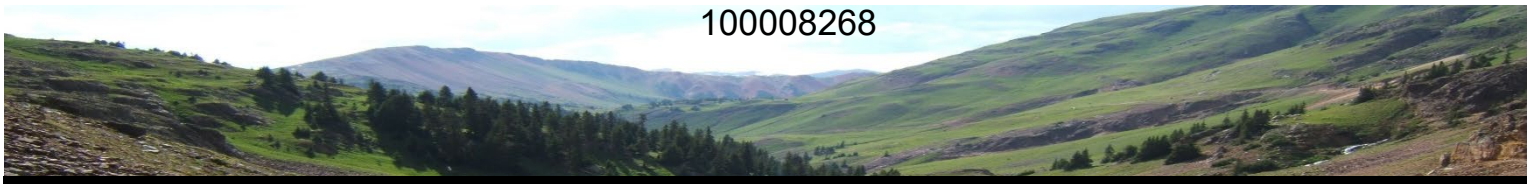
100008268



Proposed Plan for the Bonita Peak Repository

Bonita Peak Mining District Superfund Site

July 2020

United States Environmental Protection Agency

COLORADO Department of Public Health & Environment

Executive Summary

This proposed plan for the Bonita Peak Mining District Superfund Site (the Site) in San Juan County, Colorado presents the U.S. Environmental Protection Agency's (EPA's) preferred alternative for the Bonita Peak Repository (the repository), a sitewide, mining-related, waste repository to be located on top of one or more existing tailings impoundments at the Mayflower Mill. The preferred alternative is based largely on the results of the *Focused Feasibility Study Report, Bonita Peak Repository Interim Remedial Action,* finalized in July 2020. The focused feasibility study (FFS) evaluated potential repository alternatives using the existing tailings impoundments.

The proposed repository would provide much needed capacity for disposal and long-term management of mining-related wastes generated and managed from response actions at the Site: sludge stored at the Gladstone interim water treatment plant (IWTP) and wastes from the interim remedial actions (IRAs) described in the 2019 interim record of decision (IROD) and from potential future remedial actions.

The FFS evaluated five repository alternatives:

- Alternative NA: No Further Action
- Alternative R1: Repository at Mayflower Tailings Impoundment 1
- Alternative R2: Repository at Mayflower Tailings Impoundment 2
- Alternative R3: Repository at Mayflower Tailings Impoundment 3
- Alternative R4: Repository at Mayflower Tailings Impoundment 4

This proposed plan provides an overview of the Site, a summary of the alternatives evaluated in the FFS, and details of and supporting rationale for EPA's preferred alternative, which is a combination of Alternatives R1, R2, and R4. Opportunities for public comment and participation are also described.

EPA is the lead agency and, in consultation with the Colorado Department of Public Health and Environment (CDPHE), will select the final repository location after reviewing and considering public comment.

Public Comment Opportunities

Issuing the proposed plan starts a 30-day public comment period **(July 29 to August 27, 2020).** EPA will review and consider all comments received during that period and will determine whether to move ahead with the preferred alternative as written, modify it, or develop another.

EPA's final risk management and cleanup decisions will be published in an IROD, and a responsiveness summary will address public comments. Page 15 explains how to provide comment, attend a virtual public meeting, and get more information.

Need for Action

The Gladstone IWTP intercepts and treats contaminated water from the Gold King Mine adit, preventing the discharge to Cement Creek of roughly 992 pounds per day of contaminants of potential ecological concern. However, the treatment process creates 4,600 to 6,000 cubic yards per year of sludge that contains heavy metals

and requires proper disposal. The existing capacity for sludge storage at the IWTP is likely to be exhausted by late 2021 or early 2022, and a new on-site location is needed to ensure continued operation of the IWTP.

In addition, actions taken under the 2019 IROD will generate mining-related wastes that will also require a stable, long-term repository. IROD wastes are expected to include up to 10,700 cubic yards of material removed from settling ponds, streams, and adits. Certain wastes generated from other future response actions and the eventual sitewide ROD are also likely to require disposal and would be expected to include similar types of materials.

Concurrent Activities at the Site

EPA's adaptive management strategy for cleanup at the Site allows progress to continue sitewide while data for IRAs are collected and evaluated. Separate remedial activities are also being conducted by both EPA and Sunnyside Gold Corporation.

Sitewide Remedial Investigation/Feasibility Study/Record of Decision

Under the ongoing sitewide remedial investigation (RI), EPA and its federal and state partner agencies are investigating the source, nature, and extent of contamination across the Site; identifying data gaps; and assessing human health and environmental risk. The sitewide feasibility study (FS) will evaluate options for cleanup, and a proposed plan and record of decision (ROD), respectively, will propose and select alternatives necessary to protect human health and the environment.

Operable Unit 2 Remedial Investigation/Feasibility Study

Sunnyside Gold Corporation is currently leading an RI/FS of Operable Unit (OU) 2 pursuant to the May 10, 2017, Administrative Order on Consent. The OU2 RI includes investigation of surface water, groundwater, and solids in and around the Mayflower Mill tailings impoundments.

Documents to Support This Action

Preliminary Remedial Investigation and Risk Information

Baseline human health and ecological risk assessments have been completed. The baseline human health risk assessment evaluates recreational and occupational populations, while the aquatic baseline ecological risk assessment provides continued characterization of aquatic receptor risks from exposure to mine-related and natural sources of contamination from the headwaters of the Site to about 70 river miles down the Animas River. The terrestrial risk assessment is in development.

Focused Feasibility Study

The 2020 Bonita Peak Repository FFS uses existing site information to identify, develop, and evaluate remedial alternatives (cleanup options) that will address unacceptable risks from contamination. The FFS also identifies preliminary remedial action objectives (PRAOs) and potential remedial technologies that will satisfy these PRAOs, assembles remedial alternatives that can protect human health and the environment, and conducts a detailed analysis of the alternatives.

Proposed Plan

This proposed plan summarizes alternatives evaluated in the 2020 Bonita Peak Repository FFS and presents EPA's preferred alternative and key factors that led to its selection. Proposed plans are required by EPA's public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan. A 30-day public comment period allows the State of Colorado and interested stakeholders or other members of the public to provide comment.

Interim Record of Decision

EPA will document the final decision on the repository location in an Interim Record of Decision (IROD) after the public comment period. The IROD will include a summary of responses to comments received.

Site Characteristics

The proposed locations for the repository are on top of the four tailings impoundments associated with the Mayflower Mill. Roughly nine miles from the Gladstone IWTP (Exhibit 1), they extend about one mile along the right bank of the Upper Animas River, one mile upstream of Silverton and directly north of County Road 2 (Exhibit 2). Impoundment 1 is the furthest upstream and impoundment 4 is the furthest downstream. All four impoundments have flat tops and steep sides.

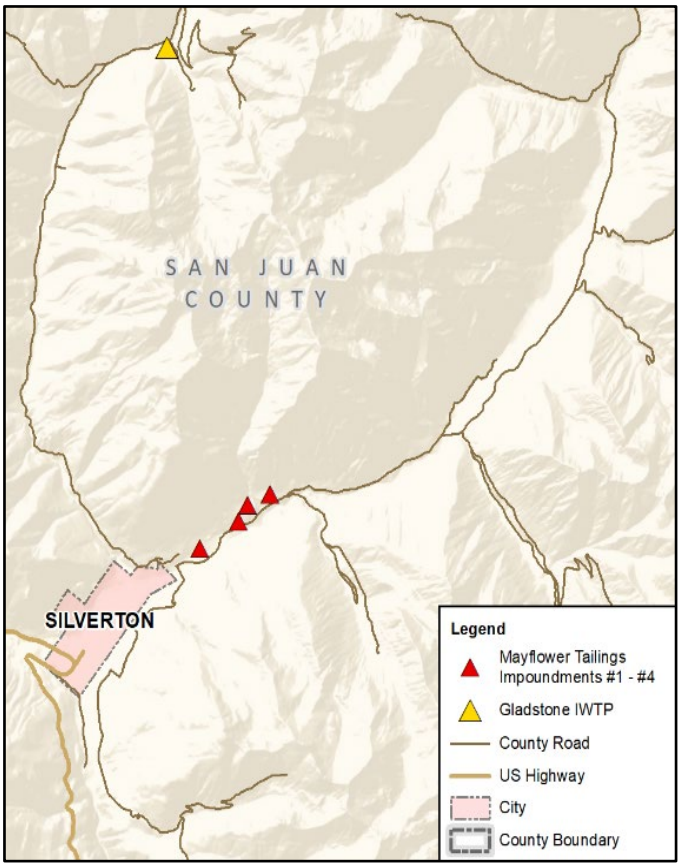


Exhibit 1. Locations of Features Relevant to Treatment of Sludge and the Proposed Repository

The Mayflower tailings impoundments were identified as a favorable repository location over other on-site locations for several reasons. They are close to the Gladstone IWTP, are in a high and dry location, and the area is already used to manage mining-related wastes. The proposed locations are on land primarily owned by the Sunnyside Gold Corporation.

Site Background

The Mayflower Mill was built in 1929 and 1930, with major expansions in 1937 and 1975. The mill operated until 1991. Operations included crushing (milling) and mineral concentration by flotation for export to a smelter. The mill processed several hundred tons of ore per day from mines across the region, producing several hundred tons of tailings per day. The tailings impoundments were constructed between 1936 and 1977, and wastes were placed there into the early 2000s. Prior to 1936, tailings were discharged directly into the Upper Animas River. Exhibit 3 lists characteristics important to a repository that were identified in the FFS.

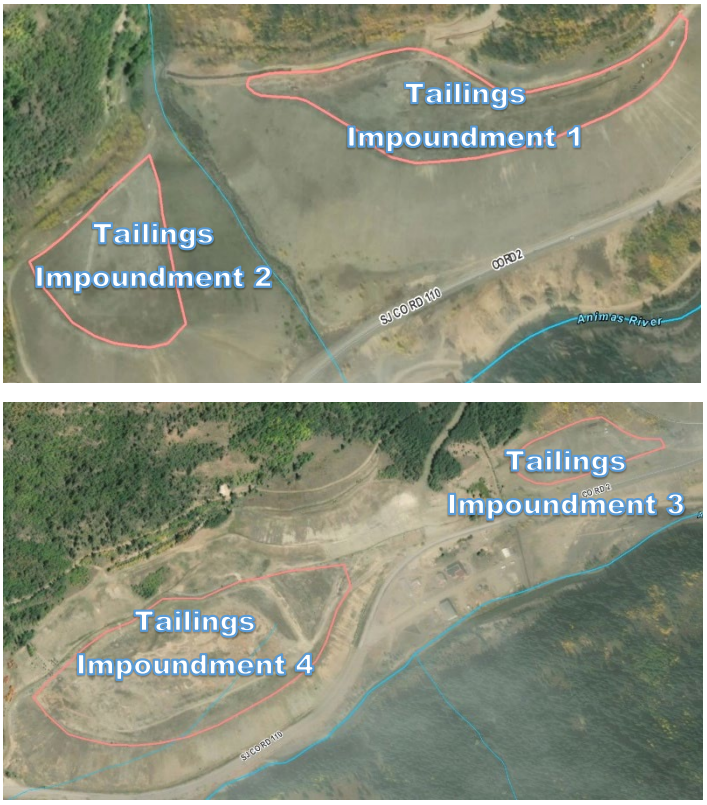


Exhibit 2. Aerial View of Tailings Impoundments

Characteristic	Impoundment			
	1	2	3	4
Surface area (acres)	11	7	5	26
Average slope (degrees)	19	23	20	20
Maximum slope height (feet)	208	144	67	79
Access	Via County Road 2			
Nearby domestic water	Silverton drinking water intake 0.1 mile upgradient of impoundment		None	1 well .25 miles southwest
Diversion controls	Diversion ditch		None	Swales
Other	Adjacent to Mayflower Mill		Lined ditch outfalls at Upper Animas River	Slope dewatering system

Exhibit 3. Characteristics of Tailings Impoundments Evaluated in the FFS

Source and Nature of Contamination

Sampling conducted since the Site was added to the National Priorities List in 2016 has included surface water quality (high- and low-flow), sediment, pore water, groundwater (high- and low-elevation), and soil/waste rock. Stream flow monitoring has also been conducted.

The sitewide RI focuses on the nature and extent of contamination in source areas. Elevated concentrations of multiple mining-related contaminants have been found in surface water, sediment, soil, and waste rock. In some places, leaching analysis results have exceeded applicable water quality criteria for acute aluminum, cadmium, copper, lead, and zinc, and the potential exists for contaminants to leach to surface water and impact aquatic life. The chronic water quality standard has been exceeded for iron and aluminum. Discharge from many adits at the Site exceeds relevant standards.

Conceptual Site Model

A conceptual site model describes how contaminants enter the environment, how they are transported, and what routes of exposure exist. It provides a framework for assessing risks from contaminants, developing removal or remedial strategies, and determining source control needs and methods to address unacceptable risks. A preliminary model is provided within the risk memorandum in Appendix A of the 2020 Bonita Peak Repository FFS. The sitewide RI will include a comprehensive conceptual site model.

Contaminant Media and Migration Issues

The proposed repository is intended to address the need for long-term management of the following wastes:

- **Treatment sludge**. The Gladstone IWTP uses a lime neutralization process that removes metals from water as solid metal hydroxides and concentrates those metals as sludge. At current sludge production rates, sludge storage capacity at the Gladstone IWTP is expected to run out in late 2021 or early 2022.
- **Mine wastes**. Mine waste from source areas addressed under the 2019 IROD may be transported to the repository, if deemed appropriate. Other mine waste may be best managed in place. A map of the OU1 source areas is shown in Exhibit 4. These areas include up to 10,700 cubic yards (CY) of wastes potentially managed under the 2019 IRA. Mine waste from other source areas within the Site may be disposed of at the repository during future remedial actions, pursuant to future decision documents.

The proposed repository has the potential to generate leachate in the form of mining-influenced water (MIW) that may be contaminated and would need to be managed. Other mining-related contaminated solid and aqueous media (including tailings and groundwater) exist within the Mayflower tailings impoundments. They may be addressed as part of a future OU2 response action.

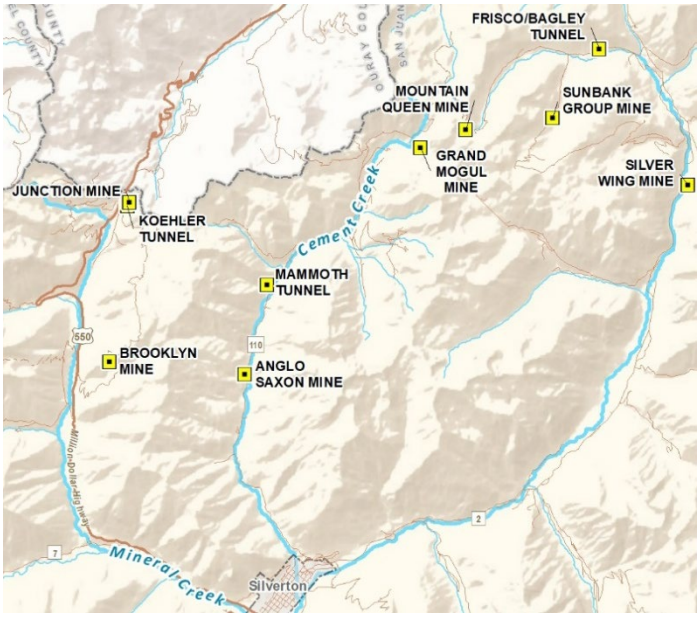


Exhibit 4. OU1 IRA Locations with Mining-Related Wastes Identified for Potential Interim Storage

A significant migration issue related to the need for a repository is continuous discharge of contaminated water from the Gold King Mine adit. That water is currently intercepted and treated at the Gladstone IWTP. While this process keeps contaminants of potential ecological concern from entering Cement Creek, it generates approximately 6,000 CY of sludge per year that require management and disposal.

Ecological Risk

The Animas River and many of its tributaries, including Cement Creek, contain elevated concentrations of metals due to MIW from past mining activities and from naturally mineralized sources. While aquatic life is unlikely to be directly exposed to adit discharges and other mine-related surface water drainages prior to entering the receiving stream, these discharges and associated, contaminated solid media can significantly

increase in-stream metals concentrations, contributing to risks to ecological receptors. Aquatic ecosystem health is limited by high concentrations of toxic metals from a wide range of mining-related and natural sources, precluding aquatic life in some locations. In other on-site locations, metals-tolerant organisms, such as brook trout, can persist.

Treatment of the Gold King Mine adit discharge reduces ecological risk in the watershed by capturing and treating the adit flow and reducing metals loading. Metals driving ecological risk that are removed by the IWTP include aluminum, cadmium, copper, iron, manganese, and zinc. The 2019 IROD IRAs potentially reduce metals in surface water by addressing potential mining-related sources, reducing contact of sources with stormwater or mining-related discharges, and stabilizing solid media, limiting potential migration. Many metals from these sources are toxic to aquatic life at elevated levels.

Continued operation of the Gladstone IWTP and consolidation of the IRA wastes will reduce ecological risk caused by exposure to metals. Proper management of the wastes is critical. In certain circumstances, interim management, as is planned pursuant to existing decision documents, presents potential stability and migration concerns related to storm events and trespassing. Additionally, potential erosion and transport of mining-related wastes in interim storage can result in increased physical stresses to ecological receptors.

Preliminary Remedial Action Objectives

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

The PRAOs for the construction and operation of the repository are:

1. Control mining-related wastes and resulting MIW leachate to minimize migration of contamination from the repository to groundwater and surface water outside the repository that contribute to unacceptable ecological risks.
2. Control surface water runoff from the repository to minimize transport and deposition of contaminants of potential concern into a receiving stream, contributing to unacceptable ecological risk.
3. Limit uses of the property that are incompatible with a mine waste repository.

Summary of Remedial Alternatives

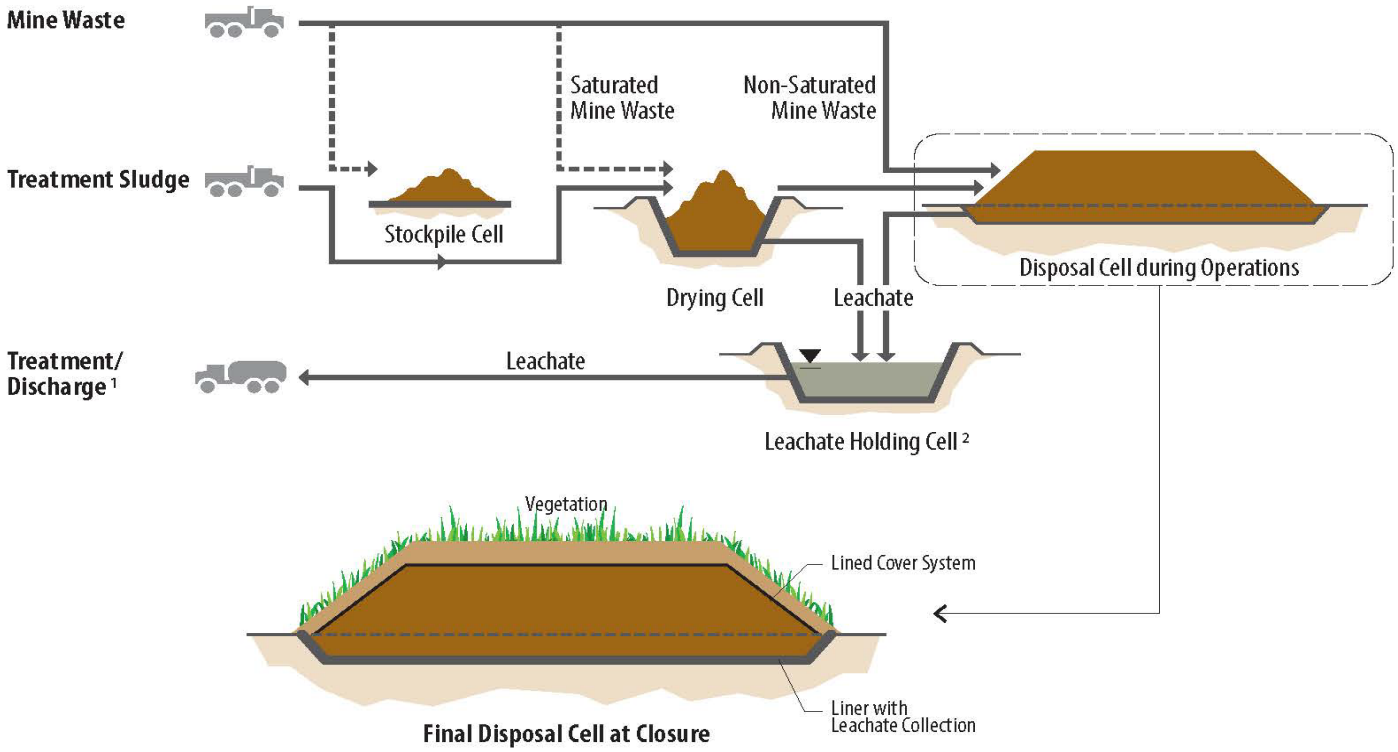
The remedial alternatives are summarized by common elements and individual characteristics. A more detailed analysis is provided in the 2020 Bonita Peak Repository FFS report. Assumptions and details for repository components and configuration were identified in the FFS for analysis but are conceptual and would be refined in remedial design. Exhibit 5 shows the conceptual process for handling wastes under all the repository alternatives.

Elements Common to All Repository Alternatives

Differences between the four repository alternatives are mainly location and constructed size. All alternatives, except no further action, share the following common elements for construction, operation, and closure. Details would be refined during remedial design.

Construction

- **Drying cell**. This cell would dewater wastes by batch or waste type. Shallow cover soils stripped from the impoundment could be used to create berms along cell perimeters and a liner would be installed over the bowl created by the berms to minimize infiltration into underlying tailings. A protective layer would protect the liner during material transfer. Water would initially be managed through evaporation, with periodic transport of remaining leachate to the Gladstone IWTP.
- **Stockpile cell**. This cell would temporarily store wastes that do not require dewatering until they can be placed for final disposal. The lined cell would be configured to promote gravity drainage of precipitation toward a sump, and the water would be moved to the leachate holding cell.
- **Disposal cell**. This cell would be used for final disposal of sludge and mine wastes at the repository. The cell would use a liner to isolate newly placed wastes and resulting leachate from the underlying Mayflower



Repository components shown are conceptual and will be evaluated during remedial design.
Initial approach for treatment/discharge is treatment and discharge at Gladstone IWTP.
A leachate holding tank could be considered in lieu of a leachate holding cell.

Exhibit 5. Conceptual Illustration of Repository Waste Handling Process

tailings. A leachate collection layer would be placed above the liner. Leachate would move through that layer and be transferred to a leachate holding cell for storage prior to transport. Portable pumps would be used if gravity drainage was insufficient.

- **Leachate holding cell**. This cell would temporarily store leachate prior to treatment and disposal, which would be initially accomplished through transport to the Gladstone IWTP until a final decision for leachate treatment and disposal is made, pursuant to a subsequent decision document. The cell would include a liner system with leak detection.
- **Stormwater controls**. Lined channels would divert stormwater away from the repository toward existing Mayflower impoundment stormwater controls. If needed, a detention basin could be built to control runoff. Best management practices (BMPs) would address potential erosion and sedimentation.
- **Access**. County Road 2 and the existing impoundment's perimeter access road would be used where appropriate, and improvements made as needed. If needed, additional private roads would be improved to access the different cells. Public access will not be allowed to those roads.

Operation

- **Startup.** Waste placement would begin after the repository cells and water management components are constructed and BMPs are put in place.
- **Transportation.** Wastes would be transported by truck from Gladstone and existing IRA locations.
- **Treatment sludge**. Sludge from the Gladstone IWTP would be trucked to the repository, placed in drying cells for additional dewatering as needed, and then moved to the disposal cell.
- **Mine wastes**. Mine wastes would be trucked from sources, as needed, to the repository. Wastes could be placed in holding cells or drying cells for dewatering, but most would likely be dry enough to be placed directly into the disposal cell.
- **Seasonal operations**. Waste placement would primarily occur in summer and/or fall, after which the repository would be winterized with a temporary cover over the disposal cell as appropriate. The cover would consist of a liner anchored in place to protect covered waste from wind and precipitation.
- **Operational monitoring and maintenance**. Water from the drying cells and leachate holding cell would be isolated and trucked to the Gladstone IWTP for

treatment until a final decision for leachate treatment and disposal is made. Cell components, access controls (fencing and gates), and stormwater controls would be maintained and BMPs used.

- **Institutional controls (ICs)**. Access controls and administrative use restrictions will minimize exposure to repository wastes. An ICs implementation and assurance plan would guide monitoring and maintenance of ICs.

Closure

- **Cover**. A cover system would include a liner overlain by a protective layer of soil or rock, depending on the slope and aspect.
- **Access**. Permanent access controls would be constructed around the impoundment. The specific control (such as fencing) would be determined with the landowner and comply with Applicable or Relevant and Appropriate Requirements (ARARs).
- **Postclosure operations and maintenance (O&M)**. O&M would include cover system maintenance and inspections for erosion, exposed liner, vegetative cover, and stormwater controls; inspection of access controls; necessary repairs or improvements; and water management. Leachate would be transported to the Gladstone IWTP for treatment.

Individual Descriptions

Each remedial alternative has additional components specific to that alternative, as described below. Waste volumes for each alternative description are given for both the "reasonable minimum" and "reasonable maximum" scenario. The reasonable minimum represents the current volume of stockpiled sludge at the Gladstone IWTP and the estimated volume of mine waste requiring removal at sources included in the 2019 IROD. The reasonable maximum is the maximum disposal volume that could be developed based on each impoundment's footprint characteristics (Exhibits 3 and 6). Costs are provided for the reasonable minimum.

Alternative NA: No Further Action

- Total Capital Cost: none
- Total Annual O&M Cost (100 years): $0
- Total Periodic O&M Cost (100 years): $0
- Total Alternative Cost (Present Value [PV] cost over time in today's dollar value): $0
- Construction Timeframe: none

The Superfund Law requires that EPA retain a no action alternative as a baseline for comparison to other alternatives. This alternative would leave treatment sludge and mine wastes as is and no additional response actions would be implemented. Treatment sludge would remain in temporary storage adjacent to the Gladstone IWTP and mine wastes would continue be stored at their interim management locations throughout the Mineral Creek, Cement Creek, and Animas River watersheds.

Alternative R1: Repository at Mayflower Tailings Impoundment 1

- Total Capital Cost: $4,420,000
- Total Annual O&M Cost (100 years): $9,243,000
- Total Periodic O&M Cost (100 years): $976,000
- Total Alternative Cost (PV): $6,440,000
- Construction Timeframe: one season

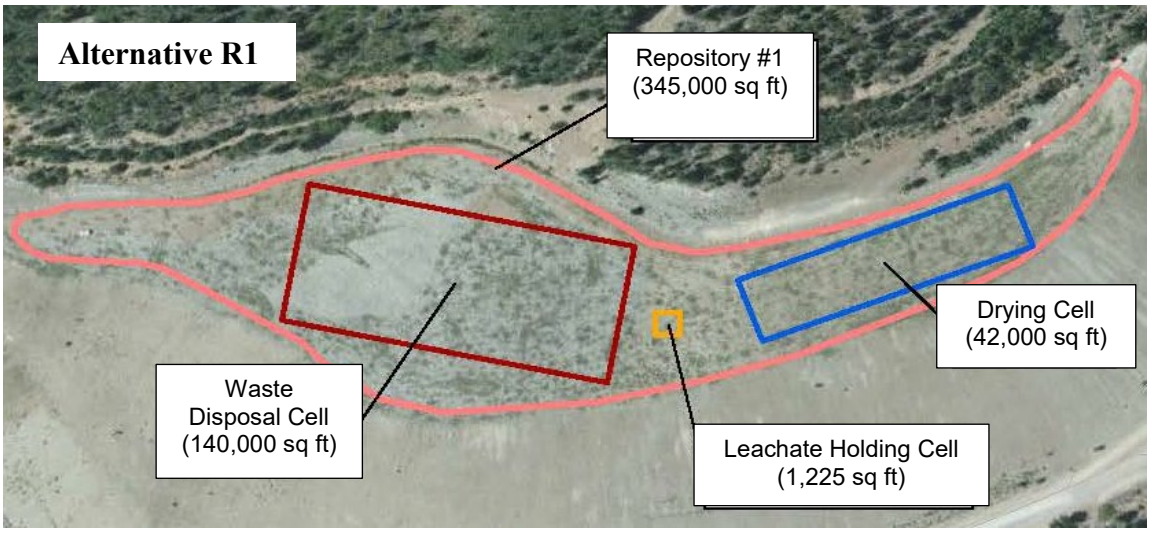
A repository would be built at tailings impoundment 1 and, as described under common elements, would have a drying cell, stockpile cell, leachate holding cell, and a final disposal cell. Wastes would be managed and then disposed of in the repository.

A setback on the impoundment's top would increase geotechnical stability but reduce the footprint available for repository use from 8 to 7 acres. Roughly 18,000 embankment cubic yards (ECY) of stockpiled treatment sludge and mine waste would be placed in the disposal cell under a minimum volume scenario. Repository capacity could be expanded to 67,000 ECY (13 years of operation at current generation rates).

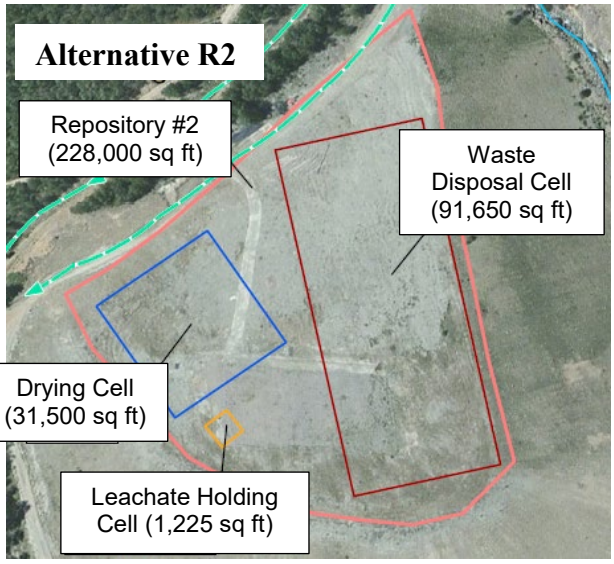
Alternative R2: Repository at Mayflower Tailings Impoundment 2

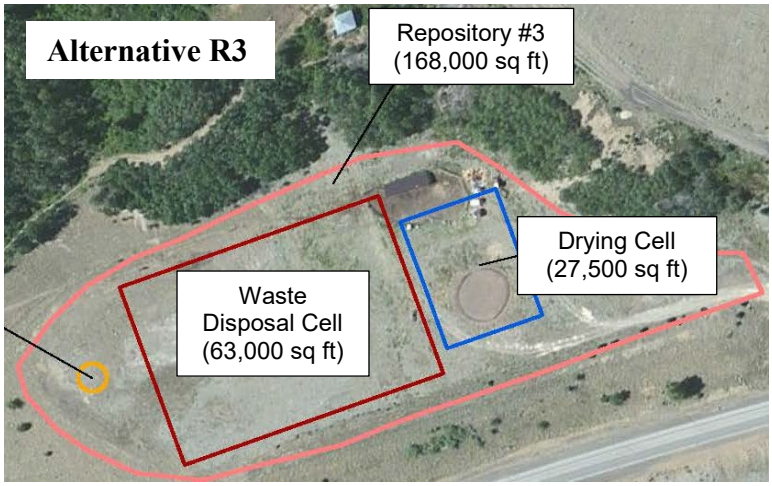
- Total Capital Cost: $3,383,000
- Total Annual O&M Cost (100 years): $8,743,000
- Total Periodic O&M Cost (100 years): $954,000
- Total Alternative Cost (PV): $5,349,000
- Construction Timeframe: one season

A repository would be built at tailings impoundment 2 and, as described in common elements, would include a drying cell, stockpile cell, leachate holding cell, and final disposal cell. Wastes would be managed and then disposed of in the repository.



Repository components shown are conceptual and will be evaluated during remedial design.





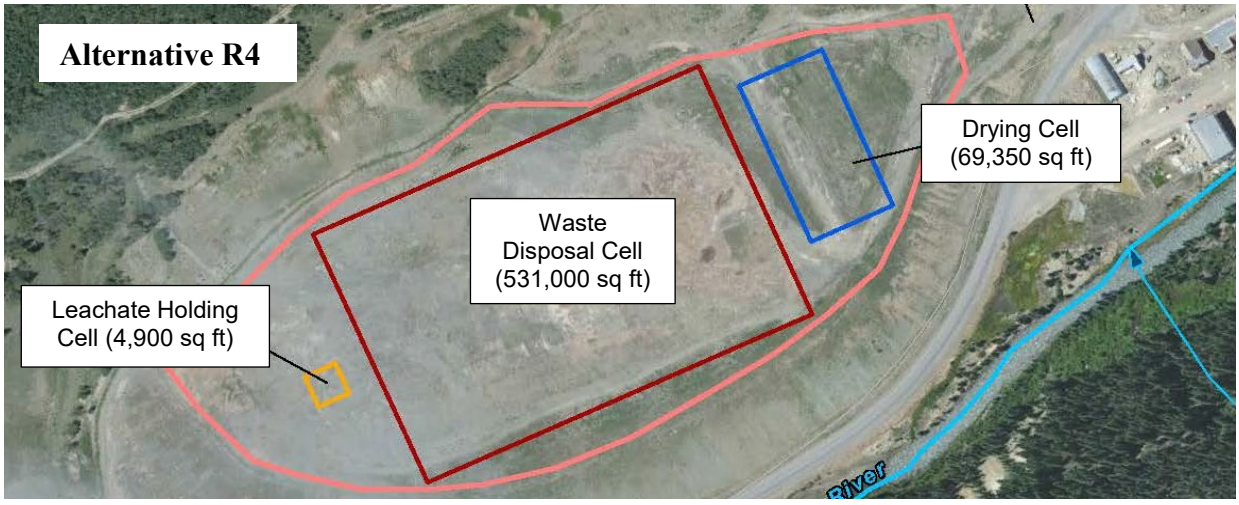


Exhibit 6. Footprint of Conceptual Repository with Cell Type and Locations under the Four Alternatives

A setback on the impoundment's top would increase geotechnical stability but decrease the repository footprint from 5 to 4.5 acres. Repository components would be the same as Alternative R1, but cells would be smaller because of the smaller footprint. Roughly 18,000 ECY of stockpiled treatment sludge and mine waste would be placed in the disposal cell under a minimum volume. Repository capacity could be expanded to 33,800 ECY (4 years of operation at current generation rates).

Alternative R3: Repository at Mayflower Tailings Impoundment 3

- Total Capital Cost: $3,166,000
- Total Annual O&M Cost (100 years): $8,743,000
- Total Periodic O&M Cost (100 years): $941,000
- Total Alternative Cost (PV): $5,141,000
- Construction Timeframe: one season

A repository would be built at tailings impoundment 3 and, as described in the common elements, would have a drying cell, stockpile cell, and final disposal cell. However, limited space would require the substitution of a leachate holding tank for the leachate holding cell. Wastes would be managed and then disposed of in the repository.

A setback on the impoundment's top would increase geotechnical stability but decrease the footprint available for repository use from 4 to 3 acres. Repository components would be the same as Alternative R1, but cells would be smaller to fit the footprint. A leachate holding tank would be used instead of a leachate cell. Roughly 18,000 ECY of stockpiled treatment sludge and mine wastes would be placed in the disposal cell under a minimum volume scenario. Repository capacity could be expanded to 22,800 CY (1 year of operation at current generation rates).

Alternative R4: Repository at Mayflower Tailings Impoundment 4

- Total Capital Cost: $11,365,000
- Total Annual O&M Cost (15 years): $9,543,000
- Total Periodic O&M Cost (100 years): $1,156,000
- Total Alternative Cost (PV): $13,393,000
- Construction Timeframe: one season

A repository would be built at tailings impoundment 4 and, as described in the common elements, would consist of multiple drying cells, a stockpile cell, leachate holding cell, and final disposal cell. Wastes would be managed and then disposed of in the repository.

A setback on the impoundment's top would increase geotechnical stability but decrease the footprint available for repository use from 22.5 to 21 acres. Repository components would be the same as Alternative R1, but the cells would be larger because of the larger footprint. Roughly 18,000 ECY of stockpiled treatment sludge and mine waste would be placed in the disposal cell under a minimum volume scenario. Repository capacity could be expanded to 508,300 ECY (128 years of operation at current generation rates).

Alternatives Evaluation

The alternatives described above were evaluated against seven of the nine Superfund evaluation criteria. Those criteria are divided into three groups: threshold, balancing, and modifying (Exhibit 7).

Each alternative (except no further action) was first compared against the two threshold criteria, which *must* be met for an alternative to be selected. Alternatives R1 through R4 passed that evaluation. All alternatives were then evaluated against the five primary balancing criteria to weigh the main differences between them. Evaluations against the two modifying criteria will not be made until after the public comment period ends, as comments are an important indicator of acceptance.

Evaluations against threshold and balancing criteria for each alternative are discussed on the following pages and illustrated in Exhibit 8. Results of evaluation for modifying criteria will be discussed in the final remedy decision in the IROD after comments are received and reviewed. The 2020 Bonita Peak Repository FFS provides the detailed comparative analysis of the evaluation criteria.

Overall Protection of Human Health and the Environment

The no further action alternative would fail to provide protection of human health and the environment as it would not provide permanent disposal of wastes generated from the Gladstone IWTP and other response actions. Wastes would remain at their current interim management locations and residual risks may include potential stability and migration concerns.

Threshold Criteria (*must* be met)

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 with 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 7. EPA's Nine Superfund Evaluation Criteria

Exceedance of interim storage capacity of Gladstone sludge could present a threat of release and migration to Cement Creek and, if an off-site disposal alternative was not found, the IWTP might need to be shut down. This could result in releases of MIW from the Gold King Mine to Cement Creek, adding unacceptable environmental risks, especially if released sludge were to be reacidified.

Alternatives R1, R2, R3, and R4 are rated as "adequate" because each would protect human health and the environment via construction of a repository. Containment elements, such as use of bottom liners and leachate collection and management, would offer long-term protection by isolating mining-related wastes from the surrounding environment. Other repository elements, such as leachate treatment, would be interim and would be protective until a final remedy is selected for contaminated water management and disposal.

PRAOs would be achieved using dust suppression and other BMPs to minimize dust during waste placement, temporary covers to minimize dust during extended inactivity, and liner and cover systems at the cells. Berming and sloping would reduce erosion and generation of MIW from precipitation, snowmelt, and runoff. A repository would address imminent threats and stability/migration concerns.

Long-term effectiveness and permanence of the repository depends on continued integrity of the covers and adherence to ICs. Placement of a repository on Mayflower tailings impoundments 1, 2, 3, or 4 (under both reasonable minimum and reasonable maximum volume scenarios) would be geotechnically stable using an appropriate setback from the slope face.

<table>
<tr><th colspan="2" rowspan="2">Evaluation Criteria</th><th colspan="5">Qualitative Rating by Alternative</th></tr>
<tr><th>No Further Action</th><th>R1</th><th>R2</th><th>R3</th><th>R4</th></tr>
<tr><td rowspan="2">Thresh</td><td>Overall Protection of Human Health and the Environment</td><td>Not Adequate</td><td colspan="4">Adequate</td></tr>
<tr><td>Compliance with ARARs</td><td>None</td><td colspan="4">Adequate</td></tr>
<tr><td rowspan="6">Primary Balancing</td><td>Long-Term Effectiveness and Permanence</td><td>Low</td><td>Moderate to High</td><td colspan="2">Moderate</td><td>High</td></tr>
<tr><td>Reduction of Toxicity, Mobility, or Volume through Treatment</td><td rowspan="4">None</td><td colspan="4">Low to Moderate</td></tr>
<tr><td>Short-Term Effectiveness</td><td colspan="4">Moderate</td></tr>
<tr><td>Implementability</td><td>Moderate</td><td colspan="2">Moderate to High</td><td>Moderate</td></tr>
<tr><td>Cost</td><td>$6,440,000</td><td>$5,349,000</td><td>$5,141,000</td><td>$13,393,000</td></tr>
</table>

Exhibit 8. Alternative Evaluation Ratings

Compliance with ARARs

Because no further action is taken, ARARs are not triggered for the no further action alternative. However, compliance with the substantive requirements of ARARs is required for the remaining alternatives. ARARs considered to be the drivers for the repository and how they will be addressed are discussed below.

- **Erosion, dust, and noise control.** Measures such as sediment control measures and siltation structures would be implemented during repository construction and operation to meet the requirements of the Surface Mining Control and Reclamation Act, the Colorado Air Pollution Prevention and Control Act, the Colorado Noise Abatement Statute, and CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Section 2.1.3.

- **Stormwater management**. Stormwater runoff would be routed to stormwater management facilities at the repository to meet the substantive requirements of Colorado Discharge Permit System (CDPS) Regulations as well as CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Section 2.1.6 and 2.5.7.

- **Groundwater protection**. A groundwater monitoring program would be established to meet the substantive requirements of CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Section 2.1.4, 2.1.15, 2.2, and 2.5.5.

- **Mining-related waste management and placement**. Storage, handling, and disposal of mining-related wastes, including leachate generated from waste disposal would comply with the substantive requirements of 40 CFR 258 as well as CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Section 2.1.2. and 2.1.17. The Bevill exclusion for mine waste applies.

- **Repository construction**. Grading, liner system installation, leachate collection and control, cover placement, and periodic inspections would meet substantive requirements of CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Sections 2.1.7, 2.5.4, 3.1.8, 3.2.5(B) through (D), 3.2.6, 3.5.2, 3.5.3, and 3.6.

- **Institutional controls and access controls**. Environmental covenants or notice of environmental use restrictions as well as signage and access restrictions would protect human health, the environment, and repository components and would meet the substantive requirements of the Colorado Environmental Covenants Statute as well as CDPHE Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1, Sections 2.1.8 and 2.5.4.

- **Additional Construction and Operation Locational Considerations**. The Mayflower Mill was listed as a National Historic Landmark in 2000. Alternative R1 construction would work to eliminate or minimize adverse effects to the landmark in accordance with the National Historic Preservation Act.

  According to the National Wetlands Inventory, the footprint of impoundments 3 and 4 and base of impoundment 1 contain wetlands. If wetlands are confirmed to exist, the restrictions indicated in 6 CCR 1007-2, Part 1, Section 3.1.2 will be met.

  A preliminary review of unstable areas has been completed, but a seismic review has not been completed. The use of a setback from the edge of impoundments was used to avoid unstable areas. However, if the repository is determined to still be located in unstable areas or a seismic impact zone, engineering measures and/or seismic-resistant components would be incorporated as part of remedial design as indicated in 6 CCR 1007-2, Part 1, Section 3.1.4 and 3.1.5.

  If any of the following are identified, work must conserve the species and their habitat to comply with the substantive requirements of the laws and regulations listed in parentheses:

  - Bald or golden eagles (Bald and Golden Eagle Protection Act)
  - Threatened or endangered species in San Juan County (Endangered Species Act and Colorado Non-Game, Endangered, or Threatened Species Act)
  - Migratory birds (Migratory Bird Treaty Act)

Alternatives R1, R2, R3, and R4 could comply with substantive requirements of ARARs and are rated as "adequate." Alternative NA is rated as "none."

Long-Term Effectiveness and Permanence

Under Alternative NA, wastes managed while implementing the IRAs under other response actions would remain in their current interim management locations, posing residual risks such as instability and further migration. If capacity for interim storage adjacent to the Gladstone IWTP is exceeded, the sludge could present an imminent threat of release and migration to Cement Creek, which could require the IWTP to be shut down. This could result in releases of MIW from the Gold King Mine to Cement Creek, presenting unacceptable risks to the environment, especially if the treatment sludge reacidified. Alternative NA is rated as "low."

Alternatives R1, R2, R3, and R4 would reduce ecological risk through proper management of mining-related wastes from the Gladstone IWTP and the other IRAs. Each alternative would have a minimum capacity of about 18,000 ECY to address known waste streams, and wastes would be moved from interim management locations for permanent disposal. Untreated wastes managed at the repository would have some residual risk. Long-term effectiveness and permanence would depend on the cover, BMPs, inspection and repair, and adherence to ICs. Monitoring and maintenance of covers would need to be performed in perpetuity. All alternatives would lessen infiltration of precipitation and minimize infiltration of leachate into subsurface tailings.

Estimates developed for the reasonable maximum waste-placement scenario used the full capacity of each repository. Wastes placed could include treatment sludge and/or solid mine wastes. For the FFS, sludge was used for estimating purposes, as its generation rate and physical characteristics are known. Estimated volumes and additional years of theoretical sludge placement (at the current generation rate) are:

- Alternative R1: 67,000 CY and 13 years
- Alternative R2: 33,800 CY and 4 years
- Alternative R3: 22,800 CY and 1 year
- Alternative R4: 508,300 CY and 128 years

Differences in long-term effectiveness and permanence between the repository alternatives are:

- The larger reasonable maximum capacities of Alternatives R4 and R1 (508,300 ECY and 67,000 ECY, respectively) allow greater flexibility for future waste volumes above the minimum and would reduce concerns of limited storage.
- The adequacy and reliability of controls under Alternatives R2 and R3 would be reduced compared to Alternatives R4 and R1 because of the limited area for drying cells and leachate holding. This presents challenges in disposal of mining-related wastes from other IRAs and for proper management of stormwater and contaminated water without adverse impacts to the environment.

Alternative R1 is rated "moderate to high," Alternatives R2 and R3 are "moderate," and Alternative R4 is "high."

Reduction of Toxicity, Mobility, or Volume through Treatment

All alternatives see a reduction of toxicity, mobility, or volume via treatment of leachate at the Gladstone IWTP. The low to moderate reduction is based on the limited volume of leachate expected to be generated at the Bonita Peak Repository over time and the nature of the leachate, much of which may be buffered by alkalinity from the treatment sludge.

Short-Term Effectiveness

Alternatives R1, R2, R3, and R4 have safety issues related to transport of equipment, borrow, sludge, and waste. Short-term risks have the potential to impact the community, workers, and the environment.

- **Community**. Transport of wastes and borrow materials to the repository and contaminated water from the repository to the IWTP presents traffic safety issues. Signage and flaggers could reduce hazards and dust suppressants would be used.
- **Workers**. Construction and waste placement could pose short-term risks. Dust suppression, personal protective equipment, and work zones would protect workers. Safety measures would reduce hazards from increased truck traffic, work near sloped areas and at high altitude, and changing weather conditions.
- **Environment**. Construction, hauling, and development of borrow areas present short-term impacts that would be mitigated by fuel-efficient and low-emission equipment and careful selection and reclamation of borrow areas. Repositories would initially be vulnerable to storms, with the potential for erosion and transport to streams.

Differences in short-term effectiveness between repository alternatives are:

- Potential impacts to visitors and museum workers at the Mayflower Mill—dust, noise, increased truck traffic—exist for Alternative R1 because of proximity to the museum. Potential safety issues exist for workers related to community traffic along the access road that connects to the Mayflower Mill parking lot.
- If Alternatives R1 and R4 were built to maximize the size of the repository, there would be more borrow material development, more truck traffic for transportation of mining-related wastes and borrow materials, and more equipment working in constrained areas for alternatives with larger footprints and more cells (R1 and R4).
- There could be greater community impacts from dust and noise for Alternative R4 because of the proximity of Silverton.

Alternatives R1, R2, R3, and R4 were rated "moderate." Alternative NA rates as "none."

Implementability

Implementability is similar for Alternatives R1, R2, R3, and R4. Construction of repository components and transport and placement of wastes are straightforward, as labor, equipment, and materials for initial repository development, waste placement, final cover construction, and postclosure maintenance should be available.

Implementability issues include timing and volume of waste placement, repository capacity, water volume generated, slope stability, and availability of uncontaminated borrow for covers.

Differences between the repository alternatives are:

- Additional agency coordination for Alternative R1, because of proximity to the Mayflower Mill and museum
- More logistical concerns and a need for greater amounts of borrow for alternatives with larger footprints and more cells (R1 and R4)
- Agency coordination with the Colorado Division of Reclamation and Mining Safety for Alternative R4
- Road access issues (hairpin road and Mayflower Mill proximity) for R1

Alternatives R2 and R3 are rated "moderate to high." Alternatives R1 and R4 are rated "moderate." Alternative NA rates as "none," as no further work would be done.

Cost

Costs were evaluated over a 100-year period based on the minimum waste placement volume (18,000 CY). Cell sizing was based on the available footprint for each alternative and disposal cell footprints for Alternatives R1, R2, R3, and R4 are 140,000 square feet (SF), 91,650 SF, 63,000 SF, and 531,000 SF, respectively. Drying cells, stockpile cells, and leachate holding cells would have similar differences in footprint size and costs. While the costs for all alternatives would be based on the same waste placement volume, alternatives with larger footprints would have proportionally larger costs because of their correspondingly larger capacities and costs to construct.

The primary focus of the Bonita Peak Repository FFS was the disposal of mining-related wastes currently being generated for interim management from the Gladstone IWTP and the 2019 IRAs. However, the FFS also addressed flexibility for disposal of wastes from potential future response actions. The minimum placement scenario has the greatest certainty and best represented the costs for comparison of alternatives.

Costs for Alternative NA are $0, as no further action is taken. Using the minimum placement scenario, the PV costs for the remaining alternatives are:

- Alternative R1: $6,440,000
- Alternative R2: $5,349,000
- Alternative R3: $5,141,000
- Alternative R4: $13,393,000

Cost estimates herein include capital, annual O&M, periodic O&M, and PV costs for the total work at all locations. The accuracy range is +50 to -30 percent.

EPA's Preferred Alternative

EPA's preferred alternative for a sitewide mine waste repository combines Alternatives R1, R2, and R4. It offers a phased implementation approach, meets the threshold evaluation criteria, and provides the best balance of tradeoffs with respect to the balancing criteria.

The preferred alternative would provide safe, permanent disposal of Gladstone IWTP sludge and of certain mining-related wastes across the Site and would address repository-generated leachate. The initial construction timeframe is one season and the repository should be able to accept wastes from the Gladstone IWTP by the time storage space runs out in late 2021 or early 2022.

Exhibit 9 provides an overview of the components of the preferred alternative. Specific construction details will not be finalized until remedial design. Construction and operation of waste management and disposal cells would be phased for flexibility and to meet the need for waste disposal from other response actions.

Combined Remedial Components	Quantity
Available repository footprint (acres) ▪ Impoundment 1 = 7 ▪ Impoundment 2 = 4.5 ▪ Impoundment 4 = 21	32.5
Waste placement volume (reasonable minimum) for disposal cell (ECY)	36,000 to 54,000
Waste placement volume (reasonable maximum) for disposal cell (ECY) ▪ Impoundment 1 = 67,000 ▪ Impoundment 2 = 33,800* ▪ Impoundment 4 = 508,300	575,300 to 609,100

All measurements are estimates
*May not be used for disposal cell

Exhibit 9. Components of the Preferred Alternative

The impoundments would be used as follows:

- **Tailings impoundment 1**. Used as the initial location for disposal, beginning with cells on the western portion of the impoundment to minimize repository-related impacts to the adjacent Mayflower Mill.
- **Tailings impoundment 2**. Used to manage wastes in holding cells and drying cells prior to placement in impoundment 1 disposal cells. As impoundment 1 space is used up, EPA would determine the future layout of disposal and waste management cells within the footprints of the selected impoundments.
- **Tailings impoundment 4**. Used for disposal once impoundment 1 capacity is met and future waste-generation decisions that require repository disposal have been made as part of other response actions.

Use of impoundment 3 was rejected because of its lack of space and very steep slopes.

As impoundment 1 disposal cells reach capacity, temporary cover would be placed over them until final closure. The repository's final cover would be installed over the disposal cells when waste placement is complete. The estimated time frame to reach maximum capacity of the waste management cells in the preferred alternative is 146 years. Waste management cells would be decommissioned. Water management would continue, using leachate storage cells, and treatment would continue until a final leachate management decision is made for the repository. Repository postclosure monitoring and maintenance would begin upon closure.

The preferred alternative performs well against EPA's Superfund evaluation criteria because:

- Containment elements protect human health and the environment in both the short and long term by isolating mining-related wastes.
- ARARs can be met.
- Long-term effectiveness and permanence would be achieved as the volume of the disposal area is flexible, and concerns that interim management in other areas of the Site could add to unacceptable risks to the environment are reduced.
- Short-term risk would be reduced through safety measures and BMPs for repository construction and operation, and monitoring and maintenance would ensure protectiveness.

The present value cost for minimal development of the repository and the placement of sludge currently stored at the Gladstone IWTP and mine wastes generated for disposal at already identified watershed remedial action locations is approximately $4,493,000. The present value cost for implementing the initial phase of the preferred alternative (utilizing tailings impoundment 2 for waste processing and tailings impoundment 1 for disposal until it reaches capacity) is approximately $ 9,577,000. The present value cost for fully implementing the preferred alternative (the initial phase followed by utilizing tailings impoundment 4 for disposal until it reaches capacity) is approximately $17,480,000.

Upcoming Public Meetings

Given current travel and meeting restrictions, EPA will provide a virtual presentation on the proposed plan to the public on **August 11, 2020**. Please join us to learn more about this action. The meeting will be provided through the Teams/Zoom/Adobe platform via the link below.

https://epawebconferencing.acms.com/bpmdproposedplan/

6:00 p.m. to 8:00 p.m.

EPA will present information about the proposed plan from 6:00 to 7:00 and will take public comments from 7:00 to 8:00. Any public comments made during the virtual meeting will be documented for the record.

Providing Written Comment

The public comment period for the proposed plan runs from **July 29 to August 27, 2020**.

Please send written comments (electronically or via the mail) to:

Katherine Jenkins
U.S. EPA, Region 8
1595 Wynkoop Street (8OC-PAI)
Denver, Colorado 80202
jenkins.katherine@epa.gov

Site Contacts

U.S. EPA, Region 8

- Christina Progess, Project Manager, 800-227-8917, ext. 312-6552, progess.christina@epa.gov
- Rob Parker, Project Manager, 800-227-8917, ext. 312-6664, parker.robert@epa.gov
- Katherine Jenkins, EPA Community Involvement Coordinator, 800-227-8917, ext. 312-6351, jenkins.katherine@epa.gov

CDPHE

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

Documents

Public documents are available online or at the four local document repositories:

www.epa.gov/superfund/bonita-peak

- **Silverton Library**. 1117 Reese Street, Silverton, Colorado, 970-387-5770
- **Durango Public Library**. 1900 East Third Avenue, Durango, Colorado, 970-375-3380
- **Farmington Public Library**. 2101 Farmington Avenue, Farmington, New Mexico, 505-599-1270
- **Diné College Shiprock Campus Library**. BIA Road 0570, Shiprock, New Mexico, 505-368-3644