Bullion Mine Operable Unit 6—Proposed Plan

Introduction and Overview

The U.S. Environmental Protection Agency (EPA) Region 8, in consultation with the Montana Department of Environmental Quality (MDEQ), is proposing a plan to conduct an interim cleanup of the abandoned Bullion Mine Site located in the Jack Creek drainage, a tributary to Basin Creek, near the town of Basin, in Jefferson County, Montana. **Exhibit 1** illustrates the Site location within the Basin Creek Watershed.

The EPA has determined that the owners of the Bullion Mine do not have the financial resources to perform a cleanup of the Site. Therefore, the work performed will be federally and State funded. The EPA is the lead agency with MDEQ providing support. Other federal, State of Montana (State) and local governments, and public interest groups have participated in the process.

Exhibit 1. Location Map

This Proposed Plan (Plan) describes EPA's preferred interim remedy and the other alternatives the EPA considered for cleanup. In accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended, also known as Superfund, the Plan describes the interim remedial strategy proposed by the EPA for the Bullion Mine, and is presented to the public for their consideration, review and comment. It fulfills EPA's requirements under section 117(a) of CERCLA and section 300.430(f)(2) of the National Contingency Plan (NCP). This Plan highlights key information from the Remedial Investigation (RI)/Feasibility Study (FS) Report. The reader should consult the RI/FS Report and administrative record file for more information regarding the remedial action.

EPA invites Public Comment

The EPA and MDEQ may modify their cleanup preferences on the basis of new information or comments from the public. The public is encouraged to review and comment on all of the alternatives. The EPA will then either move forward with the preferred alternative, modify it or select another of the alternatives presented in this Plan. Information on how to provide comments or questions to the EPA is provided on page 18 along with Site contacts and public meeting details. Page 19 presents a list of commonly used environmental terms and abbreviations.

In general, the proposed remedy for the Bullion Mine site consists of treatment of acid mine drainage (AMD) to remove contaminants before the AMD intercepts Jill Creek. Erosion-prone areas will be capped with clean soil and vegetation to minimize human and environmental exposure to residual soil contamination. Remedial action will consist of dewatering the mine, and opening and stabilizing the lower adit portal. AMD from the mine will be captured and treated through a semi-passive biological process to reduce or eliminate impacts on Jill Creek. Amended soil cover, vegetation and woody debris will be placed over areas of excessive erosion. Institutional controls (ICs) will be applied to the site and will conclude the sequence of remedial actions.

Site Background

The EPA added the Basin Mining District Superfund Site to the Superfund National Priorities List in October 1999 and subsequently divided the site into subunits called "operable units" (OU)s. The EPA has developed or will develop cleanup plans for each OU. The Basin Watershed (OU2) includes more than 300 abandoned hard rock mine sites located within a 77-square-mile area from the headwaters of Basin and Cataract Creeks to their confluence with the Boulder River. The town of Basin (OU1) is located at the mouth of this watershed. The EPA completed the cleanup of mining-related impacts in the town in 2002. The Bullion Mine (OU6) is located within the Basin Watershed (OU2), as is the Crystal Mine (OU5). Operable units 5 and 6 are separated by a drainage divide. The mines are located within 2 miles of each other and historically mined the same ore body.

Because the Bullion and Crystal Mine sites, with their associated acid mine drainage (AMD), represent the greatest threat to water quality in the entire Basin Watershed (OU2), the EPA is addressing these OUs first with interim remedial actions. Remedial action for the remainder of the Basin Watershed (OU2) will follow.

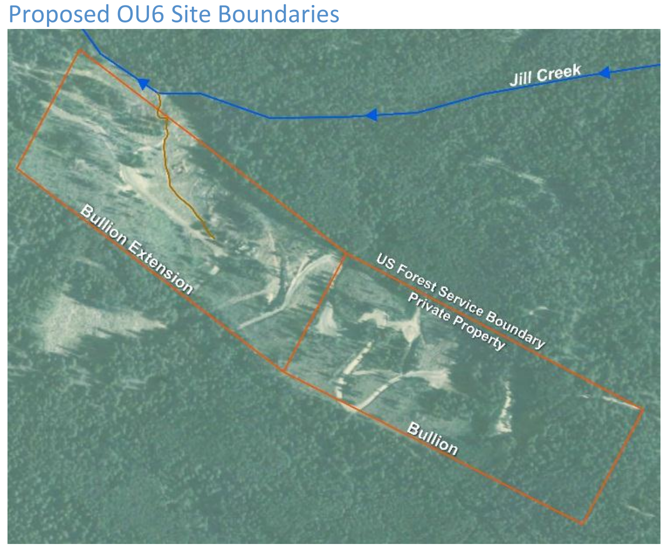
The Bullion Mine (OU6) remedy will address the principal and low-level threats (AMD and small areas of contaminated soils) to human health and the environment associated with potential exposures to contaminants in surface water, soil and other Site media.

The development of the Bullion Mine has an extensive history, dating back to 1897 when the Bullion claim was located (staked).

The Bullion Mine was most productive between 1901 and 1948. By 1903, the Cataract Copper Mining Company had erected a concentrator and smelting plant that processed 200 tons of ore per day on the Bullion property. In 1929 a flotation mill was constructed in the main development area, and a total of approximately 30,000 tons of ore were processed. In 1959, the mine was registered to Allan J. Bullock. At some point, ownership included Delbert Bullock (Allen's brother) and Keith and Donald Johnson. The Bullock brothers of Basin, Montana operated the Bullion Mine on a small scale between 1969 and 1984. In October 1997, the Johnson's undivided half interest was conveyed to Bayhorse Inc., a Montana Corporation. The Bullion Mine property is currently owned by the Bullock family (Allen and Chris) and Bayhorse Inc.

Historic stockpiling of waste rock from underground, ore processing and ground water infiltrating into mine workings have contributed to contamination of site soils, shallow ground water, surface water and AMD being discharged from the lower adit. **Exhibit 2** illustrates the current footprint of the Bullion Mine and proposed OU boundaries. The Site boundaries fall within existing patented mine claims (40 acres) surrounded by the Beaverhead - Deerlodge National Forest, and bounded along the northwest corner by Jill Creek.

Exhibit 2. Current Footprint of the Bullion Mine and Proposed OU6 Site Boundaries

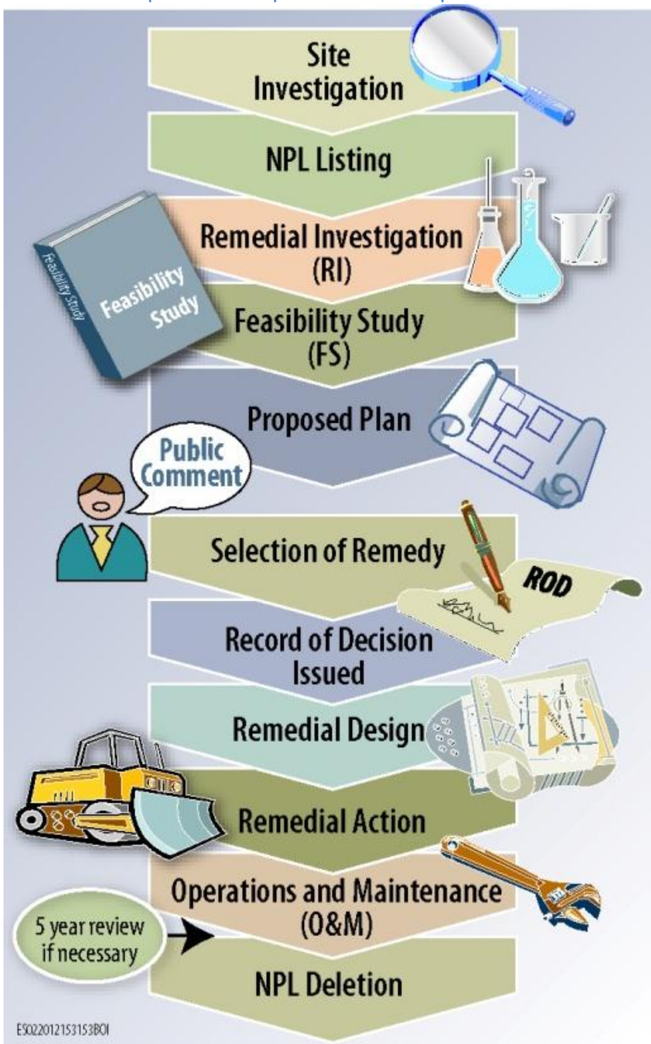


Interest in cleaning up the mined areas of the Basin Watershed (including the Bullion Mine) extends back to 1989, as documented by water quality studies initiated by the U. S. Geological Survey (USGS) and the Montana Bureau of Mines and Geology. Several studies documented water quality in the Boulder River, Basin Creek and Cataract Creek. Major tributaries to Basin Creek (including Jack Creek) were bracketed by the sampling in 1998. Results concluded that the water flowing down Jack Creek was degraded more significantly by the Bullion Mine than by any other influence down to its confluence with Basin Creek. From 2001 to October 2002, the Bullion Mine was the target of a time critical removal action in a joint action between EPA and the U.S. Forest Service (Northern Region). The action removed approximately 27,000 cubic yards of mine waste and covered residual underlying contaminated soils with 12 to 18 inches of cover material.

The Superfund Process

For every site designated as a Superfund site, the EPA follows a process that starts with discovery, proceeds through an investigation and, as warranted, ends with cleanup (see **Exhibit 3**).

Exhibit 3. Steps in the Superfund Cleanup Process



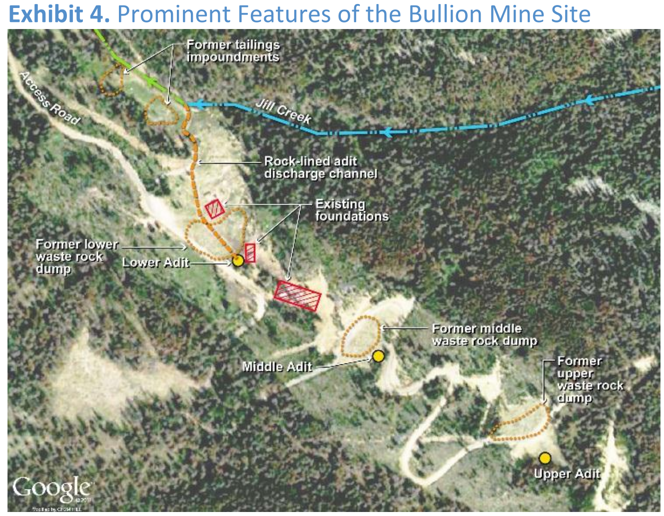
The EPA conducted a focused remedial investigation and focused feasibility study of the Bullion Mine site from 2010 to 2013. Results, conclusions and other relevant information available from previous studies conducted by the USGS and others were incorporated into the following key documents:

- *Bullion Mine OU6 Remedial Investigation Report*. This report contains a characterization of the nature and extent of contamination and human health and ecological risk assessments.
- *Bullion Mine OU6 Feasibility Study*. This report screens potential remedial options, identifies the most viable remedial alternatives and evaluates them against nine EPA criteria (see **Exhibit 9**).
- This *Proposed Plan* introduces the final phase of the remedial investigation and feasibility study process by presenting the public with the alternatives evaluated in the focused feasibility study, presenting a preferred alternative, and soliciting written and oral comments. The comments will form the basis for EPA's further evaluation of the final Modifying Criterion, community acceptance, and will influence the selected remedy presented in the Record of Decision (ROD) to be issued in 2014. The EPA, in consultation with MDEQ, will provide written responses to public comments in a section of the ROD known as the "Responsiveness Summary."

Site Characteristics

Exhibit 4 shows the prominent site features associated with the Bullion Mine.

Exhibit 4. Prominent Features of the Bullion Mine Site



As shown in **Exhibits 4 and 5**, contaminated water from the mouth of the lower adit (tunnel) flows directly into Jill Creek. This adit discharge is highly acidic and contains high concentrations of dissolved arsenic, cadmium, copper, lead and zinc. Cadmium, copper and zinc are highly toxic to aquatic organisms.

Exhibit 5. Channel from lower adit area showing contaminated discharge entering Jill Creek, a tributary to Jack Creek

Vegetation has been established on much of the face of the Bullion Mine site as a result of a removal action in 2001-2002 by the U.S. Forest Service and the EPA (see **Exhibit 6**). Steep slopes that used to contribute to excessive erosion by snowmelt and storm runoff are largely mitigated by a layer of clean soil, vegetation and reclaimed topography. During the spring, contaminated seeps and springs flow on the face of the mine site. This water originates from water trapped in the mine tunnels (adits), which migrates to the ground surface through fractures in the bedrock. These conditions have led the EPA to classify the discharging water from the lower adit as the principal threat waste associated with the Bullion Mine site.

Exhibit 6. Steep vegetated slope with hummocky topography and wood debris. Contaminated seep in foreground

Nature and Extent of Contaminated Areas

The Bullion Mine is located near the headwaters of Jill Creek, a tributary to Jack Creek. Before mining, the upper reaches of the mine site contained forested stands dominated by lodgepole pine, Douglas fir, spruce, aspen and common juniper. A variety of small trees, shrubs and grasses were found in scattered open areas and a narrow riparian wetland mantled the stream banks of Jill Creek. As mining activities proceeded and wastes were created, the hillside and narrow floodplain were altered significantly. Waste was deposited on the face of the mine site and down gradient adjacent to Jill Creek, leaving the thin organic-rich top soils buried under layers of waste rock and mill tailings. Vegetation in the formerly active mine area was decimated. Exposed mine wastes eroded down the barren slope and into Jill Creek. The majority of this material was removed in 2002. Some residual soil contaminated with arsenic, other heavy metals and acid-generating sulfidic material still remains. However, the majority of the contaminated material is buffered by a clean, limed soil cover installed to a depth of 12 to 18 inches by the federal removal action in 2002. Underlying soils are exposed only in small localized areas where vegetation did not re-establish and the soil cover eroded. Contaminants continue to migrate from the discharging mine waters into site soils, as well as to the surface water and sediment of Jill Creek.

What are key areas of concern?

Contaminated water is pooled within the mine (potentially as much as 2 million gallons) and is slowly discharging from the collapsed entrance of the adit. This water follows a rock-lined channel to its confluence with Jill Creek. Jill Creek then flows 1 mile south to its confluence with Jack Creek, one of the major tributaries in the Basin Creek watershed.

What are the contaminants of concern?

The contaminants of concern at the Site are aluminum, antimony, arsenic, cadmium, copper, iron, lead, silver and zinc.

In soils, antimony, arsenic, cadmium, copper, lead, silver and zinc are the focus for terrestrial life because significant concentrations of these contaminants still remain in small exposed areas. In surface water and ground water discharging to surface water, elevated concentrations of aluminum, antimony, arsenic, cadmium, copper, iron, lead and zinc are of particular concern because of their toxicity to aquatic life and potential toxicity to plants in the floodplain. Stream sediment data show that antimony, arsenic, cadmium, iron and silver exist at concentrations high enough to cause adverse effects on stream macroinvertebrates (aquatic life).

How do the contaminants move, and what are the exposure pathways?

Contaminants in the adit discharge water, the largest source of contamination, flow directly into Jill Creek and degrade sediment and water quality. To a lesser extent, contaminants in the impacted soils move into the stream through erosion. The wind may also transport contaminants around the site, particularly in areas where vegetation is not growing and where the previous soil cover has been disturbed or degraded.

Exhibits 5 and 7 show key features of the Site, acid mine discharge entering Jill Creek and minor areas of exposed, barren soils subject to erosion.

Exhibit 7. Bullion Mine Site exposed soils. Note erosion channels and sparse vegetation.

Summary of Site Risks

What are human health risks?

Land use in the vicinity of the Bullion Mine is primarily recreational (U.S. Forest Service [USFS]-Deerlodge National Forest) with scattered residential use only occurring offsite along lower Jack and Basin creeks. Risks were estimated for the most plausible pathways of human exposure, on the basis of current and reasonably anticipated future land and water uses at Bullion Mine. The EPA evaluated exposure scenarios for intermittent workers, recreational users (adult and adolescents all-terrain vehicle [ATV] and non-ATV users), future excavation workers and hypothetical industrial worker receptor groups.

The conclusion of the Bullion Mine human health risk assessment in the *Bullion Mine Remedial Investigation Report* is that human health risks from arsenic in soils exceed acceptable levels for future workers and current and future recreational users (assuming ATV use). Exposure to arsenic in surface water for recreational users also exceeds acceptable levels. The mining claims associated with the Bullion Mine are still in private ownership, and other property surrounding the site is managed by the (Beaverhead-Deerlodge National Forest).

What are the ecological risks?

The ecological risk assessment established clear risks to aquatic life within Jill Creek, particularly in the section adjacent to the mine. Sporadic areas of exposed soils lacking clean cover material and vegetation present an unacceptable risk to ecological receptor groups potentially exposed to elevated concentrations of metals within the former dump foot prints. Jill Creek, adjacent to the mine, was reclaimed during the 2002 removal action and suffers from poor recovery of riparian vegetation as a result of contaminated surface water.

- Surface water sampling results show that aluminum, cadmium, copper, iron, lead, and zinc exceed State of Montana Circular DEQ-7 Numeric Water Quality (DEQ-7) chronic aquatic life standards. The greatest exceedances occur for cadmium, copper and zinc. The degraded water quality within Jill Creek does not support aquatic life.
- Stream sediment data show that antimony, arsenic, cadmium, iron and silver exist at concentrations high enough to cause adverse effects on stream macroinvertebrates (aquatic life). A benthic macroinvertebrate study conducted in 2010 within Jill Creek and Jack Creek supports this conclusion.
- Several contaminants in soil, sediment, and water (primarily aluminum [water and sediment only], antimony, arsenic, cadmium, copper, iron [sediment only] lead, silver and zinc) are high enough to pose a significant risk to wildlife should they use the site. Animals ingest the contaminants through consumption of contaminated sediment, soil, water and through the food chain (consumption of contaminated plants or prey).
- Contaminants in soil also pose a significant risk to vegetative communities at the site. Aquatic plants uptake contaminants by absorption of the contaminated water. Contaminant uptake by plants is a well-documented occurrence that prevents or limits vegetative growth.

Conclusion - On the basis of the entire administrative record including historic investigations and the 2010–2013 human health and ecological risk assessments, the EPA concludes that widespread unacceptable terrestrial and aquatic risk exists in Jill Creek and portions of the Bullion Mine site. The EPA, in consultation with MDEQ, has determined that the preferred remedy identified in this Plan, or one or more of the other active measures considered in the Plan, is necessary to mitigate these risks, and protect public health and the environment.

A detailed description of site risks can be found in the "Risk Assessment" section of the *Crystal Mine Remedial Investigation Report*.

Preliminary Remedial Action Objectives

The final remedial action objectives (RAOs) for surface water, ground water, stream sediment and site soils will be stated in the ROD. The preliminary remedial action objectives (PRAOs) for the Bullion Mine site are as follows:

Soils

The PRAOs for exposed soils are as follows:

- Prevent or minimize human exposure to soils/waste rock contaminated with contaminants where incidental ingestion, dust inhalation or direct contact poses an unacceptable health risk.
- Prevent or minimize unacceptable risk to ecological systems (including aquatic and terrestrial) from contaminated waste rock/soils containing elevated levels of metals.

Ground water

The ground water PRAOs proposed for Jill Creek, an interim action, are consistent with, and will not preclude, whatever may be chosen as a final remedy for the Basin Watershed OU2. They are as follows:

- Prevent or minimize source water infiltration to the workings.
- Prevent or minimize ground water discharge containing contaminants.

Surface Water

The surface water PRAOs proposed for Jill Creek, an interim action, are consistent with, and will not preclude, whatever may be chosen as a final remedy for the Basin Watershed OU2. They are as follows:

- Prevent or minimize source water infiltration to the workings.
- Prevent or minimize release of contaminants to surface waters.

Stream Sediment

PRAOs for sediment include:

- Prevent or minimize exposure to contaminants in sediments.
- Prevent or minimize further migration of Site-contaminated source materials or discharges in close proximity to the creek.

Preliminary Remediation Goals

The proposed preliminary remediation goals (PRGs) represent the concentration below which a contaminant is at an acceptable level of risk. PRGs were developed independently for the protection of human health and ecological receptors.

For human health, the EPA considers acceptable exposure levels to be concentrations of *carcinogens* that represent an excess upper-bound lifetime cancer risk to an individual of between 10^{-4} (1 in 10,000 probability) to 10^{-6} (1 in 1,000,000 probability) or less; and concentration levels of *non-carcinogens* that are below toxicity reference doses protective of human health. Achieving a 10^{-6} risk is often not practical at western mining sites, where risks from naturally occurring background metals concentrations at the site can sometimes exceed this level.

For ecological receptors, the EPA considers acceptable exposure levels to be concentration levels that are below toxicity reference values or benchmarks protective of ecological populations.

PRGs provide numeric goals for the protection of human health and the environment. Determination of PRGs depends on PRAOs, current and reasonably anticipated future land uses, and applicable or relevant and appropriate requirements (ARARs). The EPA is proposing the following remedial cleanup goals below which a 10^{-5} excess cancer risk is not exceeded and exposures are not expected to exceed non-cancer toxicity levels of a hazard index of 1 or less for human and toxicity reference values for wildlife populations.

The "Risk Assessment" section of the *Bullion Mine Remedial Investigation Report* identified aluminum, cadmium, copper, iron, lead and zinc in surface water and ground water as contaminants of concern. Because this is an interim action, EPA proposes to waive the surface and ground water quality standards until a final action is taken for the entire Basin watershed. The final action for OU2 will address all ARARs, including DEQ-7 standards for surface water and ground water. The EPA expects that the interim action will improve water quality significantly. The Basin Watershed OU2 ROD will consider the effectiveness of the interim ROD for the Bullion site and determine whether additional measures are needed to meet water quality standards.

Human health PRGs for soil were derived for arsenic—the only human health risk for recreational users (ATV riders and hikers). The PRG for arsenic is based on potential risks (including bioavailability testing) derived for the adolescent recreational user (296 mg/kg). Potential exposure is limited to small areas where erosion has compromised the original soil cover placed during the removal action in 2002.

Antimony, arsenic, cadmium, copper, lead, silver and zinc were identified as ecological contaminants of concern in soils and sediment. Potential ecological exposure in soils is limited to small areas where erosion has compromised the existing soil cover, and to wildlife species that may burrow or consume food items below the soil cover. Exposure will be mitigated through the addition of clean cover material and vegetation.

The proposed PRGs for contaminants in stream sediments in Jill Creek address potential risks to benthic infaunal communities, and are derived from the more restrictive of probable effects threshold concentrations for protection of sediment infauna and wildlife (**see Table 1**).

Monitored natural recovery is proposed to achieve the stream sediment PRGs. The quantity of contaminated stream sediment is limited because of previous removal work, removal of sediments will harm the streambed and banks, and sediment quality is expected to improve through natural recovery after remedial actions for the contaminant source (mine adit discharge into Jill Creek).

ARARs provide other standards and criteria for consideration in the remedial action decisions. In addition, because some proposed PRGs (for example, lead) may be below naturally-occurring levels of metals, the final PRGs may be based on background concentrations measure at the site.

Table 1. Stream Sediment PRGs in mg/kg[a]

Contaminant	Probable Effects Concentration/ Cleanup Screening Level
Antimony	3.0 [b]
Arsenic	33.0
Cadmium	4.98
Copper	149
Iron	40,000 [b]
Lead	128
Nickel	48.6
Silver	4.5 [b]
Zinc	459

Notes:

[a] Dry Weight. Source: D.D McDonald; C.G. Ingersoll; T.A. Berger. Development and Evaluation of Consensus Based Sediment Quality Guidelines for Freshwater Ecosystems. Arch. Environ. Toxicol. 39, 20-31 (2000)

[b] Upper Effects Thresholds (UETs) from the NOAA SQuiRT tables – Buchman, 2008. NOAA Screening Quick Reference Tables.

Summary of Remedial Alternatives

Description of Alternatives

During the feasibility study, five primary remedial alternatives were evaluated and are briefly described here. A more detailed description of the alternatives can be found in the feasibility study.

The alternatives were developed to span the range of categories defined by the NCP (40 CFR sections 300.430(e)) including, as appropriate:

1. The No Further Action Alternative.
2. A range of alternatives for source control in which treatment is a principal element. Treatment should reduce toxicity, mobility or volume of contaminants. This range includes alternatives that:
    a. Remove or destroy contaminants in order to eliminate or minimize the need for long-term management.
    b. Treat the principal threats, but vary in the degree of treatment and the amount and characteristics of treatment residuals and untreated waste that must be managed.
3. A range of alternatives for source control that involve little or no treatment. These alternatives protect human health and the environment by preventing or controlling exposure to contaminants through engineering controls and land-use controls.

The detailed alternatives address surface water and ground water infiltration, AMD from the lower adit and limited exposed Site soils for remedial action.

Combined-media alternatives were developed for the Bullion Site as a means of implementing a comprehensive cleanup. Technology options for discharging mine water were developed and assembled into five primary alternatives. Some limited soil remediation will be a component for four of the alternatives.

The EPA approved the five primary alternatives as the final list of alternatives to be carried into the detailed analysis of the feasibility study. All alternatives, except No Further Action, include the use of best management practices (BMPs) and land-use controls designed to prohibit residential use of the site, prevent domestic consumption of the ground water and to protect the remedy. **Exhibit 8** presents a summary of the five alternatives.

Exhibit 8. Components of a Remedy by Alternative

Remedial Components	Alternatives				
	GW1	**GW2**	**GW3**	**GW4**	**GW5**
Improve access and site roads		O	O	O	O
Treat and discharge trapped Mine water		O	O	O	O
Waste disposal in Luttrell Repository			O	O	O
Cap impacted soils with amended top soil and revegetate		O	O	O	O
Re-open mine adit—construct adit plug			O	O	O
Construct treatment plant			O		
Construct treatment quicklime dispenser facilities and piping				O	
Construct lined settling ponds			O	O	O
Construct treatment cells				O	O
Construct surface water controls	O	O	O	O	O
Construct erosion control		O	O	O	O
Provide periodic monitoring of site	O	O	O	O	O

Notes:
GW-1 No Further Action
GW-2 Mine Plugging through Re-opened Adit
GW-3 Active Treatment
GW-4 Semi-Active Treatment (Quicklime Injection System)
GW-5 Semi-Passive Treatment (Sulfate Reducing Bioreactor)

Ground Water Media Alternatives

EPA will evaluate and control ground water and surface water infiltration into the mine workings. Ground water (GW) media alternatives will either block the flow from the adit, or control or treat the flow before it enters Jill Creek. One alternative considers blocking the flow of AMD by reopening the lower adit to place a plug in competent rock to seal the lower mine workings. Three treatment options are also evaluated. All will control the flow of AMD from the adit and convey water to a treatment option. Treatment options vary from an active, fully staffed plant to an unstaffed semi-passive system. The specific details of the ground water and surface water control and preferred remedial treatment process will be identified during remedial design after approval of the ROD, when the alternative(s) is/are selected as part of the remedy for the Site.

Alternative GW-1: No Further Action (Estimated Cost $231,000)

The No Further Action Alternative will involve no further remedial action or land use controls at the Bullion Mine beyond those currently in place or already undertaken. This alternative will provide the baseline conditions against which the other remedial action alternatives will be compared. This alternative will include completed and ongoing actions at the mine site including periodic monitoring of water quality.

Alternative GW-2—Mine Plugging Through Reopened Mine Adit (Estimated Cost $5,520,000)

This alternative will employ the construction of a plug within the lower adit (tunnel) to seal mine water within the mine. The resulting flooding behind the plug will prevent air from entering the mine through the adit, potentially reducing oxidation and generation of AMD. After sealing the mine adit, the surrounding area will be monitored to determine if new ground water discharge points have developed or if significant changes to the local ground water flow occur. Several monitoring wells will be located downgradient from the mine plugs. Ground water monitoring upgradient of the mine will provide background concentrations of contaminants for comparison. Additionally, surface water (springs and seeps), both downgradient and upgradient of the mine site, will be routinely monitored for contaminant concentrations to determine effectiveness of the plug.

Alternative GW-3—Active Treatment of AMD (Estimated Cost $7,140,000)

Alternative GW-3 will consist of an active treatment process to treat AMD at the mine site. A high-density sludge (HDS) plant, or comparable standard technology for treating AMD, will be designed and constructed. Low and relatively consistent annual flows suggest that no mine water storage will be required for this treatment option. Construction of the HDS plant will require that a permanent source of electrical power be provided to the site, resulting in the installation of above-ground transmission lines.

The HDS plant will require year-round operation by a part-time operator. Upgraded access roads to the mine will provide access from late spring through the early fall until snow starts to accumulate. Once snow has blocked access to the sites for automobiles or trucks, an alternative means of winter transportation such as snowmobiles or tracked vehicles will be required to access the site for ongoing operations and maintenance.

Alternative GW-4—Semi-Active Treatment of AMD (Quicklime Injection System) (Estimated Cost $4,358,000)

Alternative GW-4 will consist of a semi-active AMD treatment process. The treatment process will be sequenced as described in the following text.

The mine will be dewatered and the portal re-opened and stabilized to allow mine water to flow freely. Adit discharge will be collected by a diversion structure. Contaminated ground water and surface water will be collected below the mine by a ground water cut-off wall. The intercepted ground water from the cut-off wall and the adit discharge diversion structure will be piped to a quicklime injection system. The quicklime injection system will be driven by a water wheel powered by the adit discharge, eliminating the need for electricity at the Site.

The quicklime injection system effluent stream will mix while passing through a "V" ditch lined with riprap. The ditch will be routed into one of two lined settling ponds where metals will co-precipitate with hydroxide and settle out. Effluent from the primary settling pond will drain into a secondary settling pond that will allow for additional settling time. Effluent from the secondary settling pond will drain directly into Jill Creek. As necessary, the settling ponds will be drained and the hydroxide sludges on the bottom will be excavated and placed on drying beds nearby. Once dried, the sludge will be hauled to the Luttrell Repository located on the northern boundary of the watershed. The drying beds will drain into the primary settling ponds. Alternative GW-4 will require periodic maintenance (approximately weekly) to ensure the system is operating properly. Additionally, depending on the quicklime injection system and storage capacities of the system, the quicklime will need to be resupplied once or twice each year.

Alternative GW-5—Semi-Passive Treatment of AMD (Sulfate Reducing Bioreactor) (Estimated Cost $3,847,000)

Alternative 5 is a three-stage semi-passive system. Implementation of this alternative will consist of dewatering the mine, and re-opening and stabilizing the portal to allow mine water to flow freely. Contaminated ground water below the mine will be collected via a ground water cut-off wall. Adit discharge will be collected by a diversion structure. The collected ground water and surface water will be conveyed to the treatment alternative. Two parallel treatment trains will be installed to allow for one to be out of service for maintenance or repairs while the other provides the treatment. The three stages of the treatment process are as follows (see *Bullion Mine Focused Feasibility Study* for more detail):

- **pH Adjustment Cell (Stage 1)**. The pH adjustment cell will consist of three layers and is designed to increase AMD to a pH greater than 6.
- **Sulfur Reducing Bio Reactor (SRBR) (Stage 2)**. The SRBR is designed to convert sulfate and trace metals in the water into metal sulfides that remain with the media. The process consists of a series of horizontal flow-through cells. Each cell will be comprised of limestone gravel and media (compost or stable waste). However, unlike the pH adjustment cell, the mix ratio will be approximately 10 percent limestone gravel and 90 percent compost by volume. Each cell will be about 6 feet wide by 8 feet tall and wrapped in an impervious PVC liner. The total length of the SRBR cells will provide, at a minimum, 5 days retention time.
- **Clarification (Stage 3) and discharge to Jill Creek.** The clarification pond will allow settling of sludges and organic materials formed in the prior two stages. Effluent from the SRBR cells will be discharged into the 6-foot-deep end of the pond which offers storage for settling sludges. The bottom of the pond will gradually rise halfway through. At the shallow end of the pond, native aquatic vegetation will provide biological filtering. Periodically, sludge that settles in the deep end of the clarification pond will be excavated, and dried on drying beds which would drain into the clarification pond. The dried waste will be transported to the Luttrell Repository for disposal.

Evaluation of Alternatives

The Superfund law and regulations require that the EPA, in consultation with MDEQ, evaluate and compare the remedial cleanup alternatives based on the nine NCP criteria. These nine criteria are derived from the Superfund law, especially section 121 of CERCLA, 42 U.S.C. section 9621, and are promulgated in the NCP at 40 CFR section 300.430(f)(1)(ii)(E). **Exhibit 9** presents the nine criteria.

Any selected remedy must meet the **threshold criteria** of "overall protectiveness of human health and the environment" and "compliance with ARARs or appropriate justification for use of the CERCLA ARAR waivers." Only those alternatives that meet these criteria are considered further by the EPA. The **balancing criteria** of long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; short-term effectiveness; implementability; and cost are used by the EPA to identify and consider major trade-offs among the alternatives. Two of these criteria—long-term effectiveness and permanence, and reduction in toxicity, mobility or volume through treatment—are emphasized by the NCP and EPA guidance. The **modifying criteria**—State acceptance and community acceptance—are evaluated as the preferred remedy is selected to the extent that information is available, and more thoroughly evaluated after the public comment period.

The EPA evaluates these criteria in detail in both the "Detailed Analysis" and the "Comparative Analysis of Alternatives" sections of the feasibility study, which contain more detailed information. The EPA, in consultation with MDEQ, formally evaluated these five alternatives using the threshold and balancing criteria. A summary of the individual Ground Water Alternatives is provided in the following text.

Exhibit 9. EPA's Evaluation Criteria

EPA'S Evaluation Criteria

Threshold Criteria—Must be Addressed

1. Overall protection of human health and the environment—*must be protective of human health and the environment.*
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)—*includes State and federal regulations; where ARARs cannot be met, a waiver is required*

Balancing Criteria—Must be Considered

1. Long-term effectiveness and permanence
2. Reduction of toxicity, mobility and volume
3. Short-term effectiveness
4. Implementability
5. Capital and operating and maintenance cost

Modifying Criteria—Must be Considered

1. State acceptance
2. Community acceptance

Overall Protection of Human Health and the Environment

Alternative 1 will leave existing conditions at the Bullion Mine unchanged. This alternative would not address or mitigate the identified baseline risks to human or ecological receptors.

Alternative 3 will use a conventional, demonstrated treatment process which offers the greatest protection to both human health and the environment. This alternative will effectively capture and reliably treat the AMD, breaking the human health and ecological exposure pathways.

Alternatives 4 and 5 will be less protective than Alternative 3 because the treatment processes are subject to more variability caused by limited pond capacities and potential treatment upsets or disruptions (chemical and biological) that would go undetected because of lack of regular operator attention. Although the degree of treatment of the effluent will be acceptable, it will be less efficient and reliable than that of Alternative 3. Alternative 2, which allows untreated ground water to build up behind the plug, potentially creating a large pressure head, will provide only moderate protection of human health and the environment because of the high uncertainty of total containment (the consequences of which may include potential plug failure, uncontrolled seeps forming downgradient of the mine adits or uncontrolled discharge from another adit as the static water level rises within the mine workings).

Compliance with ARARs

Appendix A in the Feasibility Study Report contains an analysis and discussion of potential ARARs for the Bullion Mine. Because the EPA is selecting an alternative at the Bullion Mine as an interim measure, EPA proposes to waive compliance with surface and ground water ARARs until all five OUs comprising the Basin Mine Area National Priorities List (NPL) Site are complete. However, proposed remedial actions taken at the site should improve overall water quality significantly. All other ARARs not waived by this interim action, will be met by each alternative, except Alternative 1. The Site is one of the two largest contributors to contamination in the watershed, and thus will have a major effect on whether the remedy for the entire Basin Watershed OU2 is capable of meeting ARARs.

Long-Term Effectiveness and Permanence

Alternative 1 will leave existing conditions at the Bullion Mine unchanged. This alternative will be least effective compared to the action alternatives in the long-term.

Alternative 3 will offer the greatest long-term effectiveness because of the process control that is available to the trained operator of the plant. Typical removal efficiencies at similar HDS treatment plants at other mine sites are often greater than 99 percent. Operational upsets within the treatment system (identified by system alarms) will reduce the removal efficiencies at times, but could be readily diagnosed and corrected by the operator. Alternative 3 will require the greatest level of operations and maintenance effort to ensure long-term effectiveness.

Alternative 4 will offer the potential for 85 to 95 percent effectiveness of removal of contaminants. Upsets within the system could be diagnosed and corrected by trained operators. However, because of the lower level of operations and maintenance (O&M) required, no telemetry or alarms will be included, and upsets within the treatment system would take longer to discover, diagnose and correct when compared to Alternative 3. Proper operations and maintenance for the treatment ponds and process will contribute significantly to the long-term effectiveness and permanence of this treatment alternative. Alternative 5 offers 75 to 95 percent long-term effectiveness. The greater range in effectiveness results from anaerobic biological processes being less predictable and consistent than chemical precipitation. Upsets within the treatment system could go longer without being identified. Proper operations and maintenance for the treatment ponds/cells and process would contribute significantly to the effectiveness and permanence of this treatment alternative.

The long-term effectiveness of Alternative 2 will potentially range from as low as 25 percent to as high as 90 percent. The larger variability in effectiveness results from uncertainties associated with the competence of fractured bedrock surrounding the underground workings, lack of information concerning geologic conditions and potential sources within the mine workings, and uncertainties concerning the efficiency of the grout curtain. Over time grout curtain and plug material would degrade because of the corrosiveness of the ground water and likely require some form of maintenance approximately every 10 years.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternatives 3, 4 and 5 will all offer treatment, while Alternatives 1 and 2 do not. However, Alternative 2 will reduce toxicity by inhibiting acid generation through mine flooding. Alternative 2 will also reduce mobility and volume by retaining AMD within the mine workings. All treatment alternatives will also reduce the toxicity, mobility and volume of arsenic and other metal contaminants in the AMD. In the treatment process, sludges and wastes are created as a byproduct of all three treatment alternatives and must be properly disposed of in a local repository. Alternative 3 will offer the greatest amount of control of sludges by drying the sludges as part of the treatment process. Alternatives 4 and 5 will require excavation and drying of sludges prior to disposal. Alternative 5 has less process control, resulting in the potential for greater mobility of contaminants when compared to Alternative 4. Alternative 4 is rated higher than Alternative 5.

Short-Term Effectiveness

Alternative 1 will have the least short-term impact because no construction would occur.

Alternative 2 is considered to have the greatest short-term impacts of the alternatives because it will require construction work within the mine, increasing potential risk to construction workers. Alternative 2 will also carry impacts from transport and operation of construction equipment, and the transport of debris and muck to the Luttrell Repository. Alternative 3 will require improving the access road to the Site to allow for year-round Site access. This alternative will carry similar short-term safety concerns as discussed for Alternative 2 because it will also require site construction with some work within the mine. Construction will probably require two field seasons, but when complete the treatment process should be fully effective. Alternatives 4 and 5, through construction disturbance, will impose short-term impacts on the mine sites and the local populations. However, implementation of these alternatives will carry similar safety concerns as previously described, including the need for two construction seasons. When construction is complete, several months may be required before these systems meet their optimal treatment efficiencies, unlike Alternative 3.

Implementability

Implementability includes the evaluation of technical and administrative feasibility as well as the local availability of goods and services to successfully implement the chosen alternative.

Technical Feasibility

Alternative 1 will not involve construction, so no technical constraints exist with regard to its implementation.

Alternative 2 will require specialized services to dewater the mine, re-open the mine portal and construct a safe entry point into the mines. Assessment and inspection of the adit for competence, evaluation of seepage and recharge, and strategic placement of a mine plug will require special mining expertise and equipment. However, these activities are technically feasible to execute.

Technical feasibility constraints associated with Alternative 3 will be the construction and operation of the treatment plant, and providing power to the Site. Technical feasibility challenges associated with Alternatives 4 and 5 are installing the treatment ponds/cells, installation of liners and collection of contaminated ground water. These alternatives are considered equivalent in technical implementability.

Administrative Feasibility

All of the ground water alternatives will require meeting the substantive requirements of a special use permit for using USFS-maintained access roads and constructing treatment facilities on USFS property. In addition, waste sludges generated by the treatment alternatives will have to be characterized and managed in compliance with State and federal solid and hazardous waste regulations. Impacts to wetlands will need to be considered and evaluated. Alternatives 3, 4 and 5 will be equivalent and slightly harder to implement than Alternative 1 or 2.

Availability of Services and Materials

Most of the services and materials associated with the implementation of Alternative 2 will be available regionally.

Alternative 3 will require the construction of a water treatment plant which will require specialized supply and services available regionally. Alternative 3 is ranked lowest of the four action alternatives in availability of services and materials.

Alternatives 4 and 5 will require typical construction capabilities available locally and regionally. These alternatives are equivalent and ranked above Alternatives 2 and 3.

Cost

Proposed alternative costs consist of direct and indirect capital costs and long-term (30-year) O&M costs. Direct capital costs pertain to construction, materials, land, transportation and analysis of samples for proposed alternatives. Indirect capital costs pertain to design, legal fees and permits. O&M costs pertain to maintenance and long-term monitoring and are presented as the present worth value. Ranked by cost, the action alternatives, from most to least costly, are Alternative 3 ($7.1 million), Alternative 2

($5.5 million), Alternative 4 ($4.4 million) and Alternative 5 ($3.8 million). Long-term monitoring costs associated with the Alternative 1 are estimated to be $231,000 over the next 30 years.

State and Community Acceptance

State and community acceptance will be evaluated through the community involvement process. As members and representatives of the State and community provide comments, remedial action alternatives will be re-assessed and potentially modified. State and community concerns will be considered by the EPA during preparation of the interim Record of Decision.

Key Guidance Documents

Key guidance documents used in the study and evaluation of remedial options for the site are as follows:

- The NCP regulations (found at 40 CFR part 300, and the statutory requirements of CERCLA—especially section 121 of CERCLA, 42 U.S.C. & 9621) are the mandatory requirements that the EPA and MDEQ must follow in selecting a remedy.
- In addition, the EPA uses guidance as appropriate in the remedy selection process. Key guidance documents used for the Bullion Mine (OU6) are as follows:
  - *A Guide to Selecting Remedial Superfund Actions*, OSWER No. 9355.0-27FS (EPA, April 1990)
  - *A Guide to Principal Threat and Low Level Threat Wastes*, OSWER No. 9380.3-06FS (EPA, November 1991)
  - *Rules of Thumb for Superfund Remedy Selection*, OSWER No. 9355.0-69 (EPA, August 1997)
  - *Incorporating Citizen Concerns into Superfund Decision Making*, OSWER No. 9230.0-18 (EPA, January 1991)
  - *The Role of Cost in the Superfund Remedy Selection Process*, OSWER No. 9200.3-23FS (EPA, September 1996)
  - *A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents*, OSWER No. 9200.1-23P (EPA, July 1999).

These and other guidance documents are available at http://www.epa.gov/superfund/policy/remedy/index.htm. Copies are available from the EPA upon request.

Preferred Remedy

Preferred Remedial Actions to Address Environmental Risks and Pathways

The preferred remedy for the Bullion Mine focuses on reducing the amount of AMD by controlling surface water and ground water infiltration into the mine workings where possible, and by the capture and treatment of residual AMD to address environmental risks. The discharge from the mine contains the contaminants of concern that present a principal threat to the environment resulting in unsuitable conditions for aquatic life in Jill and Jack creeks. This action will significantly improve the quality of the water in Jill Creek down to its confluence with Jack Creek.

The remedy will also repair a vegetated soil cover over mixed soils throughout the site that were exposed by erosion, improving the stability and productivity of the vegetation at the Bullion Mine. The mixed soils are presently posing an unacceptable risk to vegetation and wildlife. The greatest risk is to smaller wildlife and those that may burrow below the existing cover material. This action will reduce erosion and potential transport of contaminated sediments into the stream.

These actions are expected to significantly reduce contamination entering Jill Creek. They will also improve vegetation community, stability and natural productivity at the Bullion Mine site.

General Cleanup Strategy and Remedial Action Sequencing

Remedial Strategy - The preferred remedy and general cleanup strategy for the Bullion Mine OU6 consists of evaluation and control of surface water and ground water infiltration into the mine workings, followed by treatment of the contaminated discharge from the lower mine adit (Alternative GW-5). Exposed, eroding and contaminated soils will be covered with clean soil and revegetated. The remedy will be implemented primarily within the patented claim boundaries of the Site.

The preferred remedy will address the need to complete a protective interim remedy in a reasonable period of time and at a reasonable cost. Implementation of the cleanup strategy will encompass the following actions:

- Road improvement will be performed to facilitate the safe movement of equipment to, and around, the site.
- Remedial actions start with dewatering of the mine and stabilization of the lower adit portal area. The potential for catastrophic failure of the existing soil/debris plug and release of up to several million gallons of contaminated mine water into Jill Creek drive this action.
- The lower adit portal will be reopened and stabilized. Equipment and mucked waste from the tunnel will be staged near the entrance during construction. BMPs will be applied to the portal and staging area. Site access will be restricted through fencing to prevent unauthorized personnel from entering the construction area. Mine debris cleared from the portal area will eventually be removed to the Luttrell Repository. Surface water and ground water will be evaluated and actions taken to intercept water from entering the mine workings.
- The source water recharge area is geologically complex. Source water control efforts for this interim ROD will be evaluated and actions taken to minimize infiltration into the mine workings. Proposed actions are described below:

  Step 1
  - *Review existing information and look for additional information on the extent of the mine workings. Identify mine features not observed during the RI that may have a surface expression that would allow water to enter the workings.*
  - *Perform a final site reconnaissance to locate areas that could act as a conduit for surface water into the mine.*
  - *Investigate and evaluate ground water inflow and contaminant release locations.*
  - *Identify strategic locations for surface water control features to capture and convey snowmelt and rainfall away from areas above the underground workings.*

  Step 2
  - *Design seals for mine features identified in Step 1.*
  - *Design water control features for conveyance away from areas above the underground workings and into adjacent drainages to limit ponding and infiltration.*

  Step 3
  - *Construct surface and ground water seals, and water control and conveyance features.*
  - *Continue to monitor lower adit discharge to gauge impact on flow.*

  Step 4
  - *Design an appropriate treatment system, using flow rates adjusted after source water control actions have been implemented.*
- A semi-passive treatment system will be constructed. Contaminated ground water and surface water downgradient of the mine will be collected via a ground water cut-off wall. Adit discharge will be collected by a diversion structure and conveyed to the treatment alternative. Two parallel treatment trains will be installed to allow for one to be out of service for maintenance or repairs while the other serves treatment needs (see Alternative GW-5).
- Areas of contaminated soil exposed by erosion of the previous cap material will be identified, regraded, amended with topsoil and revegetated. Debris will be strategically placed over the reclaimed areas to discourage ATV use.
- The nature and extent of contaminated sediment in Jill Creek represents considerable exposure to ecological receptors. Treatment of source materials in the mine discharge and natural processes, such as high annual spring flows, will mitigate risk to the aquatic environment. Without active sediment contributions from the mine area, the shallow bank and channel sediment deposits beyond the southern boundary of the site will remediate through scour, mixing and other natural recovery processes, which will be monitored. Stream sediments will not be actively remediated downstream of the Site boundaries.

- Institutional controls (ICs) to prohibit residential use, prevent installation of drinking water wells and to protect the remedy will be required throughout the mine site. ICs refer to administrative land management methods necessary to maintain the effectiveness of the remedy and protect human health by preventing exposure to contaminated soil and ground water that creates an unacceptable risk to human health. ICs will be tailored to the size, location and complexity of the area.
- The EPA and MDEQ will work with adjacent landowner agencies (primarily USFS) on the specific application of this remedy. The agencies will work to ensure that ICs are protective of human health and compatible with existing and reasonably anticipated future land use in the area.

Sequencing Remedial Activities – In general, the proposed sequence of remedial actions for the Bullion mine is presented in the following text. This sequence may change once remedial design begins and the allocation/timing of funding becomes clearer.

1. Improve access roads to and from the Site. Complete bench scale testing for a semi-passive water treatment system. Design a semi-passive water treatment system.
2. Remove pooled mine water, open lower adit and stabilize adit area.
3. Design/construct source water control conveyance features to divert water away from underground workings and integrate into the Site soil stabilization and revegetation actions.
4. Construct the semi-passive water treatment system. Because of the location of the lower discharging adit, and steep, narrow topography, the water treatment system may extend onto a small portion of USFS land south and west of the Site.
5. Apply clean, amended soil cover to selected areas with excessive erosion.
6. Initiate remedial operations, maintenance, and monitoring.

The cost of the preferred remedy is estimated to be in the range of $3 to $4 million. The sequencing of remedial actions will depend on EPA funding. Implementation of remedial actions will be matched to anticipated funding levels until the project is complete.

Remedial Actions to Address Human Health

The Proposed Plan identifies the following actions which are necessary to ensure protection of human health at the Bullion Mine (OU6) and are otherwise appropriate under CERCLA.

- The nature and extent of exposed impacted soils at the site are defined by the remedial investigation and are significant for a number of contaminants. For the protection of human health, amended soil cover and vegetation will be used for select areas with excessive erosion to prevent or reduce human exposure to arsenic contaminated soils.
- Woody debris and rocks will be strategically placed to discourage ATV use. Exposure pathways blocked by this action include incidental ingestion, dust inhalation or direct contact that pose an unacceptable health risk.
- The Site is located above 7000 feet in elevation in steep mountainous country and is unlikely to be a desirable permanent residential setting. The EPA will work with the landowners to assure residential development does not occur at the Site through institutional controls.
- Institutional controls to prevent ground water use onsite will be developed by the EPA with the assistance of the State and Jefferson County, and implemented through deed restrictions or zoning requirements to prevent domestic use of the local surface and ground water.

The Role of Institutional Controls

Institutional controls (ICs) will consist of a combination of legal and administrative controls, physical controls and informational controls (community awareness activities) to restrict access and use of contaminated areas and provide awareness of risks from exposure. The legal and administrative controls will be tailored to the property to provide protection of human health and to maintain the integrity of the remedy to the extent possible.

As described in the preferred remedy, ICs are important parts of the selected remedy. Presented here is a general description of the ICs that the EPA sees as necessary for the remedy. The EPA and MDEQ will carefully evaluate these aspects of the remedy during the public comment period. The ROD will provide a more detailed description of ICs, after consideration of public comment. The ICs are generally described as follows:

- Educational efforts for recreational users concerning the need to prevent incidental intake or ingestion of surface water in the vicinity of the Bullion Mine site. The EPA plans to work with local and county officials for implementation of this program.
- Prevention of ground water use for domestic consumption or activities that may spread ground water contamination at the operable unit. Several mechanisms could be used to implement this institutional control including local and county ordinances, or specific deed restrictions or easements on contaminated land.
- Restrictions that protect the remedy and promote the appropriate management of revegetated areas so that recreational use of these areas can occur, while the important revegetation efforts are protected, comply with ARARs and are sustained over time.
- Restrictions that prevent residential or commercial use, because the soil cleanup level is based upon recreational exposure.
- Fencing may be needed to discourage public access to the AMD treatment system.
- Boulders and large woody debris may be needed to discourage ATV users from disturbing the onsite repository and re-vegetated areas.

In order to track and measure progress toward achieving cleanup goals at the Bullion Mine site, a monitoring program that includes physical, chemical and biological components is essential. It will be structured to detect and evaluate improvements and failures.

On the basis of information currently available, the EPA believes that the preferred remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The EPA expects the preferred remedy to satisfy the following statutory requirements of CERCLA section 121(b):

- Be protective of human health and the environment.
- Comply with ARARs, except for those waived.
- Be cost effective.
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.
- Satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

The EPA, in consultation with MDEQ, also considers general program goals and expectations found in the NCP at 40 CFR section 300.430(a) when proposing a preferred remedy and ultimately selecting a final remedial action. Section 430(a)(1)(iii)(A) and EPA guidance states the EPA's expectation that principal threat wastes will be addressed with reliable "treatment." The semi-passive treatment for AMD provided by alternative GW-5 meets this expectation.

Section 430(a)(1)(iii)(F) emphasizes the importance of restoring ground water to beneficial uses or, at least, preventing migration and exposure to contaminated ground water. This important consideration led the EPA, in consultation with MDEQ, to propose a preferred alternative that relies on effective surface water/ground water control and on the treatment of residual AMD. This preferred alternative contributes to compliance with ARARs and provides for a long-term and permanent remedy. Section 430(a)(1)(i) describes an important goal of maintaining protection over time, and a remedy proposing stabilization of the soil cover with the capture and semi-passive treatment of the AMD is best suited to meet this goal.

Preferred Remedy Implementation

Timing of the remedial actions is an important implementation issue. The construction season for a high elevation site such as the Bullion Mine is approximately 4 to 5 months. Successful implementation of the remedy, in the shortest period of time, will need to consider this factor in planning the action. The overall project timeline for this project is projected to be 2 to 3 years. This estimate may change during the design and construction phase.

Community Involvement

Written Comments

Send written comments to:

Bullion Mine (OU6) Comments
Kristine Edwards
U.S. EPA Region 8 (8MO)
10 W. 15th St.; Suite 3200
Helena, MT 59626

You may also comment in-person on the record at the public meetings listed below.

Public Meetings

The EPA will hold a public meeting on March 19, 2014, from 6:30 to 8:30 p.m. at the Community Center in Basin, Montana.

This will be an opportunity to provide written or oral comments.

Who to Contact with Questions or Concerns

U.S. Environmental Protection Agency
Kristine Edwards, Remedial Project Manager
(406) 457-5021
Edwards.kristine@epa.gov

Montana Department of Environmental Quality
Dick Sloan, State Project Manager
(406) 841-5046
RSloan@mt.gov

Public Comment Period

EPA will accept written comments on this Proposed Plan beginning on March 7, 2014, and ending on April 21, 2014. EPA will make its final decision on the cleanup only after considering public comments. At the end of the comment period, EPA will include a responsiveness summary addressing the comments in the ROD. EPA will place all written comments and the Responsiveness Summary in EPA's Administrative Record for the Bullion Mine (OU6).

Documents

The Administrative Record for the site contains the documents that have been used to make decisions on how to clean up the site. The record can be reviewed at:

EPA Records Center
10 West 15th Street, Suite 3200
Helena, MT 59626
Phone: (406) 457-5046
Monday through Friday

Some repositories have a microfilm version of the record.

Information Repositories
Boulder Community Library
202 S. Main, P.O. Box 589
Boulder, MT 59623

Useful Terms

Understanding environmental cleanup may be confusing for the average person. The following definitions of terms commonly used will assist your understanding of this document.

Term	Definition
Acid Mine Drainage	Mine drainage is metal-rich water formed from chemical reaction between water and rocks containing sulfur-bearing minerals. The runoff formed is usually acidic and frequently comes from areas where ore or coal mining activities have exposed rocks containing pyrite, a sulfur-bearing mineral. Metal-rich drainage can also occur in mineralized areas that have not been mined.
Applicable or relevant and appropriate requirements (ARARs)	ARARs are any standard, requirement, criteria or limitation under federal environmental law or more stringent promulgated standard, requirement, criteria or limitation under State environmental or facility siting law that is legally ‘applicable’ to the hazardous substance (or pollutant or contaminant) concerned or is ‘relevant and appropriate’ under the circumstances of the release.
Exposure	The amount of pollutant present in a given environment that represents a potential health threat to living organisms.
Exposure Pathway	How contaminants move from sources to humans and environmental receptors via paths such as dermal contact, ingestion or inhalation.
Institutional Controls	Non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy.
Land Use Controls	Land-use controls typically consist of a combination of institutional controls (legal and administrative controls), access controls (physical controls) and community awareness activities to restrict access and use of contaminated areas and provide awareness of risks from exposure.
National Priorities List (NPL)	The EPA’s list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under Superfund. A site must be on the NPL to receive money from the Trust Fund for remedial action.
Operable Unit (OU)	A designation based on geography or other characteristics that define a specific area of a site and enables the Superfund process to move forward in different areas at different times, speeding up the overall cleanup process at the site.
Operation and Maintenance (O&M)	Activities conducted after a Superfund site action is completed to help sustain the effectiveness of the remedial action.
Present Value	The present worth (of a sum payable in the future) calculated by deducting interest that will accrue between the present and future date.
Remedial Action (RA)	The actual construction or implementation phase of a Superfund site cleanup that follows remedial design.
Record of Decision (ROD)	A public document that explains which cleanup alternative(s) will be used for the final remedy at NPL site.
Remedial Investigation (RI)	An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site; establish site cleanup criteria; identify preliminary alternatives for remedial action; and support technical and cost analyses of alternatives typically described in more detail in a co-associated FS.
Superfund	The program that funds and carries out EPA hazardous waste emergency and long-term removal and remedial activities. These activities include establishing the NPL, investigating sites for inclusion on the list, determining their priority, and conducting and/or supervising cleanup and other remedial actions.
Watershed	A watershed is literally any sloping surface that sheds water, but the proper definition (Webster’s) implies a topographic divide that sheds water into two or more drainage basins. Watershed is synonymous with drainage basin or catchment.