



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8**

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Ref: 8SEM-EMR

ACTION MEMORANDUM AMENDMENT

SUBJECT: Request for Ceiling and Scope Increase and Exemption from the 12-month Statutory Limit for Continued Removal Action at the North Star Mine Portal 7 Beaver Dam Site in San Juan County, Colorado.

FROM: Kerry Guy
Federal On-Scene Coordinator

THRU: Laura Williams, Chief
Emergency Response Section

Deirdre Rothery, Chief,
Emergency Management Branch

TO: Betsy Smidinger, Director
Superfund and Emergency Management Division

Site ID #B861

I. PURPOSE

The purpose of this Action Memorandum Amendment (AMA) is to request and document approval of a ceiling increase, scope increase, and exemption from the 12-month statutory limits for the ongoing time critical removal action (TCRA) described herein for the North Star Mine Portal 7 Beaver Dam Site (Site) in San Juan, Colorado. This AMA provides the rationale for the increased estimated costs and time for this expanded removal action.

The initial Action Memorandum (AM) for North Star addressed actions to reduce the risk of a sudden discharge of mine impacted water at the level 7 portal to Mineral Creek due to a beaver dam just outside the level 7 portal and to reduce the ongoing release of metals from the site. The planned actions included the removal of a beaver dam in front of the portal, the removal of a soil berm inside the portal structure, the restoration of the drainage channel from the portal to Mineral Creek to eliminate overtopping of mine discharge onto the rock waste pile, surface water controls, and site grading. This AMA modifies the AM to address the approximately 40,000 cubic yard waste pile below the portal. The large waste pile fans out below the portal and ends in a high vertical embankment approximately 200 feet long and up to 45 feet high along Mineral Creek.

Mobilization under the original action memorandum for the Site occurred in late September 2020. Due to the lateness of the mobilization, there was only sufficient time to drain down and remove the beaver dam. All other actions at the Site, including removal of the soil berm within the adit, were postponed and the Site was secured for winter. Future necessary actions to stabilize and reduce metal loading from the Site may take up to two additional years due to the short working season at this elevation. Most of the activities described in this AMA are expected to be completed in 2021.

Remaining conditions existing at the Site present a threat to public health or welfare or the environment and meet the criteria for initiating a removal action under 40 CFR 300.415(b)(2) of the National Contingency Plan (NCP). Following the successful removal of the beaver dam in September 2020, continued actions are necessary to address the soil berm inside the adit to prevent future back up of water in the mine and to rehabilitate the mine drainage channel to Mineral Creek and secure the adit with a new security gate and conduct repairs to the portal structure.

This AMA includes actions to address the large waste pile at the Site estimated at 40,000 cubic yards, which fans out below the adit, ending in a near vertical 40-foot embankment for several hundred feet along Mineral Creek. Continued undercutting of the waste pile by the river increases metal loading to the river and the likelihood that the waste pile will collapse into the river. Actions to remove the waste pile from Mineral Creek to prevent such a collapse will be conducted. Actions will include moving a large segment of the waste pile away from Mineral Creek, routing drainage around the consolidated waste pile, consolidating other areas of the waste pile, and then covering the consolidated waste pile with a vegetated cover (to the extent practicable) to reduce erosion and leaching of metals to the river. The actions to address threats posed by the large waste pile have resulted in an increase of \$676,116 to the cost ceiling approved in the original AM.

The Region has categorized the proposed work under this Action Memorandum as 3N, indicating that the Region has conducted studies or investigations and has determined that the fluid hazard is known or probable, but the Region's planned site activities will not affect or change the fluid release at the mine.

This removal action involves no nationally significant or precedent-setting issues. This time-critical removal action will not establish any precedent for how future response actions will be taken and will not commit the US Environmental Protection Agency (EPA) to a course of action that could have a significant impact on future responses or resources.

II. SITE CONDITIONS AND BACKGROUND

Site Name:	North Star Mine
Superfund Site ID (SSID):	B861
NRC Case Number:	N/A
CERCLIS Number:	CON000821039
Site Location:	San Juan County, Colorado
Lat/Long:	37.8075426666667; -107.681795166667
Potentially Responsible Party (PRP):	
NPL Status:	Non-NPL
Removal Start Date:	September 21, 2020

A. Site Description

1. Removal Site Evaluation

The North Star Mine Site has historically been associated with the Animas Mining District which is part of the San Juan National Forest. Attachment 1 shows a map of the North Star Mine, located just southwest of Silverton, Colorado. Figure 2 shows the general layout of the Site. The Site consists of an old mill site on the east side of the mine workings. Historically, access to the mine workings was by two portals, level 6 and level 7. These two portals are noted on Figure 2.

Portal 6, just above level 7, is collapsed with no visual drainage. Mine drainage exits in the North Star Mine at portal level 7. Mine level 7 portal was closed sometime in the 1980s, by placing a backfill wedge into the portal which was underlain by pipes in order to maintain drainage into the constructed channel. A closure gate was placed on the portal entrance. From portal 7, a drainage channel was constructed to convey mine drainage around the west side of the large waste rock pile into Mineral Creek. The drainage channel has not been maintained and has filled with sludge, resulting in overtopping and drainage onto the waste rock pile.

The large waste rock pile, estimated at 40,000 cubic yards, fans north to northeast with a footprint of approximately 3 acres and is actively being eroded and cut away beyond its angle of repose at its terminus with Mineral Creek. The waste pile runs north to south along the south bank of mineral creek for approximately 300 feet. Along this reach, the waste pile has been eroded by the river resulting in a near vertical embankment of 30 to 40 feet in height. The waste rock pile has significant levels of lead (up to 9,600 mg/kg) and arsenic (up to 480 mg/kg) which is a risk to recreators. Leachable zinc of up to 2,030 ug/l is likely contributing to degradation of the stream above table value standards downstream for aquatic wildlife. A significant collapse of the pile (5,00 to 15,000 cubic yards) into Mineral Creek could increase contributions of zinc from the Site significantly. Leachable Cadmium (up to 11.7 ug/l) and Aluminum (up to 240 ug/l) also would contribute to degradation of the stream.

In 2019, an active beaver colony was observed building a dam within 50 feet below the level 7 draining portal. The beaver colony was assumed to be living somewhere inside the portal gate. The beaver dam was impeding flow to the drainage channel and impounding water at a depth of up to 4 feet with an estimated 250,000 gallons of impounded mine drainage water. Mine water discharged over the crest of the 60 to 70 foot-wide dam, then cuts into the large waste rock pile in several places. The discharge across the waste pile resulted in increased metals and sediment loading into Mineral Creek and subsequently into the Animas River. See Action Memorandum dated September 15, 2020, for additional information regarding the beaver dam and berm.

Elevated metals including aluminum, cadmium, iron, manganese, and zinc are present in the acid mine water discharge from the portal. Elevated concentrations of arsenic, lead, and manganese are present in the large waste rock pile. Water quality and mine

waste soil/sediment information associated with the North Star Mine and surrounding water bodies are shown in Attachment 2.

2. Physical Location

The North Star Mine is adjacent to Mineral Creek. It is $\frac{3}{4}$ mile above its confluence with the Animas River, which is just south of the town of Silverton, Colorado. See Action Memorandum dated September 15, 2020, for additional details.

3. Site Characteristics

The Site consists of the North Star Mine workings (8 levels); a large and expansive waste rock pile estimated at 40,000 cubic yards below the level 7 portal extending to and abutting the southern bank of Mineral Creek along a 300 foot reach; a collapsed historic mill and tailings; a mine drainage channel running from the level 7 portal, along the west side of the large waste rock pile discharging into Cement Creek; and two large metal buildings. Mine levels 6 and 7 have adit portals.

An upper adit level 6, at an elevation of 9,520 feet, is collapsed and has no surface discharge. This adit consists of a moderate-sized waste rock pile thought to contain approximately 3,500 cubic yards. The lower main mill-level adit (level 7) historically discharged up to 560 gallons per minute (gpm) through a drainage pipe down a partially lined channel directly into Mineral Creek. After removing the beaver dam in fall 2020, discharge flows from the mine were measured at 355 gpm. The waste pile below level 7 has been reported by others at 40,000 cubic yards. Significantly elevated concentrations of aluminum, cadmium, iron, manganese, and zinc are the primary metals being discharged in surface water from the North Star Mine. Arsenic, lead and manganese in the waste pile are elevated above background and regional screening levels.

Several mine buildings remain at the Site. A permitted prospecting operation was conducted at this mine in the recent past and several of the buildings are modern and in good condition. A collapsed loadout exists on the northeast edge of the historic waste pile adjacent to the creek.

A mine blowout or significant surge in flows from the mine drainage would directly impact Mineral Creek and subsequently the Animas River. The discharge would occur below Silverton and flow towards Durango, 45 miles downstream. From Durango, the Animas River flows 36 miles into New Mexico past the Aztec Ruins National Monument and then joins the San Juan River near Farmington, NM. Historically, discharges from other mines above Silverton have resulted in downstream impacts on the Navajo Nation in New Mexico, and on farmers and other communities along the 126-mile-reach of the Animas River in Colorado to the confluence with the San Juan River in New Mexico.

4. Release or Threatened Release into the Environment of a Hazardous Substance, Pollutant, or Contaminant

The beaver dam at the North Star Mine portal was impounding a relatively substantial volume of water. It is estimated that the water within the beaver pond and backed up into the adit was 250,000 gallons. Photos of the beaver dam conditions are in Attachment 3.

The metals concentrations of the mine discharge are above acute and chronic aquatic life water quality standards. There is also potential for ecological risks associated with wildlife species, including insectivorous birds in the wetlands downstream of the North Star Mine. A sudden release of metals-laden impounded mine water has the potential to increase these impacts to aquatic life.

Arsenic and lead in the mine waste piles are also significantly elevated above EPA Residential and Industrial Regional Screening Levels (RSLs) (See Attachment 2). Heavy metals concentrations in the waste piles are also above Ecological Soil Screening Levels (EcoSSLs) for many wildlife species including plants, invertebrates, birds, and mammals observed at and around the North Star Mine Site.

The dam and impounded acid mine drainage prevented free drainage from the level 7 portal and posed a threat of a sudden release of acid mine drainage and resulting sludge. Furthermore, the active beaver colony behind the portal threatened conditions that could ultimately have caused a blockage of the drainage pipes conveying water out of the adit. An uncontrolled release from the Site would cause a significant increase of heavy metals loading from both soil and surface water runoff. This would result in additional migration of metals from the Site, primarily aluminum, cadmium, manganese, iron, and zinc in water, as well as, arsenic and lead in waste pile soils that could cause further migration downstream. Arsenic, cadmium, lead, manganese, and zinc are listed hazardous substances in 40 CFR 302.4.

For a discussion on the threat to human health and the environment posed by heavy metals at the site, see Section 4 of the September 15, 2020, Action Memorandum.

5. NPL Status

This Removal Site is not part of any National Priorities Listed Site but is near the Bonita Peak Mining District Superfund Site. This TCRA aligns with the BPMD sitewide goals of improving water quality in the Upper Animas between Silverton and Durango.

6. Maps, Pictures, Other Geographic Representations

A map of the Site is included as Attachment 1. Relevant Site photos are in Attachment 3.

B. Other Actions to Date

1. Previous Actions

During the week of September 21, 2020, an EPA OSC and ERRs crew conducted activities to remove the beaver dam in front of the level 7 portal. In preparation for pumping down the beaver pond, sludge, vegetation, and debris were removed from segments of the drainage channel to restore a portion of its flow capacity. This was an interim measure for the purpose of stopping the mine discharge overtopping in several reaches of the channel and to accommodate drainage of the beaver pond. The remaining channel restoration was deferred to the following season due to imminent winter conditions. On September 25, the beaver pond was drained, and the beaver dam removed. During the week of September 28, final debris removal and site closure activities were conducted, and the existing portal gate was repaired sufficiently to provide security for the adit over the winter.

The North Star Mine has been subject to several sampling and assessment activities to determine its impacts on Mineral Creek. Two assessment activities were led by the EPA in 2019. Additionally, the Colorado Division of Reclamation, Mining and Safety has conducted regular inspections of the North Star Mine Site to document compliance with an existing operating permit within the Sultan mining operations.

2. Current Actions

There are no current activities on the Site beyond actions discussed in this memorandum.

C. State and Local Authorities' Role

1. State and Local Actions to Date

Prior to the beaver dam removal in September 2020, the Bureau of Land Management trapped and relocated a beaver within the Site area. Local authorities have helped when possible, providing surrounding road maintenance and, when required, snow removal to allow access. Colorado Department of Public Health and Environment (CDPHE) is also being consulted on removal activities.

2. Potential for Continued State/Local Response

State and local entities do not have the resources to conduct this removal action in the required timeframe. Division of Reclamation, Mining and Safety (DRMS) will remain involved in a consultation role only.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions at the Site described in the September 15, 2020, Action Memorandum still exist or have not been fully addressed to reduce the human health and environmental risk posed by the Site. The September 15, 2020, Action Memorandum cited the following 40 CFR 300.415(b)(2) removal criteria as justification for the removal action.

The EPA has considered all the factors described in 40 CFR 300.415(b)(2) of the NCP and determined that the following factors apply at the Site:

“(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, or pollutants or contaminants:”

The EPA and other agencies/organizations observed an imminent threat due to water impoundment within the North Star Mine as a result of the beaver dam and beaver activities behind the soil berm closure at the portal. The beaver dam was successfully removed in fall 2020. The soil berm in the adit was not addressed in 2020 and remains a threat to future back up of water in the adit. This impounded water could result in a mine blowout adversely affecting the Animas River and downstream users in the flow path. The impact of a sudden release will affect Mineral Creek and may detrimentally impact the Animas River. The large waste rock pile also remains an ongoing source of metal loading to Mineral Creek and threatens to collapse into Mineral Creek.

The Animas River is widely known as a trout fishery with the stretch of river downstream of Silverton near Durango carrying a Gold Medal designation. It is heavily fished by residents and tourists alike. The potential for aquatic risks in lower Mineral Creek downstream of the Site include the following: impaired benthic macroinvertebrate aquatic life with low density and diversity; risk to the aquatic community from chronic exposure to aluminum, cadmium, iron and zinc in surface water; risks from lead and other metals based on active and heavy use; and exposures to birds and other wildlife that use the riparian and wetland areas downgradient from the mine and adjacent to Mineral Creek.

Due to recent mine discharges in the vicinity, downstream communities, including the Navajo Nation, the State of New Mexico, farmers, and national environmental groups are sensitive to potential impacts. Federally Threatened or Endangered species that may be relevant to downstream impacts from this Site include the Colorado Pikeminnow, Razorback sucker, and the Southwestern Willow Flycatcher. If the berm within the North Star Mine is left unaddressed, a large sudden uncontrolled release could occur resulting in heavy metals exposure to residents and wildlife downstream and, potentially, recreators and visitors to the Site.

“(v) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released:”

High flow or runoff in spring seasons could add to the volume and pressure on the mine pool behind the berm making an uncontrolled release more likely.

“(viii) The availability of other appropriate federal or state mechanisms to respond to the release:”

Local and state governments do not have the capability to conduct the action in a timely manner. DRMS will remain involved in a consultation role only.

“(viii) Other situations or factors that may pose threats to public health or welfare of the United States or the environment.”

A sudden release coincident with obstructions in the North Star portal could result in significant metal loading of Mineral Creek and the Animas River. The release would potentially cause significant erosion of the waste pile into Mineral Creek.

IV. EXEMPTION FROM STATUTORY LIMITS

Exemption from the statutory limit of 12 months is necessary to continue the removal action to completion.

A. Emergency Exemption

There is an immediate risk to public health or welfare or the environment. Exposure to the heavy metals associated with tailings and waste rock have a detrimental effect on both human health and ecosystems. While elevated concentrations of some heavy metals occur naturally in certain areas, the North Star contains metals concentrations substantially greater than conditions found in natural settings. In addition, the mine wastes are highly mobile due to their homogenous, fine-grained character and location of the deposition on the ground surface directly adjacent to Mineral Creek.

B. Continued Response Action

Initial response actions were conducted in September 2020 to remove the beaver dam. Continued response actions are immediately required to prevent a sudden release coincident with obstructions in the North Star portal that could result in significant metal loading of Mineral Creek and the Animas River as well as significant erosion of the waste pile into Mineral Creek. These response actions include removal of the soil berm in the portal, repair of the portal structure and installation of a new portal gate, restoration of the drainage channel, removal of the large waste rock pile section along Mineral Creek, re-routing the drainage channel as necessary, and consolidation and revegetation of the large waste rock pile.

C. Assistance

Assistance will not otherwise be provided on a timely basis. There are no other federal or state mechanisms with access to or resources available to respond to the release.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed Action Description

Under this action memorandum amendment, the objectives of the removal action include completion of previous proposed actions as well as the removal of a large waste rock pile which the proposed actions below now include.

- Removal of beaver dam and debris within - completed in 2020.
- Remove soil berm inside the portal structure.
- Repair the portal structure.
- Install a new gate within portal structure.
- Clear, repair and reroute as necessary the adit drainage channel from the mine to Mineral Creek.
- Remove the waste rock pile sufficiently back from Mineral Creek and stabilize.
- To the extent practicable, consolidate, grade, cover and vegetate the waste rock pile.
- Assess reach along drainage channel to incorporate retention pond (s) for settling out metals prior to discharge to Mineral Creek.
- Restore areas damaged by heavy equipment to prevent erosion.
- Grade the area to enhance positive drainage away from mine workings and waste pile.
- Construct site run-on controls.
- Assess and implement strategies that will deter beaver populations from the adit area.

2. Contribution to Remedial Performance

This effort will, to the extent practical, contribute to any future remedial effort at the Site.

3. Engineering Evaluation/Cost Analysis (EE/CA)

An EE/CA is not required for a time-critical removal action.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

Removal actions conducted under CERCLA are required, to the extent practicable considering the exigencies of the situation, to attain ARARs. In determining whether compliance with an ARAR is practicable, the lead agency may consider appropriate factors, including the urgency of the situation and the scope of the removal action to be conducted. No new ARARs have been identified for this AMA. Refer to the September 15, 2020, Action Memorandum, for the table of ARARs.

5. Project Schedule

This removal action was initiated on September 21, 2020 and will resume in summer 2021. It is expected that the work will be largely completed in late summer 2021. Some final work in summer 2022 may be required to complete cover and seeding operations of the waste pile.

B. Estimated Costs*

The estimated costs for this AMA were developed for an additional two-year period, with most of the work being completed in summer 2021. The two-year cost for the proposed action is shown below.

Tasks	Current AM Ceiling	Proposed Increase	Proposed Ceiling
ERRS	\$231,000	\$478,633	\$709,633
START	\$41,000	\$84,797	\$125,797
Subtotal	\$272,000	\$563,430	\$835,430
Contingency (20%)	\$54,400	\$112,686	\$167,086
Total Removal Project Ceiling	\$326,400	\$676,116	\$1,002,516

*EPA direct and indirect costs, although cost recoverable, do not count toward the Removal Ceiling for this removal action. Liable parties may be held financially responsible for costs incurred by the EPA as set forth in Section 107 of CERCLA

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Should this amendment not be approved, it would increase the actual or potential threats to the public health and/or the environment. If not implemented, impounded water could result in a mine blowout adversely affecting the Animas River and downstream users in the flow path.

VII. OUTSTANDING POLICY ISSUES

None

VIII. ENFORCEMENT

A separate Enforcement Addendum has been prepared providing a confidential summary of current and potential future enforcement activities.

IX. RECOMMENDATIONS

This decision document amends the selected removal action for the North Star Mine Portal 7 Beaver Dam Removal Site in San Juan County, Colorado, developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the removal action.

Conditions at the Site meet the NCP section 300.415(b)(2) criteria for a removal action and the CERCLA section 104(c) emergency exemption from the 12-month limitation, and I recommend your approval of the exemption, expanded scope of the proposed removal action and associated increase of \$676,116 in the cost ceiling. The amended total cost ceiling for the North Star Project, if approved, will be \$1,002,516; this amount will be funded from the Regional removal allowance.

APPROVE

Betsy Smidinger, Director
Superfund and Emergency Management Division

Date

DISAPPROVE

Betsy Smidinger, Director
Superfund and Emergency Management Division

Date

Attachments:

- Attachment 1: Site Maps
- Attachment 2: Sampling Results
- Attachment 3: Site Photos
- Attachment 4: Portal Inspection August 20, 2020.
- Attachment 5: Applicable or Relevant and Appropriate Requirements