Action Memorandum
for
ADIT DRAINAGE
NON TIME-CRITICAL REMOVAL

NEW WORLD MINING DISTRICT
RESPONSE AND RESTORATION PROJECT

Gallatin and Custer National Forests
Park County, Montana

April 5, 2013

ACTION MEMORANDUM

Date: April 5, 2013

Subject: Request for Removal Action
New World Mining District Response and Restoration Project
Gallatin and Custer National Forests

From: Mary Beth Marks, On-Scene Coordinator

To: Faye L. Krueger, Regional Forester

Through: Ronald Hecker, District Ranger, Gardiner Ranger District
Mary Erickson, Forest Supervisor, Gallatin National Forest
Bob Kirkpatrick, Regional CERCLA Coordinator

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I. PURPOSE

The purpose of this Action Memorandum is to request approval and document the rationale for the proposed non-time-critical Response Action described herein for historic Adit Discharges located within the New World Mining District Response and Restoration Project area (Site) in Park County, Montana (**Figure 1**). These discharges result from historic gold, silver, copper, and lead mining activity that was active during the period from the 1864 to the early 1950's. Seepage from mining-related discharges is characterized by elevated metal concentrations and sometimes acidic pH values that may contribute to degradation of receiving streams and nearby groundwater resources. The following discussion substantiates the need for a removal response, identifies the proposed action, and provides the specific risk reduction criteria under which the proposed action will be conducted, demonstrates that these criteria are protective of human health and the environment, and explains the rationale for the Forest Service's selection of the proposed response action.

A release, or a significant threat of a release from adit discharges, has or is occurring at the Site that poses a threat to public health or welfare or the environment, on and /or from lands under the jurisdiction, custody, or control of the USDA Forest Service, Gallatin and Custer National Forests. Adit and other mining related discharges at the Site may present an imminent and substantial endangerment to human health or welfare and the environment, on and/or from lands under the jurisdiction, custody, or control of the USDA Forest Service, Gallatin and Custer National Forests. These conditions meet the criteria for initiating a Removal Action under 40 CFR Section 300.415 (b)(2) of the National Contingency Plan (NCP). Executive Order 12580 under the Comprehensive, Environmental, Response, Compensation, and Liability Act (CERCLA) authorizes non-time critical removal actions {section 104 (42 U.S.C. 9604)] and 7 CFR 2.60(a)(39) delegates Removal Action authority to the USDA Forest Service, when the source of the release or potential release of hazardous substances is on or from National Forest System (NFS) lands. All response actions will be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300)(NCP). The Regional Forester has designated Mary Beth Marks, as the On-Scene-Coordinator for this action consistent with 40 CFR 300.415 (m).

The scope of the proposed Response Action is directed at eliminating, reducing, or treating uncontrolled releases of metals from these adit and other mining-related discharges in the District in order to minimize impacts to receiving surface and groundwater resources. The overall objective of the proposed Response Action is to control and contain these releases of and exposure to specific contaminants that are impacting human health and the environment at the Site. The proposed action set forth in this Action Memorandum is consistent with the Final Engineering Evaluation/Cost Analysis (EE/CA) that was prepared for the Forest Service by its consultant Tetra Tech (Tetra Tech, 2010). The EE/CA developed various response action alternatives that address impacts associated with hazardous substances released from the adit discharges present at the Site. The Final EE/CA provides the details and basis for the selected response action for features at the Site.

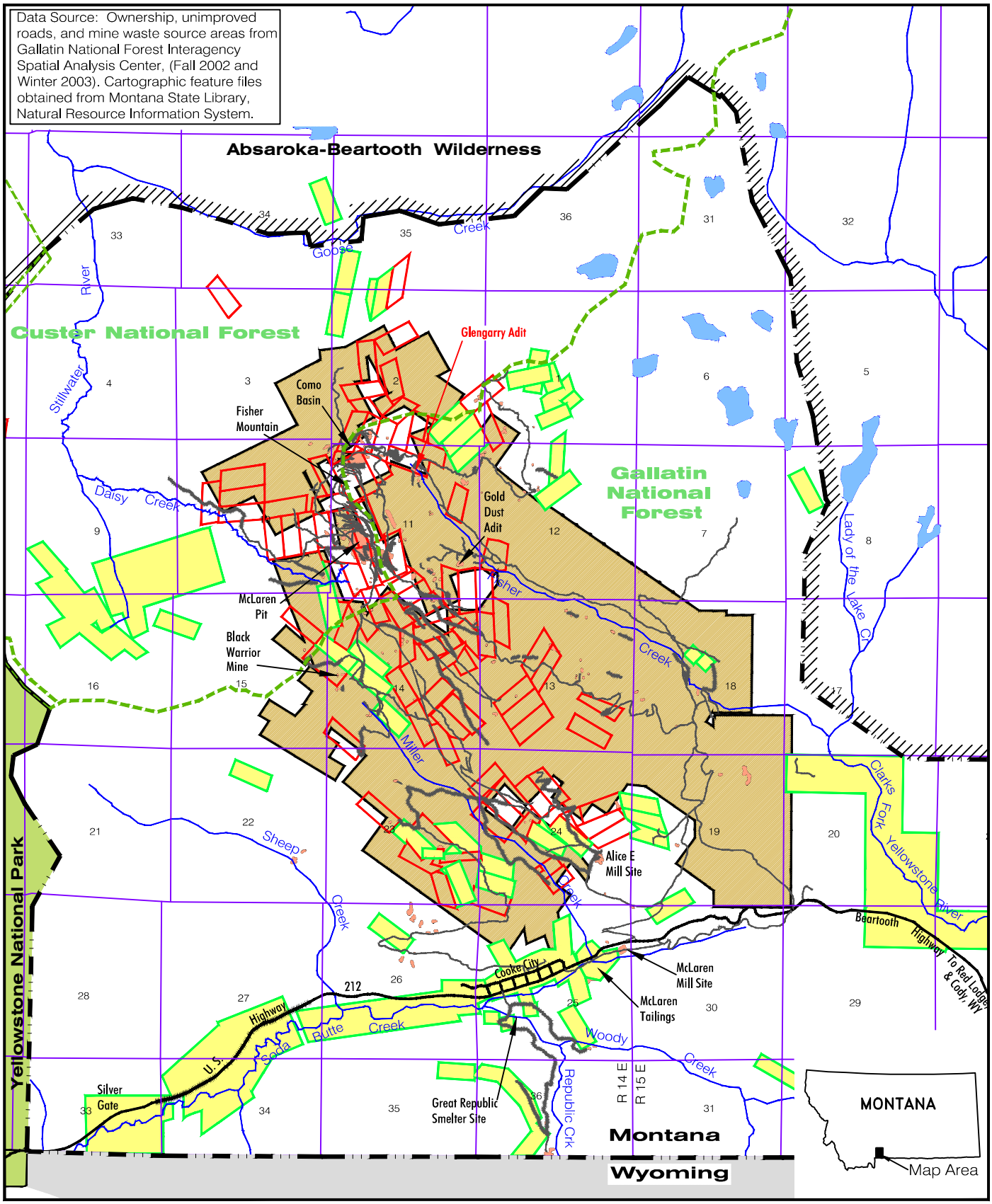
The Adit Discharge Response Action will be executed by following the non-time-critical removal action process as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42 USC 9604) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR Part 300). Response actions – as explained in the U.S. Environmental Protection Agency's (EPA) *Guidance on Conducting Non-Time-Critical Removal*

Actions Under CERCLA -- are implemented to respond to "the cleanup or removal of released hazardous substances from the environment … as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment…" (EPA, 1993).

This is the sixth Response Action proposed for the multi-year New World Project. An Overall Project Work Plan prepared for the project (Maxim, 1999a), and work plans prepared annually (Tetra Tech, 2009b, 2008b, 2007b, 2006b, 2005b, 2004b; and Maxim, 2003b, 2002a; 2001a; 2000; 1999b) describe in detail the process for prioritizing sites and the overall schedule for cleanup of historic mining wastes present in the District. A Draft (Tetra Tech, 2006c) and a Final (Tetra Tech, 2010) Engineering Evaluation/Cost Analysis (EE/CA) were prepared to develop various alternatives that address impacts associated with adit discharges of metal contaminants into surface waters throughout the New World District. The EE/CA provides the details and basis for the proposed Response Action and is available at three document repositories in Cooke City, Bozeman, and Gardiner, and on the project website at **http://www.fs.fed.us/r1/gallatin.**

This Action Memo is also requesting approval for the proposed non-time-critical Response Action described herein for the historic McLaren Mill tailings site located within the New World Mining District Response and Restoration Project area in Park County, Montana. This work is being conducted by the Montana Department of Environmental Quality (MDEQ) on State owned land immediately adjacent to National Forest System land. The topography of the site requires filling of a topographic depression and construction of a run-on diversion ditch on non-disturbed National Forest System land in order to control run-on and ponding of water that could negatively impact MDEQ's reclamation work. Additional work on National Forest System land would consist of the addition of clean fill on the western buttress of the repository to lessen the slope from 2:1 to 4:1.

Site characteristics of the McLaren Mill tailings project are not discussed in detail in this Action Memo but are available in the EE/CA for that project (Pioneer, 2002). The proposed surface run-on ditch and the topographic depression proposed for fill/regrading are in an area with no hazardous waste. The diversion ditch and would not route any water that has come into contact or has the potential to come into contact with hazardous waste. The extension of the west side buttress fill would be made with uncontaminated material and would not come into contact with any hazardous waste.



Project Vicinity Map
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 1

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II. SITE CONDITIONS AND BACKGROUND

A. Site Description

The primary environmental issues within the New World Mining District (District) are associated with impacts from historic (1869 – 1953) gold, silver, copper, and lead mining and recent (1994) mineral exploration activities that were initiated with minerals prospecting in the area in about 1869. Mining disturbances are primarily situated on National Forest System lands. Human health and environmental issues are related to elevated levels of heavy metal contaminants present in mine waste dumps, metals-rich soils, acidic mine discharges, and in-stream sediments. Mine waste has been subject to erosion and leaching of contaminants, and perennial acid mine discharges directly impact water quality in the District.

A Consent Decree negotiated with the former owner of the mining interests in the District provides the terms and funding for cleanup efforts. For cleanup purposes, there are two categories of properties in the District: District Property and non-District Property. District Property is defined as including all property or interests in property that Crown Butte Mining, Inc. (CBMI) relinquished to the United States under the terms and conditions of a Settlement Agreement and Consent Decree entered by the United States District Court for the District of Montana in 1998. Non-District Property includes private land and other federal lands within the project boundary. Mining wastes present on District Property must first be addressed before cleanup of mining wastes on non-District Property can proceed. The discharging adits and other mining related flows addressed in this proposed Response Action are all located on District Property.

1. Removal Site Evaluation

On August 12, 1996, the United States signed a Settlement Agreement (Agreement) with Crown Butte Mines, Inc. (CBMI) to purchase CBMI's interests in the District. This transfer of property to the U.S. government effectively ended CBMI's proposed mine development plans and provided $22.5 million to cleanup historic mining impacts on certain properties in the District. In June 1998, a Consent Decree (Decree) was signed by all interested parties and was approved by the United States District Court for the District of Montana. The Decree finalized the terms of the Agreement and made available the funds that are being used for mine cleanup. Monies available for cleanup are to be first spent on District Property. District Property is defined in the Consent Decree as all property or interests in property that CBMI relinquished to the U.S. Government. If funds are available after District Property is cleaned up to the satisfaction of the United States, the clean-up of other mining disturbances in the District may be undertaken.

In 1996, the EPA began a site investigation of mining impacts in the District, which was performed by URS Operating Systems (UOS). The EPA investigation involved installing monitoring wells, surface water sampling, groundwater monitoring, and completing a groundwater tracer study. The results of these studies were published in a technical report (UOS, 1998) that included the following: a review of all previous surface water and groundwater data collected by the Montana Department of Natural Resources and Conservation, USDA Forest Service, CBMI, EPA, and UOS; an evaluation of the data collected during the 1996, 1997, and 1998 field seasons; and an overall evaluation of the complete data set with respect to restoration and reclamation of the historic abandoned mining

operations. Site investigation data adequately document impacts to human health and the environment associated with historic mining.

Ongoing work including previous response actions undertaken by the USDA-Forest Service are describe below in section II, B, 1 – Previous Actions.

2. Physical Location

The New World Mining District falls within the boundaries of the Gallatin and the Custer National Forests and abuts Yellowstone National Park's northeast corner. The Absaroka-Beartooth Wilderness Area bounds the District to the north and east. To the south of the District is the Montana-Wyoming state line. The District lies entirely within Park County, Montana.

The communities of Cooke City and Silver Gate, Montana are the only population centers near the District. The neighboring communities of Mammoth, Wyoming and Gardiner, Montana are located about 80 kilometers (50 miles) to the west. Red Lodge, Montana is about 105 kilometers (65 miles) to the northeast, via the Beartooth Highway, and Cody, Wyoming is located 100 kilometers (60 miles) to the southeast via the Chief Joseph Highway. The only route of travel is open on a year-round basis that allows access to the District is the highway between Mammoth, Wyoming and Cooke City, Montana that travels through Yellowstone Park. The Beartooth Highway and the Montana portion of the Chief Joseph Highways are closed during the winter.

The District is situated at the headwaters of three river systems, which all eventually flow into the Yellowstone River. The three tributary rivers are the Clarks Fork of the Yellowstone, the Stillwater, and the Lamar. The Lamar River flows through Yellowstone Park. The major tributary streams in the District include Daisy, Miller, Fisher, Goose, Sheep, Lady of the Lake, Republic, Woody, and Soda Butte creeks.

3. Site Characteristics

The District covers an area of about 100 square kilometers (40 square miles). Historic mining disturbances affect about 20 hectares (50 acres). The District is located at an elevation that ranges from 2,400 meters (7,900 feet) to over 3,200 meters (10,400 feet) above sea level and covers an area of about 100 square kilometers (40 square miles). The topography of the District is mountainous, with the dominant topographic features created by glacial erosion. The stream valleys are U-shaped and broad while the ridges are steep, rock-covered, and narrow. Much of the District is located at or near tree line, especially where the major mining disturbances are located. The site is snow-covered for much of the year.

Of the more than 150 historic mine sites located in the District, 27 adit openings with discharges were originally inventoried and monitored. Of these sites, only ten (10) are perennial discharges with water quality that exceeds Montana's water quality standards. In addition, three subsurface drains located at the reclaimed McLaren Pit site convey poor quality water from the reclaimed area to Daisy Creek; as such, these drains are included in the evaluation of mining-related discharges. The characterization of the nature and extent of the discharges indicates that some contribute significant loads to tributary streams while others have very minor impacts. Of the eleven (11) discharges (ten

adits and the McLaren Pit subsurface drains) that exceed aquatic water quality criteria, two are located on non-District property, which, according to the Consent Decree (the legal basis for response and restoration work), no work can be conducted at these sites until other criteria are met. Final reclamation work was conducted at four of these adits, the Black Warrior Adit, Glengarry Mill-Site Adit, Lower Tredennic Adit (USDA-FS, Action Memorandum, 2008). Closure of the McLaren Adit was conducted between 2008 and 2010 after the draft version of this EE/CA was prepared (Tetra Tech, 2006) and this Action Memorandum approves that action. Therefore, only five remaining discharges were carried through the screening and evaluation of potential response action alternatives in the Final EE/CA. A list of the discharges evaluated is presented in **Table 1**.

TABLE 1
DISCHARGE SITES REQUIRING RESPONSE ACTION EVALUATION

Site Name	Site No.	Water Quality Exceedance	Discharge Flow Range (gpm)	Site Status
Little Daisy Adit and Dump	M-1	Cd, Fe, Mn, Zn	0.5-220	Collapsed/Initial Reclamation 2005
Gold Dust Adit	F-28	Mn	1.3-247	Closed/Initial Reclamation2005
Henderson Mountain Dump 7	AE-17	Al, Cu, Fe, Mn	0.0-5	Closed/Initial Reclamation 2004
Henderson Mountain Adit	M-25	Al, Cu, Pb	<0.04-25	Collapsed
McLaren Pit Subsurface Drains	DCSW-101, -102, -103	Al, Cd, Cu, Fe, Pb, Mn, Zn	2.5-52	Three drains under cap

The characteristics of each of these adits and the McLaren Pit subsurface drains are described below. Each of the mines is an underground mine with adit entry. Some of these adit portals were collapsed; however, the Gold Dust Adit and Henderson Mountain #7 adit, were back-filled during reclamation and closure. Each of the adits has a discharge that exceeds Montana aquatic water quality standards for one or more constituents. This section presents a description of these discharges in the District. **Figure 2** shows the location of the discharging adits or drains that remain in the District.

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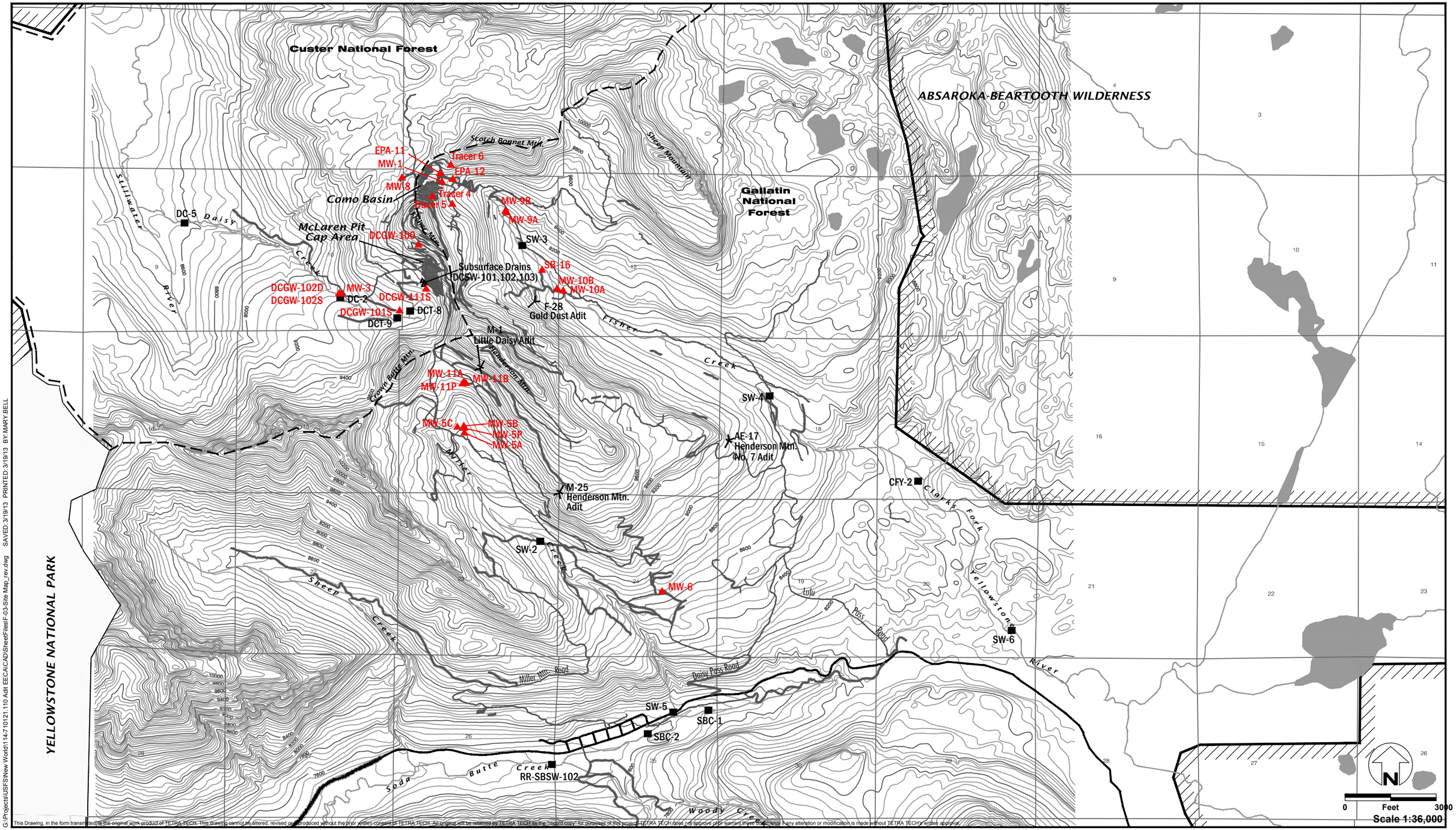

G:\Projects\USFS\New World\114-710121.110 Adit EECA\CAD\SheetFiles\F-03-Site Map_rev.dwg SAVED: 3/19/13 PRINTED: 3/19/13 BY: MARY BELL

Source: Topographic data from USGS 7.5 Cooke City Quad
Contour Interval = 40'

- District Boundary
- Forest Boundary
- Roads
- SW-2 ■ Surface Water Station
- Collapsed Adit Discharge Site
- Open Adit Discharge Site
- Other Discharge Site
- MW-3 ▲ Monitoring Well

Site Map
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 2

Figure 2, backside 11x17

McLaren Sub-surface Drains

The Final McLaren Pit Response Action EE/CA was prepared and released in December of 2001, the Action Memorandum was issued in January of 2002, construction took place in 2002 and 2003, and the final construction report was released in July of 2006. The McLaren open pit was regraded, capped with an impermeable geomembrane, and covered with a drainage system and soil cover between July 2002 and October 2003 under the McLaren Pit Response Action. During waste rock regrading operations, several wet areas were encountered. One of these was a series of seeps originating from bedrock at the toe of the pit high-wall. The others were natural spring point sources in bedrock that were found in the lower portion of the pit (Civil Consulting Services, 2006). These wet areas were excavated and filled with coarse drain rock, and a drain pipe was inserted in the rock to facilitate draining water from the wet areas so that regrading could proceed. There were four drains constructed, and the ends of these drains were terminated in a runoff channel down-gradient of the pit. One of the drain pipes was covered in the channel with rock, but the terminal ends of three drain pipes are accessible. These sites are shown on **Figure 2** as sample sites DCSW-101, DCSW-102, and DCSW-103. **Figure 3** below is an example of one of the drain pipe terminations in a run-off channel.

Figure 3. McLaren Pit subsurface drain DCSW-101.

Water from these drains exhibited very acidic pH values, ranging between 2.2 and 4.4 s.u., with generally poor water quality (copper and iron concentrations in the mg/L range). The combined flow from the three drains ranges from 9.4 Lpm to 196.6 Lpm (2.5 gpm to 52 gpm) and averaged about 79 Lpm (21 gpm) during times when flow was measured. Continuous data recorders were installed in August 2008 to monitor year-round flow from the subsurface drains. Data acquired from the recorders in 2009 and 2011 showed that flow ceases between mid-October and mid-November and the drains remain dry through late May when they begin to flow again coinciding with snowmelt.

Significant additional loading contributions to the upper reaches of Daisy Creek come from the McLaren Pit subsurface drains (DCSW-101, -102, and -103) as well as from other unidentified non-point sources. On average, the combined load from the three drains accounted for as much as 129% of the iron load and considerable contributions of aluminum (40.7%), cadmium (26.5%), copper (46.3%), manganese (19.4%), and zinc (33.1%) when compared to the loads measured at DC-2 when the subsurface drains are discharging during low flow conditions. The low flow iron load (129% of the load measured at station DC-2) indicates that iron is not conserved and that considerable iron precipitation occurs in the stream channel between the drain outlet and the DC-2 monitoring location.

Most of the combined load from the three subsurface drains is contributed by DCSW-101. The relative contribution from the drains increased for each of the metals analyzed except for cadmium, during low flow conditions when compared to the high flow percentage contribution. However, it is worth noting that the drains do not appear to flow for a period of about 6 months between November and May. During this time, the drains do not contribute any metal loading in Daisy Creek.

Post-capping metal loads calculated for the average low flow periods sampled after October 2003 range from 27% to 68% of those calculated for low flow sample events occurring before capping. A similar relationship occurred during post-capping high flow events with post-capping loads between 42% and 80% of the pre-capping high flow loads. These data indicate that capping the McLaren Pit was effective in reducing loads in Daisy Creek, although metal concentrations in Daisy Creek do not yet approach water quality standards.

In summary, the McLaren Pit subsurface drain discharges exceed standards for all COCs (Al, Cd, Cu, Fe, Pb, Mn and Zn) and are a major source of loading at station DC-2. However, most of the load at DC-2, about 65%, results from non-specific, unidentified (non-point) sources other than the McLaren Adit or McLaren subsurface drains. The possible exception to this may be iron during low flow periods; however, iron is not typically conserved in solution, but is rather precipitated out along flow paths as ferricrete deposits.

Little Daisy Adit

The Little Daisy Mine (surface water station M-1) is located on the northwestern slope of Henderson Mountain southeast of Daisy Pass at an elevation of about 3,000 meters (9,840 feet) (**Figure 2**). The ruins of a stamp mill (only the foundation remains; the stamp mill was moved to Cooke City), boarding house, stable, and two cabins are located at the mine site just below the portal between the adit and the Daisy Pass road. A photograph of the Little Daisy dump and mill site prior to reclamation is shown in **Figure 4.**

Figure 4. Pre-reclamation photograph of the Little Daisy Mine Dumps
Little Daisy Mine Dump (gray waste) and Mill Site Dump (brown waste at center of photograph). Collapsed adit is located in road cut at top of gray dump.

The Little Daisy Mine has approximately 726 meters (2,385 feet) of workings (Lovering, 1929) with portals on both the southwest and northeast facing flanks of Henderson Mountain. The longer of the two adits, the Little Daisy Adit, is collared just above the old stamp mill site. Its trend is east-northeast and the workings are approximately 427 meters (1,400 feet) in length. Only about 366 meters (1,200 feet) of these workings were accessible in the early 1920's (Lovering, 1929). This adit is connected by a raise of about 60 meters (200 feet) in height that connects with a shorter adit (Homestake Adit) that collars on the northeast flank of Henderson Mountain (elevation 3,036 meters; 9,960 feet) (**Figure 2**). This adit was driven to the west-southwest, parallel to and slightly northwest of the main Daisy Adit; it is about 152 meters (500 feet) in length. The top of the raise is about 122 meters (400 feet) in from the portal of this adit.

Mineralization consists of blocks of Park Shale and Pilgrim Limestone caught up in an intrusive matrix (quartz monzonite of the Homestake Stock) to form an intrusion breccia. The sedimentary blocks have been skarn-altered and replaced by assemblages of garnet, epidote, magnetite, pyrite, and chalcopyrite. Although gold was recovered in the stamp mill at the Daisy Mill Site, Lovering (1929) suggests that most of the ore's value must have been in copper. Drilling by CBMI between 1990 and 1993 identified ore grade mineralization in the Homestake Breccia Pipe (a phreatic explosion vent to the surface). The Daisy Adit penetrates Henderson Mountain about 18 meters (60 feet) above the elevation of ore-grade mineralization of the Homestake Breccia Pipe.

The Little Daisy Adit portal was partially backfilled and access blocked with mine wastes, although seepage discharged from the adit through the backfill. In the early 1990's the portal was partially open, and CBMI pumped water from behind the portal berm for core drilling. This information suggests that there may be a considerable amount of water backed-up into the workings behind the

portal backfill. Water from the adit discharged across the Henderson Mountain road and historically infiltrated into mine waste and talus below the road prior to 2005. The Little Daisy discharge of about 30 Lpm (8 gpm) exceeds aquatic standards for cadmium, iron, and zinc and has a near-neutral pH. The adit discharge also exceeds the human health Secondary Maximum Contaminant Level guideline for manganese of 0.05 mg/L (Tetra Tech, 2006c). Loading calculations indicate that the Little Daisy Adit (station M-1) theoretically could have contributed 1,184% of iron, 1,950% of manganese, and 78% of zinc loads measured at SW-2 in September 2008. However, because the Little Daisy Adit discharges to talus below the adit with no direct connection to Miller Creek, this comparison of recent low flow data is only hypothetical, and there is no measurable impact to surface water in Miller Creek. In addition, recent water quality results (2006 -2008) for Miller Creek stations SW-2 and SW-5, showed that only copper exceeds applicable standards, with suspended sediment the cause of a portion of these exceedances in the total recoverable fraction. The area of elevated soil copper levels on the west flank of Henderson Mountain is one source of copper in the suspended fraction.

The waste rock dump for the Little Daisy Adit contained about 680 cubic meters (890 cubic yards) of material that was spread out over a talus slope and tailed downhill toward the mill site. Waste rock was initially removed from the site by the USDA-FS in 2005 under the Miller Creek Response Action Memorandum (USDA-FS, 2004). The mill site-dump and mill site features are considered historic features and were not removed or revegetated. The dump area was reclaimed and a mine drainage control system, which consists of a small gravel infiltration basin, was constructed at the break in slope below the collapsed adit, on the west side of and just below the access road along Henderson Mountain (see photo below). At the point of infiltration, the discharge is some 1,067 meters (3,500 feet) from the nearest surface water in Miller Creek. If this discharge ultimately reaches Miller Creek, it does so as a dilute and dissipated groundwater source down-gradient of the mine site in Miller Creek. Metal loading from the Little Daisy discharge could not be detected in Miller Creek during a synoptic study of metals loading to the Creek by the USGS (Cleasby and Nimick, 2002).

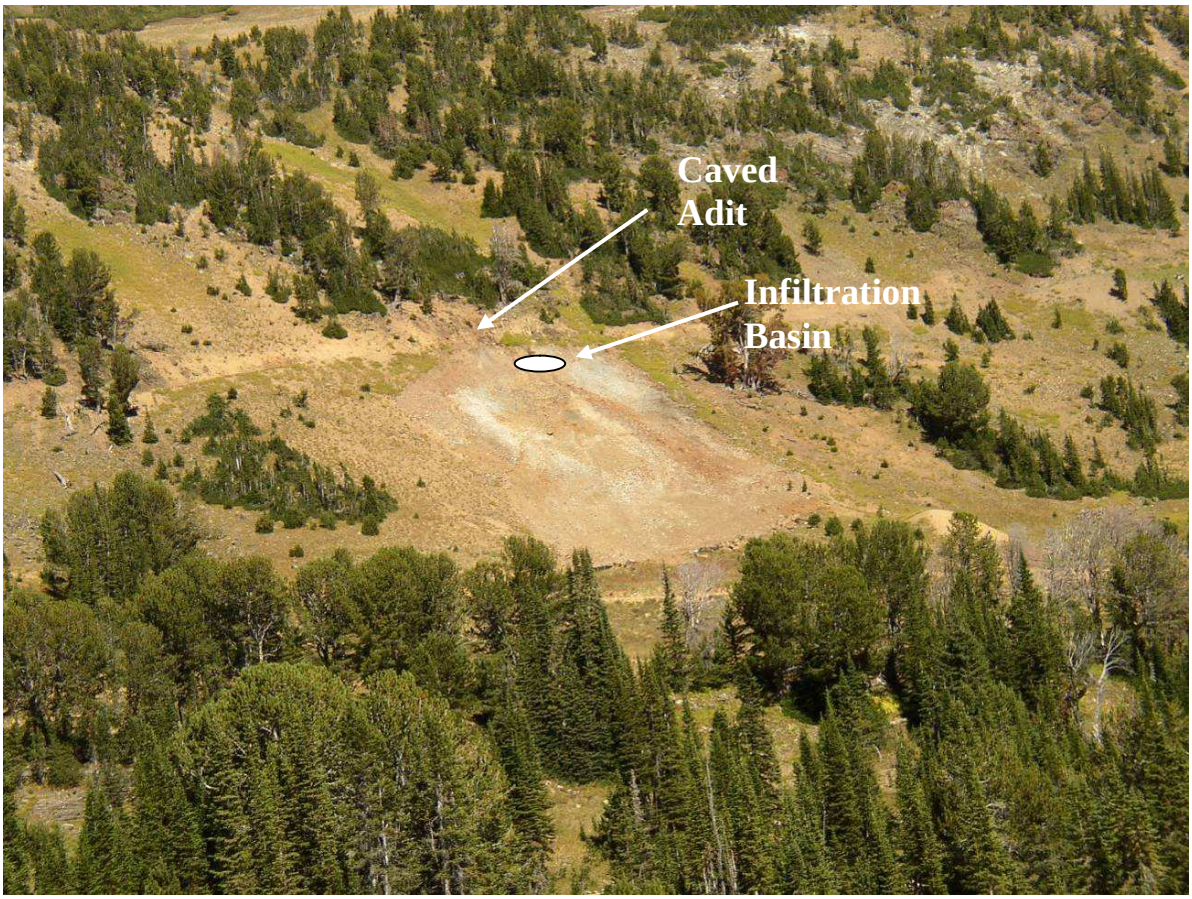

Figure 5. Little Daisy Adit and waste rock dump following reclamation

Gold Dust Adit

The Gold Dust Adit (F-28) is located on the southwest side of the Fisher Creek Valley, near the break in slope forming the flank of Henderson Mountain (elevation 2,810 meters [9,220 feet]) (**Figure 2**). The Gold Dust Adit was driven between 1920 and 1925 and drifts to the southwest for about 701 meters (2,300 feet) (Tetra Tech, 2006). No production is recorded from the adit. The majority of the waste rock dump, which contained about 4,360 cubic meters (5,700 cubic yards) of material, was removed from the portal of the Gold Dust Adit in 2005 as part of the Fisher Creek Surface Controls Removal Action (US Forest Service Action Memorandum , 2005). A small portion of the waste was left for historic interpretation purposes. **Figure 6** shows the condition of the portal prior to waste removal.

The adit is driven in Precambrian granite for the first 900 feet, and then crosses into monzonite porphyry intrusion breccia of the Homestake stock (Tetra Tech, 2006c). The intrusion breccia contains varying amounts of sub-angular clasts of sedimentary rocks of predominantly Wolsey shale that range in size from a few centimeters to house size blocks at the margin of the Homestake Breccia Pipe. Relatively fresh biotite-bearing monzonite gives way to strongly sericitized monzonite porphyry further into the mine. Mineralized specimens observed from the mine contained specular hematite, pyrite, chalcopyrite, ankerite, epidote, and quartz (Lovering, 1929).

Figure 6. Gold Dust Adit Portal

After discovery of the Homestake Breccia Pipe in 1990 by surface drilling, CBMI executed an underground drilling program from the Gold Dust Adit to delineate mineralization in the middle and lower portion of the breccia pipe by drilling angle holes from four drill stations. The mine portal and underground workings were rehabilitated to gain access and to cut the four new drill stations. Approximately 7,111 meters (23,331 feet) of core drilling were completed in 23 drill holes. Drill holes that were making water when drilled were closed with mechanical packers. The portal was closed with a series of timber sets, a locking steel gate, and a wooden air-door. The mine discharged water prior to being rehabilitated by CBMI, with an average discharge of about 49 Lpm (13 gpm). Since the time of drilling, at least two of the packers had failed and these holes were producing a combined flow of about 30 Lpm (8 gpm) when measured in 2004 (Tetra Tech, 2005b). Two or three other holes were also making small amounts of water (combined about 11 Lpm [3 gpm]).

During August and September of 2005, the USDA-FS contracted with Denver Grouting (who had recently completed work in the Glengarry Adit) to re-enter the Gold Dust Adit, remove packers from drill holes, and grout and plug all drill holes producing water under the Como Basin/ Glengarry Adit/Fisher Creek Response Action Memorandum (USDA-FS, 2002) . After successful completion of this work, flow from the Gold Dust Adit portal was reduced to an average flow of 34 Lpm (9.1 gpm) measured between October 2005 and September 2008. This decrease in flow represents a 31% reduction from the average flow prior to closure and a commensurate reduction in loading from the discharge to tributaries of Fisher Creek.

In 2005, the Forest Service completed surface reclamation and restoration of the Gold Dust portal area under their Como Basin/ Glengarry Adit/Fisher Creek Response Action Memorandum (USDA-

FS, 2002). The restoration work was undertaken to preserve various aspects of the site for cultural resource purposes and as such the site was developed as an interpretative site. Facilities associated with this mine include the Chicago (White) smelter, and aerial tram that connected the portal with the smelter (762 meters [2,500 feet] long), blacksmiths shop, boarding house, electric compressor (still in building), and several cabins. The aerial tram was subsequently extended up the side of Henderson Mountain to the Homestake Adit. Activities at the portal included: backfilling of the portal with coarse rock for about 15-20 feet, removal of approximately 7,800 cubic yards of the portal pad waste rock dump to the selective source repository, construction of portal timber façade, construction of a rock armored diversion ditch for adit discharge to the south of the remaining waste rock pile at the portal and regrading and revegetation (**Figure 7**).

Based on average concentration and flow data measured at the Gold Dust Adit from October 2006 through September 2008, this adit, which discharges to Fisher Creek between stations SW-3 and SW-4, contributes less than 0.5% of the cadmium, copper, and zinc loads measured at station SW-4 and about 0.79%, 12.3%, 2.1%, and 3.9% of the aluminum, iron, lead, and manganese load, respectively (Tetra Tech, 2011).

Manganese was historically monitored in surface and groundwater in order to compare measured concentrations to the secondary human health standard that was in place for this element. The manganese standard was dropped during MDEQ's October 2012 revision of the numeric water quality criteria listed in DEQ-7. Prior to elimination of the manganese standard, this element was the only contaminant in the Gold Dust adit discharge which exceeded a human health water quality standard. There are no exceedances of aquatic standards.

Figure 7. Reclaimed Gold Dust Adit waste rock dump area

Henderson Mountain Dump 7 Adit

Two adits are located at the southeast terminus of Henderson Mountain at an elevation of approximately 2,780 meters (9,120 feet). Both of these adits were developed in stock-work fracture zones in the Cambrian Flathead Sandstone and lie in close proximity to one another. The only obvious sulfide mineral present is pyrite, although abundant iron-oxide occurs on fractured rock surfaces. Based on the size of the waste rock dumps, neither adit extended more than about 18 meters (60 feet) (and perhaps considerably less) into the side of Henderson Mountain. Numerous other similar small prospect pits occur throughout the immediate area.

One of the adits is dry, but the second adit, Henderson Mountain Dump # 7 (AE-17) (**Figure 2**), discharged at an average rate of 5.3 Lpm (1.4 gpm) onto a topographic swale on the southeast flank of Henderson Mountain. Drainage from this adit historically infiltrated to groundwater before reaching any surface water tributary to Fisher Creek located approximately 760 meters (2,500 feet) away. The adit discharge exceeds aquatic life stands for aluminum, copper, iron, and human health Secondary Maximum Contaminant Level guidelines for manganese (Tetra Tech, 2006c). Discharge from the Henderson Mountain Dump 7 (station AE-17), which enters Fisher Creek between SW-4 and CFY-2 could theoretically contribute 35.6% of the iron load and 6.7% of the manganese load measured at station CFY-2. Other metal loads from this adit were 1.1% or less of the load at station CFY-2. However, if this discharge ultimately reaches Fisher Creek, it does so as a dilute and dissipated groundwater source down-gradient of the mine site. There is no evidence to suggest that metal loading from the Henderson Mountain Dump 7 is affecting water quality in Fisher Creek.

Both of these collapsed adits were closed in August 2005 after being evaluated as part of the Como Basin/Glengarry Adit/ Fisher Creek Response Action Memorandum (USDA-FS, 2002) (**Figure 8**). A mine drainage control system consisting of a small gravel basin was constructed at the mouth of Henderson Mountain Dump # 7 adit portal as part of the 2005 response action.

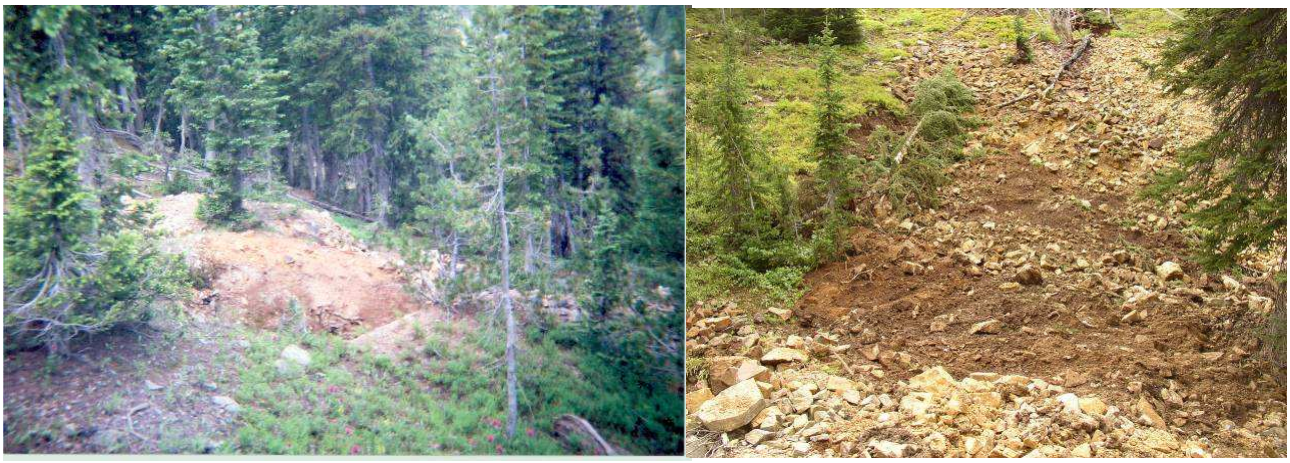

Figure 8. Photographs of Henderson Mountain Dump #7 Adit before and after reclamation

Henderson Mountain Adit

The Henderson Mountain Adit (M-25) (**Figure 9**) is an isolated adit located on the steep southwestern flank of Henderson Mountain. The adit is inaccessible except by foot up a steep hillside well above the Daisy Pass road. This adit occurs in an area of anomalously high metal concentrations in soil and intrusive rock associated with the Henderson Mountain Stock. Soils in this area contain copper values as high as 500 parts per million. The adit has a very small waste rock dump (less than a few cubic meters [10 to 20 cubic yards]) indicating a very small amount of underground workings (probably less than three to five meters in length, 10 to 15 feet), and a caved portal. It sits some distance from a small tributary of Miller Creek. It is possible that this feature is actually the site of spring-water development rather than an adit.

Discharge at this adit site ranges from 0.15 to 94.6 Lpm (0.04 to 25 gpm), averaging 19 Lpm (5 gpm) and the discharge contains relatively low total metals loading (~215 kg/yr or 0.24 tons). The adit does not discharge directly to surface water but rather infiltrates to groundwater some 550 meters (1800 feet) from Miller Creek. Discharge from the Henderson Mountain Adit exceeds Montana aquatic water quality standards for aluminum, copper, and lead, however, only copper seasonally exceeds the aquatic standards at the nearest downstream receiving waters at station SW-2 in Miller Creek. Cleasby and Nimick (2002) suggest that three anomalous copper concentrations collected in small tributaries to Miller Creek located downhill of this adit might be attributable in part to groundwater flow into the tributaries from the adit.

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

Hazardous Substances

Site characterization, including extensive sampling of adit discharges, surface and groundwater, has revealed that hazardous substances, as defined in section 101 (14) of CERCLA, 42 U.S.C. 9601(14), have been released into the environment. The hazardous substances released at the New World Project site include aluminum, arsenic, cadmium, copper, iron, lead, and zinc. Concentrations of these hazardous substances are reported from the adit discharges from the Little Daisy, Henderson Mountain, and Henderson Mountain Dump 7 adits as well as the subsurface drains from the McLaren Pit. Concentrations of these hazardous metals have also been detected in groundwater near adit discharges and in surface receiving waters in Fisher and Daisy Creek (Tetra Tech, 2006c). The only harmful substance released from the Gold Dust Adit in exceedence of standards (Human Health) is manganese (a Secondary Maximum Contaminant Level (MCL guideline).

Sampling and Analysis Data

The FS continues to monitor water quality at the Site. Past monitoring has included surface, groundwater, and adit discharge water quality monitoring for hazardous substances, as well as macroinvertebrate monitoring. The sampling methods used to collect the chemical data are described and the results summarized in the Draft Adit Discharge EE/CA prepared by Tetra Tech under contract to the USDA Forest Service (Tetra Tech, 2006c) and in annual water quality monitoring reports since 2006 (Tetra Tech 2006c and 2007b, 2008b, and 2009b). Surface water,

Figure 9. Henderson Mountain Adit (M-25).

mine waste, groundwater and adit discharge samples were collected in 1996 by CBMI, in 1997 and 1998 by the EPA, and from 1999 through 2009 by the USDA Forest Service. Long-term monitoring of surface water in Fisher and Daisy Creeks show that water quality standards for aquatic life are exceeded for aluminum, copper, lead, and zinc as well as other parameters including pH, suspended solids, and iron. Secondary Maximum Contaminant Level Guidelines for Human Health are also locally exceeded for manganese and iron at several of the adit discharges.

Mechanism for Past, Present, or Future Release

The five discharges that were carried through the screening and evaluation of potential response action alternatives in the final EE/CA include the four adit discharges and the combined flow from the three McLaren Pit subsurface drains (**Table 1**). Past, present and future releases from the adit discharges result from year-around, variably contaminated flows from the underground workings. The McLaren Pit subsurface drains flow seasonally (late May through early November) with

significantly higher contaminant loads and concentrations. Releases from individual sources are summarized below.

The McLaren subsurface drains flow seasonally between mid-October and mid-November and the drains remain dry through late May when they begin to flow again coinciding with snowmelt. The combined flow from the three drains ranges from 9.4 Lpm to 196.6 Lpm (2.5 gpm to 52 gpm) and averaged about 79 Lpm (21 gpm) during times when flow was measured. Water from these drains exhibited very acidic pH values, ranging between 2.2 and 4.4 s.u., with generally poor water quality that exceed standards for all COCs (Al, Cd, Cu, Fe, Pb, Mn and Zn) and are a major source of loading at station DC-2. On average, the combined load from the three drains accounted for as much as 129% of the iron load and considerable contributions of aluminum (40.7%), cadmium (26.5%), copper (46.3%), manganese (19.4%), and zinc (33.1%) when compared to the loads measured at DC-2 when the subsurface drains are discharging during low flow conditions. However, most of the load at DC-2, about 65%, results from non-specific, unidentified (non-point) sources other than the McLaren subsurface drains.

The Little Daisy year-around discharge of about 30 Lpm (8 gpm) exceeds aquatic standards for cadmium, iron, and zinc and has a near-neutral pH. The adit discharge also exceeds the human health Secondary Maximum Contaminant Level guideline for manganese of 0.05 mg/L (Tetra Tech, 2006c). Loading calculations indicate that the Little Daisy Adit (station M-1) theoretically could contribute 1,184% of iron, 1,950% of manganese, and 78% of zinc loads measured at SW-2 in September 2008. However, because the Little Daisy Adit discharges to talus below the adit with no direct connection to Miller Creek, these loading calculations are only theoretical. In fact, at the point of infiltration, the discharge is some 1,067 meters (3,500 feet) from the nearest surface water in Miller Creek. There is no measurable impact to surface water in Miller Creek. .

Year-around flow from the Gold Dust Adit portal has an average flow of 34 Lpm (9.1 gpm) as measured between 2005 and 2008. Currently, the only contaminant in the Gold Dust adit discharge is manganese, which exceeds the human health Secondary Maximum Contaminant Level guideline of 0.05 mg/L (Tetra Tech, 2006c). There are no exceedances of aquatic standards. Based on average concentration and flow data measured at the Gold Dust Adit after October 2006, this adit, which discharges to Fisher Creek between stations SW-3 and SW-4, contributes less than 0.5% of the cadmium, copper, and zinc loads measured at station SW-4 and about 0.79%, 12.3%, 2.1%, and 3.9% of the aluminum, iron, lead, and manganese load, respectively.

Discharge from the Henderson Mountain Dump 7 (station AE-17), is at an average rate of 5.3 Lpm (1.4 gpm) onto a topographic swale on the southeast flank of Henderson Mountain. This water infiltrates to groundwater before reaching any surface water tributary to Fisher Creek located approximately 760 meters (2,500 feet) away. The year-around adit discharge exceeds aquatic life stands for aluminum, copper, iron, and human health Secondary Maximum Contaminant Level guidelines for manganese (Tetra Tech, 2006c). Discharge from the Henderson Mountain Dump 7 (station AE-17), which enters Fisher Creek between SW-4 and CFY-2 could theoretically contribute 35.6% of the iron load and 6.7% of the manganese load measured at station CFY-2. Other metal loads from this adit were 1.1% or less of the load at station CFY-2.

Discharge from the Henderson Mountain Adit ranges from 0.15 to 94.6 Lpm (0.04 to 25 gpm),

averaging 19 Lpm (5 gpm) and the discharge contains relatively low total metals loading (~215 kg/yr or 0.24 tons). The adit does not discharge directly to surface water but rather infiltrates to groundwater some 550 meters (1800 feet) from Miller Creek. Discharge from the Henderson Mountain Adit exceeds Montana aquatic water quality standards for aluminum, copper, and lead, however, only copper seasonally exceeds the aquatic standards at the nearest downstream receiving waters at station SW-2 in Miller Creek.

Conceptual Model and Properties that Influence the Rate of Releases

The majority of underground mines in the district were developed using adit entries. Adits were driven into mineralized and non-mineralized bedrock, including pyrite-rich and massive sulfide ores. As an adit is advanced into mineralized rock, oxygen in the atmosphere reacts with sulfide-bearing minerals in the surrounding rock, accelerating acid generating /oxidation reactions in the mine workings. These reactions produce acid, and due to the low pH associated with acid production, cause metals such as aluminum, copper and iron to become more soluble. As rain, snowmelt and groundwater enters the mine workings thorough fractures and faults, water becomes more acidified and transports dissolved metals from the adit to surface and groundwater. The conceptual model presented in the Adit Discharge EE/CA (Tetra Tech, 2006c) illustrates that the principal mechanisms of transport of contaminants to Fisher, Daisy and Miller Creeks associated with adit discharges include the following:

- Movement of contaminated water through open underground mine workings and improperly abandoned exploratory borings.
- Infiltration of adit discharges containing dissolved metals into soil and groundwater.
- Contaminated groundwater discharge into surface water.
- Contaminated surface water inflow to groundwater.
- Precipitation of iron and aluminum mineral phases with adsorption of trace metals as ferricrete deposits and on substrate in creek beds along the adit discharge flow path.
- Scouring of secondary minerals and remobilization metals.
- High volume rain events and spring runoff /snowmelt events could affect the rate of metal release by flushing of stored acid rock drainage oxidation products.

5. National Priority List (NPL Status)

CERCLA, sometimes referred to as the "Superfund" statute, was enacted in 1980 to address sites where releases of hazardous substances pose a threat to public health or the environment. Under CERCLA, the nation's most contaminated sites are placed on the National Priorities List (NPL) by the EPA. No mine sites in the District are listed or have been proposed for listing on the NPL by the EPA or MDEQ because, to date, hazard ranking evaluations of the worst sites in the District do not result in a hazard score warranting listing.

6. Maps and Graphic Representation

A general location map and a map of the individual adit discharges including the location of the McLaren subsurface drains are included on **Figure 2**. Numerous tables of data showing

concentration and loading from the various adit facilities are contained in the Final Adit Discharge EE/CA (Tetra Tech, 2011).

B. Other Action to Date

1. Previous Actions

In March 1999, the USDA Forest Service initiated the planning process for overall project cleanup. Planning documents were in place in June 1999, and work was begun on the project with the monitoring of surface water and groundwater quality at selected monitoring points. Details of projects activities are described in work plans that have been prepared annually for the project since 1999 annually (Tetra Tech, 2009a, 2008a, 2007a, 2006a, 2005a, 2004a, and Maxim, 2003b, 2002a; 2001a; 2000; 1999b). Activities that have been conducted to date include the following:

The USDA-FS assisted CBMI in October 1998 in completing and submitting a Support Document and Implementation Plan to support CBMI's petition for temporary modification of water quality standards, which was approved on June 4, 1999. The petition for temporary standards was necessary to temporarily modify surface water quality standards for Daisy Creek including a headwater portion of the Stillwater River and Fisher Creeks so that improvements to water quality might be achieved during implementation of the response and restoration project.

Major work completed during the first three years of cleanup activity initiated by the USDA-FS was associated with the Selective Source Response Action EE/CA (Maxim, 2001b) implemented under the Selective Source Action Memorandum (USDA-FS, 2001). Initial construction activities associated with this response action were completed in 2002, and involved removing approximately 25,000 cubic meters (32,000 cubic yards) of mine waste and mill tailings from nine mine waste areas, disposing of these wastes in an engineered repository, and re-vegetating about 1.9 hectares (4.6 acres) of the former waste areas.

The second response action by the USDA-FS in the District was analyzed in the McLaren Pit Response Action EE/CA(Maxim, 2001c) and implemented under the McLaren Pit Response Action Memorandum (USDA-FS, 2002). Construction activities were initiated in 2002 and were completed in October 2003. These activities included consolidation of waste rock dumps from the Daisy Creek headwaters area into the McLaren Pit, capping the consolidated wastes with a composite soil/geomembrane impermeable cap, and re-vegetating 4.5 hectares (11 acres). Minor closure activities were taken on the discharging McLaren Adit (Winter Tunnel) site at the north end of the McLaren Pit in 2003 with the plugging of an exploration drill hole from surface that intercepted the adit and contributed significant portion of the adit discharge.

The third response action by the USDA-FS was analyzed in the Como Basin/Glengarry Adit/Fisher Creek Response Action EE/CA (Maxim, 2002b) and implemented under the Como Basin/Glengarry Adit/Fisher Creek Response Action Memorandum (USDA-FS, 2002). Three separate source areas were evaluated in this study and include: the Como Basin Source Area, the Fisher Creek Source Area, and the Glengarry Adit Source Area. The Como Basin and Fisher Creek source areas were similar in that they both contain contaminated soils and/or mine waste rock deposits and metal-laden leachate, which impacted the quality of surface water and groundwater. These two areas differ in

scale in that the Como Basin Source Area was a large area (2.23 hectares; 5.5 acres), whereas the Fisher Creek Source Area contained a number of small scattered waste rock piles in the upper Fisher Creek drainage. The implemented response action for the Como Basin Source Area used a composite cover system (geomembrane liner overlain by amended soil cover) to confine and reduce the mobility of contaminants present in soils in the basin. Work was begun on this project in 2005 and completed in 2006. The response action for the Fisher Creek Source Area used surface controls (regrading, drainage control, shallow soil lime amendment, and revegetation) for select waste rock dumps and the removal of other waste rock dumps to the Selective Source repository. Several waste rock dumps either reclaimed or removed were associated with discharging adits and often the adit discharge was directed into a subsurface infiltration basin located at or near the portal during reclamation. The response action for the Fisher Creek source area was implemented between 2004 and 2005.

Reclamation and closure of the Glengarry Adit Source Area, where contaminated inflows into underground workings flowed through the workings before discharging contaminated water into Fisher Creek, involved grouting contaminated inflows and plugging outflows from the mine with water-tight hydraulic adit plugs, and essentially eliminated discharge from the mine workings. This project was initiated in 2003 and was completed in September 2004.

The fourth response action by the USDA-FS was analyzed in the Miller Creek Response Action EE/CA (Maxim, 2004c) and implemented under the Miller Creek Response Action Memorandum (USDA-FS 2004). The fourth response action implemented by the USDA-FS was the Miller Creek Response Action (Maxim, 2002b). The response action for the Miller Creek Source Area used surface controls (regrading, drainage control, shallow soil lime amendment, and revegetation) for the reclamation of three select waste rock dumps and the removal of two other waste rock dumps (2) to the Selective Source Repository. The two waste rock dumps removed were at the Little Daisy and Black Warrior Adit sites and were associated with discharging adits. The adit discharges from both were directed into a subsurface infiltration basins located at or near the portals during reclamation.

The fifth response action implemented by the USDA-Forest Service was directed at stemming the flow (4 gallons per minute) of low pH, metal contaminated water from the Glengarry Mill Site Adit into Fisher Creek (USDA-FS Action Memorandum, 2008). Minor remedial actions were also proposed for the Tredennic and Black Warrior adit portal areas as follow-ups to past Response Actions that removed mine waste rock dumps, recontoured and revegetated these historic mine sites in 2002 and 2004 respectively. The Glengarry Mill-site Adit was closed in 2008 with an underground grout curtain, infiltration basin and a portal plug that reduced flow from the adit by as much as 60% and eliminated the surface discharge. Remediation at the Lower Tredennic and Black Warrior mines involved minor work on adit drainage to insure that the drainage was captured by previously installed infiltration basins and additional revegetation work.

Activities during 2009 included the preparation of drawings and bid specifications for the McLaren adit closure as part of the larger roads restoration/stabilization package for the New World project. The final road maintenance restoration/stabilization contract, which included the closure of the McLaren Adit, was let for construction during the summer of 2010 as work deferred until near the end of the active phase of the New World Response and Restoration Project under the 2004 Miller Creek Response Action Memorandum (USDA-FS, 2004).

Permanent closure of the McLaren Adit was completed in 2010 when the portal was reopened and an underground dam constructed, from which a piped drainage system was installed to the portal. The portal was plugged with coarse rock and a buried piping system was installed from the portal to capture and direct adit discharge through a drop inlet and into an infiltration basin located outside and down gradient of the adit. Non-degradation calculations were completed for the infiltration basin for the McLaren adit discharge. Plugging the portal was also used to restrict public access to the McLaren Adit, thereby minimizing the risk of personal injury from entry into the underground workings.

Other road maintenance work included local road resurfacing and stabilization, culvert maintenance or replacement, improvements to drainage ditches including water bars and construction of armored stream crossings, and regrading and revegetation of cut-and-fill slopes along approximately 30 miles of district roads. Some road obliteration was also undertaken. In addition a lime/compost soil amendment was added over a five acre area of highly acidic surface soils below the McLaren Pit. A total of about 15 acres of disturbed ground was also revegetated under the roads contract.

In June of 2009, a Long-Term Operations and Maintenance Plan was prepared for the New World Project Site that was subsequently informally modified in during subsequent years as plans for long-term monitoring activities evolved with continued public and agency input. The current Plan was last modified in June 2012 and will continue to be updated as necessary. This plan provides descriptions of annual monitoring tasks that will be completed to determine whether additional maintenance of reclaimed sites and the repository is needed, how maintenance work will be done, and estimated costs of site wide monitoring and maintenance. The Long-Term Operations and Maintenance Plan for the project began in 2012 after reclamation actions were complete and covers activities that will occur for the following 20 years. The operations and maintenance period will end in 2032. This plan is intended to modify the Overall Work Plan (Maxim, 1999b), and the Repository Monitoring Plan during the years of its implementation. No additional monitoring of adit discharges or adit water quality is anticipated during implementation of the Long-Term Operations and Maintenance Plan.

2. Current Actions

The USDA Forest Service completed a public draft version of an EE/CA for the Adit Discharge Response Action in December 2006. Public and agency comment was sought and the EE/CA revised based on these comments (see discussion of EE/CA and public comment, in section V, 4 below). The final version of the Adit Discharge EE/CA was released in December 2011(Tetra Tech, 2011). Yet to be completed is the preparation of an Action Memorandum for Response Action (this document) for point source adit and under-drain discharges in the District as identified in the Adit Discharge EE/CA.

C. State and Local Authorities' Role

1. State and Local Actions to Date

The USDA Forest Service has been cooperating throughout the project with the states of Montana and Wyoming, the United States Environmental Protection Agency, the United States Department of

Interior –National Park Service, and the local county commissioners. The cooperating agencies, environmental groups as co-signers of the Consent Decree, as well as the general public have reviewed the various project documents and have provided comments to the USDA Forest Service.

2. Potential for Continued State/Local Response

Neither the State nor local authorities have the resources to conduct a Response Action on District Properties at this time. State and local constituents will continue to be involved in site activities and will be kept apprised of all activities of this Response Action. The Montana DEQ is in the process of reclaiming historic mine waste and tailings located on private property at the McLaren Tailings-site located on the east end of the town of Cooke City in the Soda Butte Creek drainage. The USDA Forest Service is cooperating with the Montana DEQ by granting approval to place fill in a low lying area near the repository and construct a run-on control diversion ditch on National Forest System land adjacent to the project. The diversion would prevent run-on from infiltrating into the tailings contained within the repository while filling of the topographical depression would eliminate the potential for ponding of precipitation and run-on near the repository.

This work would include clearing and grubbing of approximately 0.1 acre of National Forest property which would necessitate the re-establishment and survey of the USFS property corner and bearing tree monuments. Approximately 767 cubic yards of native material would be used to fill the topographic depression with about 275 cubic yards of that material placed on National Forest property. A 103-foot long grass-lined diversion channel would be constructed on National Forest property. All disturbances associated with the fill and channel construction would be reclaimed by amending with organic material and fertilizer prior to seeding with an upland seed mix. Buffaloberry and Douglas fir seedlings would also be planted.

Additional work on National Forest System land would consist of the addition of clean fill on the western buttress of the repository to lessen the slope from 2:1 to 4:1. The proposed work would be conducted in a manner to construct a stable and non-erosive slope. This action would allow for a more stable repository configuration in that western section adjacent to the Forest.

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

The EE/CA indicates there is a threat to public health or welfare, or to the environment as set forth in the National Contingency Plan (NCP) at 40 CFR 300.415(b)(2). Briefly, this threat is the risk of continued and future metals contamination of surrounding lands, surface water, and groundwater related to ongoing adit discharges.

Due to the concentrations of metals in the adits and McLaren Pit subsurface drain discharges (Tetra Tech, 2006c), this source meets the criteria for initiating a Response Action under 40 CFR 300.415(b)(2) of the NCP. The following factors from 40 CFR 300.415(b)(2) of the NCP form the basis for USDA Forest Service's determination of the threat present and the appropriate action to be taken:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;
(ii) Actual or potential contamination of drinking water supplies or sensitive ecosystems;
(iii) The unavailability of other appropriate federal or state response mechanisms to respond to the release

A. Threats to Public Health or Welfare

The EE/CA does not demonstrate a threat to public health or welfare, as set forth in the NCP at 40 CFR 300.415 (b)(2). For the purposes of the human health risk assessment, aluminum, cadmium, copper, lead, iron, manganese, and zinc, were considered potential COCs. Aluminum in surface water is not considered a risk to human health, as there are no human health standards for aluminum in MDEQ's list of numeric water quality standards (MDEQ Circular DEQ-7, 2004). Iron and manganese are generally considered nontoxic as well, and human health guidelines for iron and manganese are based on aesthetic properties such as taste, odor, and staining. Therefore, iron and manganese are not considered a COC for the adit discharge and subsurface drain sites, as these sites are not used as a source of drinking water.

There is no residential use of District Property in or around any of the discharges considered in this EE/CA. Current human exposure to site-related contaminants in adit discharge and the subsurface drain water is via seasonal recreational activities that occur during the snow-free period in the District, which generally falls between the months of June and October. From late fall through the spring, access to the discharge sites is exclusively over snow, and during this period the adit discharge sites are covered with snow and do not pose a risk to humans. Exposure pathways are limited to direct contact (dermal exposure) with discharge water and ingestion of water. Instances of direct contact might occur from wading through or in discharges, washing in discharge water, or using discharge water for other recreational pursuits such as gold panning. Ingestion would likely occur from incidental ingestion rather than purposeful drinking of water, since most of the discharges are non-palatable due to unpleasant odor and taste attributes that are mainly associated with iron and manganese staining and coloring. Both of the exposure pathways are likely to be minor, as relatively few people are exposed to the adit discharges during their recreational pursuits and because the majority of people recreating in the District are generally in the area for only a few days to a couple of weeks. Exposures on any one day are believed to be of very short duration, on the order of

minutes.

Findings of the recreational scenario exposure assessment were combined with toxicity data for the COCs to characterize health risks posed to a gold panner/rock hound for the ingestion and dermal exposure routes (Tetra Tech, 1996). Risks were determined for individual routes of exposure and additive effects. Using the hazard quotient (HQ) methodology, hazard indexes were calculated for each of the four adit discharges and McLaren Pit subsurface drains. The exposure point concentration used in the calculation was the mean value measured at each site.

Only the McLaren Pit subsurface drains site has a Hazard Index (HI) value greater than 1.0. The HI's for the rest of the adit sites are less than one, indicating that these adit discharges do not pose a risk to human health. For the McLaren Pit subsurface drains, 98% of the HI score is due to ingestion of this water. The assumptions used for ingestion (Section 4.1.2) for the gold panner/rock hound include drinking one liter of water per day, 50 days per year, for 30 years. Since such a scenario is highly unlikely, the HI score for the McLaren Pit subsurface drains was recalculated for 0.25 liters of water (incidental ingestion) for 10 days per year for 30 years. The recalculation of the HI using this scenario is 0.20. Because the exposure scenario under the second set of assumptions is also conservative, in that it is highly unlikely that a person would drink the water coming from the drains more than incidentally, water discharging from the McLaren Pit subsurface drains is not considered to present any risk to human health.

B. Threats to the Environment

The EE/CA demonstrates a potential threat to the environment as set forth in the NCP at 40 CFR 300.415 (b)(2). For the purposes of the streamlined ecological risk assessment developed in the EE/CA (Tetra Tech, 2010) aluminum, cadmium, copper, iron, lead, manganese, and zinc are considered potential COCs. Two groups of ecological receptors have been identified as potentially being affected by site contamination. The first group includes aquatic life residing in streams downstream of where discharges enter a surface water course. This population may be affected by concentrations of COCs that directly enter the receiving stream. The second group of receptors is wildlife that may use the adit discharge water for consumption.

Exposure pathways for aquatic life include: 1) direct exposure of aquatic organisms to metals in surface water that exceed toxicity thresholds; and 2) ingestion of aquatic species (e.g., insects) that have accumulated contaminants by predators to the extent that they are toxic to predators (e.g., fish). Exposure pathways for aquatic species apply only for those adit discharges that reach a surface water body where aquatic species reside. The Henderson Mountain No.7 (AE-17), Henderson Mountain Adit (M-25), and Little Daisy percolate into the ground after leaving the closed adits and do not flow to surface water. The Gold Dust adit flows into a tributary to Fisher Creek. The McLaren Pit subsurface drains flow into tributaries to Daisy Creek.

Exposure pathways for wildlife include direct contact (dermal exposure) with discharge water and ingestion of discharge water. Instances of direct contact might occur from wading or swimming through discharges. Ingestion would likely occur from incidental ingestion rather than purposeful drinking, since most of the discharges would likely be avoided in preference to other easily obtainable sources of water, as the odor and taste attributes of adit discharges are likely less

desirable. Exposure pathways for wildlife are likely to be minor as the adit discharges constitute only a small portion of the water available in the District, and, based on cursory observations of the sites, wildlife are not known to favor any discharge over other sources of water. Exposure to discharge waters on any day is thought to likely be of very short duration. The exposure period for wildlife, as with humans, would be limited to the snow-free period between the months of June and October. From late fall through the spring, the adit discharge sites are covered with snow.

Aquatic water quality standards are exceeded in all discharges except the Gold Dust Adit for one or more parameter. However, impacts to receiving waters immediately downstream of the adit discharges (as measured by aquatic standards) are not measured for the Little Daisy Adit or the Gold Dust Adit, which means that these sites pose little to no risk to the aquatic environment. Impacts to receiving waters are clearly evident as a result of discharges from the McLaren Pit drains. Impacts from the Henderson Mountain Dump 7 adit in Fisher Creek and the Henderson Mountain Adit (M-25) in Miller Creek are less clear. Even though the standards for aquatic risks are exceeded in these latter adit discharges, because the flow from these adits are relatively low compared to in-stream flows and the adits do not directly discharge to surface water, and because the adits are a considerable distance from receiving waters any impact to downstream receiving waters is questionable or unclear.

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IV. ENDANGERMENT DETERMINATIONS

Actual or threatened releases of hazardous substances from adit discharges at the New World Response and Restoration Project site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed actions are designed to mitigate the potential threat at the New World Project site. The Proposed Actions for this Adit Discharge Removal Action are non-time critical and consist of implementation of a Site-Wide, Long-Term Operations and Maintenance Plan (Tetra Tech, 2012) and evaluation of alternatives for the following discharges: McLaren subsurface drains, Little Daisy Adit, Gold Dust Adit, Henderson Mountain Dump #7 Adit and the Henderson Mountain Adit. The No Action alternative was selected for response actions at each of these latter sites, which includes implementation of the Site-Wide, Long-Term Operation and Maintenance Plan for the site (Tetra Tech, 2012).

The proposed removal actions will not adversely affect, but rather would support proposed future removal or remedial actions. However, no future response actions are anticipated at the present time.

A. Proposed Actions

1. Proposed action description

Action Common to All Alternatives

In addition to the alternatives analyzed, implementation of the Site-Wide, Long-Term Operations and Maintenance Plan was considered an essential action that is Common to All Alternatives, including the No Action Alternative. The Site-Wide, Long-Term Operations and Maintenance Plan was issued in 2009 (Tetra Tech, 2009d) and was informally revised during subsequent years as plans for long-term monitoring activities evolved with continued input from the public and other agencies. The current Plan was last modified in June 2012 and will likely be updated again to include revised plans for aquatic macroinvertebrate and fisheries monitoring. The Plan is not static and is intended to be modified as needs arise due to changing site conditions or decisions made throughout the Plan's implementation period. The Plan is described in greater detail in section "b" below.

McLaren Pit Subsurface Drains

The McLaren Pit subsurface drain discharges exceed standards for all COCs and are a major source of loading at station DC-2. However, the majority of the load at DC-2 still results from non-specific, unidentified (non-point) sources other than the McLaren Adit or McLaren subsurface drains. The possible exception to this may be iron during low flow periods; however, iron is not typically conserved in solution, but is rather precipitated out along flow paths as ferricrete deposits.

Only water treatment alternatives are applicable to the subsurface drains (relevant source containment options were screened out due to high cost and difficultly in implementation). Alternative WT-2 (Anoxic Limestone Drain, Anaerobic Bioreactor & Open Limestone Channel) and Alternative WT-5 (Chemical Addition, Precipitation, and Micro-filtration) were both determined to be effective in treating water discharging from the drains, but are expensive (as much as $5,513,922), and have serious construction and operation problems associated with them. The problems associated with trying to operate an active water treatment system (Alternative WT-5), considering the access required, are many and difficult, and such a treatment system would seriously impact recreational use of the Daisy Pass Road by winter recreationists.

The chances of successful installation and effective operation of a water treatment system when weighed against the total cost leaves the No Action Alternative as the most desirable alternative, particularly while the results of longer term monitoring of the effectiveness of the McLaren Pit Cap are evaluated over the next few years. The seasonally large flow volumes and high contaminant loads would not permit the development of an effective infiltration basin for the subsurface drain discharges and preliminary calculations suggest the discharge to groundwater would fail to meet non-degradation requirements. No Action is also preferred because the large loading contribution from non-specific and unidentified (non-point) sources other than the McLaren Adit or subsurface drains will prevent water quality standards at station DC-2 from being met even if an expensive water treatment technology was employed for the subsurface discharges.

Little Daisy Adit

The Little Daisy adit discharge, which exceeds aquatic standards for a number of COCs, does not discharge directly to surface water; it instead percolates into colluvial material a short distance below the infiltration basin constructed near the collapsed portal, and does not surface again down-gradient of the mine. Therefore, if this discharge ultimately reaches Miller Creek, it does so as a dilute and dissipated source some 1,067 meters (3,500 feet) down-gradient of the mine site in Miller Creek. Load from the Little Daisy discharge could not be detected in Miller Creek during a synoptic study of metals loading to the Creek by the USGS.

The Little Daisy Adit is amenable to closure by Engineering Source Control Alternative EC-2, Plugging an Inaccessible Adit. This method may be an effective closure, depending on underground conditions in the workings, with water flow from the adit reduced or eliminated. However, because underground conditions are unknown, implementability of this alternative may be extremely difficult, and successful reentry of the Little Daisy may not be possible.

As the Little Daisy discharge exceeds aquatic standards, the moderate flow of about 30 Lpm (8 gpm) suggests that an anaerobic bioreactor system could function for an extended time, although the cost of passive treatment is about twice that of the Engineering Source Control alternative. Active treatment (Alternative WT-5) is plagued by many difficulties with respect to year-round operations, site access, and power and supply requirements. The projected cost of over $3 million makes the passive system more attractive, particularity considering its potential long-term effectiveness.

Loading data indicate the only metal in the Little Daisy discharge that exceeds 1% of the load in Miller Creek at station SW-2 is manganese (5.0% of the total in-stream load of manganese in Miller

Creek). There is no direct traceable connection from this discharge to Miller Creek, and in addition, recent water quality results (2009) for Miller Creek stations SW-2 and SW-5, showed that only copper exceeds applicable standards, with suspended sediment the cause of a portion of these exceedances in the total recoverable fraction. The area of elevated soil copper levels on the west flank of Henderson Mountain is one source of copper in the suspended fraction.

Based on the flow path for the Little Daisy Adit discharge and the lack of measurable impact to receiving groundwater, it appears that infiltration into surrounding soils and colluvial materials provide conditions where natural attenuation and/or dilution of contaminants is occurring under existing conditions. Because there does not appear to be any measurable impact from the Little Daisy discharge and because the costs associated with treating or eliminating the discharge are several hundred thousand dollars, the preferred alternative for this site is No Action. Long-term monitoring of water quality in Miller Creek that will be done as part of the Long-Term Operations and maintenance plan will allow the USDA-FS to regularly evaluate whether this alternative continues to be appropriate for the site.

Gold Dust Adit

After completing work involved with grouting boreholes in the Gold Dust Adit, discharge from the adit has been reduced to about 16.6 Lpm (4.4 gpm). Water discharging from the portal flows through about 305 meters (1,000 feet) of open grassy meadows and willow covered wetlands prior to entering Fisher Creek. At the portal, the Gold Dust discharge meets all chronic aquatic life standards, and only exceeds the human health guideline for manganese (0.05 mg/L). Manganese loading from the Gold Dust Adit discharge could theoretically contribute as much as 3.9% of the total manganese load at station SW-4 in Fisher Creek.

The Gold Dust Adit is suitable for closure using Engineering Source Control Alternative EC-1, Plugging an Accessible Adit. Use of a plugging system for closure is considered to be a highly effective method to reduce or eliminate flows from the Gold Dust Adit. Implementing this alternative is technically and administratively feasible. The cost of closure is estimated to be about $792,027.

Constructing a manganese removal cell under Alternative WT-4 would be a passive treatment technology that has been shown to be effective at removing manganese at other mining sites, although it is difficult to predict final effluent water quality at this time because site-specific performance data is needed before this assessment can be made. While the cost of passive treatment is one-twentieth that of active water treatment, final effluent water quality from an active treatment system would assure the manganese standard is met. However, while it is effective, active treatment (Alternative WT-5) is plagued by difficulties related to surface infrastructure requirements, power requirements, and the ability to operate on a year-round basis under the extreme climate and access conditions present at the site. Due to these supply requirements, winter recreation along the Lulu Pass Road would be significantly impacted under active treatment.

It is probable that Alternative NA-1, No Action, could achieve the level of manganese reduction required given sufficient distance between the discharge source and the receptor stream. Under similar conditions manganese is oxidized by numerous bacteria found in nature, and, therefore, it is

likely that in the oxidizing, organic-rich, uppermost soil horizon, manganese would be sequestered and removed from solution. This is in fact is what appears to be occurring under existing conditions where manganese concentrations meet the human health standards in the down gradient tributary of the Gold Dust adit prior to entering Fisher Creek.

Based on the reduction in flow achieved by grouting boreholes in 2005, the effective adit closure, the relatively high cost to either plug or treat the existing discharge, and the fact that there is no aquatic risk associated with manganese, the preferred alternative for the Gold Dust Adit is No Action.

Henderson Mountain Dump 7

Henderson Mountain Dump 7 site is characterized by relatively low flows and relatively low metal concentrations. Henderson Mountain Dump #7 historically discharged at an average rate of 5.3 Lpm (1.4 gpm) onto a topographic swale on the southeast flank of Henderson Mountain. The discharge is located approximately 760 meters (2,500 feet) from Fisher Creek. Historically, the water has infiltrated into surrounding soils and could not be traced as either a seep or spring down-gradient of the site, however, during mine reclamation activities in 2005 flow from the adit was redirected into a small infiltration basin located at the portal (Alternative WT-1 Infiltration).

Because the Henderson Mountain Dump #7 is too short and too shallow for an engineering flow control closure, the No Action Alternative is most applicable. The fact that the Henderson Mountain Dump 7 discharges through an infiltration basin to colluvial materials some 760 meters (2,500 feet) distant from Fisher Creek, support the preferred alternative selection of No Action.

Henderson Mountain Adit – (M-25)

This adit is inaccessible except by foot up a steep hillside above the Daisy Pass Road. Because the small dump at the site indicates that the underground workings are very short (probably less than three to five meters [10 to 15 feet] based on the size of the waste rock dump), there is a possibility that this discharge is actually development associated with a natural spring. As the bedrock source in the area is known to contain elevated metals, water from the Henderson Mountain Adit exceeds standards for aluminum, copper, and lead, with only copper seasonally exceeding aquatic standards at surface water receiving station SW-2 in Miller Creek.

The Henderson Mountain Adit is not amenable to Engineering Source Control alternatives as it is too short and too close to the surface. Due to difficult access and the small physical size of the site, implementation of either passive or active water treatment would be difficult if not impossible, and would likely not allow optimizing these technologies to assure final effluent water quality. Therefore, No Action is the preferred alternative for this discharge.

New World Waste Repository Sump Solution

Solution continues to accumulate within the New World Waste Repository and is being pumped as necessary. Currently it is being pumped once a year. Preliminary calculations made after construction of the repository suggest that complete drain down of water entrained within waste material placed in the repository could take between 20 and 30 years. When drain down diminishes

to a suitably low annual volume, a technical memo evaluating available appropriate passive treatment system technologies will be prepared for consideration. The appropriate technology would be selected, designed, and constructed to treat the discharge and eliminate the need to pump and transport sump fluid.

McLaren Tailings Water Diversion Ditch

The McLaren flotation mill, located approximately ¼ mile southeast of Cooke City, operated from 1934 through 1953 and produced a gold and copper concentrate. Tailings produced during the milling process were deposited into the original channel of Soda Butte Creek and the creek itself was eventually relocated to a new channel excavated along the north side of the tailings impoundment. A risk assessment determined that human health risks were present and related to soil ingestion of copper and iron, and water ingestion of iron (Pioneer, 2002). Ecological risks were related to copper and cadmium.

Reclamation of the McLaren Tailings site was initiated under a contract implemented by MDEQ in 2010 and continues at the time of this writing. Reclamation work includes dewatering of tailings with subsequent placement into an on-site repository. During this work, a low spot with near-surface bedrock was identified in the ground surface near the southeast corner of the repository. This topography limits options for trenching to drain the area. In order to limit potential ponding of surface runoff water from uphill adjacent to the repository, DEQ has proposed placing earthen fill on approximately 0.1 acre of USFS property in this area, and the construction of a run-on control ditch to divert seasonal snow melt water away from the repository.

The preferred alternative for this non-district property is to cooperate with MDEQ by granting permission to construct run-on control features on undisturbed (no hazardous waste) National Forest land adjacent to the McLaren Tailings site. This work would include clearing and grubbing of approximately 0.1 acre of National Forest property which would necessitate the re-establishment and survey of the USFS property corner and bearing tree monuments. Approximately 767 cubic yards of native material would be used to fill the topographic depression with about 275 cubic yards of that material placed on National Forest property. A 103-foot long grass-lined diversion channel would be constructed on National Forest property. All disturbances associated with the fill and channel construction would be reclaimed by amending with organic material and fertilizer prior to seeding with an upland seed mix. Buffaloberry and Douglas fir seedlings would also be planted. The extension for the west repository buttress would be constructed to be stable and non-erosive.

McLaren Tailings Extension of Waste Repository Embankment

The repository at the McLaren Tailings project includes an abutment constructed along a portion of the western edge of the repository near the DEQ-USFS property boundary. The abutment was constructed using 2 horizontal : 1 vertical slopes. In order to minimize erosion and facilitate the establishment of a vegetative cover, DEQ is proposing to add additional fill materials to decrease the slope of the abutment. Due to the proximity of the National Forest System land, this proposed modification would require construction of a fill slope on NFS land.

The modification to the abutment would require placing fill approximately 25 feet onto National

Forest System land. A total of 321 bank cubic yards of clean materials would be required, including 245 bank cubic yards placed on DEQ property and 76 bank cubic yards placed on USFS property. An estimated 0.02 acre USFS property would be covered by fill.

This proposed work will result in a reduction of the abutment slope to a less erosive 4 horizontal : 1 vertical, which is expected to improve revegetative success. Surface water run-on from the western portion of the repository will be conveyed in runoff control channels constructed in the north and south sides of the abutment. The final disturbed footprint will be fertilized, seeded with the McLaren upland seed mix and mulched.

a. Address Identified Environmental Threats

Upper Daisy Creek is characterized by highly variable flow with rapidly increasing flow rates and short periods of sustained high flow during snowmelt. As much as 90% of Daisy Creek's discharge volume occurs between mid May and early August.

The two major identifiable sources of metals loading in the Upper Daisy Creek drainage were the McLaren Pit and McLaren Adit. The McLaren Pit and McLaren Adit were addressed by an earlier response action (Maxim, 2001c). However, with the closure of the McLaren Pit the McLaren subsurface drains were added as another major metals loading source. Remaining significant identifiable sources of contamination in the upper Daisy Creek drainage, therefore, are limited to the McLaren subsurface drains.

It should be recognized that the implementation of any response action for the McLaren subsurface drains, and subsequent reduction in loading to Daisy Creek will not bring surface water in Daisy Creek into compliance with established surface water standards. Any failure to meet Montana surface water standards will in part be due to the McLaren subsurface drains, but primarily result from other natural non-point sources of metals-enriched water that report to Daisy Creek. The Pre-Mine Water Quality Report (Tetra Tech, 2009c) summarized pertinent literature and demonstrated the effects of naturally occurring sulfide minerals in bedrock. These natural sources are believed to be a major source of metals and acid rock drainage in the Daisy Creek drainage. There are also other sources present in the headwaters of Daisy Creek, including contaminated groundwater from the Fisher Mountain and McLaren pit areas that is migrating from these headwaters areas to Daisy Creek and metals-enriched sediment that has been transported or precipitated from mining-related disturbances into the headwaters of Daisy Creek. Metals-enriched sediment from these sources has deposited in the streambed along most of the length of upper Daisy Creek. Cleaning up of the source areas accomplished to date does not address these other sources of metals contaminants in the Daisy Creek drainage. However, by addressing releases from the McLaren Adit discharge some additional reduction in contaminant concentrations are expected in surface and groundwater.

b. Justification for Proposed Alternative – Long Term Operations and Maintenance Plan

The Site-Wide, Long-Term Operations and Maintenance Plan was first issued in 2009 (Tetra Tech 2009d) and was revised during subsequent years as the goals of monitoring evolved. The current Plan was issued in June 2012 (Tetra Tech 2012). Implementation of the Plan is considered an action that is Common to All Alternatives including the NA-1 No Action Alternative.

The Plan provides descriptions of annual monitoring tasks that will be completed to determine whether additional maintenance of reclaimed sites and the repository is needed, how maintenance work will be done, and estimated costs of site-wide monitoring and maintenance. This long-term operations and maintenance plan for the project began in 2012 and will end in 2032. This Plan is intended to modify the Overall Work Plan (Maxim, 1999a), and the Repository Monitoring Plan (Maxim, 2006c) during the years of its implementation.

Primary objectives for work covered in the Long-Term Operations and Maintenance Plan are to document and monitor the effectiveness of reclamation response and restoration actions; to provide for maintenance actions as required to ensure long-term stability of erosion controls and reclamation covers; to monitor surface and groundwater quality and to satisfy the requirements of the rule allowing adoption of temporary water quality standards. This Plan also provides an outline of specific tasks that form the basis for estimating costs for long-term operations, monitoring and maintenance tasks. This plan is not static and may be modified as needs arise due to changing site conditions or decisions made after the initial release of this report.

To meet the objectives for the Site-Wide, Long-Term Operations and Maintenance Plan, the following specific activities will be performed:

- Maintain community relations. Public meetings will no longer necessarily be held annually in both Bozeman and Cooke City. It is anticipated that as many as two meetings may be held annually.
- Maintain the project database.
- Continue monitoring surface water and groundwater quality in the District as required by the BER for verification that temporary water quality standards are being met.
- Continue monitoring surface water and groundwater quality in the District, including monitoring surface water and groundwater conditions downstream of the Como Basin capped reclamation area, downstream of the closed Glengarry Adit, and downstream and within the capped McLaren Pit. In connection with this monitoring, the USFS will continue to work the State to determine the actions necessary to support an administrative wrap-up of the temporary water quality standards and the project, such as site specific standards if necessary or other resolution.
- Solution accumulating within the Repository will be pumped as necessary and is estimated to occur once a year. Monitor erosion and vegetation at all reclamation sites every 5 years.
- Periodic maintenance of the McLaren adit drain system consisting of cleaning / flushing the discharge pipe with a high pressure water or air line via the manhole-covered service access installed outside the portal during construction of the closure system.
- Prepare abbreviated annual reports that summarize the work that was completed, present data gathered, and delineate the work that will be performed the following year.

The costs for implementing the Long-Term Operations and Maintenance Plan over the 20-year period from 2012 to 2032 are variable depending on the year. They have been estimated based on a number of assumptions including average annual inflation rate, discount rate, and frequency of certain operations and maintenance activities such as soil sampling during reclamation monitoring, reseeding, and replacement of culverts. The estimated annual cost for implementing the Long-Term Operations and Maintenance Plan range between $107,000 and $212,000. Extended costs for the entire 20 year period (until 2032) are estimated at total cost of $1,895,452 (net present value).

c. Institutional Controls

No institutional controls are expected to be needed following the implementation of this Response Action.

d. Off-Site Disposal

No off-site disposal is required by the implementation of this Response Action.

e. Post-Removal Site Controls

Post-removal site control involving monitoring to identify any problems with revegetation or erosion will be required. Monitoring surface water will also be provided under the Site-Wide, Long Term Operations and Maintenance Plan (Tetra Tech, 2009d) at established stations.

f. Further Information

No further information is needed to select the proposed action.

2. Description of alternative technologies

General response technologies and process options that are potentially capable of achieving established goals and objectives related to the treatment or reduction of mining-related discharges were screened, and the most promising technologies were then used to develop a reasonable set of alternatives that would be evaluated in the EE/CA (Tetra Tech, 2010). Response technologies considered included no action, monitoring, institutional controls, engineering controls, and water treatment controls. After screening, it was evident that the most promising response technologies were related to either emplacing engineering controls to reduce or eliminate flows from the adit discharges, or water treatment technologies to reduce or eliminate contaminants present in the discharges. Alternatives were then developed from the two types of technologies. Source control alternatives specifically focused on the McLaren Pit subsurface drains were identified in the screening process but were not further considered for alternative development and detailed evaluation due to effectiveness, implementability, and cost concerns.

a) Monitoring – Two types of monitoring are currently on-going at the New World Project site including surface water and groundwater monitoring, and reclamation monitoring. Surface water and groundwater monitoring down-gradient of mine facilities is being used to evaluate

changes in conditions at the site and the effectiveness and success of response actions as measured by impacts to receiving waters. Reclamation monitoring evaluates the effectiveness of erosion control and revegetation on reclaimed mine facilities and is used to determine areas in need of maintenance. Aquatics/biological monitoring in Daisy and Fisher Creek will be conducted to support water quality evaluations conducted by MDEQ.

b) Institutional Controls- Institutional controls are used to restrict or control access to or use of a site. Land use and access restrictions are potentially applicable institutional controls. Land use restrictions would limit the possible future uses of the land through changes to the local forest management plan or implementation of a closure order. Institutional controls involve restricting access to the site via fencing and gates. Neither institutional controls nor land use controls will prevent migration of the contaminants from the adit nor will they achieve cleanup goals. However, in addition to limiting access, these controls can provide for long-term public safety.

c) Engineering Source Controls - Engineering controls are used limit the release or threat of release of hazardous substances generally by reducing the mobility of contaminants by establishing barriers that limit contaminant exposure, reducing contaminant reactivity, and preventing or limiting migration or flow of contaminated surface or groundwater. Engineering controls generally do not reduce the volume or toxicity of hazardous materials. Underground flow controls were considered for the adit discharges at the New World Project site.

For engineering source control alternatives for discharging adits on the New World Project site, two groups of sites were identified including: sites with open or recently closed adits, and sites with collapsed adits. Engineering source controls were only considered for adit discharges that were amenable to this type of closure; these included only one accessible mine (Gold Dust adit) and one inaccessible mine (Little Daisy adit). The remaining sites have underground workings that are too short to be considered for engineering source control measures. The two engineering source control alternatives evaluated (EC-1 and EC-2) use high strength, acid-resistant, watertight, cement plugs that block the flow of water and greatly reduce or eliminate a discharge. Watertight plugs have been shown to be effective in greatly reducing or eliminating water flow from mine sites. The effect of placing plugs would be immediate and permanent, and the mobility of metals would be permanently reduced or eliminated. A No Action alternative was also evaluated.

d) Water Treatment - Two sources of water have been identified at the New World site that may require treatment prior to discharge. The two sources are: (1) adit discharges; and (2) discharges from the McLaren Pit subsurface drains. Six water treatment alternatives were evaluated, including both passive treatment technologies and active treatment technologies for these discharges. Infiltration of adit portal discharges (Alternative WT-1) was considered for all adit sites. Under this alternative, water is diverted from a surface discharge at the portal into a subsurface infiltration basin, where it is allowed to mix with groundwater in a mixing zone. Water quality is improved by a combination of dilution and natural attenuation or adsorption onto unconsolidated colluvial materials. In order to use infiltration as a treatment method, non-degradation requirements issued by the Montana DEQ must be met.

Passive, semi-passive, and conventional active treatment response alternatives were also evaluated for each source under review. With many of the innovative or passive treatment approaches, it is unclear given available current literature if the technology can meet the stringent aquatic standards applied to the New World sites. This is due in part because, in many of the studies reported in the literature, the recorded detection limits are above the aquatic criteria set for Montana B-1 standards. It is therefore difficult to predict removal efficiencies by biological and/or other passive treatment technologies, and treatability testing with actual discharge waters would be necessary to define achievable removal efficiencies for each discharge.

In contrast, conventional, active treatment technologies such as chemical addition-precipitation followed by micro- or nano-filtration, or reverse osmosis, typically have the best chance of consistently meeting effluent discharge standards from a proven technology standpoint. However, the remoteness of the location, limited access, and the severe winter climate in the District would make operation and maintenance of active technologies very difficult and expensive, and may also render these more proven technologies less efficient than would be expected with close monitoring in a very controlled environment. Typically, implementation of an active treatment technology could only be accomplished at a significant increase in cost over a passive treatment system.

3. Changes Resulting from Agency and Public Comments on the EE/CA

Written comments on an internal agency review draft of the Adit Discharge EE/CA were received from the EPA, Montana DEQ, and Department of Interior National Park Service. These comments were considered, modifications were made to the internal review draft based on these comments, and a public Draft EE/CA was prepared.

The Public Review Draft EE/CA was released on December 2006, and copies were placed in the information repositories in Cooke City (Chamber of Commerce), Gardiner (Gardiner Ranger District Office), and Bozeman (Gallatin National Forest Supervisor's Office). A public notice appeared in the Bozeman Chronicle, Livingston Enterprise, Cody Enterprise, and Powell Tribune announcing that the draft EE/CA was available, setting a 75 day time period for the comments, and listing the location of the information repositories. Two written comment letters were received from the public, from the Beartooth Alliance, and the Center for Science in Public Participation. Comments received from these organizations recommended an additional review of water treatment alternatives particularly sulfate reducing bioreactors for the McLaren subsurface drains, and suggested an additional review of closure alternatives for the Glengarry Mill-site adit with a recommendation to continue monitoring the effect of closure of the Glengarry Adit prior to taking action at this site. Both organizations supported the selection of the no action alternative for the remaining sites including the McLaren Adit.

The review of the solid and liquid substrate bioreactors for the McLaren subsurface drains resulted in a significant reduction in cost over the 2006 draft EE/CA, however, the overall effectiveness and rationale for the use of this treatment alternative remained unchanged. The Glengarry Mill-site Adit was the subject of an action memorandum released in 2008 that recommended underground grouting of fractures systems and a portal closure. This response action was implemented in 2008. Finally,

based on a formal evaluation of the effectiveness of infiltration as a means of mitigating adit discharges in the EE/CA (as recommended by the Montana DEQ) the Forest Service selected this method for closure of the McLaren adit. The final version of the EE/CA (Tetra Tech 2011) was revised based on these public and agency comments. A copy of the Draft EE/CA is available at **http://www.fs.fed.us/r1/gallatin**.

4. Applicable or Relevant and Appropriate Requirements (ARARs)

The risk evaluation demonstrated that there is no human health risk associated with any of the discharges at the site and that ecological risks are likely associated only with the McLaren Pit subsurface drains. Environmental risks associated with these discharges appear in down gradient surface water tributaries that receive the discharges. Contaminants (aluminum, cadmium, copper, iron, lead, and zinc) present ecological risks to aquatic life from ingestion and direct contact.

This Removal Action will attain, to the extent practicable considering the exigencies of the situation, applicable or relevant and appropriate requirements (ARARs) of Federal and State laws. The identified ARARs are shown in Appendix A. The assessment of ARARs included review of the list of ARARs provided by the Montana Department of Environmental Quality.

Section 300.415(i) of the National Contingency Plan (NCP) and guidance issued by the Environmental Protection Agency (EPA) require 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 (EPA, 1993). In addition to ARARs, the lead Agency may identify other federal or state advisories, criteria, or guidance to be considered for a particular release.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant found at a site and would apply in the absence of a CERCLA cleanup. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that are not applicable to a particular situation but apply to similar problems or situations, and therefore may be well suited requirements for a response action to address.

ARARs are divided into contaminant specific, location specific, and action specific requirements. Contaminant specific ARARs are listed according to specific media and govern the release to the environment of specific chemical compounds or materials possessing certain chemical or physical characteristics. Contaminant specific ARARs generally set health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs

generally relate to the geographic location or physical characteristics or setting of the site, rather than to the nature of the site contaminants.

Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Only the substantive portions of the requirements are ARARs. Administrative requirements are not ARARs and do not apply to actions conducted entirely on-site. Provisions of statutes or regulations that contain general goals expressing legislative intent, but are non-binding, are not ARARs. In addition, in instances like the present case where the cleanup is proceeding in stages, a particular phase of the remedy may not comply with all ARARs, so long as the overall remedy does meet ARARs.

Under Section 121 of CERCLA, 42 U.S.C. §9621, only those state standards that are more stringent than any federal standard are considered to be an ARAR provided that these standards are identified by the state in a timely manner. To be an ARAR, a state standard must be "promulgated," which means that the standards are of general applicability and are legally enforceable. The State of Montana ARARs set forth below have been identified in cooperation with, and with assistance from, the State of Montana Department of Environmental Quality.

Response action goals for the Adit Discharge EE/CA at the New World site are primarily contaminant-based concentrations that are set by federal or state laws and regulations. For this project overall, the primary contaminant-specific ARARs apply to groundwater and surface water.

Aquatic life standards and human health standards are common ARARs for surface water. Generally, the more stringent of the two standards is identified as the ARAR-based reclamation goal. Because the aquatic life standards are more stringent than the human health standards for COCs, and ecological risks predominate at this site, aquatic standards represent the surface water ARARs for this site. These goals are presented in **Table 2**. Enforcement of cleanup goals may be executed at specific water quality stations, in which case the cleanup goal for hardness dependent contaminants should be calculated based on the hardness at a specific stream station. The hardness-dependent goals shown in the table are based on a hardness of 100 mg/L.

CBMI, with the support of the USDA-FS, petitioned the State of Montana Board of Environmental Review (Board) for temporary modification of water quality standards for certain stream segments in the District. The temporary standards are necessary so that improvements to water quality may be achieved by implementation of the response and restoration project. The Board approved a rule allowing temporary standards on specific reaches of Fisher Creek, Daisy Creek, and the headwaters of the Stillwater River on June 4, 1999. No temporary standards have been established for Miller Creek.

TABLE 2
ARAR-BASED RECLAMATION GOALS FOR SURFACE WATER

	Total Recoverable Metals (micrograms/liter)[1]						
	Aluminum	**Cadmium**	**Copper**	**Iron**	**Lead**	**Manganese[2]**	**Zinc**
Goal	87	0.27	9.3	300	3.2	50	119.8

Notes: (1) Standards are in terms of total recoverable concentrations except for aluminum which is dissolved per 2012 DEQ-7.
(2) Numeric standard for manganese was discontinued in October 2012.
Hardness based criteria are calculated for hardness = 100 milligrams/liter.

Groundwater

ARAR-based reclamation goals for groundwater are Montana Human Health Standards. Using these standards, ARAR-based goals for COCs in groundwater are shown in **Table 3.**

TABLE 3
ARAR-BASED RECLAMATION GOALS FOR GROUNDWATER

Chemical	Type [1]	Concentration (µg/L)
Arsenic	HHS/MCL	10
Cadmium	HHS/MCL	5
Copper	HHS/MCL	1,300
Iron	MCL[2]	300[2]
Lead	HHS/MCL	15
Manganese	MCL[2]	50[2]
Zinc	HA	2,000

Notes: (1) HHS = Human Health Standard (MDEQ, 2012); MCL = EPA Maximum Contaminant Level, EPA Health Advisory Level
(2) Human health guideline (for taste, odor, color) for iron and manganese were discontinued in October 2012.
µg/L = micrograms per liter

5. Project Schedule

Implementation of the proposed action will begin immediately following execution of this Action Memorandum. Long-term Monitoring and Maintenance activities identified in the Adit Drainage Response Action for the New World Response and Restoration Project are included as part of the NA-1 No Action Alternative and have been ongoing since 2012.

B. Estimated Costs

Of the four adits (Little Daisy, Gold Dust, Henderson Mountain and the Henderson Mountain Dump 7) and the McLaren subsurface drains evaluated for closure in the Adit Discharge EE/CA and addressed in this Adit Discharge Response Action, none were selected for Response Action. The Preferred Alternative was the No Action Alternative (NA-1) which includes the implementation of the Long-Term Operations and Maintenance Plan (an Action Common to All Alternatives). All previously monitored adits were last sampled in 2008 under annual Task Orders that had their own source of funding. There are no future plans to monitor adit discharges.

Therefore, the estimated cost of implementing the Adit Discharge Response Action for the New World Response and Restoration Project are for long term monitoring, operations and maintenance of the site. The estimated annual cost for implementing the Long-Term Operations and Maintenance Plan range between $107,000 and $212,000. Extended costs for the entire 20 year period (until 2032) are estimated at total cost of $1,895,452 (net present value)

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

None.

VII. OUTSTANDING POLICY ISSUES

None.

VIII. ENFORCEMENT

Although the USDA Forest Service specifically denies any liability in this situation, it will be the "lead agency" for all response actions occurring on National Forest System Lands, as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR part 300, and all response actions will be undertaken in a manner not inconsistent with the NCP. A Consent Decree and Settlement Agreement between the United States, several signature parties, and CBMI is the legal mechanism that outlines responsibilities of the parties to the agreement, the process, and the funds that will be used for cleanup.

IX. RECOMMENDATION

This decision document presents the Adit Drainage Response Action for the New World Response and Restoration Project within the Gardiner Ranger District of the Gallatin National Forest, Park County Montana. The No Action Alternative was selected for the adit discharges and the McLaren subsurface drains. This Removal Action has been developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the New World Response and Restoration Project Site.

This decision document also includes work conducted by MDEQ to place earthen fill on approximately 0.1 acre of USFS property and construct a run-on control ditch to divert seasonal snow melt water away from a tailings repository as part of the State of Montana's McLaren Tailings project and place additional fill on the western repository buttress. To provide additional stabilization of the western repository buttress, fill will be placed on National Forest System land to lessen the slope of this buttress.

Conditions at the site meet the NCP section 300.415(b)(2) criteria for a Removal, and I recommend your approval of the proposed Removal Action.

Mary Beth Marks — 4/5/2013

Mary Beth Marks
On-Scene-Coordinator (OSC)

Date

I concur with the recommendation to implement the proposed action as described in this Action Memorandum for the Adit Discharge Response Action, New World Mining District Response and Restoration Project. Additionally, I concur with the recommendation to allow the State of Montana to place fill and construct a surface run-on diversion ditch and place additional fill on the repository buttress on National Forest land adjacent to the McLaren Tailings site:

4/8/13

Ronald Hecker
District Ranger
Gardiner Ranger District

Date

Mary Erickson — 4/9/13

Mary Erickson
Forest Supervisor
Gallatin National Forest

Date

Bob Kirkpatrick — 4/18/2013

Bob Kirkpatrick
Regional CERCLA Coordinator
USDA-FS Northern Regional Office

Date

I approve of the proposed removal action as described in this Action Memorandum and referenced Adit Discharge Engineering Evaluation/Cost Analysis for the New World Mining District Response and Restoration Project, Park County, Montana. Additionally, I approve MDEQ to place fill and construct a surface run-on diversion ditch and place additional fill on the repository buttress on National Forest land adjacent to the McLaren Tailings site. MDEQ's work to be implemented at the McLaren Tailings site shall be coordinated with Mary Beth Marks, USFS OSC for the New World Response and Restoration Project:

4/22/2013

Faye L. Krueger
Regional Forester
USDA-FS Northern Regional Office

Date

ATTACHMENTS:

APPENDIX A – ARAR Table

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APPENDIX A

Applicable or Relevant and Appropriate Requirements Table

Identification of Applicable or Relevant and Appropriate Requirements
Adit Discharge Response Action

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status
FEDERAL CONTAMINANT-SPECIFIC			
Safe Drinking Water Act National Primary Drinking Water Regulation	40 USC § 300 40 CFR Part 141	Establishes health-based standards (MCLs) for public water systems.	Relevant and Appropriate
National Secondary Drinking Water Regulations	40 CFR Part 143	Establishes welfare-based standards (secondary MCLs) for public water systems.	Relevant and Appropriate
Clean Water Act Water Quality Standards	33 USC. §§ 1251-1387 40 CFR Part 131 Quality Criteria for Water 1976, 1980, 1986	Ch. 26- Water Pollution Prevention & Control Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Relevant and Appropriate
FEDERAL LOCATION-SPECIFIC			
National Historic Preservation Act	16 USC § 470; 36 CFR Part 800; 40 CFR Part 6.310(b)	Requires Federal Agencies to take into account the effect of any Federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places and to minimize harm to any National Historic Landmark adversely or directly affected by an undertaking.	Applicable
Archaeological and Historic Preservation Act	16 USC § 469; 40 CFR § 6.301(c)	Establishes procedures to provide for preservation of historical and archaeological data which might be destroyed through alteration of terrain as a result of a Federal construction project or a Federally licensed activity or program.	Applicable
Historic Sites, Buildings and Antiquities Act	36 CFR § 62.6(d)	Requires Federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Applicable
Protection of Wetlands Order	40 CFR Part 6	Avoid adverse impacts to wetlands.	Applicable
Migratory Bird Treaty Act	16 USC §§ 703 et seq.	Establishes a federal responsibility for the protection of international migratory bird resource.	Applicable

Identification of Applicable or Relevant and Appropriate Requirements Adit Discharge Response Action			
Standard, Requirement Criteria Or Limitation	**Citation**	**Description**	**ARAR Status**
FEDERAL LOCATION-SPECIFIC (continued)			
Fish and Wildlife Coordination Act	16 USC § 661 et seq.; 40 CFR Part 6.302(g)	Requires consultation when Federal department or agency proposes or authorizes any modification of any stream or other water body and adequate provision for protection of fish and wildlife resources.	Applicable
Floodplain Management Order	40 CFR Part 6	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid the adverse impacts associated with direct and indirect development of a floodplain, to the extent possible.	Relevant and Appropriate
Bald Eagle Protection Act	16 USC §§ 668 et seq.	Establishes a federal responsibility for protection of bald and golden eagles. Requires consultation with the USFWS.	Applicable
Endangered Species Act	16 USC §§ 1531-1543; 40 CFR Part 6.302(h); 50 CFR Part 402	Requires action to conserve endangered species within critical habitat upon which species depend. Includes consultation with Dept. of Interior.	Applicable
FEDERAL ACTION-SPECIFIC			
Clean Water Act National Pollutant Discharge Elimination System	33 USC §§ 1251-1387 40 CFR Parts 121, 122, 125	Requires permits for the discharge of pollutants from any point source into waters of the United States.	Relevant and Appropriate
Clean Air Act National Primary and Secondary Ambient Air Quality Standards	42 USC § 7409;40 CFR Part 50.12	Air quality levels that protect public health.	Applicable
Occupational Safety And Health Act Hazardous Waste Operations And Emergency Response	29 USC § 655 29 CFR 1910.120	Defines standards for employee protection during initial site characterization and analysis, monitoring activities, materials handling activities, training & ER.	Applicable

Identification of Applicable or Relevant and Appropriate Requirements
Adit Discharge Response Action

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status
STATE CONTAMINANT-SPECIFIC			
Montana Water Quality Act	75-5-101 et seq., MCA	Establishes Montana's laws to prevent, abate and control the pollution of state waters.	Applicable
Regulations Establishing Ambient Surface Water Quality Standard	ARM 17.30.601 et seq.	Provides the water use classification for various streams and imposes specific water quality standards per classification.	Applicable
	ARM 17.30.637	Provides that surface waters must be free of substances attributable to industrial practices or other discharges that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film or globules of grease or other floating materials; (c) produce odors, colors, or other conditions which create a nuisance or render undesirable tastes to fish or make fish in edible; (d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; (e) create conditions which produce undesirable aquatic life.	Applicable
Montana Groundwater Pollution Control System Regulations	ARM 17.30.1006	Classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater and states groundwater is to be classified to actual quality of actual use, whichever places the groundwater in a higher class.	Applicable

Identification of Applicable or Relevant and Appropriate Requirements Adit Discharge Response Action			
Standard, Requirement Criteria Or Limitation	**Citation**	**Description**	**ARAR Status**
STATE CONTAMINANT-SPECIFIC (continued)			
Clean Air Act Of Montana	75-2-101, MCA	Montana's policy is to achieve and maintain such levels of air quality as will protect human health and safety and, to the greatest degree practicable, prevent injury to plant and animal life and property.	Applicacble
Air Quality Regulations	ARM 17.8.206	Establishes sampling, data collection, and analytical requirements to ensure compliance with ambient air quality standards.	Applicable
	ARM 17.8.222	No person shall cause or contribute to concentrations of lead in the ambient air which exceed the following 90-day average: 1.5 micrograms per cubic meter of air.	Applicable
	ARM 17.8.220	No person shall cause or contribute to concentrations of particulate matter in the ambient air such that the mass of settled particulate matter exceeds the following 30-day average: 10 grams per square meter.	Applicable
	ARM 17.8.223	No person may cause or contribute to concentrations of PM-10 in the ambient air which exceed the following standards: 1) 24-hr. avg. : 150 micrograms per cubic meter of air, with no more than one expected exceedance per year; 2) Annual avg.: 50 micrograms per cubic meter of air.	Applicable
Occupational Health Act of Montana	50-70-101, et. seq., MCA	The purpose of this act is to achieve and maintain such conditions of the work place as will protect human health and safety	Applicable
Occupational Air Contaminants Regulations	ARM 17.42.102	Establishes maximum threshold limit values for air contaminants believed that nearly all workers may be repeatedly exposed day after day without adverse health effects.	Applicable
Occupational Noise Regulations	ARM 17.42.101	Addresses occupational noise levels and provides that no worker should be exposed to noise levels in excess of the	Applicable

Identification of Applicable or Relevant and Appropriate Requirements Adit Discharge Response Action			
Standard, Requirement Criteria Or Limitation	**Citation**	**Description**	**ARAR Status**
		specified levels.	
STATE LOCATION-SPECIFIC			
Endangered Species	87-5-106, 107,111, MCA ARM 12.5.201	Fish and wildlife resources are to be protected and no construction project or hydraulic project shall adversely affect game or fish habitat.	Applicable
STATE ACTION SPECIFIC			
Montana Water Quality Act	75-5-605, MCA	Pursuant to this section, it is unlawful among other things, to cause pollution of any state waters, to place any wastes in a location where they are likely to cause pollution of any state waters, to violate any permit provision, to violate any provision of the Montana Water Quality Act, to construct, modify, or operate a system for disposing of waste (including sediment, solid waste and other substances that may pollute state waters) which discharge into any state waters without a permit or discharge waste into any state waters.	Applicable
MPDES Permit Requirements	ARM17.30.1342-1344	Sets forth the substantive requirements applicable to all MPDES and NPDES permits. Include the requirement to properly operate and maintain all facilities and systems of treatment and control.	Relevant and Appropriate
	ARM 17.30.1203 and 1344	Technology-based treatment for MPDES permits.	Relevant and Appropriate
Clean Air Act Of Montana	75-2-102, MCA	Montana's policy is to achieve and maintain such levels of air quality as will protect human health and safety and, to the greatest degree practicable, prevent injury to plant and animal life and property.	Applicable
Air Quality Requirements	ARM 17.8.1401-1404	Sets forth emission standards for hazardous air pollutants	Applicable

Applicable or Relevant and Appropriate Requirements (ARARs)

Section 300.415(i) of the National Contingency Plan (NCP) and guidance issued by the EPA require that removal actions attain Applicable or Relevant and Appropriate Requirements (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 (EPA, 1993). In addition to ARARs, the lead Agency may identify other federal or state advisories, criteria, or guidance to be considered for a particular release. ARARs were identified in the Como Basin/Glengarry Adit/Fisher Creek Response Action EE/CA.

ARARs are either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant found at a site and would apply in the absence of a CERCLA cleanup. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that are not applicable to a particular situation but apply to similar problems or situations, and therefore may be well suited requirements for a response action to address.

ARARs are divided into contaminant specific, location specific, and action specific requirements. Contaminant specific ARARs are listed according to specific media and govern the release to the environment of specific chemical compounds or materials possessing certain chemical or physical characteristics. Contaminant specific ARARs generally set health or risk based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

Location specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of cleanup activities because they are in specific locations. Location specific ARARs generally relate to the geographic location or physical characteristics or setting of the site, rather than to the nature of the site contaminants. Action specific ARARs are usually technology or activity based requirements or limitations on actions taken with respect to hazardous substances.

Only the substantive portions of the requirements are ARARs. Administrative requirements are not ARARs and do not apply to actions conducted entirely on-site. Provisions of statutes or regulations that contain general goals expressing legislative intent but are non-binding are not ARARs. In addition, in instances like the present case where the cleanup is proceeding in stages, a particular phase of the remedy may not comply with all ARARs, so long as the overall remedy does meet ARARs.

Under Section 121 of CERCLA, 42 U.S.C. §9621, only those state standards that are more stringent than any federal standard are considered to be an ARAR provided that these standards are identified by the state in a timely manner. To be an ARAR, a state standard must be "promulgated," which means that the standards are of general applicability and are legally enforceable. State of Montana ARARs set forth below have been identified in cooperation with, and with assistance from, the State of Montana Department of Environmental Quality.