Exhibit 2

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ACTION MEMORANDUM

SUBJECT: Request for Approval of a Non-Time-Critical Removal Action at the Bonita Peak Mining District NPL Site ID# CON000802497

Gladstone Interim Water Treatment Plant for Gold King Mine Discharge and a Request for Exemptions from the 12-Month and $2 Million Statutory Limits on Removal Actions

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I. PURPOSE

The purpose of this Action Memorandum (AM) is to request and document approval of a Non-Time Critical Removal Action (NTCRA) described herein for the Gold King Mine adit discharge, Gold King Mine adit discharge collection system, and Gladstone Interim Water Treatment Plant (IWTP) in the Bonita Peak Mining District (BPMD) Superfund Site (Site). This NTCRA involves the collection of acid mine water flowing from the Gold King adit for treatment at the Gladstone IWTP. This AM is based on the Engineering Evaluation/Cost Analysis (EE/CA) and public comments received pursuant to 300.415(n)(4)(iii) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

An emergency removal action for construction and emergency operation of the Gladstone IWTP was initiated using the on- scene coordinator's (OSC) delegated authority. The action memorandum for this emergency removal action (EPA 2016), was signed in January 2016 by EPA's Assistant Administrator

for the Office of Land and Emergency Management. The emergency removal action memorandum, under which the Gladstone IWTP was constructed and is currently being operated, anticipated that the treatment plant would be operated through November 2016. The emergency removal action memorandum included emergency exemptions from the 12-month and $2 million statutory limits on removal actions. The emergency removal action costs for the Gladstone IWTP were $2,672,152.

The objective of this NTCRA AM is to transition the Gold King Mine adit discharge collection system and Gladstone IWTP within the BPMD Site from an emergency removal action to a NTCRA.

A consistency exemption is being requested as part of this AM because the proposed action will exceed the statutory 12-month period and $2 million ceiling to prevent further unacceptable exposures from the release of hazardous substances, and pollutants and contaminants from the Gold King Mine. This NTCRA is expected to be consistent with a future remedial action to ultimately address contamination from the Gold King Mine adit discharge and other sources of mining influenced water (MIW) to Cement Creek, and the NTCRA does not foreclose any future remedial action.

II. SITE CONDITIONS AND BACKGROUND

Site Name:	Bonita Peak Mining District Superfund Site
CERCLIS ID:	CON000802497
Superfund Site ID:	A8M5
NRC Case Number:	112824
Site Location:	Gladstone, San Juan County, Colorado
Lat/Long:	37.8945/-107.6384
NPL Status:	NPL Final
Category of Removal:	Non-time-critical
Name of water body:	Cement Creek, Animas River
Contaminant name:	Zinc, cadmium, other mining-related inorganic contaminants
Removal Start Date:	FY 2017/2 estimated

A. Site Description

1. Removal site evaluation

The NTCRA area is located about 9 miles north of Silverton, Colorado in the BPMD Superfund Site. The NTCRA area encompasses the Gold King Mine adit discharge, Gold King Mine adit discharge collection system, and the Gladstone IWTP (see Figures 1 and 2 in Attachment 1). On August 5, 2015, 3 million gallons of mine influenced water (MIW) was unexpectedly released from the mine. The MIW first entered the North Fork of Cement Creek, then the main stem of Cement Creek, then the Animas and San Juan Rivers.

After the release, EPA initiated an emergency removal action. As part of this action, the IWTP was constructed near the old town site of Gladstone. The Gladstone IWTP was operational by October 2015 and removes metals through a lime neutralization, flocculation, and precipitation process.

The listing of the BPMD Site on the National Priorities List (NPL) became effective on October 11, 2016. The Gold King Mine and the IWTP, where EPA currently treats the adit discharge, are within the BPMD Site.

The Gold King Mine is located along the North Fork of Cement Creek, a tributary to the Upper Animas River. It and many other inactive or abandoned mines in the mining district continue to discharge MIW from adits into streams. The Animas River and many of its tributaries, including

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Cement Creek, carry elevated concentrations of hazardous substances (heavy metals) due to both MIW (acid rock drainage (ARD)/acid mine drainage (AMD)) generated from mining activities and from naturally mineralized sources.

2. Physical location

The Gold King Mine adit is approximately 9 miles north of the town of Silverton, CO off of San Juan County Road 110 (Figure 1). The Gold King Mine adit has a latitude of 37.8945 N and longitude of 107.6384 W. It is located in the southeast quarter of Section 16, Township 42 North, Range 7 West on the U.S. Geological Survey (USGS) Ironton 7.5-Minute Topographic Quadrangle (CDM Smith 2016).

The location of the Gladstone IWTP is on relatively flat terrain just above the confluence of the South Fork and main stem of Cement Creek. The Gold King Mine adit and Gladstone IWTP are located in an area of rugged, steep topography within the San Juan Mountains in southwestern Colorado. Elevations in the area range from approximately 10,500 feet North American Vertical Datum of 1988 (NAVD88) at the Gladstone IWTP to approximately 11,440 feet NAVD88 at the Gold King Mine adit on the North Fork of Cement Creek.

Surrounding Land Use and Population

The Gold King Mine and Gladstone IWTP are approximately 9 miles north of Silverton, CO. The population in 2015 in the community of Silverton was estimated to be 637. Historically, mining was the main industry in the area; therefore, there are many inactive and abandoned mines within the Cement Creek watershed. Tourism (including skiing and recreation) and construction are now the most common industries. There is a ski area north of Silverton, which is south of and adjacent to the NTCRA area. The ski area has one lift and small parking lot.

The Gladstone IWTP and infrastructure sits on private mining claims and the Gold King Mine is privately owned. The land surrounding the NTRCA area is mainly U.S. Bureau of Land Management (BLM) managed land interspersed with a few private mining claims.

Climate

The location of the site has an alpine climate with snowy, cold winters and cool summers. The greatest amount of snowfall is between the months of November and April, with an average snowfall of 12 feet per year (CDM Smith 2016). Precipitation was evaluated by long-term precipitation data collected from the National Oceanic and Atmospheric Administration (NOAA) weather station at Silverton, CO, which is in close proximity to the NTCRA area. The weather station has a latitude of 37.809 N and a longitude of 107.663 W. In 2015, the Silverton station recorded annual precipitation of approximately 26 inches (NOAA 2016). In this alpine climate region, the minimum and maximum mean temperatures for January and July are 8°F/24°F and 36°F/72°F, respectively (CDM Smith 2016).

3. Site characteristics

Surface Water

The Animas River watershed extends from the mountainous terrain above Silverton, CO, south into the San Juan River in Northern New Mexico. The three major tributaries that flow into the Animas River at Silverton are Cement Creek, Mineral Creek, and the Upper Animas River. Cement Creek is the receiving stream for MIW discharge from the Gold King Mine adit.

Site Geology and Hydrogeology

Years of mining and the installation of bulkheads has significantly influenced groundwater elevations within the NTCRA area and adjacent mining districts. Historically, groundwater flowed along fractures and faults, with minimal leakage through bedrock, likely due to low primary permeability. With the

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advent of underground mining, bedrock groundwater that once followed natural fractures instead followed the new path of least resistance, the networks of tunnels in the underground mine workings. Thus, drainage and haulage tunnels form preferential flow paths for bedrock groundwater, leading to MIW formation when water and air interact with these mineralized source areas within the tunnels.

Between 1997 and 2004, bulkheads were installed to stop the uncontrolled flow of water from the Sunnyside mine, including three locations on the American Tunnel (drainage tunnel from the Sunnyside mine) and the Mogul mine. The bulkheads modified the bedrock hydrogeology and resulted in changes in water flowing from Gold King Mine adit. EPA installed a bulkhead at the nearby Red and Bonita Mine in 2015 with a flow through control valve that was left open due to uncertainty about how it would affect groundwater elevations and discharging adits.

4. **Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant**

CERCLA hazardous substances from the list at 40 CFR 302.4 identified for this NTCRA are beryllium, cadmium, copper, lead, manganese, silver, and zinc. The other contaminants of potential ecological concern (COPECs) identified from the draft baseline ecological risk assessment (BERA) are pollutants and contaminants as defined in 40 CFR 300.5.

MIW is water that is contaminated or influenced by mining-related activities. MIW can include both AMD and ARD or water that is not acidic. AMD is metal-bearing, acidic water discharged from underground mine workings through adits, tunnels, or shafts. ARD is a similar discharge of metal-bearing acidic water resulting from water seeping or flowing through and from acid-generating materials such as pyritic waste rock, tailings piles, or mineralized rock formations.

Acidic MIW forms when water and oxygen interact with sulfide-rich mine wastes, host rocks, or vein rocks. Sulfuric acid forms and can dissolve additional metals into the MIW. This MIW can discharge through adit portals or via seeps and springs in the groundwater and enter surface water. The Gold King Mine adit is one of many mines discharging MIW to local surface waters.

In the BPMD Superfund Site, the surface waters in the main stems of Cement Creek, Mineral Creek, and the Upper Animas River carry high loads of total and dissolved metals and high acidity into the Animas River in the vicinity of Silverton even though substantial dilution occurs with cleaner water. Aquatic life in the affected waterways are exposed to elevated levels of COPECs. In Cement Creek, current metal levels are high enough and pH levels low enough to cause Cement Creek to be essentially devoid of aquatic life.

The untreated Gold King Mine adit discharge exhibits a low pH and contains elevated concentrations of heavy metals, Fe and Al, including elevated concentrations of most of the surface water COPECs. The samples of untreated MIW were collected from the influent of the Gladstone IWTP and not at the adit because of the ongoing construction and portal rehabilitation activities. Exhibit 1 provides ranges of concentrations and flow rates as summarized in the EE/CA.

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Exhibit 1. Influent COPEC Concentrations and Flow Rate of MIW from the Gold King Mine Adit

COPECs and Flow Rate	Units	Values		
		Min	Max	Average
Flow Rate	gpm	300	961	540
Aluminum, Total	µg/L	13,000	75,000	26,957
Beryllium, Dissolved	µg/L	2.5	9.3	6.0
Cadmium, Dissolved	µg/L	35	170	66
Copper, Dissolved	µg/L	1,900	11,000	4,904
Iron, Total	µg/L	49,000	340,000	118,087
Lead, Dissolved	µg/L	0.3	35	12
Manganese, Dissolved	µg/L	1.2	30,000	23,391
pH	s.u.	3.3	3.4	3.3
Silver, Dissolved	µg/L	0.1	2.0	0.2
Zinc, Dissolved	µg/L	11,000	45,000	19,609

Note: Statistics of data from 10/19/2015 to 7/22/2016. For the statistical calculations, n=26 for flow; n=23 for Al, Be, Cd, Cu, Fe, Pb, Mn, Ag, and Zn; and n=3 for pH.

s.u. = standard units; µg/L = micrograms per liter

The maximum flow rate of 961 gpm occurred in April 2016 after personnel intentionally shut down inflow into the IWTP for several hours for maintenance, which allowed the equalization ponds to fill. The high flow rate represents a brief, rapid emptying of the equalization ponds for treatment and not flow from the adit. The highest concentrations of Al, Cd, Cu, Fe, Ag, and Zn occurred in June and July and do not appear to correspond with any flow rate trends. For all COPECs except for Ag, the lowest concentrations were observed in March and April.

Exhibit 2 summarizes the average loading data for the Cement Creek COPECs in both the untreated influent and the treated effluent. The average COPEC load removed in the Gladstone IWTP over the period analyzed was 992 pounds/day (lb/day).

Exhibit 2. COPEC Loads in MIW from the Gold King Mine Adit

Location	Influent	Effluent
COPEC	Average load (lb/day)	
Aluminum, Total	161	19
Beryllium, Dissolved	0.036	0.002
Cadmium, Dissolved	0.40	0.04
Copper, Dissolved	29	0.3
Iron, Total	708	67
Lead, Dissolved	0.068	0.001
Manganese, Dissolved	148	84
Silver, Dissolved	0.0011	0.0006
Zinc, Dissolved	119	4
COPEC load sum:	1,166	174
Difference = 992 lb/day		

Note: Statistics of data from 10/19/2015 to 7/22/2016. For the statistical calculations of the influent, n=23 for Al, Be, Cd, Cu, Fe, Pb, Mn, Ag, and Zn. For the statistical calculations of the effluent, n=25 for Al and Fe and n=23 for Be, Cd, Cu, Pb, Mn, Ag, pH, and Zn.

lb/day = pounds per day

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5. NPL status

EPA proposed the BPMD for addition to the NPL on April 7, 2016. A 68-day public comment period, during which EPA accepted comments from the public on the NPL proposal, closed on June 13, 2016. After carefully considering and responding to all comments in a responsiveness summary, EPA officially added the BPMD to the NPL on September 9, 2016.

6. Maps, pictures, and other graphic representations

Attachment 1 contains figures showing the BPMD Site location (Figure 1), the NTCRA area (Figure 2) and the current IWTP process (Figure 3) for MIW discharged from the Gold King Mine.

B. Other Actions to Date

1. Previous actions

Previous EPA response action activities conducted at the Gold King Mine adit are described below:

- 2014 and 2015: EPA investigations were performed around the Gold King Mine adit. (CDM Smith 2016).
- August 2015: While EPA was conducting work around the Gold King Mine adit, Three million gallons of MIW were unexpectedly released from the mine. Upon the release, concentrated MIW discharged into the North Fork of Cement Creek below the mine, and ultimately into the Animas and San Juan Rivers (CDM Smith 2016). EPA immediately began implementation of an emergency removal action to address the release.
- September through November 2015: Initial stabilization of the new Level 7 Gold King Adit was conducted.
- October 2015: As part of the emergency removal action to address the Gold King Mine adit release, the Gladstone IWTP was constructed to treat discharge from the Gold King Mine adit (CDM Smith 2016). The Gladstone IWTP is described briefly below.
- April 2016: The BPMD Site was proposed for addition to the NPL (CDM Smith 2016).
- June through October 2016: As part of the emergency removal action, additional stabilization of the Gold King Mine adit was completed (CDM Smith 2016).
- September 2016: The BPMD Site was listed on the NPL and the listing became effective on October 11, 2016 (CDM Smith 2016).

Description of the Gladstone IWTP

The Gladstone IWTP is a "fully automated water treatment facility" designed to treat MIW from the Gold King Mine adit. Highlights of the treatment process are described here and shown in the process diagram (see Figure 3 included in Attachment 1). Additional details can be found in the EE/CA.

The Gladstone IWTP entails a single-stage, lime neutralization process to raise the pH of the MIW and precipitate and remove heavy metals, Fe and Al, as metal hydroxides. The key components to the chemical treatment process are the lime- neutralization reactor, flocculation basin, inclined plate clarifiers, geotextile filter bags, electrical power, and control system. The plant was designed to treat an average of 600 gpm of MIW, with a range of 200 to 900 gpm, and a hydraulic spike of up to 1,200 gpm.

Gold King Mine adit MIW is delivered by gravity from the adit discharge collection sump through a 4,000-foot long high-density polyethylene (HDPE) pipeline to settling equalization ponds at the upper Gladstone area and then is gravity drained into the Gladstone IWTP lime-neutralization reactor. Figure 2

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shows a map of the NTCRA infrastructure. Hydrated lime (Ca(OH)2) is added as a slurry to the treatment reactor at a rate to achieve a target pH of between 7.5 and 9.0 in the flocculation basin immediately downstream of the reactor. Polymer flocculent is added to coagulate the metal hydroxide sludge particles in the slowly agitated flocculation basin to encourage particle coagulation. The flow enters an inclined plate clarifier (two clarifiers available) where particles impinge upon inclined plates to promote settling of the sludge and allow treated water to overflow and discharge to Cement Creek.

The sludge settles to a cone at the base of the clarifier where it is pumped to geotextile bags for filtration and sludge consolidation. Water expressed through the filter bags ("bag filtrate") is of the same quality as the clarifier overflow. It can be pumped back to the treatment system or discharged directly to the creek; currently, the water is pumped back into the treatment system for ease of monitoring and because some sludge can make it through the bags at times. The filter bags gradually fill with sludge and when full can be taken offline to further decant and consolidate. Percentages of solids in the sludge range from approximately 10 to 15 percent. Higher percent solids are achieved by stacking the bags or allowing the sludge to experience freeze-thaw cycles. After consolidation, sludge can be moved to drying beds using conventional excavation equipment.

An additional interim sludge management location will be identified in early 2017 so that transport of sludge to this location can begin in the 2017 construction season. A permanent sludge disposal location has not yet been determined but may be a component of the overall remedy for the BPMD site.

2. Current Actions

Since the emergency removal action and construction of the IWTP, EPA activities at the NTCRA area have included operation, management, and maintenance of the IWTP, Gold King Mine adit discharge collection system, and site access.

C. State, Tribal, and Local Authorities' role

1. State, Tribal and Local actions to date

State, Tribal, and local authorities have provided assistance to EPA related to the emergency removal action by conducting independent and joint sampling activities and conducting independent and joint community outreach activities to help citizens and media stay informed of response activities. Additionally, these authorities have provided notifications and assisted affected users regarding the status of the river system and established call centers for questions from the public. These partners also have provided Public Information Officers and other support activities. All of these activities have been and are conducted both jointly with and independently from the EPA response activities.

2. Potential for continued State, Tribal, and Local response

State, Tribal, and local authorities that commented on the EE/CA, support this NTCRA and are expected to remain involved in future activities at the BMPD Site. State, Tribal, and local authorities do not have the resources or authority to conduct this removal action, and are involved in a consultation role only.

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

Conditions at the NTCRA Site present a threat to public health and the environment, and meet the criteria for initiating a removal action under 40 CFR 300.415(b)(2) of the NCP.

Section 300.415(b)(2) of the NCP lists eight factors for EPA to consider in determining whether a removal action is appropriate. Specifically, EPA has determined that the following two factors apply for

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the Gladstone IWTP NTCRA area of the BPMD Site.

> *"(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;"*

A human health risk assessment for the BPMD Site has not been conducted.

Aquatic receptors are being exposed to and adversely affected by heavy metals released from the Gold King Mine and other mine discharge waters at the BPMD Site. The draft Baseline Ecological Risk Assessment (BERA) for the watershed (CDM Smith 2016) indicates adverse ecological risks to aquatic receptors. The COPECs in the surface water in the main stem of Cement Creek include pH, total Al, dissolved Be, dissolved Cd, dissolved Cu, total Fe, dissolved Pb, dissolved Mn, dissolved Ag and dissolved Zn (CDM Smith 2016). The chronic benchmarks for Al and Fe are based on the total metals due to the potential formation of iron and aluminum oxy-hydroxide precipitates; therefore, those COPECs are for total Al and total Fe. The sediment COPECs in Cement Creek include As, Be, Cu, Pb, Ag, and Zn.

It was found that the benthic macroinvertebrate population in the main stem of Cement Creek was impaired due to poor surface water and sediment quality as well as lack of habitat for macroinvertebrates. Furthermore, the water chemistry in Cement Creek is highly toxic and acutely lethal to fish, primarily due to low pH and high Al concentrations but also elevated Cd, Cu, and Zn. The draft BERA found that the water quality in Cement Creek would cause lethal stress to fish and would be acutely toxic to juvenile rainbow trout. Elevated TSS is indicative of suspended mineral precipitates, which in an acidic aqueous environment can cause adverse impacts to aquatic receptors such as benthic macroinvertebrates through mineralogical coatings on their habitat.

Analysis of the hazard quotients suggests that the sediment poses moderate risk and that the surface water poses high risk to the benthic macroinvertebrate population. The fate and transport of contaminants and exposure pathways for wildlife receptors were not investigated for Cement Creek since the communities of fish and aquatic invertebrates in the creek were minimal or non-existent.

EPA recognizes that the mass of COPECs discharging from the Gold King Mine adit is only a portion of the total mass of COPECs transported in Cement Creek and that treatment of only this one source may not appreciatively improve water quality conditions in Cement Creek or the Animas River.

> *(vii) "The availability of other appropriate federal or state mechanisms to respond to the release;"*

EPA is the lead agency at the BPMD Site. There are no other appropriate federal or state entities that have the funding resources to perform the removal response at the Gladstone IWTP.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances, and pollutants and contaminants from the Gold King Mine, if not addressed by implementing the response action described in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

The endangerment determination is based on collaboration with EPA Region 8 staff toxicologists that led to the conclusions of the draft BERA that indicates adverse ecological risks to aquatic receptors in Cement Creek, which is a tributary to the Animas River.

V. EXEMPTION FROM STATUTORY LIMITS

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A consistency exemption is being requested as part of this AM because the proposed action (continuing water treatment) will exceed the statutory 12-month period and $2 million ceiling to prevent further unacceptable exposures from the release of hazardous substances, and pollutants and contaminants from the Gold King Mine. A three-year period for IWTP operations is requested to allow treatment to continue while CERCLA investigations and engineering analyses proceed regarding further response actions addressing water treatment for the Gold King Mine, at a minimum.

The proposed action meets the criteria for the consistency exemption. The proposed action does not foreclose any future remedial actions regarding the Gold King Mine and the proposed action is also appropriate to avoid foreseeable threats from further migration of MIW and subsequent adverse impacts to ecological receptors as indicated in Section III of the AM.

VI. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The proposed action will continue operation of the existing Gold King Mine adit discharge collection system and Gladstone IWTP to collect and treat Gold King Mine Adit MIW discharge. The proposed action will include utilizing the existing IWTP and Gold King Mine adit discharge collection system (built or modified during the emergency removal action) to continue collection and treatment of the MIW from the Gold King Mine adit. The removal action objective (RAO) for the proposed action is to reduce the mass of surface water COPECs and total suspended solids (TSS) in MIW after discharge from the Gold King Mine adit.

1. Proposed action description

The proposed action entails utilizing the existing Gladstone IWTP and Gold King Mine adit discharge collection system (built or modified during the emergency removal action) to continue collection and treatment of the MIW from the Gold King Mine adit. Under this alternative, treatment of Gold King Mine adit MIW would continue, as has been ongoing since the Gladstone IWTP was brought online in October 2015.

The proposed action would produce treated effluent, which would be discharged to Cement Creek. The effluent flow will be slightly less than the influent flow due to the production of sludge from the treatment process. The sludge will contain a high percentage of water, therefore, removing a fraction of water from the effluent flow. There are no institutional controls or land use controls, however a Consent for Access is in place with a private property owner for siting of the Gladstone IWTP at the current location. This Consent for Access will expire on June 30, 2017. Access will need to be secured for the additional interim sludge management location.

The removal activities performed during the operation of the MIW collection and conveyance system include but are not limited to:

- Monitoring of the automated system for the Gladstone IWTP, including regular physical checks by an operator.
- Periodic snow removal in the vicinity of the Gladstone IWTP during winter to allow year-round MIW treatment.
- Periodic truck delivery of lime and polymer flocculant for operation of the IWTP. From Silverton, CO trucks would use County Road 110 and County Road 10 for deliveries.
- Sludge generation at Gladstone would be managed by the use of geotextile filter bags,

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sludge drying area(s), and interim sludge management areas. Management of geotextile filter bags would be performed as necessary to densify treatment sludge and maximize usable storage space at the sludge drying area(s).

- Inspection and maintenance of the adit discharge collection sump and equalization ponds, including periodic removal of accumulated MIW sludge and replacement of liner material, as necessary.
- Inspection and maintenance of pipelines from the adit sump to the equalization ponds and from the equalization ponds to the IWTP.
- Sludge management which could include off-site disposal at an appropriate facility or siting, construction, and operation and maintenance of an on-site interim sludge repository.

Permanent disposition (i.e., disposal) of the sludge has not been determined. Sludge disposition is expected to be addressed in a future CERCLA response action, recognizing that sludge management and disposal may be a long-term BPMD site need.

Because the Gladstone IWTP has been constructed and is operational, the proposed action would only have minor impacts to the community and workers due to truck traffic related to transportation of treatment materials such as lime and reagents. Short-term risks posed to the community during implementation of the proposed action relate to trespassers within the areas of the Gold King Mine and the Gladstone IWTP. The road to the IWTP is also used to access the base of the Silverton Mountain ski area; however, lime deliveries would be limited after the onset of winter, allowing for about 150 days of lime storage on site, lessening the likelihood of IWTP truck traffic interfering with skier traffic. In addition, after capacity at the existing sludge drying area is exhausted, there will be additional periodic truck traffic for transport of sludge to the new interim sludge management area. While limited exposure to MIW and treatment plant reagents or residuals may occur while workers perform monitoring, exposure risk would be mitigated through the use of personal protective equipment (PPE)

2. Contribution to remedial performance

Current data indicate that the existing Gladstone IWTP removes a substantial percentage of the COPECs mass discharging from the Gold King Mine adit. TSS present or forming in the untreated Gold King Mine adit MIW is removed in the Gladstone IWTP process and prevented from entering surface water in Cement Creek, limiting the likelihood of an uncontrolled release of suspended solids. The average load of COPECs mass removed by the IWTP is 992 lb/day.

EPA recognizes that the mass of COPECs discharging from the Gold King Mine adit is only a portion of the total mass of COPECs transported in Cement Creek and that treatment of only this one source may not appreciatively improve water quality conditions in Cement Creek or the Animas River. Nonetheless, since the Gladstone IWTP is in place and available, continuing treatment of this one source does provide some benefit in the interim, while EPA investigates and studies the other sources of untreated mine discharges and natural mineralization in the area that contribute to the mass of COPECs transported in Cement Creek and while EPA analyzes the feasibility of options to address these sources (either as interim or final actions), irrespective of MIW treatment.

3. Engineering Evaluation/Cost Analysis

The EE/CA is located in the administrative record file for the project. The EE/CA evaluated two alternatives, continuation versus suspension of water treatment operations at the Gladstone IWTP (CDM Smith 2016). While treatment of just the Gold King mine adit discharge does not fully address water quality issues in Cement Creek or the Animas River, it does provide benefit in the interim.

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The EE/CA was released to the public for a 30-day comment period beginning November 14, 2016. Of the comments/letters received, all were in favor of continued water treatment and operation of the Gladstone IWTP. None suggested discontinuing treatment. The written response to significant comments on the EE/CA and supporting information are located in the administrative record.

4. ARARs (Applicable or Relevant and Appropriate Requirements)

The removal actions will attain, to the extent practicable considering the exigencies of the situation, Applicable or Relevant and Appropriate Requirements (ARARs) of federal and state environmental laws. The identified ARARs are presented in Attachment 2. Section 300.415(j) of NCP requires that removal actions attain ARARs under federal or state environmental laws or facility siting laws, to the extent practicable considering the urgency of the situation and the scope of the removal. In addition to ARARs, the lead agency may identify other federal or state advisories, criteria, or guidance to be considered for a particular release.

Only the substantive portions of the requirements are ARARs. Administrative requirements are not ARARs and do not apply to removal actions conducted on the Site. Provisions of statutes or regulations that contain general goals expressing legislative intent, but are non-binding, are not ARARs.

The preferred removal action selected will comply with ARARs to the extent practicable given the urgency of the situation and the scope of the proposed action. After discussion with the State and review of the list of potential State ARARs, it was determined that it is practicable to meet substantive provisions of the State surface water quality ARARs through development of a permit equivalent document that would establish discharge limits for the IWTP discharge. The permit equivalent document would be developed in coordination with the State. Chemical- specific ARARs will be complied with at the discharge point to Cement Creek as practicable with the existing configuration of the Gladstone IWTP. Location- and action- specific ARARs would be addressed, to the extent practicable, during removal action implementation given that the Gladstone IWTP has already been constructed under a previous removal action. Treatment residuals (sludge) temporarily stored on site would comply to the extent practicable with the substantive requirements of action-specific ARARs such as the Colorado State Solid Waste Disposal Sites and Facilities Act and Implementing Regulations.

5. Project Schedule

The Gladstone IWTP will transition from the "emergency removal action" to a non-time critical removal action upon signing of this AM. It is anticipated that this will occur in the second quarter of Fiscal Year 2017. A three-year period of time for IWTP operations was estimated to allow for further remedial investigation, analysis for further response actions addressing the Gold King Mine, at a minimum.

The removal action will be conducted beyond the statutory 12-month period to prevent further unacceptable exposures from the release of hazardous substances and pollutants and contaminants from the Gold King Mine. A consistency exemption is being requested as part of this AM.

Estimated costs were also developed for the proposed action over a three-year period of analysis, based on the scope of the proposed action described in Section V.A.5. The three-year undiscounted constant dollar cost for the proposed action is approximately$5,489,000. This includes a capital cost of $348,000. The annual removal costs are $2,101,000 for the first year and $1,694,000 for the subsequent years for a total removal cost of $5,141,000. The present value cost for the proposed action is approximately $4,825,947 (with 7 percent discount factor).

A consistency exemption is being requested as part of this AM because the proposed action is scheduled beyond the statutory 12-month period and $2 million ceiling.

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

Suspension of the IWTP would stop treatment of MIW from the Gold King Mine. Untreated MIW would substantially contribute to metals mass loading of Cement Creek and the Animas River. For example, the average mass of COPECs removed in the Gladstone IWTP would cease, and mass loads entering Cement Creek would increase to 992 lb/day. Because concentrations and flow rates discharging from the adit have been observed to vary since the release, water discharged from the Gold King Mine adit may be of worse quality than prior to the release, resulting in even higher mass of COPECs released to surface water, perhaps significantly worsening risks to aquatic receptors. The Gladstone IWTP would not be in use to mitigate the effects of potentially higher mass loads of COPECs if they occur. Untreated MIW would flow into North Fork of Cement Creek, which could increase exposure risk to human and ecological receptors. TSS present or forming in the untreated Gold King Mine adit portal could be released chronically or in a sudden, uncontrolled release.

VIII. OUTSTANDING POLICY ISSUES

Removals involving mine sites are one of eight categories designated as nationally significant or precedent-setting (NSPS).

IX. ENFORCEMENT

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

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X. RECOMMENDATION

This decision document represents the selected removal action for the the Gold King Mine adit discharge, Gold King Mine adit discharge collection system and Gladstone ITWP within BMPD Superfund 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 this action.

Conditions at the site meet the NCP Section 300.415(b) criteria for a removal action and the CERCLA Section 104(c) consistency exemptions from the 12-month and $2 million limitations, and I recommend your approval of the proposed removal action and the 12- month and $2 million exemptions. The total project ceiling, if approved, will be $5,489,000. Of this, none of the funding will come from the Regional removal allowance as funding will be obtained from the remedial program.

APPROVE

Shaun L. McGrath
Regional Administrator

1/12/17
Date

DISAPPROVE

Shaun L. McGrath
Regional Administrator

Date

ED_002434_00001630-00014

ATTACHMENTS

Attachment 1 – Select figures from EE/CA
Attachment 2 – Summary of ARARs

SUPPLEMENTAL REFERENCE DOCUMENTS

CDM Smith. 2016. Public Review Draft, Gladstone Interim Water Treatment Plant Engineering Evaluation/Cost Analysis (EE/CA), Bonita Peak Mining District Superfund Site, San Juan County, Colorado. November

EPA. 2016. Action Memorandum, Gold King Mine Release Site, San Juan County, Colorado EPA. 2009. Superfund Removal Guidance for Preparing Action Memoranda. September.

EPA. 1993. Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA. EPA 540-R-057. August

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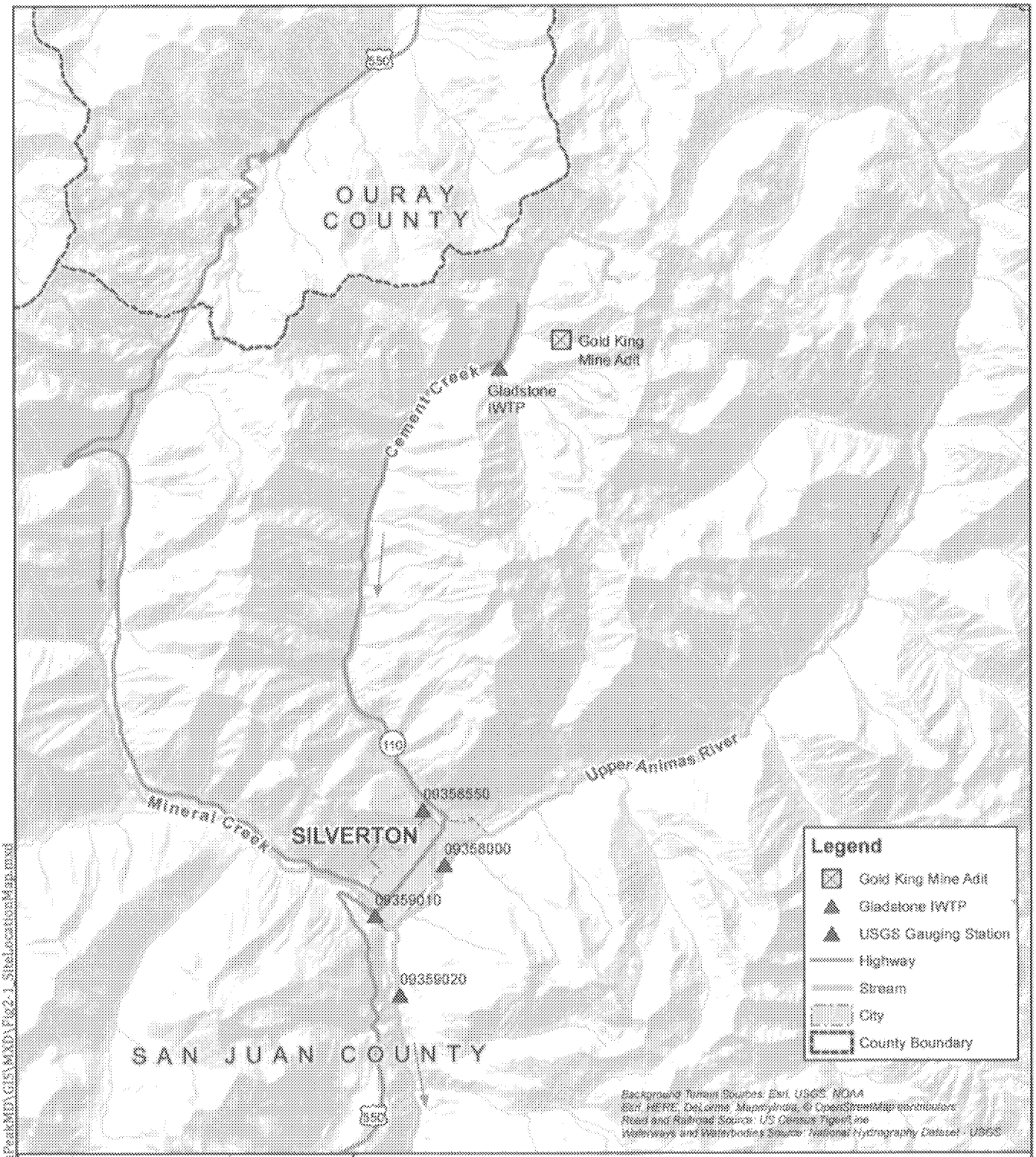

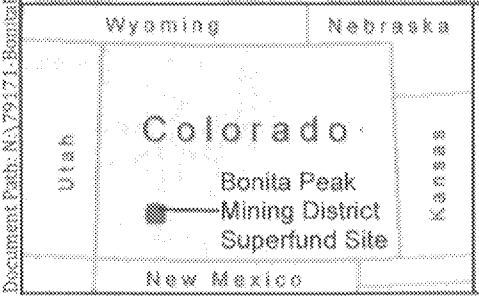

Figure 1
Site Location Map
Gladstone IWTP AM
Bonita Peak Mining District Superfund Site

N

0 0.5 1 2
Miles

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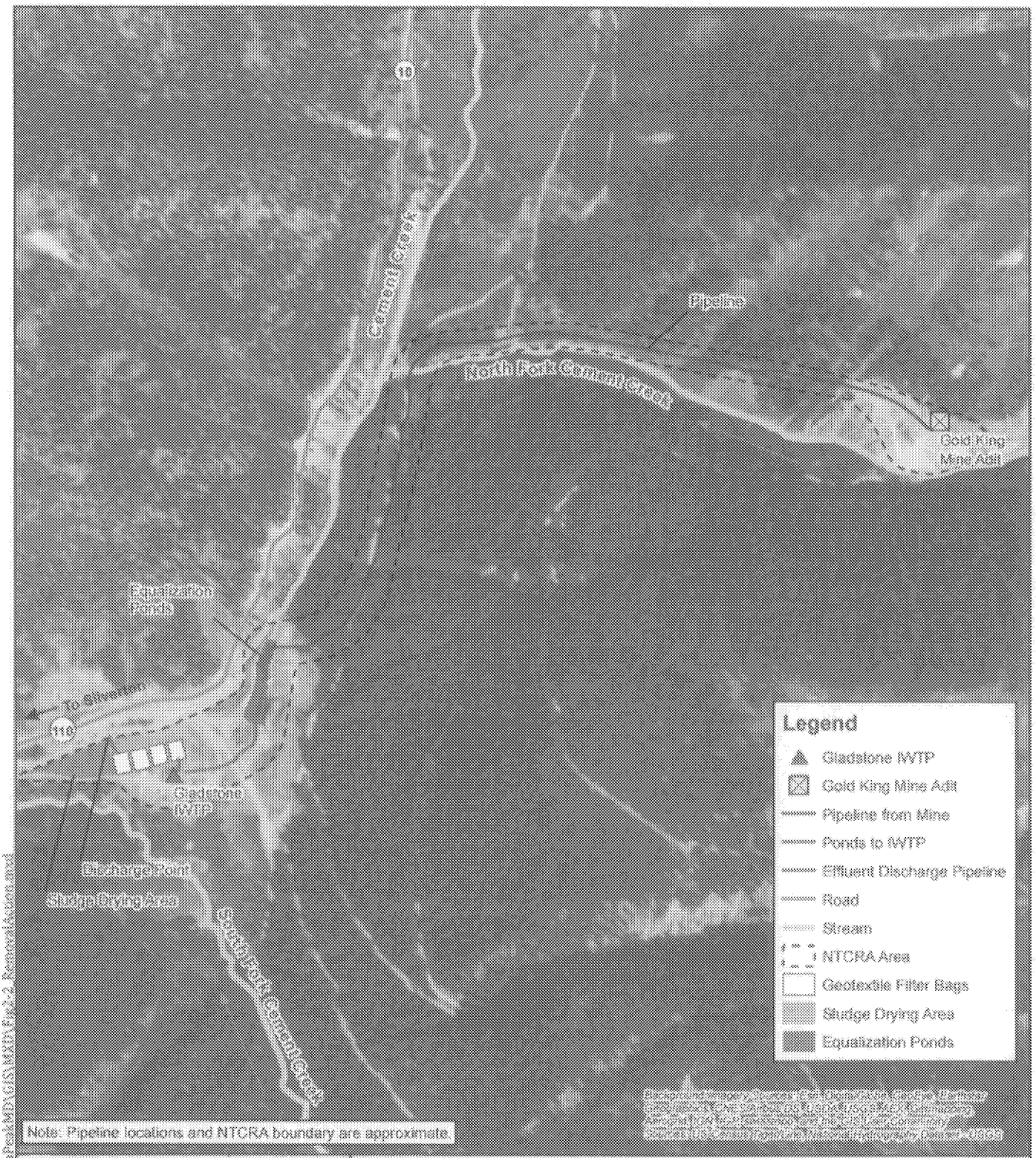

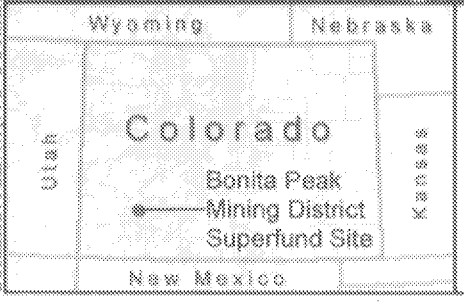

Figure 2
Non-Time-Critical Removal Action Infrastructure
Gladstone IWTP AM
Bonita Peak Mining District Superfund Site

N

0 0.05 0.1 0.2
Miles

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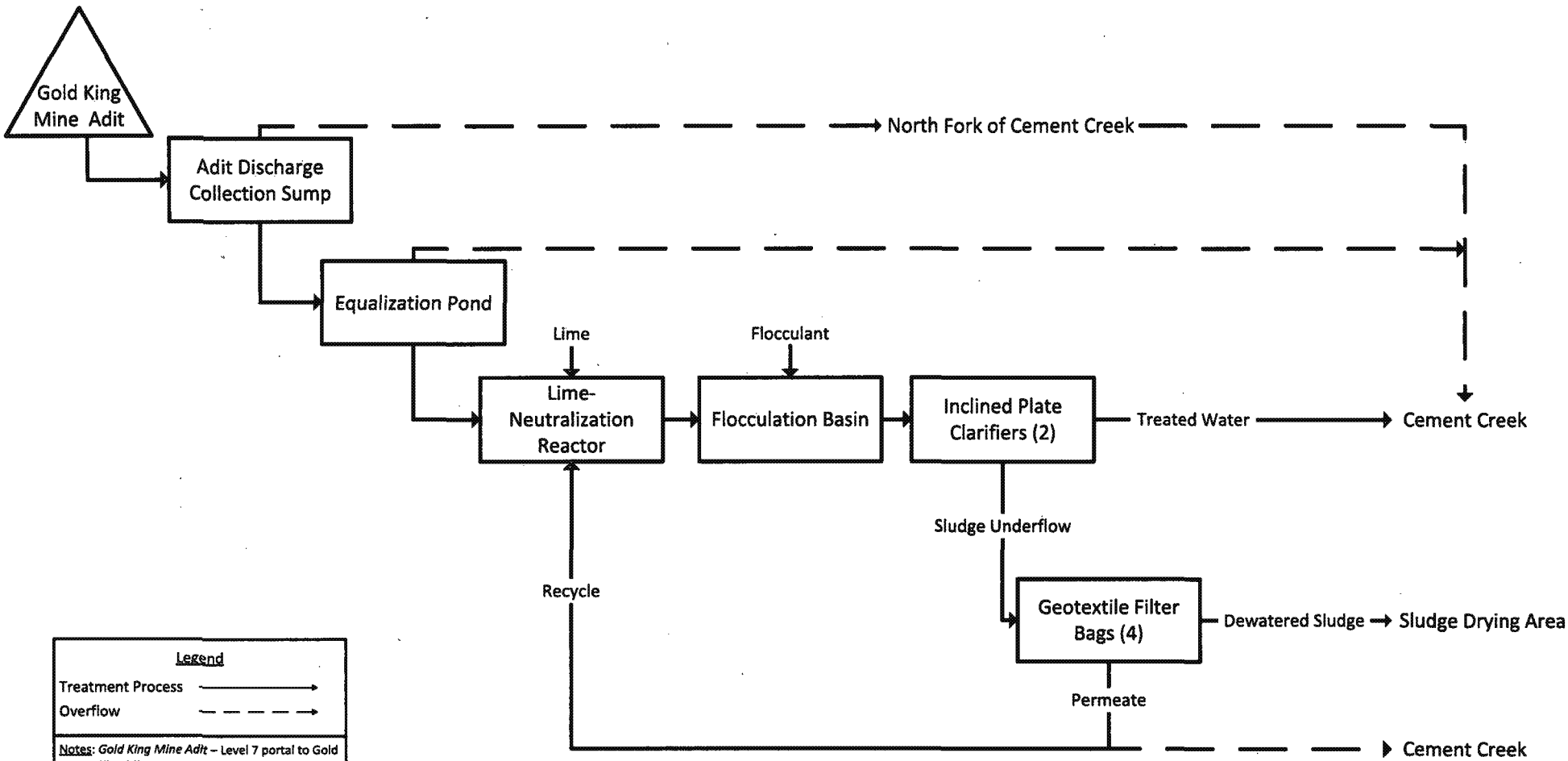

Legend

Treatment Process

Overflow

Notes: *Gold King Mine Adit* – Level 7 portal to Gold King Mine;
Inclined Plate Clarifiers - two clarifiers operate in parallel to accommodate higher flows or solids loading;
Geotextile Filter Bags – four filter bags operate in parallel and can be isolated for sludge management

Figure 3
Gold King Mine Adit MIW Treatment Process
Gladstone IWTP AM
Bonita Peak Mining District Superfund Site

Identification of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)

Action Memorandum, Gladstone IWTP Bonita Peak Mining District (BMPD) Superfund Site

	Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
			Federal ARARs				
1	National Historic Preservation Act (NHPA) and Implementing Regulations 54 United States Code (U.S.C.) § 300101 36 C.F.R. § 63 36 C.F.R. § 800	Potential ARAR	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (generally, 50 years old or older). Federal agencies required to take into account their undertakings on historic properties and afford the Advisory Council on Historic Preservation or its designees a reasonable time to comment.	It is not anticipated that cultural resources eligible for the National Register of Historic Places would be found within the removal action area due to previous disturbances. In addition, the removal action alternatives contemplated do not involve intrusive activities.		✓	
2	Fish and Wildlife Coordination Act and Implementing Regulations 16 U.S.C. 662 *et seq.*,	Potentially Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency. The statute requires Federal agencies to take into consideration the effect that water-related projects would have upon fish and wildlife and then take action to prevent loss or damage to these resources.	The alternatives include potential discharges of treated or untreated water to Cement Creek. If the activities affect wildlife and/or non-game fish, federal agencies must first consult with the U.S. Fish and Wildlife Service and the Colorado Department of Natural Resources. Consultation is not required for on-site actions but is encouraged. The selected removal actions will be carried out in a manner to avoid adversely affecting wildlife and/or non-game fish.		✓	
3	Bald Eagle Protection Act 16 U.S.C. § 668 et seq.	Potentially Applicable	This requirement establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the appropriate program within the USFWS during removal design and removal construction to ensure that any cleanup of the facility does not unnecessarily adversely affect the bald and golden eagle.	Bald eagles have been identified in San Juan County, but not necessarily found at the removal action area. If bald eagles are identified within the removal areas, the selected removal actions will be carried out in a manner to avoid adversely affecting bald eagle.		✓	

Identification of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)

Action Memorandum, Gladstone IWTP Bonita Peak Mining District (BMPD) Superfund Site

	Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
			Federal ARARs				
4	Endangered Species Act and Implementing Regulations, 16 U.S.C. §1531 50 C.F.R §1§7 and 402	Potentially Applicable	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. Endangered Species Act, Section 7 requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species. Substantive compliance with the ESA means that the lead agency must identify whether a threatened or endangered species, or its critical habitat, will be affected by a proposed response action. If so, the agency must avoid the action or take appropriate mitigation measures so that the action does not affect the species or its critical habitat. If, at any point, the conclusion is reached that endangered species are not present or will not be affected, no further action is required.	Lynx (federally threatened mammal) and southwestern willow flycatcher (federally endangered bird) have been identified in San Juan County, but not necessarily found at the removal action area. If threatened or endangered species (T&E) are identified within the removal action area, the selected actions will be carried out in a manner to avoid adversely affecting those species.		✓	
5	Migratory Bird Treaty Act and Implementing Regulations, 16 U.S.C. § 703 *et seq.* 50 C.F.R. § 10.13	Potentially Applicable	This requirement establishes a federal responsibility for the protection of the international migratory bird resources and requires continued consultation with the U.S. Fish and Wildlife Service during removal design and removal construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	The selected actions will be carried out in a manner to avoid adversely affecting migratory bird species, including individual birds or their nests.		✓	
6	Floodplain Management Executive Order No. 11988.	Potential TBC	Requires federal agencies to take action to reduce the risk of the flood loss, to minimize the impact of flood on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. Requires federal agencies to consider alternatives to avoid, to the extent possible, adverse effects and incompatible development in the floodplain. Design or modify its action in order to minimize potential harm to or within the floodplain.	The existing removal action infrastructure (e.g. the IWTP and associated ponds and pipelines from the Gold King Mine) are not known to be located in floodplains. None of the actions involve any construction activities within a floodplain. Additional research will be performed during the removal action to determine whether in fact this condition exists within removal action area.		✓	

Identification of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)

Action Memorandum, Gladstone IWTP Bonita Peak Mining District (BMPD) Superfund Site

	Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
			Federal ARARs				
7	Protection of Wetlands Executive Order No. 11990.	Potential TBC	Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.	The existing removal action infrastructure (e.g. the IWTP and associated ponds and pipelines from the Gold King Mine) are not located in known jurisdictional wetlands. Also the alternatives do not involve discharge of dredge or fill material into Cement Creek. Additional research will be performed during the removal action to determine whether in fact this condition exists within removal action area.		✓	✓
8	Colorado Non-Game, Endangered, or Threatened Species Act CRS 33-2-101	Potentially Applicable	Protects endangered or threatened species and preserves their habitats. Requires coordination with the Division of Wildlife if removal activities impact on state-listed endangered or threatened spices or their habitat.	Lynx, wolverine (state endangered mammals), and southwestern willow flycatcher (state endangered bird) were identified in San Juan County, but not necessarily found at the removal action area. If State-endangered species are identified within the removal action area, the selected actions will be carried out in a manner to avoid adversely affecting those species.		✓	✓
9	Classifications and Numeric Standards for San Juan and Dolores River Basins 5 CCR 1002-34	Potentially Applicable	Classification and numeric standards for the San Juan and Dolores River Basins, including tributaries and standing bodies of water. Classification identifies actual beneficial uses of water and allowable concentrations of various parameters.	Establishes numerical water quality standards for the contaminants of potential ecological concern (COPECs) in Cement Creek and the Animas River.	✓	✓	
10	Colorado Water Quality Control Act, and Colorado Discharge Permit System Regulations, CRS 25-8-101 *et seq.*, 5 CCR 1002 -61, Regulation No. 61	Potentially Applicable	Establishes program for permitting discharges of contaminants into waters of the United States within Colorado.	The substantive provisions of the Colorado Discharge Permit System (CPD) program are potentially applicable to point source discharge under the proposed removal activities (e.g. potential treated effluent discharges from the IWTP or from the collection pond at the Gold King Mine)			✓

Identification of Federal and State Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considered Information (TBCs)

Action Memorandum, Gladstone IWTP Bonita Peak Mining District (BMPD) Superfund Site

	Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location	Action
			Federal ARARs				
11	State Solid Waste Disposal Sites and Facilities Act and Implementing Regulations, CRS 30-20-100.5 *et seq.*, 6 CCR §1007-2 §§ 1, 2 and 9	Potentially Relevant and Appropriate	Section 2.1 and 2.2 establishes minimum standards and groundwater monitoring requirements for solid waste management facilities. Sections 9.1 and 9.2.1 establish general provisions and specific requirements for Type A waste impoundments.	The alternatives involve generation of non-hazardous solid waste (i.e. sludge) from IWTP operations. While the operations do not involve disposal or open dumping within the period of evaluation for the removal action alternatives (sludge is contained within geotextile bags), they do involve storage of IWTP sludge within a diked area for a period exceeding 30 days. Thus, the substantive requirements in Section 9.2.1 for a Type A waste impoundment are potentially relevant and appropriate to the removal action.			✓
12	Colorado Natural Areas CRS 33-33-101 *et seq.*	Potentially Applicable	The Colorado Natural Areas Program maintains a list of plant species of special concern for the State. Coordination with Division of Parks and Outdoor Recreation is recommended if activities will impact listed species.	If the removal action involves activities that impact species of special concerns, federal agencies will coordinate with Division of Parks and Outdoor Recreation to address substantive requirements to limit impacts.		✓	