Proposed Plan for Record of Decision Amendment

Anaconda Regional Water, Waste and Soils Operable Unit

Anaconda Smelter Superfund Site, Anaconda, MT

EPA U.S. EPA, Region 8 – Helena, MT April 2017

This proposed plan presents the U.S. Environmental Protection Agency's (EPA's) proposed changes to the existing 1998 record of decision (ROD) (amended in 2011) for cleanup of surface water within the Anaconda Regional Water, Waste and Soils Operable Unit (ARWW&S OU) of the Anaconda Smelter Superfund Site (the Site). It has been prepared by EPA, the lead agency for the Site, in consultation with the Montana Department of Environmental Quality (DEQ), the support agency. The plan is required as part of EPA's public participation responsibilities under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA or Superfund) and National Oil and Hazardous Substance Pollution Contingency Plan 40 Code of Federal Regulations Part 300. This is the federal regulation that guides the Superfund program.

Why Changes Are Needed

Since 2000, the Atlantic Richfield Company, under the direction and authority of the EPA and Montana DEQ, has been completing remedial designs and implementing remedial actions throughout the ARWW&S OU, which covers nearly 170 square miles of land impacted by smelter emissions and mining and smelting waste deposition. Surface water monitoring is also being conducted by the U.S. Geological Survey at two locations on each of the four major streams that drain the Site (Mill Creek, Lost Creek, Willow Creek, and Warm Springs Creek).

Remedial actions to address contaminants have been implemented on more than 11,500 acres. Specifically, sparsely-vegetated soils and mining wastes have been treated or covered and revegetated and controls to manage storm water runoff have been constructed.

Despite this work and even after the remaining remedies have been implemented, it is likely that certain streams will not meet State of Montana acute and chronic aquatic life standards (Circular DEQ-7) for surface water. In response, EPA and DEQ directed Atlantic Richfield to complete a technical impracticability evaluation to determine if those standards could be achieved with additional work. That evaluation, the *ARWW&S OU Surface Water Technical Impracticability Evaluation Report*, was completed in April 2017 and the results confirm that achieving these standards would likely be impracticable (or impossible to carry out). Thus, EPA and DEQ are proposing a limited waiver of State of Montana acute and chronic aquatic life standards for specific stream reaches and their tributaries as well as proposing additional upland remediation where practicable.

The purpose of this proposed plan is to explain the proposed changes to the existing surface water remedy and to solicit public comment. An overview of background, scope and results of previous activities, summary of risks, and description of EPA's preferred alternative for cleanup is also included. EPA will select a final remedy after consulting with DEQ and after reviewing and considering all information received during a 45-day period for public comments (see page 10). If compelling new information is received during the comment period, it could result in the selection of a final remedy that differs from the preferred alternative described in this plan.

What Would Change?

EPA proposes to:

1. Expand and enhance the current remedy to minimize contamination to surface water.
2. Waive Montana acute and chronic aquatic life standards for cadmium, copper, lead, and zinc for upper Willow Creek and its tributaries and the tributaries of upper Mill Creek. Federal water quality criteria would remain in effect.

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Site Background

The Site is located in the Deer Lodge Valley in southwestern Montana, in and around the city of Anaconda. Milling and smelting activities conducted in the area for nearly 100 years resulted in the contamination of soils, surface water, and ground water, primarily through airborne emissions and disposal practices from smelting operations. The primary contaminants of concern are arsenic, cadmium, copper, lead, and zinc. Exhibit 1 shows the timeline for smelting activities at the Site.

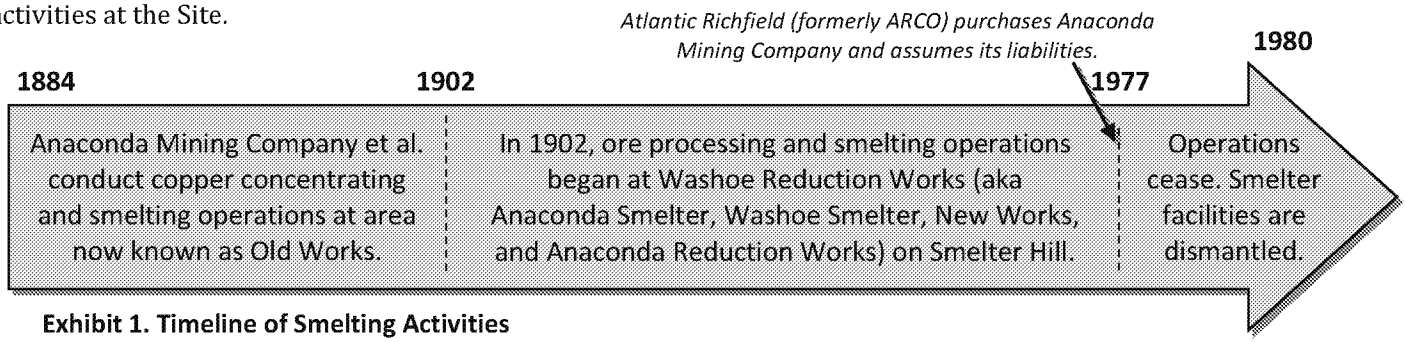

Exhibit 1. Timeline of Smelting Activities

The Site was added to EPA's National Priorities List in 1983, under Superfund authority. The Atlantic Richfield Company was identified as the primary potentially responsible party. Since then, Atlantic Richfield has been actively involved in the investigation and cleanup of the following five Anaconda Smelter OUs:

1. **Mill Creek OU (1987 ROD)**. This first cleanup action involved relocating residents from Mill Creek and soil stabilization and removal efforts.
2. **Flue Dust OU (1991 ROD)**. The second cleanup action addressed flue dust on Smelter Hill through removal, treatment, and containment. At the same time, Atlantic Richfield removed the Arbiter and beryllium wastes and contaminated residential yard materials from portions of Anaconda.
3. **Old Works/East Anaconda Development Area (OW/EADA) OU (1994 ROD)**. The third cleanup action addressed waste sources within the OW/EADA OU.
4. **Community Soils OU (1996 ROD, 2013 ROD Amendment).** The fourth cleanup action provided for cleanup of residential and commercial soils contaminated with arsenic and lead in Anaconda, Opportunity, and the surrounding area.
5. **Anaconda Regional Water, Waste and Soils (ARWWS) OU (1998 ROD, 2011 ROD Amendment)**. The fifth and final OU provides for cleanup of all remaining contamination at the Site, including large volumes of wastes, slag, tailings, debris, and contaminated soil, ground water, and surface water that are spread over 170 square miles of agricultural, pasture, rangeland, forests, and riparian and wetland areas (Exhibit 2).

The ARWWS OU is the subject of this proposed plan, specifically, the surface water remedy. Major components of the original 1998 surface water remedy included: 1) reclamation of contaminated soils and engineered storm water management options to control overland runoff into surface waters; and 2) selective source removal and stream bank stabilization to minimize transport of fluvial deposited tailings into surface waters.

To date remedies have been completed in the most contaminated areas of the Site (waste management areas and surrounding valley lowlands) where heavy equipment can be readily used. Remaining remedies are still required in the upland areas where steep slopes will limit the use of heavy equipment for construction.

The 1998 ROD also identified the following contingency actions for surface water if it was determined, after completion of remedial actions, that applicable water quality standards cannot be achieved: 1) an analysis of the technical impracticability of achieving further contaminant reduction and the potential waiver of the water quality standard, 2) reevaluation of remedial technologies for treatment of surface water, and 3) consideration of additional BMP's.

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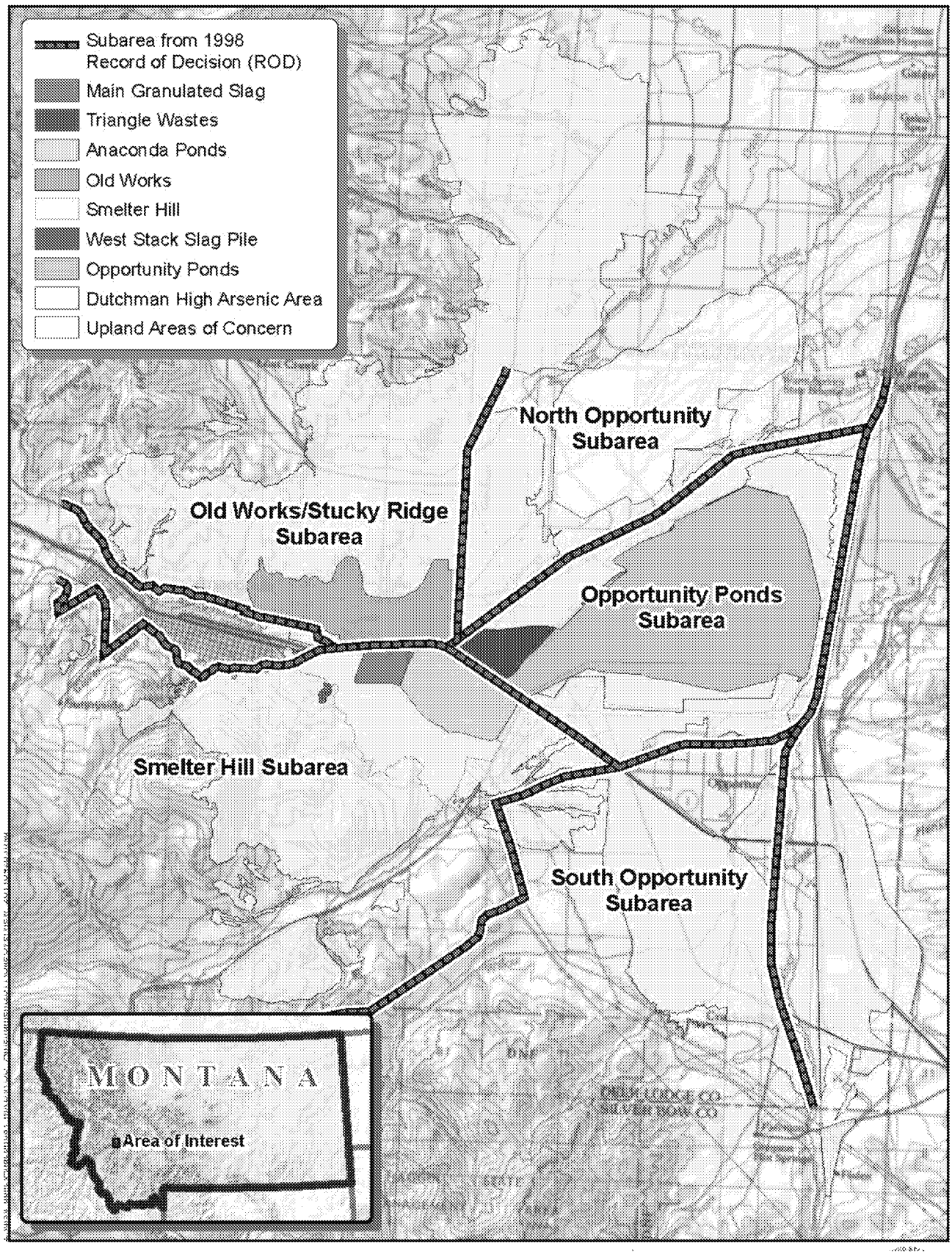

Exhibit 2. Site Layout

Site Characterization

The original 1998 ROD identified cleanup requirements for Mill, Willow, and Warm Springs Creeks. The 2011 ROD amendment added Lost Creek and California Creek. Exhibit 3 shows these streams and their drainages and identifies the technical impracticability 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 metals samples. Under the technical impracticability evaluation, additional 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. Data show that State of Montana water quality standards, which are based on total recoverable analysis, are routinely exceeded in all the Anaconda steams and tributaries during high flows and storm events (Exhibit 3). Specifically, copper and lead, and to a lesser extent cadmium, is exceeded during these events. Tributaries generally have higher exceedance rates than the main streams. Under based flow conditions, copper only periodically exceeds State standards.

The conceptual site model developed under the technical impracticability evaluation, to help understand how and why water quality varies across seasonal flow patterns in the streams, indicated 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 and results in higher suspended sediment and total recoverable metals concentrations (copper, lead and (less often) cadmium).
- During base flow when ground water recharge supplies most surface water flow, exceedances are less frequent.

This suggests that runoff of sediment is the most important pathway of metals to surface water.

Summary of Site Risks

The contaminants of concern identified in the 1998 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. Arsenic concentrations in surface water that exceed human health standards were waived in the 2011 ROD amendment (but remain for aquatic life standards).

Based on the 1998 ROD, potential ecological risks to aquatic receptors were identified based on contaminant concentrations and exposure criteria. Acute and chronic Ambient Water Quality Criteria (AWQC) for both total recoverable and dissolved metals were evaluated in surface water and sediments. These criteria also provided the acceptable range of risk to metals in surface water and sediments, 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.

What's the Difference between Total Recoverable and Total Dissolved Metals?

Total *recoverable* metals (often shortened to *total metals*) refers to analysis of a water sample that detects all the metals concentrations, including dissolved metals and metals present in the

Total *dissolved* sample analysis only analyzes for the dissolved metals (those metals present after the water sample passes through a filter).

EPA's recommended ambient water quality criteria for metals are based on total dissolved metals analysis. These are numeric criteria set by EPA for protection of aquatic life in our nation's waters. The State of Montana has chosen to adopt a more stringent standard than EPA's criteria by choosing to adopt the EPA hardness-based criteria formulas but replacing the dissolved concentration limit with a total recoverable concentration limit.

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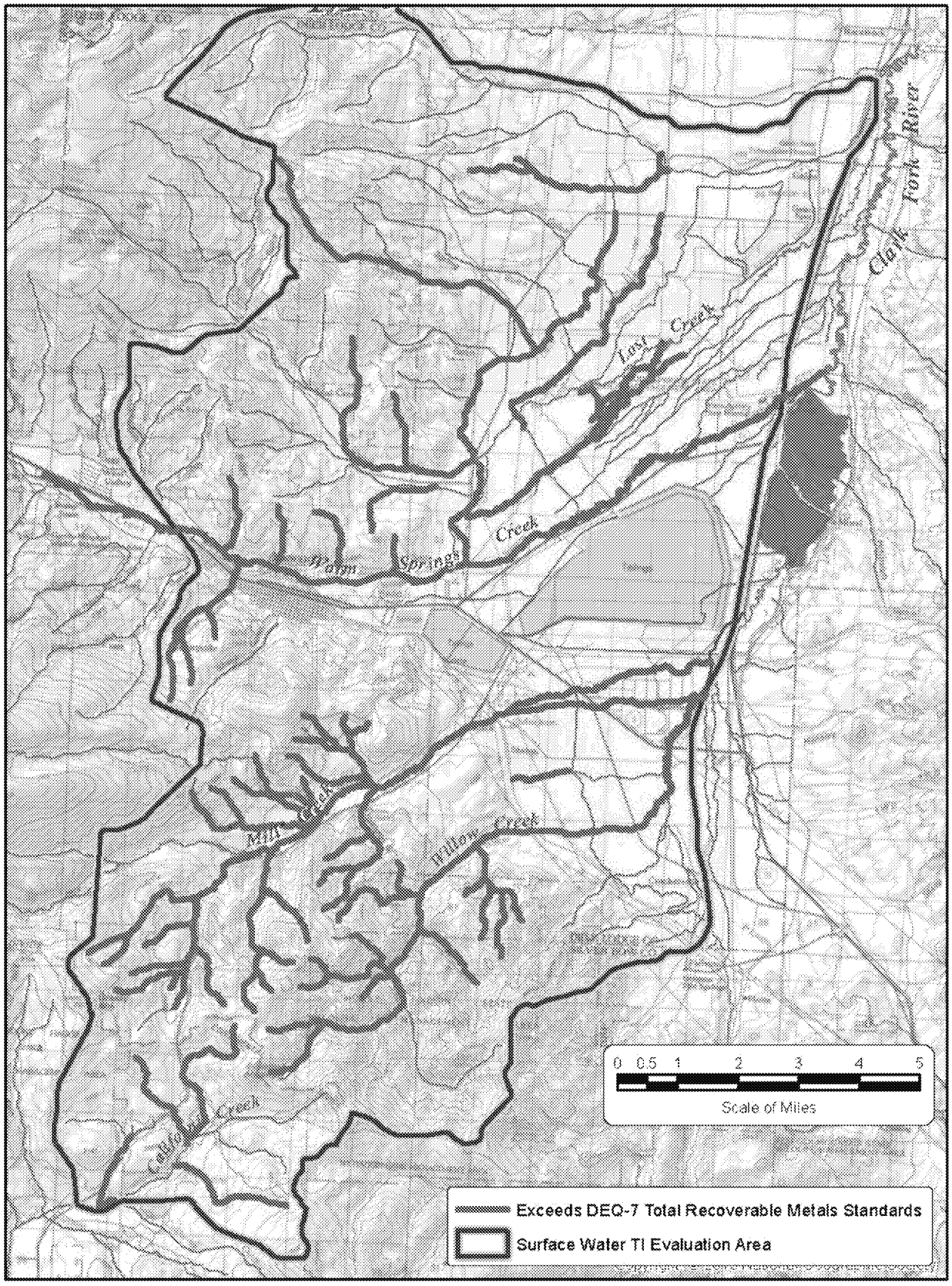

Exhibit 3. Stream Reaches That Have Exceeded DEQ-7 Total Recoverable Metals Standards

Remedial Action Objectives

This proposed plan only addresses the surface water remedy of the 1998 ROD. As such, the following 1998 remedial action objectives (RAOs) generally remain unchanged:

- Minimize source contamination to surface waters that would result in exceedances of State of Montana water quality standards.
- Return surface water to its beneficial use by reducing loading sources of contaminants of concern.

However, based on the technical impracticability analysis, this plan proposes to waive certain State of Montana water quality standards for certain contaminants in certain portions of Anaconda streams. For waters where the State of Montana standards would be waived, the federal water quality criteria, based on dissolved metal analysis, would apply (Exhibit 4).

Exhibit 4. Surface Water Quality Standards

Contaminant	State[1]		Federal[2]	
	Aquatic Life		Criteria Maximum Concen-tration (CMC)	Criterion Continuous Concen-tration (CCC)
	Acute	Chronic	Acute	Chronic
Arsenic	340	150	340	150
Cadmium	2.13	0.27	1.8	0.72
Copper	14	9.33	TBD*	TBD*
Lead	81.65	3.18	65	2.5
Zinc	119.8	119.8	120	120

1. Montana Numeric Water Quality Standards - Circular DEQ-7. Oct. 2012, total recoverable fraction.
2. National Recommended Water Quality Criteria; U.S. EPA, dissolved fraction.
TBD = To be determined under the forthcoming Surface Water Management Plan.

Summary of Alternatives

This proposed plan presents the current remedy for surface water, the treatment alternatives considered, and EPA's preferred alternative to amend the remedy.

Current Remedy

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

- Reclamation of contaminated soils and engineered storm water management options to control overland runoff into surface waters.
- Selective source removal and stream bank stabilization to minimize transport of contaminants of concern from fluvially deposited tailings into surface waters. Removed material will be place within a designated Waste Management Area.

These requirements led to the development of the following actions at the Site:

- Soil removal
- Slope reclamation (soil treatment, steep slope reclamation, and slope BMPs)
- Storm water BMPs (check dams and erosion controls)
- Engineered storm water controls (retention/detention basins)

Based on analysis of newly collected surface water and soils data, it was found that the current remedy does not encompass all areas that potentially impact surface waters. Therefore, the technical impracticability evaluation considered additional actions within the current remedy areas and beyond.

Consideration of Surface Water Treatment

Previous surface water technical impracticability evaluations (summarized in the 2011 ROD amendment) have already determined 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). Thus, treatment alternatives are again dismissed from further consideration.

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Consideration of Large-Scale Soil Removal or Soil Treatment

Based on the results of the technical impracticability evaluation and several visits to the Site by EPA and DEQ, it was concluded that large scale removal or treatment of what are low level contaminated soils would entail destruction of extensive stands of mature vegetation (see Exhibits 5 and 6) which would cause unnecessary and potential irreparable harm to the environment for relatively low benefit. Additionally, large scale soil treatment, such as that currently being implemented in the southern Deer Lodge valley, is determined to be technically impracticable in this mountainous region due to limited accessibility and steepness of slopes. Thus, this alternative has been dismissed from further consideration.

Because active water treatment and large scale removal or treatment of soils was determined impracticable, the technical impracticability evaluation focused on additional engineered controls, storm water BMPs, and steep slope reclamation. Enhancements to existing steep slope reclamation remedies include aerial application of seed and/or fertilizer to improve vegetation cover on moderately vegetated to barren steep slopes.

Exhibit 5. Upper Willow Creek Within the Evaluation Area. This plan calls for a waiver of the Montana metals standards for this stream reach, as it is remote, well-vegetated and undisturbed.

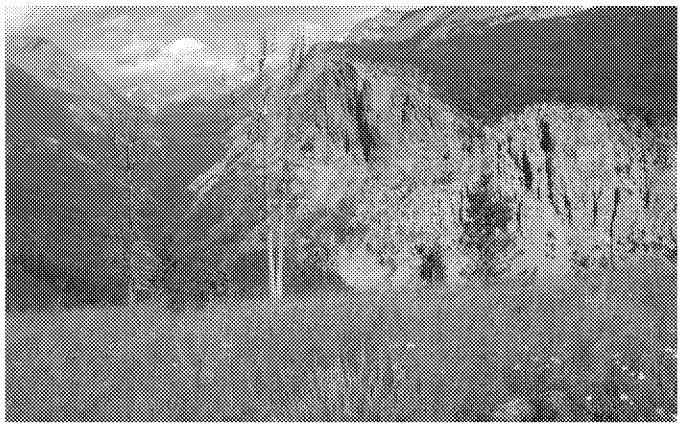

Exhibit 6. Upper Mill Creek Outside of the Evaluation Area. Although data indicate that some copper loading to comes from this area, the area was eliminated from consideration for additional work due to its pristine condition.

Preferred Alternative

EPA's preferred alternative both expands and enhances the current remedy and includes the following components:

1. **Expand and enhance the current remedies.** This includes additional storm water controls, storm water BMP's and enhanced steep slope reclamation in areas both within the current remedial areas and within the expanded technical impracticability area of concern.

2. **Waive Montana acute and chronic aquatic life water quality standards** for upper Willow Creek and its tributaries and upper Mill Creek tributaries (Montana Numeric Water Quality Standards - DEQ-7. October 2012, total recoverable fraction).

3. **Use federal water quality criteria, based on dissolved analysis,** as the alternative to waived Montana standards.

4. **Continue to monitor surface water quality**. If exceedances of surface water criteria continue after vegetation and erosion stability performance standards have been met, additional work and/or waivers will be considered.

Exhibit 7 shows the current remedy areas and expanded/enhanced remedy areas (preferred alternative) and the surface waters where waivers are proposed.

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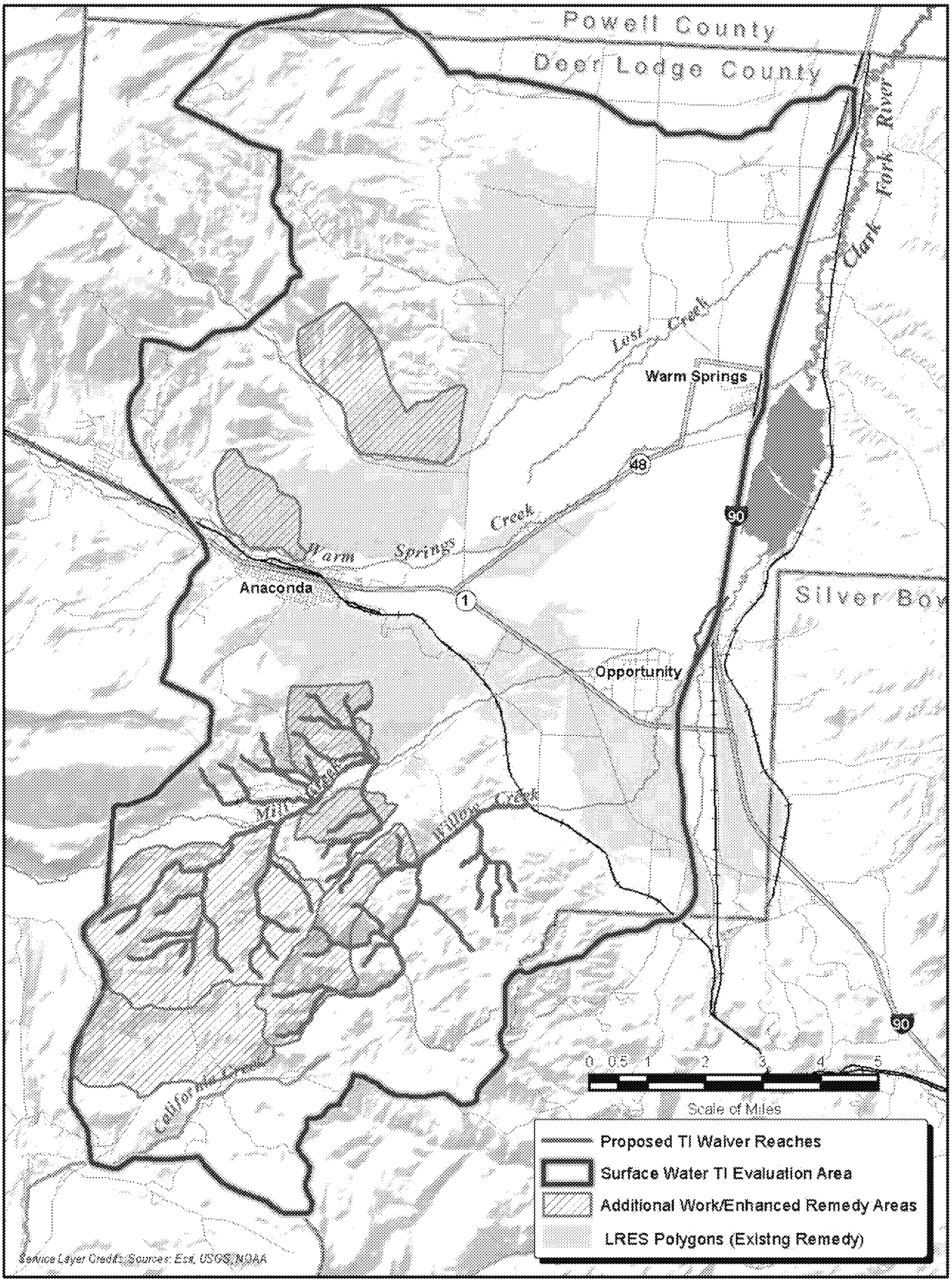

Exhibit 7. Current Remedy and Preferred Alternative

Evaluation of Alternatives

Nine standard evaluation criteria (Exhibit 8) are used at all Superfund sites to evaluate remedial alternatives. The criteria fall into three groups: threshold, primary balancing, and modifying criteria. The alternatives considered in this plan are the preferred alternative and current remedy and are discussed below.

Overall Protection of Human Health and the Environment

Both alternatives are protective of human health and the environment. Both alternatives will continue to meet Ambient Water Quality Criteria for surface water and sediment (based on total recoverable and/or dissolved) The preferred alternative will increase overall protection of the environment through expansion and enhancement of the current remedy.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The preferred alternative invokes a technical impracticability waiver for the State of Montana water quality standards (Montana Numeric Water Quality Standards - DEQ-7, October 2012, total recoverable fraction) for arsenic, cadmium, copper, lead and zinc at the Willow Creek and Mill Creek areas of the Site (Exhibit 7). Where the ARAR is waived, the preferred alternative will meet the EPA Recommended Water Quality Criteria.

Long-Term Effectiveness and Permanence

The preferred alternative will provide greater long-term effectiveness through implementation of enhanced storm water 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.

Exhibit 8. Standard Alternative Evaluation Criteria

Criterion	Description
Overall protection of human health and the environment	Does an alternative eliminate, reduce, or control threats to public health and the environment through institutional controls, engineering controls, or treatment?
Compliance with ARARs	Does an alternative meet federal, state, and tribal environmental statutes, regulations, and other requirements relevant to the site, or is a waiver justified?
Long-term effectiveness and permanence	Does the alternative maintain protection of human health and the environment over time?
Reduction of toxicity, mobility, or volume through treatment	Does an alternative use treatment to reduce a contaminant's harmful effects or ability to move in the environment and the amount of contamination remaining after cleanup?
Short-term effectiveness	How much time is needed to implement an alternative and the risk the alternative poses to workers, residents, and the environment during implementation?
Implementability	What is the technical and administrative feasibility of implementing the alternative, including factors such as the availability of materials and services?
Cost	What are the estimated capital and annual operations and maintenance costs as well as present value (PV) cost?
State/Support agency acceptance	Does the state agree with EPA's analyses and recommendations?
Community acceptance	Does the community agree with EPA's analyses and preferred alternative? Comments on the proposed plan are an indicator of acceptance.

PV cost = Total cost over time in terms of today's dollar value.

Cost estimates are expected to be accurate within a range of +50 to -30%.

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Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Neither alternative reduces the toxicity, mobility of volume of contamination through treatment. Treatment alternatives were considered to be technically impracticable.

Short-Term Effectiveness

The current remedy for surface water specified an iterative process of constructing remedies, monitoring, and then implementing additional work or conducting a technical impracticability evaluation if standards are not met. The preferred alternative would essentially speed up that process by implementing contingency actions concurrent with the remedy. Therefore, the preferred alternative would accelerate the cleanup process. Cleanup is anticipated to take ten years.

Implementability

The preferred alternative utilizes construction practices currently used by Atlantic Richfield. New technologies under consideration for additional work, such as aerial application of fertilizer have been successfully demonstrated by the State of Montana's Natural Resource Damage Program.

Cost

The preferred alternative would not result in any significant increase in cost to the original remedy as these actions likely would have been implemented later under the incremental remedy approach identified in the 1998 ROD.

State and Community Acceptance

The State of Montana will make its determination after review and considering the information received during the public comment period. Community acceptance of the preferred alternative will be evaluated after public comment is received.

Protectiveness Summary

Based on information available at this time, EPA believes the preferred alternative will continue to be protective of human health and the environment, comply with ARARs (in consideration of waivers), and will be cost effective. All other components of the 1998 ROD and 2011 ROD amendment will remain in effect. Once public comments are received, EPA, in consultation with DEQ, will make a final decision. EPA will publish a 2017 ROD amendment providing the rationale for its decision. It will include a responsiveness summary, which provides EPA's responses to comments received during the public comment period.

Ongoing remedial action construction at Warm Springs Creek has been designed to both improve water quality and fish habitat by removing mining wastes from inactive meander bends and reconstructing them as new, clean stream channels.

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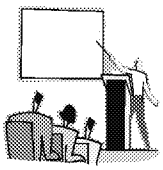
Community Participation

Public Meeting

EPA will provide a presentation about the proposed plan at a public meeting in May 2017. It's a great way to learn more about the details. Please join us.

ARWW&S Public Comment Meeting

May __, 2017
6:30 to 8:30 pm
Metcalf Memorial Sr. Citizen Center
115 E Pennsylvania St.
Anaconda



If you like, you can provide comment orally at the public meeting, and the meeting stenographer will record it.

Contacts

Do you have questions or need help? Please contact one of the following in Helena, Montana:

U.S. EPA, Region 8
1-866-457-2690 (toll free)

- Charlie Coleman, Remedial Project Mgr., 406-457-5038, coleman.charles@epa.gov
- Robert Moler, Community Inv. Coordinator, 406-457-5037 moler.robert@epa.gov

Montana DEQ

- Joel Chavez, Project Officer, 406-444-6407, jchavez@mt.gov

Written Comments

The public has 45 days to comment on this proposed plan. The public comment period runs from April 15, 2017 to May 30, 2017. You can submit a comment in writing (by mail, email, or at the public meeting).

The mailing address for written comments is:
Charlie Coleman
U.S. EPA, Region 8, 10 West 15th Street, Suite 3200, Helena, MT 59626
coleman.charles@epa.gov

Documents

Background information EPA used to prepare this proposed plan came from several sources:

- 1998 ARWW&S Record of Decision
- 2011 ARWW&S OU Record of Decision Amendment
- *Technical Impracticability Evaluation Report*, including appendices with supporting data analyses

- **www.epa.gov/region8/superfund/mt/anaconda**
- **EPA Superfund Records Center, 10 West 15th Street, Suite 3200, Helena**
- **Arrowhead Foundation, 118 E. 7th Street, Anaconda**

This information and other site documents are available in the site record at EPA's office in Helena and at the Community Center in Anaconda (see box). All public project reports and documents are available for viewing at EPA's website or at one of the document repositories. These are also excellent sources for all sorts of project information (fact sheets, brochures, etc.).

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