water quality. I urge you to continue with current State of Montana Water Standards. Instead of looking at technical impracticality evaluations that state why cleanup is not practical from an engineering standpoint I urge you to continue to strive to meet State of Montana water quality standards. Imagine finishing this project in the distant future and looking back with pride, despite the difficult task at hand, and being able to say "I did it"."

- **Comment 23.1 (2017).** "Thank you for your prompt response and for forwarding the OU information that you sent (my originals on file). I am responding once again within the response date period to express my opinion on changing current Montana standards for five listed HEAVY METALS to a lower National standard that I believe does not apply in our Great State of MT, but especially out in my subdivision on the Mill Creek drainage. I staunchly will oppose these changes at several levels, and will arrange Council, if necessary. Because of biopractices such as ground filter and more importantly BIOMAGNIFICATION higher levels of specific metals will affect larger mammals who depend on that drainage for H2O, including Man. There is already a significant health risk because of the smelter and no one is more prepared, , qualified, and capable to put up significant resistance than I. I believe a quieter professional agreement can be reached, however and look forward to meeting with you to discuss options."

- **Comment 24.7 (2017)**. "SUMMING UP. When I read that, "EPA and DEQ directed Atlantic Richfield to complete a technical impracticability evaluation to determine if those standards could be achieved with additional work," I do not expect the next

sentence to begin, "But no: ARCO said that if a few hundred Spaniards in two year could conquer one of the great civilizations of the world, whose monumental architecture was accomplished without even the wheel or beasts of burden, then we can do much more than the faint-hearted think." More like: It's even worse than you thought. Give us a pass and we'll all pretend to do something, but not too expensively please. Incentive to do much is gone with the waiver. Stream work is impermanent. Barren slopes are neither the problem nor the solution. Two hundred conquistadors could surely overcome water treatment challenges – and they loved challenges. I have never seen such magnificent natural recovery as in the Mill Creek drainage. I first saw this area about 1970 driving to the Big Hole Valley. My mouth fell open. "What happened here?" I gasped. "The smelter," my Anaconda hosts replied. I grew up in the Anthracite coal region where streams in my youth ran orange from acid-mine drainage, but Montana, I thought, was pristine. The improvement since is breathtaking. Even in the 10 years or so I have worked in Mill Creek, natural recovery is ascendant. I witnessed some transplanting there that was utterly ineffective, but there was the natural recovery process operating at a far grander scale. Exceedances will diminish, but not because due to beefing up the remedy."

- **Comment 27.2 (2017)**. "As an advocate and stakeholder in this process, the coalition has consistently pushed for use of stricter state water quality standards based on total recoverable concentrations for two main reasons. We know, first of all, that the metals of concern are pervasive in sediments that are located in the beds and banks of the streams. And, secondly, we know that these streams continue to show biological harm even though they meet federal water quality standards. With respect to the proposed TI waiver at issue today, the coalition's position is that the waiver is inappropriate at the stage -- or at this stage of the process. Excuse me. Federal guidance makes it clear that these so-called front-end, or sort of decision-first, evaluations must be adequately supported by detailed site characterization and data analysis that is focused on the most critical limitations to restoration."

- **Comment 28.1 (2017)**. "I'm just representing myself as a native of Anaconda and a property owner. I strongly disagree with the proposed -- the proposal to raise the standards to raise limits for the contaminants. I don't believe that will help us, and it would end up permanently allowing Arco to violate with absolution, excused by the Montana and federal governments. The reason that it's too hard is not sufficient to support the excuse of Arco from complying with the surface water standards and, instead, raising them. They already enjoy relaxed standards for solids contamination.

  "It's hard to do work, but does that mean you don't have to do your job or uphold your responsibilities? It's hard because it is work. We've worked hard to prove it's impractical. I did not hear all of the methods that were tried, but I don't know if it included alter filtration, reverse osmosis, working on water softening or other methods of your treatment of partial portions of the stream which can be mixed back in and then allow them to meet these standards. I don't think that people in this area are necessarily in the same protection of our health by environmental standards as the rest of the United States. We don't even have the EPA stepping in for us to fight for stronger protection, but, instead, trying to just allow this to come to a conclusion. We should not be downgraded and we should not be less human than the rest of the country. I think that we should impose fines for the violation and that the water -- that the money brought in from this should be brought in to this area to provide additional motivation

to work on additional remedies for the problems, and those provide some compensation to the Anaconda area for deterioration of the environmental quality and health for the improved increase and exposure to population."

**Comment 29.1 (2017)**. "I'm a property owner and water right owner along Willow. I just have two quick comments. And how Anaconda is such an extreme Superfund site, how can we -- how do we need to -- how can our Superfund site go under the federal, and how did their guidelines start? And do they start with our major Superfund site, or where do their guidelines start from? Because we are such a massive Superfund site. And, also, I'd like the community to be able to request a second opinion on all of the studies and testing that have been done."

**Comment 31.1(2017).** "1. Some of the cleanest water in the nation finds its origin in the Pintler Mountains, Anaconda-Pintler Wilderness Area. We view it as our responsibility to the citizens of Anaconda-Deer Lodge County, the State of Montana and the citizens of the United States to protect this water and provide this high quality resource for all to enjoy and benefit from in perpetuity. Relaxing water quality standards in these watersheds is NOT the answer. We adamantly oppose the Proposed Plan to do so."

#### 2.19.2.2 EPA Response

Based on the comment received, in 2019, EPA removed upfront waivers of water quality standards from the revised proposed plan. EPA notes that the ROD amendment sets forth replacement standards that are the current 2020 federal standards for cadmium, lead and zinc, and the federal biotic ligand model standard for copper that is in effect at the time of the petition for a waiver.

### 2.19.3 Other

#### 2.19.3.1 Comment Summary

- **Comment 6.1 (2017).** "In response to the Public Notice dated 6/21/17 regarding solicitation of public comments on the plan (by 9/5/17) to modify the remedy for OU4 by: Waiving the State of Montana's acute and aquatic life surface water criteria for cadmium, copper, lead and zinc for upper Willow Creek and its tributaries and the tributaries of upper Mill Creek; Maintaining federal water quality criteria as the applicable surface water standard; and Expanding and enhancing the current upland remedies to minimize source contamination to surface waters that would result in exceedances of water quality standards. I respectfully request that Anaconda-Deer Lodge County (ADLC) be provided an on-the-ground tour of and detailed technical presentation on the remedy that has been put in place to-date pertaining to this proposed plan. On behalf of ADLC I am requesting the opportunity to examine and provide professional input on the remedy that has been only partially implemented for this watershed.

- **Comment 21.4 (2017).** "4. General Comment: ADLC 's economy in large part relies on recreational opportunities tied to fishing and hunting, among other outdoor activities. We value our water and land resources and strive to maintain the highest beneficial use of these assets through sound environmental management. The environmental degradation effects of contamination from historic smelter operations are widely evident as are the negative effects to ADLC's economy from the smelter's closure. ADLC

is limited in what it can do alone to remedy the ills of the past, and must therefore rely on State and Federal regulatory agencies to assist ADLC in restoring, protecting and improving our resources and economy. Until sufficient effort is made to adjust, enhance and exhaust potential remedies for restoration of the watersheds addressed in the subject Tl evaluation, we view it as premature to relax any water quality standards."

- **Comment 21.5 (2017).** "5. General Comment: ADLC concurs with comments on the Tl evaluation provided by the Clark Fork Coalition, and reiterates their concerns regarding completing all work outlined in the Record of Decision (ROD), the appropriate timing to consider issuance of a Tl waiver based on Federal guidance, and advocating for clear timelines for the agencies and the Potentially Responsible Party (ARCO) to fully re-evaluate remedial technologies and BMPs applicable to the contaminants of concern in these watersheds."

#### 2.19.3.2 EPA Response

ADLC has participated in the development of the surface water management plan and the supplemental surface water remedy, and has provided comment.

## 2.20 Total Metals Versus Dissolved Water Quality Standards

### 2.20.1 Comment Summary

One comment was given orally at the 2017 public meeting regarding the lack of information about the differences in total and dissolved water quality standards.

- **Comment 22.2 (2017).** "I really wanted, and expected, to hear and explanation of how these two water quality standards differ. Not just how the sampling methods differed, but more importantly how the results differed. There was one slide during the presentation that gave data on the Water Quality Criteria. Based on this one slide, it seems that comparing the state and federal numbers is like comparing apples and oranges. When I asked for further explanation in order to better understand this data the answer given was vague and confirmed my initial belief that comparing the state and federal water quality criteria is indeed like comparing apples and oranges (excluding the levels of arsenic). I would have appreciated data and statistics explaining how to interpret these comparisons. I found it bewildering that this was not included. This information, even presented at a lay person's level, would have given me something tangible in my mind and help me make a more educated opinion on this topic."

  **Comment 27.1 (2017).** "As an advocate and stakeholder in this process, the coalition has consistently pushed for use of stricter state water quality standards based on total recoverable concentrations for two main reasons. We know, first of all, that the metals of concern are pervasive in sediments that are located in the beds and banks of the streams. And, secondly, we know that these streams continue to show biological harm even though they meet federal water quality standards. With respect to the proposed TI waiver at issue today, the coalition's position is that the waiver is inappropriate at the stage -- or at this stage of the process. Excuse me. Federal guidance makes it clear that these so-called front-end, or sort of decision-first, evaluations must be adequately supported by detailed site characterization and data analysis that is focused on the most critical limitations to restoration."

### 2.20.2 EPA Response

Additional text was provided in the 2019 Proposed Plan and the ARWW&S ROD amendment that explains the difference between the two standards. A technical note explaining Montana's DEQ-7 aquatic life surface water criteria and federal ambient water quality criteria is provided in Appendix A.

DEQ agrees that Montana's total recoverable metals standards are more appropriate for the Clark Fork River Superfund Site Complex because metals are bound in the sediment. The technical note in Appendix A also explains DEQ's position on total recoverable metals. EPA notes that the ROD amendment does not contain upfront waivers, and the waiver to the federal dissolved will only occur after the technically practicable work has been completed and a compliance determination period shows that the total recoverable standard cannot be met.

## 2.21 Water Treatment

### 2.21.1 Comment Summary

Two commenters believed that water treatment was not adequately evaluated in the *Surface Water TI Evaluation Report.* One stated that there was ample room to construct a water treatment plant east of the Dave Gates power plant to treat Mill Creek water.

- **Comment 8.1 (2017). "**Water interception walls, or a treatment plant is called for here. Not the lessening of our states water quality standards."

- **Comment 24 (2017).** "No place for a water-treatment facility? Too much conveyance channel? Come now. One could be built in Sections 16-17, T4N, R10W, east of the gas-fired power plant. That area currently awaits remediation and Mill Creek as a ditch runs right by it. I lack the knowledge to comment on the other three streams. I have been told by someone who operates a water-treatment facility that it can sit idle and self-actuate when a certain flow is exceeded. There are challenges to be sure, but I doubt the proposed plan will accomplish much other than waiving standards."

  "WATER TREATMENT. In the big picture, almost the entire Mill Creek watershed has been contaminated with As and heavy metals from smelter emissions, not to mention acidity. The issue before us is mainly dissolved copper originating throughout the watershed and transporting to the Clark Fork River. Through SO2 fumigation, vegetation loss, and soil erosion (up to two feet), barren slopes consisting of rhyolitic tuff are among the cleanest, whereas some well-vegetated slopes harbor more contaminants. The natural recovery process has been nothing short of phenomenal. Never lose sight of this: natural recovery dwarfs any proposed remedial action. Let's see, we have diffuse contamination that concentrates in Lower Mill Creek before damaging an iconic Montana river, the Clark Fork of the Columbia. The solution is obvious: treat the water before it enters the river. But this, I have heard, was ruled out almost at the onset. Admittedly, there are problems with treatment of very high flows. There is little chance that remedial actions, as proposed and I have no doubt adopted, will reduce Cu delivery significantly, much less to Montana water standards. Moreover, there are problems and limitations with the proposed remedy surpassing those associated with treatment.

"Because of the continuing role of natural recovery, completely overshadowing assisted recovery, water treatment would not have to be "in perpetuity," to use the fanciful but clearly imaginary plan for the Berkeley Pit, Golden Sunlight pit, etc. Exceedances will continue to reduce, as they have for many decades."

### 2.21.2 EPA Response

Water treatment was extensively evaluated as part of the 2011 ARWW&S OU ROD Amendment for arsenic. That analysis determined that if less than 10 percent of the total flow of the tributary flow (tributaries that contributed the highest arsenic loading to Mill Creek) were diverted to a treatment plant, it would require a peak storage capacity of about 1,000 acre-feet. Since that evaluation was to treat dissolved arsenic, and the 2017 TI evaluation required treatment of much greater flows during wet weather for suspended metals, the required storage capacity would be much greater than 1,000 acre-feet. Moreover, different technologies would be needed to remove suspended metals as opposed to treating dissolved metals. As explained in the 2017 TI Evaluation Report, filtration technologies are not suitable for the high flow rates and high total suspend solids concentration that the area streams experience during annual spring runoff.

## 2.22 Watershed Functionality

### 2.22.1 Comment Summary

One comment was received that addressed the functionality of the watersheds in the project area.

- **Comment 7.5 (2017).** "Are the watersheds in the project area functioning at risk, functioning at unacceptable risk, or in a properly functioning condition? Are there any WQLS streams in the project area and if so are the TMDLs completed and are you complying with them?"

### 2.22.2 EPA Response

The CERCLA remedy will address metals loading to area streams within the Superfund site. Within the Surface Water Area of Concern, five water bodies were on the 2008 Clean Water Act Section 303(d) list as being impaired by metals: Modesty Creek, Lost Creek, Warm Springs Creek, Mill Creek, and Willow Creek. A metals Total Maximum Daily Load (TMDL) and Framework for Water Quality Restoration report was prepared by DEQ for these streams as part of the Upper Clark Fork River Tributaries TMDL. The streams remain on the 2016 303(d) list.

# Section 3
# References


Atlantic Richfield. 2017. *ARWW&S OU Surface Water Technical Impracticability Evaluation Report*. April 2017.

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EPA. 1998. *EPA Superfund Record of Decision: Anaconda Company Smelter (ARWW&S) OU, Anaconda, MT*. September 29, 1998. PB98-964406. November 1998

EPA. 2011. *Record of Decision Amendment, Anaconda Regional Water, Waste, and Soils Operable Unit, Anaconda Smelter National Priorities List Site, Anaconda-Deer Lodge County, Montana.* September 2011. 1211311-R8 SDMS

EPA. 2017. *Proposed Plan for Record of Decision Amendment, Anaconda Regional Water, Waste and Soils Operable Unit, Anaconda Smelter Superfund Site, Anaconda, MT*. June 2017.

EPA. 2019. *Proposed Plan to Amend the 1998/2011 Record of Decision Anaconda Regional Water, Waste and Soils Operable Unit Anaconda Smelter Superfund Site, Anaconda, MT.* September 2019. 1917242 – R8 SDMS

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# Appendix A

# Technical Note

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# Technical Discussion
# Federal Dissolved Aquatic Life Ambient Water Quality Criteria
# Compared to Montana Numeric Water Quality Standards
# As Applied to Technical Impracticability Evaluations
# Of Achieving Metals Standards at the Anaconda Smelter NPL Site

The surface water quality performance standards applied in the Anaconda Smelter Site Technical Impracticability (TI) waiver are for certain metals in surface water based on aquatic life. **Human health standards were not involved in this TI evaluation**. The metals of interest are generally insoluble in metallic form, but soluble in an oxidized state. They are referred to in this form as *divalent* metals. It is the divalent metals that can have toxic effects on aquatic life at elevated concentrations. Under the Clean Water Act, recommended criteria for divalent metals are prepared by the U.S. Environmental Protection Agency (EPA) and published as Section 304(a) of the Clean Water Act. These are the criteria that are proposed as the replacement standards in the proposed plan.

The 304(a) criteria are derived by a specific method in EPA's "*Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and their Uses*". This method uses toxicological testing results and statistical methodology to derive recommended criteria. EPA occasionally updates criteria using these guidelines when new toxicological test results become available. For example, the 1980 fresh water acute standard for cadmium was developed using 29 species while the 2016 revised standard used significantly more (101 species).

The toxicological data on which the criteria are based come from numerous sources including academia, industry, and government. When reviewing criteria, EPA evaluates the toxicological data for applicability and consistency using criteria in the guidelines. Most testing is conducted using established methodology such the "*Standard Guide for Conducting Acute Toxicity Tests on Test Materials with Fishes, Macroinvertebrates, and Amphibians*" (ASTM Designation E729-96). In this test, the metal is dissolved into specially-formulated water and the organisms are exposed to the water for specific periods of time under controlled conditions. Results are used to develop criteria by following the guidelines described above.

Toxicological effects to aquatic biota are thought to occur because divalent metals have the same ionic charge as calcium and the metals can interfere with biological processes involving calcium. Interferences can also occur with other divalent ions such as magnesium. The oxidized form of calcium, magnesium, and divalent metals occur in the dissolved state and the processes occur under aqueous conditions. This is considered to be the bioavailable form of the metals – those that are available for uptake by aquatic organisms. Exposure to metals via diet is not measured by these tests. This route uses a different test and is reported as a bioconcentration factor. Since the criteria are for contaminants in water, not in food sources, the recommended criteria focus on exposure to water.

Early EPA-recommended criteria such as those contained in the *Red Book* (1976) and the *Gold Book* (1986) were published prior to the implementation of the guidelines and the ASTM standard. These were based on the unfiltered metals concentrations reported with the toxicological test results. **Toxicological research since that time has developed better models of exposure routes and toxic mechanisms generally determining the important**

**toxicological effects occur as described above. As a result, EPA changed its recommended criteria in 1993 to use a dissolved metals concentration as being the bioavailable form.**

Montana retains the use of unfiltered metals concentrations for its standards. In a response to a comment on the dissolved standard in the 2016 triennial review of water quality standards under the Clean Water Act Section 303(c) by EPA, Montana responded:

> *On October 1, 1993, the U.S. Environmental Protection Agency (EPA), Office of Water recommended dissolved metals criteria to be adopted instead of total recoverable criteria as the State Water Quality Standard for metals to protect aquatic life. In the same memorandum, EPA maintained its position that the total recoverable fraction (TR) published under the 304(a) of the Clean Water Act is scientifically defensible and specified that it will approve individual state's risk management decisions to keep the total recoverable fraction as the water quality standard. The State of Montana adopted the total recoverable fraction as the water quality standard to protect aquatic life and human health, with the exception of aluminum which is expressed as the dissolved fraction (MT DEQ, 2012). In 2007, EPA issued a revised national recommendation for copper aquatic life criteria using the copper biotic ligand model (BLM) for those who wanted to use this approach (EPA 2007).*
>
> *For the BLM, ten characteristics of the receiving water are necessary as inputs to the model (temperature, pH, dissolved organic carbon (DOC), major cations (Ca, Mg, Na, & K), major anions (SO4 & Cl), alkalinity, and sulfide). Whereas for the dissolved metal fraction, only two factors are necessary to implement the water quality standard: Factor one relates to the fact that the EPA's section 304(a) criteria for metals are expressed as total recoverable (TR) metal fraction, not as dissolved requiring a conversion factor (EPA 1996) to express the total recoverable fraction as a dissolved fraction; Factor two relates to Federal regulation 40CFR 122.45(c), which requires metal permit discharges to be expressed as total recoverable, not dissolved making, a translator factor necessary to determine the dissolved fraction of the total recoverable fraction in the fully mixed receiving water. This translator factor can be greatly influenced by temperature, pH, hardness, total suspended solids (TSS), particulate organic carbon (POC), dissolved organic carbon (DOC), acid volatile sulfides (AVS) as well as concentrations of other metals and organic compounds. A test of the parameters per site that influence the translation factor and development of the correspondent regressions to calculate the translator is the best approach. Other approaches have been used as interim measures in the absence of site specific information and conservative assumptions can be made. These approaches can be found in the EPA guidance document on how to develop a translator factor (EPA, 1996).*
>
> *Although the dissolved fraction is more bioavailable to aquatic life, aquatic organisms are subjected to metals contamination from factors other than water. Dissolved fractions move with surface water and groundwater flows, interact with other compounds (ligands) to form complexes that reduce the apparent toxicity of the dissolved metal and adsorbed to sediment particles. Both the BLM and the dissolved fraction provide only estimates of water column toxicity. Ingestion of contaminated sediment is a pathway for aquatic organisms, therefore the use of sediment metals standards when using the BLM model or the dissolved metal fraction as water quality standard (WQS) is recommended (EPA, 1993). At present, there are not sediment standards, only guidance values. The total recoverable fraction is a more conservative approach but includes the particulates, which minimizes the need for a complementary sediment standard.*
>
> *DEQ is currently in the process of evaluating data gaps, research needs, complexities and implications of the BLM and the dissolved fraction as a water quality standard. Stakeholder input will be incorporated to this process when the time arrives to present the findings. In the absence of these findings, the Board is not adopting use of the BLM in Montana and is not adopting the footnote suggested by the commenter. However, under Montana Code Annotated §75-5- 310, a permit applicant, permittee, or person potentially liable under any state or federal environmental remediation statute may petition the Board of Environmental Review to adopt site-specific standards of water quality for acute and chronic life. The board's decision to adopt site-specific standards must be based on sound scientific, technical, and available site-specific evidence.*

*References*

*EPA. 2007. Aquatic Life Ambient Freshwater Water Quality Criteria – Copper – 2007 Revision. EPA 822-F- 007-001. U.S. Environmental Protection Agency, Office of Water. Washington, D.C.*

*EPA.1988. Ambient Water Quality Criteria for Aluminum. . EPA 440/5-88-008. U.S. Environmental Protection Agency, Office of Water. Washington, D.C.*

*EPA. 1996. The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion. EPA 823-B-96-007. U.S. Environmental protection Agency, Office of Water. Washington, D.C.*

*EPA. 1993. Memorandum from Martha Prothro, Acting Assistant Administrator for Water. To: Water Management Division Directors. Subject: Office of Water Policy and technical Guidance on interpretation and Implementation of Aquatic Life Metals Criteria. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.*

*MDEQ. 2012. Circular DEQ-7. Water Quality Planning Bureau, Water Quality Standards Section. Montana Department of Environmental Quality, Helena, MT.*

Based on the above response by the Montana Department of Environmental Quality, the state is attempting to be conservative by including the ingestion pathway as measured in the total recoverable (unfiltered) form of metals. The EPA guidelines for developing criteria specifically exclude toxicological tests where the organisms were fed. This limits the tests to include only those that evaluate the toxicological effects of the water column. **Since the ambient water quality criteria are applicable to water and not food sources to aquatic life, the criteria based on dissolved metals are appropriate for that purpose.**

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