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Proposed Plan for Interim Remedial Actions

Bonita Peak Mining District Superfund Site

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United States Environmental Protection Agency

Forest Service, U.S. Department of Agriculture

CDPHE COLORADO Department of Public Health & Environment

Introduction

This document is the U.S. Environmental Protection Agency's (EPA's) *Proposed Plan for Interim Remedial Actions* (IRAs) at the Bonita Peak Mining District Superfund Site (the Site) in San Juan County, Colorado. It identifies the IRAs considered at 26 mining-related sources (Exhibits 1 and 2) and EPA's preferred alternative to address contaminant migration issues. EPA is the lead agency and, in consultation with the Colorado Department of Public Health and Environment (CDPHE) and U.S. Forest Service (USFS), will select final IRAs for some or all the sources after reviewing and considering public comment.

The agencies may modify the preferred alternative based on new information or public comment. Therefore, the public is encouraged to review and comment.

The proposed plan addresses five different contaminant migration issues:

- Mine portal mining-influenced water (MIW) discharge
- Mining-related sources/stormwater interactions
- Mine portal pond sediments
- In-stream mine wastes
- Mining-impacted recreation staging areas

EPA, CDPHE, and USFS completed an initial characterization of mining-related sources where IRAs might be beneficial based on technical work and data already collected.

The IRAs will stabilize source areas, reduce contaminant loading, provide information to support the ongoing Site-wide remedial investigation (RI), and provide "lessons learned" for future studies addressing larger and more complex sources. Results will be evaluated and incorporated into the eventual Site-wide RI and feasibility study (FS). Performance information collected from these actions will assist EPA in deciding the scope and necessity of future IRAs before a Site-wide record of decision (ROD) is issued.

This proposed plan provides an overview of the Site mining history, contamination, cleanup work completed, and remaining risk. It summarizes the IRA alternatives being considered and details the preferred alternative and supporting rationale.

Public Comment Opportunities

Issuance of the proposed plan starts the 30-day public comment period **(June 14 to July 16, 2018)**. At the end of that period, EPA will review and consider all comments and determine whether to move ahead with the preferred alternative as written, modify it, or develop other IRAs. EPA's final risk management and cleanup decisions will be published in an interim record of decision (IROD). The IROD will include a responsiveness summary in which EPA and the USFS will address public comments.

Page 16 explains how to provide comment, attend the public meeting, and get information on the IRA or the entire Site.

The Superfund Process

EPA has adopted an adaptive management strategy to approach cleanup at the Site. It allows for the agency to

continue progress on the Site-wide RI while data collected are continuously evaluated to determine the need or capability to implement IRAs. EPA has completed a preliminary RI for the IRAs presented in this proposed plan.

Site-wide RI/FS/ROD

Under the Site-wide RI, EPA and its federal and state partner agencies are investigating the source, nature, and extent of contamination across the Site. The RI will also assess risk to human health and the environment and will support the evaluation of contributions of sources to waterways. It will also identify where additional information is needed to fully characterize the Site and determine actions needed to protect human health and the environment. The RI will be followed by a FS that will evaluate options for cleanup and a proposed plan and ROD that will propose and select alternatives for Site-wide cleanup.

Interim Remedial Actions

IRAs for the 26 mining-related sources (Exhibits 1 and 2) will be conducted concurrent with the Site-wide RI. Because the actions are interim and not final, the IRA process is more streamlined than the traditional Superfund process. For example, the number and range of alternatives evaluated is reduced and evaluation criteria not directly relevant to the IRA—such as reduction of toxicity, mobility or volume through treatment—are not discussed in detail. The process used is shown below.

Preliminary RI and Risk Information

A preliminary RI memorandum and human health risk/ ecological risk memoranda were completed concurrent with the development of the focused feasibility study (FFS) and included as appendices in the FFS report. The information is used to characterize conditions, determine the nature of contamination, and summarize risks to human health and the environment.

Focused Feasibility Study

The FFS uses existing site information to identify, develop, and evaluate remedial alternatives (cleanup options) that will address unacceptable risks from contaminant migration issues. It also:

- Identifies preliminary remedial action objectives (PRAOs)
- Identifies potential remedial technologies that will satisfy these PRAOs
- Assembles remedial alternatives that can protect human health and the environment
- Conducts a detailed analysis of the alternatives

Proposed Plan

The proposed plan for the IRAs briefly summarizes alternatives developed in the FFS and highlights key factors that led to identifying a Preferred Alternative for each of five contaminant migration issues. A 30-day public comment period allows the State of Colorado and communities to provide comment.

A proposed plan is required by EPA's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan.

Interim ROD

The interim ROD (IROD) documents the Agency's decision for IRAs and responds to public comment in the form of a responsiveness summary.

Site Characteristics

As described in the National Priorities List (NPL) documentation, the Site is centered in southwestern Colorado, in San Juan County, in the headwaters of the Animas River watershed. It includes three tributaries of the Animas River: Mineral Creek, Cement Creek, and Upper Animas River. The Animas River flows south from Silverton to Durango, Colorado, crosses into New Mexico, and joins the San Juan River in Farmington, New Mexico.

The NPL documentation identified 48 mining-related sources. It includes 35 mines, 7 tunnels, 4 tailings impoundments and 2 study areas where additional information is needed to evaluate environmental concerns. The 26 mining-related sources in this proposed plan are located over 3 watersheds (Exhibits 1 and 2).

Mining-Related Source		Mine Portal MIW Discharges	Mining-Related Source Stormwater Interactions	Mine Portal Pond Sediments	In-Stream Mine Wastes	Mining-Impacted Recreation Staging Areas
Mineral Creek	Bandora Mine	X	X			
	Brooklyn Mine	X	X	X		
	Junction Mine	X		X		X
	Koehler Tunnel	X		X		X
	Longfellow Mine					X
Cement Creek	Anglo Saxon Mine	X		X		
	Grand Mogul Mine		X		X	
	Henrietta Mine	X				
	Mammoth Tunnel	X		X		
	Natalie/Occidental Mine	X				
	Yukon tunnel	X	X			
Upper Animas River	Ben Butler Mine		X			
	Ben Franklin Mine	X	X			
	Boston Mine				X	
	Columbus Mine	X	X			
	Frisco/Bagley Tunnel	X		X		
	London Mine	X				
	Mountain Queen Mine	X	X			
	Pride of the West	X				
	Silver Wing Mine	X	X	X		
	Sunbank Group Mine	X	X	X		
	Terry Tunnel	X				
	Tom Moore Mine	X				
	Vermillion Mine	X	X			
	Campground 4					X
	Campground 7					X

Exhibit 1. Mining-Related Sources and Contaminant Migration Issues

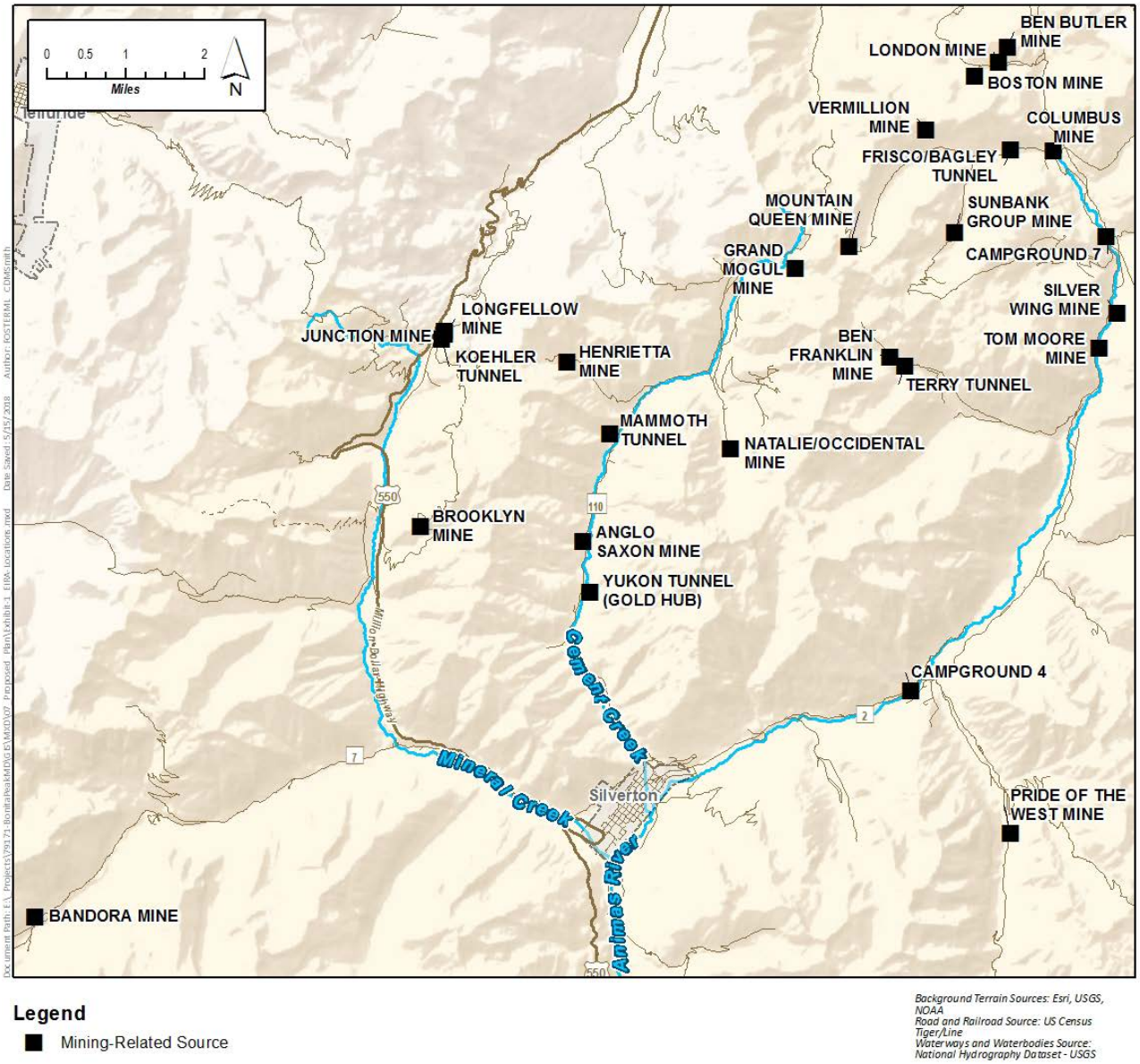

Exhibit 2. Location of Mining-Related Sources

Site Background

The Site is centered in an area where mining activities began in the 1870s. Completion of roads and railroads and a smelter in Durango encouraged mining, as did improvements to technologies used to concentrate low-grade ore. Falling metal prices in the 1890s led to a decrease in mining and closed many small operations. Major operations in the Eureka district included Sunnyside and Gold King mines. By the 1970s, only one year-round active mine (Sunnyside Mine), which closed permanently in 1991, remained in the county.

The Site was proposed for addition to the NPL in April 2016 and added in September 2016. Since then, there have been single or multiple rounds of:

- High- and low-flow surface water quality sampling and stream flow monitoring
- Sediment sampling
- Pore water sampling
- High- and low-elevation groundwater sampling
- Soil/waste rock sampling, including campground, road, and overbank sampling

Source and Nature of Contamination

The Site-wide RI is centered on determining the nature and extent of contamination in the source areas. For the 26 mining-related sources included in this proposed plan, elevated concentrations of multiple mining-related contaminants have been found in one or more media (surface water, sediment, soil, and waste rock). Results of synthetic precipitation leaching procedure analysis from waste rock in some locations have exceeded applicable water quality criteria for acute aluminum, cadmium, copper, lead, and zinc. The chronic standard has been exceeded for iron and, less often, for aluminum.

Conceptual Site Model

A conceptual site model is a basic description of how contaminants enter the environment, how they are transported, and what routes of exposure to organisms and humans occur. It provides a framework for assessing risks from contaminants, developing remedial strategies, and determining source control requirements and methods to address unacceptable risks. A preliminary model is provided in the preliminary RI (Appendix A of the FFS), and a comprehensive conceptual site model will be included in the Site-wide RI. Contaminants in the 26 IRA mining-related sources migrate via MIW discharge to surface water and erosion (wind, water, or sloughing) of waste piles.

Contaminant Migration Issues

Each of the 26 mining-related sources identified for IRAs in this proposed plan (Exhibits 1 and 2) addresses chemicals of potential concern (COPCs) for one or more of five contaminant migration issues. COPCs are chosen for a site based on an evaluation of analytical data and relationship of measured levels to background levels.

Mine Portal MIW Discharges

There are 20 mining-related sources (Exhibit 1) where MIW is discharged from a mine portal or opening that is partially obstructed by waste or debris, or where there is a clear interaction between discharged mine portal MIW and mine wastes. Discharge onto adjacent mine wastes could increase the potential for erosion or mass wasting of COPCs as sediment and/or cause leaching of COPCs from the wastes. Partial obstructions of the mine portal can also impound MIW, sediments, and precipitates within unstable mine workings that could then be released to surface water when the partial blockage is removed.

Mining-Related Source/Stormwater Interactions

Mining-related source/stormwater interaction is a concern at 11 mining-related sources (Exhibit 1). This occurs where upgradient stormwater interacts with mine waste or enters a mine portal. Co-mingling of stormwater and mining-related sources transports COPCs to surface water by generation of additional MIW and/or erosion and transport of COPCs as particulates.

Mine Portal Pond Sediments

At eight mining-related sources (Exhibit 1), settling ponds reduce metals concentrations from mine portal MIW discharges. The process creates residual sludge and sediment, which accumulate in the ponds. This reduces pond capacity and length of time MIW is retained in the ponds, which lowers transport time of COPCs to surface water. The accumulated pond sediments also have the potential for release of COPCs (both as particulates and MIW) to surface water during storm events or snowmelt.

In-Stream Mine Wastes

At two mining-related sources (Exhibit 1), mine wastes that are entirely within a stream or that comprise both banks of the channel. The waste impedes stream flow and releases COPCs to surface water from generation of additional MIW and/or erosion and transport of COPCs in particulate form.

Mining-Impacted Recreation Staging Areas

There are five mining-related sources used as staging areas for recreational uses (e.g., established campgrounds or dispersed campsites). A dispersed campsite is an area that is suitable for camping or where camping is known to occur but may not be a formal campground. At these five mining-related sources, mine waste or contaminated soil exceeds human health risk-based levels for arsenic and lead. Recreation staging uses that are sedentary such as camping result in repeated surface disturbances that

result in potential exposures of recreational human receptors to arsenic or lead.

Potential Receptors and Exposure Pathways

For the IRA, potential human and ecological receptors and their exposure pathways are:

- **Human Health**. Potential receptors are campers (children) and the exposure pathway is incidental ingestion and inhalation of soil and mine waste during camping.
- **Ecological**. Potential receptors are aquatic receptors, primarily fish and benthic macroinvertebrates (BMIs). BMIs are small aquatic animals and the aquatic larval stages of insects found at the bottom of surface water bodies. Exposure pathways for these organisms are ingestion and direct contact with surface water.

Risks to other potential receptors beyond this IRA are discussed in forthcoming human health and ecological risk assessments.

Human Health Risk Information

Human health risk-based levels for comparison to the IRAs for mining-related sources were developed as part of the FFS. The camping scenario was used because it is a sedentary receptor and allows for the evaluation of small exposure areas, such as individual campgrounds. Focus was placed on exposure to children because they are often more vulnerable to pollutants than adults and soil ingestion is higher due to increased frequency of contact through hand-to-mouth or object-to-mouth activity. Exposure parameters for the IRA risk-based levels were based on child-specific camping soil ingestion rates and EPA-default inhalation rates.

Interim remedial actions are recommended at Longfellow, Koehler, and Junction to reduce risk to elevated levels of arsenic in waste rock piles at these locations (greater than 1,419 milligrams per kilogram [mg/kg]). Interim remedial actions are recommended at Campgrounds 4 and 7 to reduce risk to elevated levels of lead in soil (greater than 2,081 mg/kg lead).

Ecological Risk Information

Ecological risk evaluation focused on aquatic risk, primarily fish. BMI communities in most reaches are also at risk; many of the factors limiting BMIs are like those limiting fish communities. Aquatic life is unlikely to be directly exposed to MIW discharges, but where those discharges enter the receiving stream, they can significantly increase in-stream metals concentrations, contributing to ecological risks.

EPA uses hazard quotients (HQs) based on Colorado's chronic aquatic life water quality criteria to evaluate ecological risk. If a HQ exceeds one, the risk of adverse effects to an exposed organism may be a concern, and the probability and/or severity of an adverse effect increases as the value of the HQ increases. Across the IRA mining-related sources, the maximum surface water concentrations for aluminum, cadmium, copper, and zinc are far elevated above water quality criteria at many locations with HQs greater than 100.

The health of aquatic ecosystems in the Animas River and its tributaries is limited by high concentrations of toxic metals coming from mining-related and natural sources throughout the watershed. Aquatic life does not exist in some locations and, in other locations, metals-tolerant organisms may persist at low populations.

PRAOs

PRAOs are goals developed by EPA to protect human health and the environment at the Site. These are the overarching goals that all the IRAs must meet. EPA considers current and future use of the Site when determining PRAOs.

Ecological

1. Reduce transport from mine waste, contaminated soil, and contaminated sediment into surface water of COPCs that contribute to unacceptable ecological risks.

Human Health

1. Reduce human exposure through ingestion and inhalation to mine waste and contaminated soils containing lead that results in greater than a 5

percent chance of exceeding a blood lead level of 5 micrograms per deciliter during camping activities.

2. Reduce human exposure through ingestion to mine waste and contaminated soils containing arsenic that exceeds risk-based levels for acute exposures during camping activities.

EPA will measure the extent by which ecological and human health risks associated with contributions from the mining-related sources have been reduced by the actions. These data will provide information about the effectiveness of the IRAs and will help inform future remedial decisions at the Site.

Summary of Remedial Alternatives

Alternatives for the 26 mining-related sources (Exhibits 1 and 2) were screened for the 5 different contamination migration issues:

- Mine portal MIW discharges
- Mining-related source/stormwater interactions
- Mine portal pond sediments
- In-stream mine wastes
- Mining-impacted recreation staging areas

Each issue was evaluated for the no action alternative (as required by Superfund) and for an additional alternative. This subsection describes the alternatives and summarizes the comparative analysis against threshold and balancing criteria. This is discussed in much greater detail in the FFS report. Cost estimates include capital, annual operation and maintenance (O&M), periodic O&M, and present value cost (cost over time in today's dollar value) for the total work at all locations. The accuracy range is +50 to -30 percent.

Applicable or Relevant and Appropriate Requirements

All alternatives (except no action) are expected to comply with applicable or relevant and appropriate requirements (ARARs) unless a legal waiver is invoked as provided by CERCLA. For the IRAs, compliance with an ARAR may not be possible for certain components of remedial alternatives (such as dewatering, interim waste management, and state water quality standards for COPCs) as the actions are interim in scope and do not address all contaminated media posing unacceptable human health and ecological risks. The CERCLA interim measures waiver was evaluated in the FFS in detail for use where needed.

CERCLA states, "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section." However, onsite work must comply with substantive permit requirements and EPA will determine what those requirements are in the remedial design to ensure they are met.

Common Elements

All alternatives, except no action, share the following common elements that will be applied as needed:

Pre-Construction Common Elements

- Pre-construction surveys (property boundary, cultural resources, habitat, and wetland delineation)
- Erosion and sediment control measures to protect nearby areas

Construction Common Elements

- Generation and use of uncontaminated borrow outside of mining-related sources, yet within the Site, for construction and access roads
- Dust suppression (water- or chemical-based) to eliminate contaminant migration during field work
- Access road improvements to provide temporary access (restored to original condition)
- Site rehabilitation/reclamation to restore areas disturbed during remedial action

Post-Construction Common Elements

Institutional controls (ICs) to provide awareness of the need to protect the remedy (on federally managed lands and on private properties with mining-impacted recreation staging areas) and to protect human health at mining-impacted recreation staging areas. The objectives of the ICs would be to prevent activities which would disturb constructed remedy components and prevent uses inconsistent with current and reasonably anticipated future land uses.

Annual or Periodic Monitoring Common Elements

- Remedy performance monitoring (surface water measurements and/or sample collection and analysis) to evaluate the effectiveness of the remedy
- Five-year reviews conducted in conjunction with Site-wide activities

Each remedial alternative has additional components specific to that alternative as described below.

Mine Portal MIW Discharges

Twenty mining-related sources (Exhibit 1) have mine portal MIW discharges that would be addressed in the IRA using one of two remedial alternatives.

Alternative A1 – No Action

- Total Capital Cost: None
- Total Annual O&M Cost (15 years): $0
- Total Periodic O&M Cost (15 years): $0
- Total Alternative Cost (Present Value [PV]): $0
- Construction Timeframe: none

Superfund requires that EPA retain a no action alternative as a baseline for comparison to other alternatives. This alternative would leave the mining-related source "as is," and no action would be taken.

Alternative A2 – Diversion/Isolation

- Total Capital Cost: $1,082,000
- Total Annual O&M Cost (15 years): $1,890,000
- Total Periodic O&M Cost (15 years): $301,000
- Total Alternative Cost (PV): $2,411,000
- Construction Timeframe: one season for individual mining-related sources, up to 5 years for all sources

Alternative A2 would use diversion and isolation (new construction and/or maintenance of existing features) to route mine portal MIW discharge around contaminated mine waste.

Components would be chosen on a location-by-location basis. Open channels typically would be constructed to collect mine portal MIW discharge and divert it around existing mine waste. The construction of berms immediately upgradient of mine waste, collection/diversion piping or liners, or a combination of multiple types of components are viable for locations that are not conducive to open channel diversion. Berms would be preferred where there are underlying rock surfaces, while collection/diversion piping or liners would be considered where there are steep slopes, roads, or other challenging features. Where there are existing MIW diversion or isolation components, repairs would be conducted to improve their condition.

Mine wastes or other materials at the portal entrance that are partially obstructing free flow of MIW discharge would be excavated, as would wastes in the path of an open channel diversion. Excavated wastes would be gravity dewatered. Additional dewatering could be implemented for saturated materials through use of a dewatering agent, as needed, for handling and stability. Physical characterization, such as analysis of geotechnical parameters would be conducted as needed, on excavated and dewatered mine waste to evaluate physical stability.

Excavated wastes would be managed locally on an interim basis and would include best management practices (BMPs). Final remedial approaches for managed wastes would be addressed as part of future remedy decisions and response actions.

Visual monitoring would be conducted and maintenance performed as needed, to maintain the integrity of newly constructed and existing components and to maintain the integrity of the waste management locations.

Mining-Related Source/Stormwater Interactions

Eleven mining-related sources (Exhibit 1) have issues related to source/stormwater interaction that would be addressed using one of two alternatives.

Alternative B1 – No Action

Same as Alternative A1.

Alternative B2 – Stormwater Diversion/ Isolation

- Total Capital Cost: $1,035,000
- Total Annual O&M Cost (15 years): $1,260,000
- Total Periodic O&M Cost (15 years): $147,000
- Total Alternative Cost (PV): $1,889,000
- Construction Timeframe: one season for individual mining-related sources, up to 5 years for all sources

Alternative B2 uses diversion and isolation of stormwater to reduce its interactions with mining-related wastes. It would involve construction and/or maintenance of diversion and isolation components to route stormwater around mine portals and/or contaminated mine waste.

Diversion or isolation components would be chosen on a location-by-location basis. Open channels typically would be constructed to divert stormwater around existing mine waste. The construction of berms immediately upgradient of mine waste, collection/diversion piping or liners, or a combination of multiple types of components are viable for locations that are not conducive to open channel diversion. Berms would be considered at locations with underlying rock surfaces while collection/diversion piping or liners would be considered where steep slopes, roads, or other features exist that would pose challenges.

Subsurface components (such as interception trenches or French drains) might also be used in conjunction with surface components, to intercept stormwater that has infiltrated into the shallow subsurface and divert it around mine portals or mine waste.

Where there are existing stormwater diversion or isolation components, repairs would be made to improve conditions. Wastes generated from excavation for stormwater diversion components are assumed to be uncontaminated and do not have handling and management requirements beyond BMPs for erosion and sedimentation.

Excavated wastes would be managed locally on an interim basis and would include BMPs to address fugitive dust and potential erosion and sedimentation issues. Final remedial approaches for managed wastes would be addressed as part of future remedy decisions and response actions.

Visual monitoring would be conducted and maintenance performed, as needed, to maintain the integrity of newly constructed and existing components.

Mine Portal Pond Sediments

Eight mining-related sources (Exhibit 1) have mine portal pond sediments that would be addressed using one of two alternatives.

Alternative C1 – No Action

Same as Alternative A1.

Alternative C2 – Excavation and Interim Local Waste Management

- Total Capital Cost: $1,355,000
- Total Annual O&M Cost (15 years): $1,110,000
- Total Periodic O&M Cost (15 years): $2,387,000
- Total Alternative Cost (PV): $3,384,000
- Construction Timeframe: one season for individual mining-related sources, up to 5 years for all sources

Alternative C2 uses excavation to remove pond sediments to allow continued pond function. Prior to sediment removal, the ponds would be drained and MIW would be managed at the location without treatment or discharge to local waters.

MIW would be diverted and sediment excavated. Where multiple ponds exist, MIW would be diverted from one pond to another during excavation. Where only one pond exists, a berm would be constructed, and MIW would be diverted to one side while sediment is removed from the other. Other functional issues of the ponds would be addressed through construction or repair of berms.

Excavated sediments would be gravity dewatered at the location. Additional dewatering, if needed, would be provided by amending the sediments to ensure geotechnical stability. Physical characterization of excavated and dewatered sediment may also be conducted (see Alternative A2). Excavated sediments would be managed locally on an interim basis and would include BMPs. Final remedial approaches for managed wastes, if necessary, would be addressed as part of future remedy decisions and response actions.

Visual monitoring of berms and excavated sediments would be conducted and maintenance performed, as needed, to remove future accumulation of sediment in ponds and to maintain the integrity of berms and waste management locations.

In-Stream Mine Wastes

Two mining-related sources (Exhibit 1) have in-stream mine wastes that would be addressed using one of two alternatives.

Alternative D1 – No Action

Same as Alternative A1.

Alternative D2 – Excavation and Interim Local Waste Management

- Total Capital Cost: $340,000
- Total Annual O&M Cost (15 years): $405,000
- Total Periodic O&M Cost (15 years): $63,000
- Total Alternative Cost (PV): $624,000
  Construction Timeframe: one season for individual mining-related sources, up to 5 years for all sources

Alternative D2 uses excavation to remove in-stream mine wastes that impede flow or are susceptible to erosion or leaching of contaminants. Excavated wastes would be gravity dewatered outside the stream channel adjacent to the source. Additional dewatering, if needed, will be provided by amending the in-stream mine waste to ensure geotechnical stability. Physical characterization of excavated and wastes may also be conducted (see Alternative A2).

Excavated wastes would be managed locally on an interim basis and would include BMPs to address fugitive dust and potential erosion and sedimentation issues. Final remedial approaches for managed wastes would be addressed as part of future remedy decisions and response actions.

Monitoring of waste through visual inspections would be conducted and maintenance performed, as needed, to maintain the integrity of the waste management locations.

Mining-Impacted Recreation Staging Areas

Five mining-related sources have in-stream mine wastes that would be addressed using one of two alternatives.

Alternative E1 – No Action

Same as Alternative A1.

Alternative E2 – Containment/Isolation

- Total Capital Cost: $1,210,000
- Total Annual O&M Cost (15 years): $135,000
- Total Periodic O&M Cost (15 years): $623,000
- Total Alternative Cost (PV): $1,689,000
- Construction Timeframe: one season for individual mining-related sources, up to 5 years for all sources

Alternative E2 uses containment/isolation of mine wastes to reduce disturbances of mine wastes and migration of contaminants at dispersed campsites. A combination of different types of covers depending on land use would be used to provide an exposure barrier and eliminate surface exposure of mine waste or contaminated soil to campers. The covers would be sloped to promote drainage and minimize erosion.

Specific cover types would be determined based on land use and availability of sufficient suitable materials. Aggregate (rock) covers would be used in dispersed campsite areas with continuous vehicle traffic (such as parking areas or guided tour start locations) and along stream banks. Soil covers would be used in dispersed campsite areas not exposed to continuous vehicle traffic, such as campgrounds. Land use would also determine if covers are revegetated or otherwise reclaimed. Vegetated covers would be amended with organics, lime, and fertilizer and seeded.

Monitoring of covers through visual inspections would be conducted and maintenance performed, as needed, to maintain the integrity of the covers.

Alternatives Evaluation

The alternatives described above were evaluated in the FFS report against the Superfund evaluation criteria. Those criteria are divided into three groups: threshold, balancing, and modifying (Exhibit 3). Each alternative (except no action) was first compared against the two threshold criteria, which *must* be met for an alternative to be selected. Alternatives A2 through E2 passed that evaluation.

All alternatives were evaluated against the five primary balancing criteria to weigh the main differences between them. Evaluations against modifying criteria will not be made until after the public comment period ends, as comments are an important indicator of acceptance.

The evaluations against threshold and balancing criteria for each alternative are discussed on the following pages and illustrated in Exhibit 4. Results of evaluation for modifying criteria will be discussed in the final remedy decision and the IROD. The FFS report provides

a more detailed and comparative analysis of the evaluation criteria.

Threshold Criteria

1. **Overall Protection of Human Health and the Environment.** Are human health and the environment adequately protected by eliminating, reducing or controlling exposures?
2. **Compliance ARARs.** Are federal and state environmental statutes, regulations, and other requirements that pertain to the alternative met? If not, is a waiver justified?

Primary Balancing Criteria

3. **Long-term Effectiveness and Permanence.** What is the magnitude of residual risk from untreated wastes? Are human health and the environment protected over time?
4. **Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment.** Is treatment used to reduce harmful effects of principal contaminants, their ability to move, and the amount of contamination present?
5. **Short-term Effectiveness.** What is the length of time needed to implement the remedy and what risks are posed to workers, the community, and the environment during implementation?
6. **Implementability.** What are the technical issues and feasibility of implementation, such as availability of goods and services?
7. **Cost.** What are the estimated costs?

Modifying Criteria

8. **State/Support Agency Acceptance.** Does the state agree with the preferred alternative?
9. **Community Acceptance.** Does the community agree with the preferred alternative?

Exhibit 3. Nine Superfund Evaluation Criteria

Overall Protection of Human Health and the Environment

Alternatives A1, B1, C1, D1, and E1 (no action) are not protective. Alternatives A2, B2, C2, D2, and E2 would protect human health and environment in the short term and are intended to provide adequate protection until a final remedy is selected. The alternatives would stabilize mining-related sources and prevent further environmental degradation. ICs will be used, as needed to help protect the remedy for all IRAs and to protect human health in the interim at recreation staging areas.

Compliance with ARARs

Because no action is taken, ARARs are not triggered for alternatives A1, B1, C1, D1, and E1. The remaining alternatives would meet ARARs but may require interim measures CERCLA ARAR waivers during implementation. The ARARs that may require waivers are Colorado basic standards and methodologies for surface water, Colorado basic standards for groundwater, and Colorado effluent limitations and discharge permit system.

Long-Term Effectiveness and Permanence

Alternatives A1, B1, C1, D1, and E1 (no action) are not effective because wastes are not addressed. Alternatives A2 and C2 are rated as moderate because long-term monitoring and maintenance of isolation/diversion components and local waste management locations would be needed. Alternative B2 is rated moderate to high because of long-term monitoring and maintenance for isolation/diversion components, and Alternative D2 rates as moderate to high because of long-term monitoring and maintenance for waste management locations. Alternative E2 is rated moderate to high because covers require monitoring and maintenance to be effective and permanent.

Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives provide reduction of toxicity, mobility, or volume through treatment because no treatment is used.

Short-Term Effectiveness

Alternatives A1, B1, C1, D1, and E1 (no action) are rated highest because no action is taken that causes short-term impacts. The remaining alternatives all have safety issues related to transport of equipment and borrow and most have safety issues with the amount of borrow needed.

Evaluation Criteria		Qualitative Rating					
		No Action Alternatives	Other Alternatives				
			A2	B2	C2	D2	E2
Threshol	Overall Protection of Human Health and the Environment	Not Adequate	Adequate				
	Compliance with ARARs	None	Will comply, but may require waiver				
Primary Balancing	Long-Term Effectiveness and Permanence		Moderate	Moderate to High	Moderate	Moderate to High	
	Reduction of Toxicity, Mobility, or Volume through Treatment		None				
	Short-Term Effectiveness		Moderate	Moderate to High			Moderate
	Implementability		Moderate	Moderate to High	Moderate		
	Cost		$2,411,000	$1,889,000	$3,384,000	$624,000	$1,668,000

No action alternatives=A1, B1, C1, D1, and E1
A2= Mine Portal MIW Discharges-Diversion/Isolation
B2= Mining-Related Source/Stormwater Interactions-Diversion/Isolation
C2= Mine Portal Pond Sediments-Excavation/Interim Local Waste Management
D2= In-Stream Mine Wastes-Excavation/Interim Local Waste Management
E2= Mining-Impacted Recreation Staging Areas-Containment/Isolation

Exhibit 4. Comparative Analysis of Alternatives

Alternative A2 has issues with outer portal stability. Alternatives C2 and D2 have potential adverse impacts to streams during excavation. Alternative E2 has safety issues related to equipment used to grade areas prior to placing covers and requires a significant amount of borrow. Alternatives A2 and E2 are rated as moderate and Alternatives B2, C2, and D2 are moderate to high. Alternatives other than no action are expected to be completed in one field season at individual sources, over a span of 5 years. O&M is assumed to be 15 years, or until final remedy is implemented.

Implementability

Alternatives A1, B1, C1, D1, and E1 (no action) rate highest, as no work would be performed. Implementability issues with the remaining alternatives include: difficult access and constrained mine locations, excavation in streams, frequent changes in weather and MIW discharge, uncertain borrow locations with suitable quality and quantity, and ICs. Alternatives A2, C2, D2, and E2 are rated as moderate, and Alternative B2 is rated as moderate to high.

Cost

Alternatives A1, B1, C1, D1, and E1 have the lowest cost, as they require no action. For the remaining alternatives, costs range from $624,000 to $3,384,000. Costs for five-year reviews are excluded because these mining-related sources would be reviewed as part of the sitewide five-year reviews. Costs for watershed monitoring are excluded because they are part of Site-wide activities.

EPA's Preferred Alternative

EPA's preferred alternative for IRA to address the 26 mining-related sources (Exhibits 1 and 2) covered by this proposed plan is a combination of A2, B2, C2, D2, and E2. It is described below, by migration issue, and is discussed in detail in the FFS.

Based on information currently available, EPA believes the preferred alternative meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The construction timeframe is one season for individual mining-related sources, up to 5 years for all sources.

Exhibit 5 provides an overview of the preferred alternative for each migration issue and lists the various components for each action. Specific details of individual actions to be taken—such as the use of open channels versus piping—at each mining-related source will not be finalized until remedial design.

Drainage Basin	Mining-Related Sources	Preferred Alternative	Components to be Used*
Contaminant Migration Issue: Mine Portal MIW Discharges			
Mineral Creek	Bandora, Brooklyn, and Junction Mines Koehler Tunnel	A2 Diversion/ Isolation	▪ Excavation (440 CY) ▪ Dewatering (4 tons of agent) ▪ Characterization/stabilization (if needed) ▪ Borrow for construction (3,220 CY) ▪ Open channels, berms, and/or piping (3,560 LF) ▪ Management on site
Cement Creek	Natalie/Occidental, Henrietta, and Anglo-Saxon Mines Mammoth and Yukon Tunnels		
Upper Animas River	Ben Franklin, Columbus, London, Mountain Queen, Pride of the West, Silver Wing, Sunbank Group, Tom Moore, Vermillion Mines Frisco Bagley and Terry Tunnels		
Contaminant Migration Issue: Stormwater Interactions			
Mineral Creek	Bandora and Brooklyn Mines	B2 Stormwater Diversion/ Isolation	▪ Surface diversion (open channels, berms, and/or piping) (4,270 LF) ▪ Subsurface diversion (French drains or interceptor trenches) ▪ Borrow for construction (50 CY) ▪ Monitoring and maintenance
Cement Creek	Grand Mogul Mine Yukon Tunnel		
Upper Animas River	Ben Butler, Ben Franklin, Columbus, Mountain Queen, Silver Wing, Sunbank Group, Vermillion Mines		
Contaminant Migration Issue: Mine Portal Pond Sediments			
Mineral Creek	Brooklyn and Junction Mines Koehler Tunnel	C2 Excavation and Interim Local Waste Management	▪ Excavation (10,200 CY) ▪ Borrow for construction (2,710 CY) ▪ Dewatering (190 tons of agent) ▪ Characterization/stabilization (if needed) ▪ Management on site ▪ Monitoring and maintenance
Cement Creek	Anglo-Saxon Mine Mammoth Tunnel		
Upper Animas River	Silver Wing and Sunbank Group Mine Frisco Bagley Tunnel		
Contaminant Migration Issue: In-Stream Mine Wastes			
Cement Creek	Grand Mogul Mine	D2 Excavation and Interim Local Waste Management	▪ Excavation (990 CY over 8,900 SF) ▪ Dewatering (20 tons of agent) ▪ Characterization/stabilization (if needed) ▪ Borrow for construction (180 CY) ▪ Management on site ▪ Monitoring and maintenance
Upper Animas River	Boston Mine		
Contaminant Migration Issue: Mining-Impacted Recreation Staging Areas			
Mineral Creek	Junction and Longfellow Mines Koehler Tunnel	E2 Containment/ Isolation	▪ Rock (6.9 acres) or soil covers (2 acres) ▪ Soil Amendments ▪ Seeding with native species ▪ Borrow for construction (18,600 CY) ▪ Monitoring and maintenance
Campgrounds	Campgrounds 4 and 7		

*Decided on a case by case basis CY=cubic yards, LF=linear feet, SF=square feet

Exhibit 5. Preferred Alternative by Migration Issue and Source, with Possible Remedy Components

Mine Portal MIW Discharges

A2 – Diversion/Isolation

EPA's preferred alternative for cleanup of the 20 mining-related sources with MIW discharge (Exhibit 1) uses diversion and isolation (new construction and/or maintenance of existing features) to route mine portal MIW discharge around contaminated mine waste. Estimates relevant to the alternative are: length of diversion/isolation components to be constructed, 3,560 linear feet; in-place volume of mine waste partially obstructing mine portal MIW discharge for excavation, 440 cubic yards; tons of dewatering agent, 4; and volume of borrow required, 3,220 cubic yards.

Alternative A2 would provide stabilization of the mining-related sources and prevent further environmental degradation. It reduces the potential for uncontrolled releases of particulates and MIW that contribute to unacceptable ecological risks. Thus, it is protective of human health and environment in the short term and is intended to provide adequate protection until a final remedy is selected. It can meet ARARs, although the interim measures CERCLA ARARs waiver would be required as noted in Exhibit 5. Alternative A2 provides moderate long-term effectiveness and permanence. Monitoring and maintenance would be used.

Mining-Related Source/Stormwater Interactions

B2 – Stormwater Diversion/Isolation

EPA's preferred alternative for cleanup of the 11 mining-related sources with mining-related source/stormwater interactions (Exhibit 1) would route stormwater around mine portals and/or contaminated mine. Subsurface components may be used to intercept stormwater that has infiltrated below ground and divert it around mine portals or mine waste. Notable estimates are: length of diversion/ isolation components to be constructed, 4,270 linear feet; in-place volume of borrow required, 50 cubic yards.

Alternative B2 reduces the potential for uncontrolled releases of particulates and MIW from mine waste through a reduction of the contact between waste and stormwater. Thus, it is protective of human health and environment in the short term and is intended to provide adequate protection until a final remedy is selected. It can meet ARARs, although the interim measures CERCLA ARARs waiver would be required as noted in Exhibit 5. It provides moderate to high long-term effectiveness and permanence. Monitoring and maintenance would be used.

Mine Portal Pond Sediments

C2 – Excavation and Interim Local Waste Management

EPA's preferred alternative for cleanup of the eight mining-related sources with mine portal pond sediments (Exhibit 1) uses excavation to remove pond sediments to allow continued pond function. Notable estimates are: number of ponds, 14 at 8 locations; horizontal extent of ponds, 68,800 square feet; in-place volume of mine portal pond sediment to be excavated, 10,200 cubic yards; weight of dewatering agent, 190 tons; and in-place volume of borrow required, 2,710 cubic yards.

Alternative C2 reduces the potential for uncontrolled releases of particulates and MIW from sediment in mine portal ponds that contribute to unacceptable ecological risks. Thus, it is protective of human health and environment in the short term and is intended to provide adequate protection until a final remedy is selected. It can meet ARARs, although the interim measures CERCLA ARARs waiver would be required as noted in Exhibit 5. It provides moderate long-term effectiveness and permanence. Monitoring and maintenance would be used.

In-Stream Mine Wastes

D2 – Excavation and Interim Local Waste Management

EPA's preferred alternative for cleanup of the two mining-related sources with in-stream mine wastes (Exhibit 1) uses excavation to remove wastes that impede flow or are susceptible to erosion or leaching. Notable estimates are: horizontal extent of in-stream mine waste, 8,900 square feet; in-place volume of in-stream mine waste to be excavated, 990 cubic yards; weight of dewatering agent, 20 tons; and in-place volume of borrow required, 180 cubic yards.

Alternative D2 reduces the potential for uncontrolled releases of particulates and MIW from in-stream mine

wastes that contribute to unacceptable ecological risks. Thus, it is protective of human health and environment in the short term and is intended to provide adequate protection until a final remedy is selected. It can meet ARARs, although the interim measures CERCLA ARARs waiver would be required as noted in Exhibit 5. It provides moderate to high long-term effectiveness and permanence. Monitoring and maintenance would be used.

Mining-Impacted Recreation Staging Areas

E2 – Containment/ Isolation

EPA's preferred alternative for cleanup of the five mining-impacted recreation staging areas (Exhibit 1) would reduce disturbances of mine wastes and migration of contaminants using covers that eliminate surface exposure of mine waste or contaminated soil. Notable estimates are: horizontal extent of aggregate covers to be constructed, 2 acres; horizontal extent of soil covers to be constructed, 6.9 acres; and in-place volume of borrow required, 18,600 cubic yards.

Alternative E2 would break the pathway for soil ingestion and reduce the potential for uncontrolled releases of particulates that contribute to unacceptable ecological risk. Thus, it is protective of human health and environment in the short term and is intended to provide adequate protection until a final remedy is selected. It can meet ARARs, although the interim measures CERCLA ARARs waiver would be required as noted in Exhibit 5. It provides moderate to high long-term effectiveness and permanence. Monitoring and maintenance would be used.

Upcoming Public Meetings

EPA will provide a short presentation about the proposed plan at a public meeting on **June 21, 2018**. Please join us. It's a great opportunity to learn.

Bonita Peak Mining District Superfund Site
Public Comment Meeting
Silverton Town Hall, 1360 Greene Street,
Silverton, Colorado
6:00 p.m. to 7:30 p.m.

If you like, you can provide your comments orally at the public meeting, and they will be recorded.

Website

www.epa.gov/superfund/bonita-peak

Providing Written Comment

The public comment period for the proposed plan runs from **June 14 to July 16, 2018**. Please send your written comments to:

Cynthia Peterson
U.S. EPA, Region 8
1595 Wynkoop Street (8OC-PAI)
Denver, CO 80202
peterson.cynthia@epa.gov

Site Contacts

If you have questions or need additional help, please contact the following representatives:

U.S. Environmental Protection Agency, Region 8

- Christina Progess, Project Manager, 800-227-8917, ext. 312-6552, progess.christina@epa.gov
- Cynthia Peterson, EPA Community Involvement Coordinator, 800-227-8917, ext. 312-6879, petersen.cynthia@epa.gov

Colorado Department of Human Health and Environment

- Mark Rudolph, CDPHE Project Manager, 303-692-3311, mark.rudolph@state.co.us

U.S. Forest Service

- Ben Martinez, USFS Abandoned Mine Lands Program Leader, 970-385-1202, **bsmartinez@fs.fed.us**

Site Documents

For copies of administrative record documents, call: 303-312-7273 or 800-227-8917 ext. 312-7273 (toll free Region 8 only).

Site documents are available to the public at the following locations.

- **Silverton Library**. 1117 Reese Street, Silverton, CO 81433, Jackie Kerwin, 970-387-5770
- **Durango Public Library.** 1900 East Third Avenue, Durango, CO 81301, Sandy Irwin, 970-375-3380
- **Farmington Public Library**. 2101 Farmington Avenue, Farmington, NM 87401, Kathi Browning, 505-599-1270
- **Diné College Shiprock Campus Library (Senator John Pinto Library).** BIA Road 0570, Shiprock, NM 87420, Samanthi Hewakapuge, 505-368–3644