ACTION MEMORANDUM

GLENGARRY MILL SITE,
LOWER TREDENNIC AND BLACK WARRIOR ADITS
RESPONSE ACTION
NEW WORLD MINING DISTRICT
RESPONSE AND RESTORATION PROJECT

Gallatin National Forest - Gardiner Ranger District
Park County, Montana

JULY 2008

ACTION MEMORANDUM

Date: July 22, 2008

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: Tom Tidwell, Regional Forester

Through: Ken Britton, District Ranger, Gardiner Ranger District
Mary C. Erickson, Forest Supervisor, Gallatin National Forest

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I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the proposed non-time-critical Response Action described herein for the Glengarry Mill Site, Lower Tredennic and Black Warrior Adits which are historic mining disturbances included within the area of the New World Mining District Response and Restoration Project. The project site is located in Park County, Montana. The Glengarry Mill Site Adit has a discharge of water from the portal that is a source of low pH water and metals contaminants that degrade water quality in the headwaters of Fisher Creek, which drains into the Clarks Fork of the Yellowstone River. The discussion provided in this memorandum will substantiate the need for a Response Action at this site, identify the proposed action, and explain the rationale for the proposed action. Minor remedial actions are 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 2006 respectively. Discussion of the details of these latter two remedial actions, because of their minor nature, are restricted to discussions in the Site Characteristics (section II, A, 3), Proposed Action (Section 5A) and Cost Estimate sections (section 5B) of this memo.

The scope of this Response Action is directed at stemming the flow of water from the Glengarry Mill Site Adit thereby eliminating or reducing uncontrolled releases of metals from this mining-related source into Fisher Creek. The Glengarry Mill Site Adit discharges an average of 15 liters per minute (4 gallons per minute) that flows for a short distance on ferricretes surficial deposits and then infiltrates into colluvial materials, where the metals-tainted water is transported as groundwater to into Fisher Creek.

The Glengarry Mill Site/Tredennic and Black Warrior Adit 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 fifth Response Action proposed for this multi-year project. An Overall Project Work Plan prepared for the project (Maxim, 1999a), and work plans prepared annually (Tetra Tech, 2008, 2007, 2006, 2005, 2004; and Maxim, 2003b, 2002a; 2001b; 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 Engineering Evaluation/Cost Analysis (EE/CA) was prepared to develop various alternatives that address impacts associated with adit discharges of metal contaminants into surface waters throughout the New World District (Tetra Tech, 2006). 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.**

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 gold, silver, copper, and lead mining and recent 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, acid 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 Glengarry Mill Site Adit addressed in this proposed Response Action is located on District Property.

1. Removal Site Evaluation

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.

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

Glengarry Mill Site Adit.

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.

Pre-clean-up conditions in the Fisher Creek drainage showed impacts to soil, sediment, and water resources from both mining impacts and natural sources of metals and acidity. Surface water in Fisher Creek was impacted by runoff from mine waste dumps and other disturbances, as well as discharges from adits, seeps, and natural groundwater that carry high metal loads. The

Glengarry Mill Site Adit discussed in this proposed Response Action is considered a source for metals contaminants that collects contaminated water flows from groundwater and discharge this water into the upper Fisher Creek watershed.

The Glengarry Mill Site Adit (site F8-B), located in upper Fisher Creek immediately south of the main Glengarry Adit, consists of a single horizontal adit extending approximately 13 meters (42 feet) into the northeast flank of Fisher Mountain from its portal. A small building, likely designed for storage, sits of the portal of the adit. This adit appears to have been driven to serve for extended storage behind the building to which it is attached. The adit itself is in good condition and has a gate at the portal consisting of a wooden frame with metal bars which is buried in about 0.6 m (2 feet) of ferricrete. The ferricrete dam at the portal backs up a 7.5 meter (25 foot) long pool of water approximately 1 meter (3 feet) deep that contains rock fall debris on the floor of the mine. A rock fall occurs at the back of the pool; about 1 meter (3 feet) wide that dams up about 4.6 lineal meters (15 lineal feet) of ferri-hydroxide chemically precipitated mud. Seepage from the Glengarry Mill Site Portal occurs at a very low rate of discharge, ranging from 3 to 19 Lpm (0.8 to 5 gpm) (average 15 Lpm [4 gpm]), except for a maximum flow of 100 Lpm (26.9 gpm measured in September of 1989). Water discharging from the adit flows over an extensive ferricrete bench outside of the portal down across the old Mill Site, and then infiltrates into colluvial materials below the Mill Site approximately 46 meters (150 feet) from Fisher Creek. This shallow groundwater likely reports to Fisher Creek.

The presence of a significant bench of ferricrete in the vicinity of the mine and ferrihydroxide mud within the workings suggests that the seepage may be originating from bedrock fractures in the country rock and workings carrying reduced iron that oxidizes and precipitates rapidly in contact with atmospheric oxygen as iron-hydroxides. Where this material precipitates as an interstitial pore-space filling of colluvial materials, it dehydrates and matures as ferricrete cement binding the colluvial material into a well lithified rock material. Radio carbon dating of logs contained within the ferricrete deposits located within 100 feet of the portal range in age from 6,000 to 8,800 years old, suggesting that these ferricretes have been forming essentially since the glaciers retreated from the area. This also suggests that stemming the flow from this very short adit may only divert water to other naturally occurring fractures along the ferricrete bench.

Discharge from the Glengarry Mill Site Adit contains several parameters, including total recoverable cadmium, copper, iron, lead, manganese, and zinc (Tetra Tech, 2006a) that regularly exceed Montana's aquatic life water quality standards (MDEQ, 1998). The average pH of the Glengarry Mill Site Adit discharge is 3.3. Metals loading investigations by Kimball and others (1999), Amacher (1998) and Tetra Tech (2006a) indicate that under average flow conditions, the Glengarry Mill Site Adit accounts for as much as 0.5 percent of the aluminum, 1.0 percent of the cadmium, 3.0 percent of the copper, 11.4 percent of the iron, 2.9 percent of the manganese, 1.4 percent of the lead, and 1.0 percent of the zinc loads at surface water station SW-3, the nearest downstream station on Fisher Creek.

As water flows down Fisher Creek, less acidic surface and groundwater with more alkalinity enters Fisher Creek and changes the chemistry of the water, raising the pH and diluting metal concentrations. As a result, settling of colloidal metals and co-precipitation of dissolved metals with ferric-hydroxides produces an overall improvement of water quality so that water quality

impacts at surface water station CFY-2, which is located near the confluence of Fisher Creek with the Clarks Fork River, are very minor for most of the year. Since the cleanup project began in 1999, no temporary standards have been exceeded at this downstream surface water station. Since 1999, copper concentrations have fallen below chronic aquatic standards during winter base flow conditions at surface water station CFY-2 and zinc concentrations are below both the chronic and acute aquatic standards. During base flow conditions in the fall, only copper has exceeded acute or chronic aquatic standards at this station.

Lower Tredennic Adit.

The lower Tredennic Adit is located on the southeast flack of Scotch Bonnet Mountain, on Polar Star Creek a tributary to the upper Fisher Creek drainage. The lower adit consists of about 247 meters (810 feet) of underground workings on one level. Discharge from the adit is perennial with flows that range from about 2.3 to 19 Lpm (0.6 to 5 gpm). In 2002, the Lower Tredennic site was cleaned-up under the Selective Source Response Action (Maxim, 2001). Activities included removal of the waste rock to an on-site repository, construction of a subsurface infiltration basin, re-contouring of the site and revegetation of the site. Although there are no major problematic issues associated with the reclamation of this site, The USDA Forest Service desires to do additional work at the portal of this adit to insure that water discharging from the portal is completely directed into the infiltration basin constructed at the site.

Black Warrior Adit.

The Black Warrior Adit is located on Miller Creek that drains to the south from Daisy Pass. The adit is about 130 meters (425 feet) in length and a 25 meter (80-foot) raise was driven to the surface from the back of the adit. A small volume of water ranging from 0.34 Lpm (0.09 gpm) to as much as 4.2 Lpm (1.1 gpm) exits the portal. In 2006, the Black Warrior site was cleaned-up under the Miller Creek Response Action (Maxim, 2003a). Activities included removal of the waste rock to an on-site repository, construction of a subsurface infiltration basin, re-contouring of the site and revegetation of the site. Although there are no major problematic issues associated with the reclamation of this site, The USDA Forest Service desires to do additional work at the portal of this adit to insure that water discharging from the portal is completely directed into the infiltration basin constructed at the site.

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

a. Hazardous Substances

The hazardous substances as defined in section 101(14) of CERCLA found at the New World site include aluminum, arsenic, cadmium, copper, iron, lead, and zinc. Concentrations of hazardous substances are reported from the adit discharge from the Glengarry Mill Site Adit and in surface water from upper Fisher Creek (Maxim, 2002b).

b. Sampling and Analytical Data

The sampling methods used to collect the chemical data are described in the Draft Adit Discharge Response Action EE/CA prepared by Tetra Tech under contract to the USDA Forest Service (Tetra Tech,2006a) and in annual water quality monitoring reports since 2006 (Tetra Tech 2006c and 2007b). Surface water, mine waste, groundwater and adit discharge samples were collected in 1996 by CBMI, in 1997 and 1998 by the EPA, and from 1999 through 2008 by the USDA Forest Service. Long-term monitoring of surface water in Fisher Creek shows 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.

c. Mechanism for Past, Present, or Future Release

The Glengarry Mill Site Adit discharges acidic, metals-contaminated water year-round. Concentrations of cadmium, copper, iron, lead, manganese, and zinc exceed aquatic-life water quality standards. Under average flow conditions, the Glengarry Adit accounts for as much as 11.4 percent of the iron, 3 percent of the copper, 2.9 percent of the manganese and 1.4 percent of the lead loads at surface water station SW-3, the nearest downstream station on Fisher Creek.

d. 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, 2006a) illustrates that the principal mechanisms of transport of contaminants to Fisher Creek 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 in Fisher Creek along its flow path.
- Scouring of secondary minerals and remobilization metals.

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 the Montana Department of Environmental Quality (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, Pictures, and other Graphic Representations

A location map and map of Glengarry Mill Site/ Tredennic and Black Warrior Adits mine site features are displayed in the Final Adit Discharge EE/CA (Tetra Tech, 2006a).

B. Other Actions to Date

1. Previous Actions

On August 12, 1996, the United States signed a Settlement Agreement with CBMI to purchase CBMI's holdings in the District. The resulting 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 to specific properties in the District. In June 1998, a Consent Decree, which was signed by all interested parties and CBMI and approved by the United States District Court, finalized the terms of the Settlement Agreement and formalized the process by which funds would be made available for mine cleanup.

Mitigation of historic mining wastes has been an on-going interest of numerous parties since the 1970s. One of the first to investigate revegetation in the District was the USDA Forest Service Intermountain Research Station (Brown, 1994; 1995). This research has focused on reclamation of high elevation mine disturbances, with the bulk of the research focused on the wastes present in the McLaren Pit and the Como Basin. Larger scale reclamation efforts were conducted by CBMI as part of exploration and proposed mine development work. In 1993, CBMI began surface restoration work to reclaim the Como Basin and McLaren pit. Reclamation activities at these sites included recontouring, construction of runon control ditches, treating acid soils with a lime amendment, and fertilizing and seeding with native grasses. From 1993 to 1996, CBMI also reclaimed a number of exploration roads and drill pads, and recontoured the Glengarry Dump.

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, 2008, 2007, 2006, 2005, 2004; and Maxim, 2003b, 2002a; 2001b; 2000; 1999b). Activities that have been conducted to date include the following:

- Established a database management system, catalogued existing information available for the site, evaluated existing information and data; identified and filled data gaps; and developed a suitable base map of the District to support environmental studies, engineering design, and response action construction.

- Recorded the locations and characteristics of mine waste dumps, adits, and stream sediments, and developed a database of site characteristics.
- Ranked mine waste sources according to a modified Hazard Ranking System to aid in the prioritization of sites identified for clean up.
- Identified unrecorded cultural features.
- Improved portions of the Daisy Pass and Lulu Pass roads to accommodate construction traffic and minimize erosion.
- Improved a previously constructed surface water diversion around the Como Shaft.
- Evaluated water quality treatment alternatives for acid mine discharges.
- Installed and monitored wells in the McLaren Pit and Como Basin; monitored surface water and groundwater quality District-wide; sampled and analyzed soil and mine wastes throughout the District.
- Completed a repository siting evaluation and collected hydrogeologic data on two prospective repository sites.
- Completed surface water tracer studies on Fisher Creek, Daisy Creek, and Miller Creek to determine surface water inputs of metal contaminants.
- Prepared the Selective Source Response Action Engineering Evaluation and Cost Analysis (EE/CA) in 2001. In accordance with the preferred alternative identified in this document, removed about 32,000 cubic yards of waste rock and mill tailings from 14 mine waste areas and disposed of these wastes in an engineered repository (Repository). About 4.6 acres of the former waste areas were revegetated as part of this response action.
- Prepared the McLaren Pit Response Action EE/CA in 2001. In accordance with the preferred alternative identified in this document, waste rock dumps from the Daisy Creek headwaters area were consolidated into the historically operated McLaren Open Pit. This waste source accounts for about 67% of the total waste rock volume on District Property. Construction activities were initiated in 2002 with consolidation of waste in the former mine pit, and completed in 2003 with the construction of an impermeable cap over the consolidated wastes.
- Reopened the McLaren Adit to conduct an evaluation of the underground mine workings and water sources within. A borehole leaking metals-containing water into the underground workings was grouted closed in 2003.
- Prepared the Miller Creek Response Action EE/CA in 2004. In accordance with the preferred alternative identified in this document, conducted a Source Controls Removal Action at four mine sites in the Miller Creek drainage in 2004 and at two mine sites in 2006 including the Little Daisy and the Black Warrior mine waste sites.
- Prepared the Como Basin/Glengarry Adit/Fisher Creek Response Action EE/CA in 2002. In accordance with the preferred alternative identified in this document, removed 34,900 cubic yards of waste rock and ore concentrates from various mine waste areas on District properties and from the NFS portion of the McLaren Mill Site and NFS land and private property at the Republic Smelter Site. About 21.4 acres of the former waste areas, including the Repository, were revegetated as part of this response action. Final capping and closure of the Repository was conducted in 2006.
- Reopened the Glengarry Adit and Como Raise to more fully characterize underground sources of water within the mine. Prepared the Como Basin/Glengarry Adit/Fisher Creek Response Action EE/CA in 2002 using the findings found during the reopening work.

Discharge from the adit was eliminated by backfilling and hydraulic plugging the Como Raise, grouting a fracture in the underground workings, installing several watertight plugs and backfilling the workings with rock and cement. Construction work began in 2003 and was completed in 2005.

- In accordance with the preferred alternative of the Como Basin/Glengarry Adit/Fisher Creek Response Action EE/CA; an impermeable cap was placed on the Como Basin and cover soil materials were amended with lime in 2005 and 2006. The Como Basin site and adjacent road corridors were revegetated. Other response actions included regrading of the road corridor, stabilization of vehicle cut-across areas, placement of runoff controls, and placement of revegetation/erosion mat between the Glengarry and Como Basin sites. Improvements were also made to stream channels below the Como Basin. The Como Basin Response Actions were completed in 2006.
- Monitored revegetation at reclaimed sites.
- Prepared an Adit Discharge EE/CA in 2005 for remaining adit discharges on District Property. The EE/CA will provide preferred alternatives to address source control/treatment of contaminated water from adit discharges. Source control and/or treatment alternatives on selected discharges may be implemented in the forthcoming review cycle.
- From 2005 through 2007, the remaining adit and drain discharges on District Property have been evaluated to address source control/treatment of the contaminated water.
- Sites that had undergone waste removal and capping have been reclaimed and revegetated, and as a result a total of about 22 acres have been revegetated.
- Other reclamation activities have included re-grading and revegetation of road corridors, stabilization and placing barriers to off-road vehicle use in select areas, placement of runoff controls, and stabilization of stream channels below the Como Basin and McLaren Pit areas.

2. Current Actions

The USDA Forest Service completed a draft version of an EE/CA for the Adit Discharge Response Action in December 2006. A copy of the draft version of the EE/CA was 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, Billings Gazette, Cody Enterprise, and Powell Tribune announcing that the draft EE/CA was available, setting the time for the comment period, and listing the location of the information repositories. A comment period was established, allowing comments to be made over a 44 day period, and the comment period closed on March 2, 2007. Two written comments were received from the public and two comments from agencies. Regarding the three sites covered in this action memo, the public recommended that the Glengarry Mill Site adit continue to be monitored to determine if further actions are warranted. Discussions regarding the comments received for the draft EE/CA have been ongoing with the commenters through a series of public meetings and other communication. Response to all comments will be provided in the Final EE/CA.

Anticipated activities in 2008 and 2009 include:

1) Stabilization of the incised Fisher Creek stream channel passing through the Glengarry Mine Site,
2) Evaluation and implementation of response alternatives for adits and under-drain discharges in the District, and
3) Restoration/stabilization of road cuts and drainage controls on roads throughout the District.

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, and the local county commissioners. The cooperating agencies 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 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.

III. THREATS TO PUBLIC HEALTH OR WELFARE AND 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 in Fisher Creek.

Due to the concentrations of metals in the Glengarry Mill Site Adit discharge (Tetra Tech, 2006a), this source meet 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

Heavy metals associated with the Glengarry Mill Site Adit discharge can affect human health through ingestion. Aluminum and iron in surface water are not generally considered a risk to human health. Contaminants of Concern (COCs) determined for Human health risk from the adit discharge are cadmium, copper, lead, manganese and zinc. The total hazard quotient for these elements present in the Glengarry Mill Site Adit discharge is 0.37. The total hazard quotient for most of these contaminants is attributed to the risk posed by ingestion of fish taken from the stream by recreationists. Because there are no fish in Fisher Creek at the present time, this risk of exposure to these COCs in surface water is currently not a pathway at this site. Therefore, based on these data, contaminants do not present a risk to human health.

B. Threats to the Environment

Only two groups of ecological receptors have been identified as potentially being affected by contamination associated with adit discharges and these groups includes aquatic life and wetlands associated with Fisher Creek located downgradient of the source areas. COCs include aluminum, cadmium, copper, and iron.

The pathways by which ecological receptors could become exposed to contaminants at the site from adit discharges are through direct contact with water and sediments, ingestion of water and sediments, and ingestion of contaminated food. Fisher Creek has been impacted by elevated heavy metals concentrations (principally copper, iron, and zinc). A comparison of metals levels measured in water quality collected from selected adit discharges to literature guidelines and state aquatic water quality standards indicate that aluminum, copper, iron, lead, and zinc pose a risk to organisms in the aquatic environment.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this 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

A. Proposed Actions

1. Proposed Action Description

Glengarry Mill Site Adit.

Our loading analysis suggests that metals loading from the Glengarry Mill Site Adit contributes a significant percent of the metal loading to fisher Creek at SW-3 (11.4 percent of the iron, 3 percent of the copper, 2.9 percent of the manganese and 1.4 percent of the lead loads). Based on this analysis, it would seem appropriate to complete a desirable response action on the Glengarry Mill Site Adit source in order to minimize contaminant migration into Fisher Creek on a year-round basis. The preferred response action for the Glengarry Mill Site Adit involves an effort to

stem the flow of contaminated water form the portal using fracture grouting techniques. This action should significantly and positively impact water quality, particularly with respect to acidity and metals loading, in the upper reaches of Fisher Creek, and will likely have some positive impacts on groundwater.

The Response Action selected for the Glengarry Mill Site Adit addresses the discharge from the adit from a source control approach. The source control approach is considered a first step in attempting to reduce contaminant loading from point sources. Source control is preferred to water treatment as a first step in mitigating impacts to water quality in Fisher Creek, as water treatment options evaluated in a separate study by the USDA Forest Service indicates that construction and operation of passive and active water treatment systems would be difficult and expensive (Unifield, 2000). Passive treatment systems are less expensive than active treatment systems, but large flow variations and low water temperatures raise uncertainties relative to effectiveness and maintenance requirements.

The most effective means of closure for the Glengarry Mine has been determined to be a combination of activities centered on grouting of fractures to eliminate inflow into the mine that will serve to minimize mobility of contaminants as outflow from the mine. The following steps are envisioned in implementing the Response Action for the Glengarry Mill Site Adit.

- Construction of access road and lay-down area,
- Removing a building at the adit portal,
- Mobilization of mine crew and equipment and set-up,
- Portal clean-up and securing of the portal for safe access,
- Prep of a muck/pad/basin
- Reopening the adit for safe working conditions, scaling, slusher set up
- Mucking out mud precipitate and rock fall from the sill (floor of the adit)
- Locate source of water inflow (current assumption, back of mine near face)
- Ring drill first set of 8 grout holes near face, and grout,
- Step back 10 feet ring-drill second set of 8 grout holes, and grout,
- Infill with secondary grout rings on five foot centers as necessary,
- Total of seven (7) rings may be drilled and grouted,
- Place or pump muck back into adit with grout additive,
- Placement on an earthen portal plug,
- Site clean-up
- Demobiliztion of the contract mining crew
- Site and access road re-contouring
- Site revegetation

Tredennic and Black Warrior Adits.

The Lower Tredennic site was cleaned-up under the Selective Source Response Action (Maxim, 2001) in 2002 and the, the Black Warrior site was cleaned-up under the Miller Creek Response Action (Maxim, 2003a) in 2006. Activities at both sites included removal of the waste rock to an on-site repository, construction of a subsurface infiltration basin for adit discharges, re-

contouring of the site and revegetation of the site. Although there are no major problematic issues associated with the reclamation of these sites, The USDA Forest Service desires to do additional work at the portals of these adits to insure that the remaining water discharging from the portal is completely directed into the infiltration basin constructed at the site. This will be accomplished by the construction of small rock/soil collection aprons at each portal site, that direct remaining adit discharges to the infiltration basins. Once constructed, the sites will be contoured and revegetated.

a. Address Identified Human Health and Environmental Threats

Upper Fisher Creek is characterized by highly variable flow with rapidly increasing flow rates and short periods of sustained flow during snowmelt. As much as 90% of Fisher Creek's discharge volume occurs between mid May and early August. Discharge rates near the upper reaches of Fisher Creek range from less than 0.3 cubic meters per second (m^3/s) or 1.0 cubic feet per second (cfs) in late winter to over 1.4 m^3/s (150 cfs) during peak runoff.

Amacher (1998) and Kimball and others (1999), and Tetra Tech (2006a) noted that the four major sources of metals loading in the Upper Fisher Creek drainage were the Como Basin, Glengarry Adit and the Glengarry and Gold Dust waste rock dumps. These sources were each addressed by response actions resulting from implementation of recommendations presented in the in the Como Basin/Glengarry Adit/Fisher Creek EE/CA (Tetra Tech, 2004). A remaining significant source of contamination in the upper Fisher Creek drainage is the Glengarry Mill Site Adit discharge as described above, which is proposed to be addressed by this response action.

It should be recognized that the implementation of the response action proposed for the Glengarry Mill Site Adit, and subsequent reduction in loading to Fisher Creek may not bring surface water in Fisher Creek into compliance with established surface water standards. Any failure to meet Montana surface water standards will be due principally to natural sources of metals-enriched water that report to Fisher Creek. The Como Basin/Glengarry Adit/Fisher Creek EE/CA summarized pertinent literature publications that demonstrate 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. There are also other sources present in the headwaters of Fisher Creek, including contaminated groundwater that is migrating from the headwaters area to Fisher Creek, and metals-enriched sediment that has been transported from mining-related disturbances in the Como Basin, and waste rock dumps present in the headwaters of Fisher Creek. Metals-enriched sediment from these sources has deposited in the streambed along most of the length of Fisher Creek. Cleaning up of the source areas accomplished to date does not address these other sources of metals contaminants in the Fisher Creek drainage. However, by addressing releases from the Glengarry Mill Site Adit discharge some additional reduction in contaminant concentrations are expected in surface and groundwater.

b. Justification for Proposed Alternative

The USDA Forest Service has selected grouting of the Glengarry Adit as the preferred Response Action because this action provides effectiveness, implementability, and cost effectiveness.

Grouting of the inflow into Glengarry Mill Site Adit will remove a significant remaining mining related point source of metals contamination to Fisher Creek.

This response action is an appropriate response because contaminated materials from the adit discharge directly impact water quality in Fisher Creek, and because such an action is in accord with the Consent Decree, Settlement Agreement, and overall project objectives. The Response Action is not expected to meet Montana's B-1 standards for surface water quality in Fisher Creek. Nevertheless, the Response Action will provide substantial mitigation of man-caused mining impacts. Unfortunately, natural sources contribute a considerable metals load to the creek via groundwater and surface water pathways, and, given the difficult environmental conditions, eliminating metals impacts from mining related activities may not allow achievement of water quality standards. The proposed Response Action will meet most project applicable or relevant and appropriate requirements (ARARs) with the exception of surface water and groundwater standards. Although Montana B-1 water quality standards may not be met if this action is selected, this action will mitigate, in part, impacts to the environment that result from historic metal mining.

Once this Response Action is implemented and evaluated, further cost effective response actions to achieve further water quality improvements can be considered. In any case, the implementation of this Response Action will not inhibit the implementation of additional response actions.

c. Technical Feasibility and Probable Effectiveness

The recommended Response Action proposed is both technically and administratively feasible. Key project components such as equipment, materials, and construction expertise, although distant from the site, are available and would allow the implementation and successful execution of the alternative.

The proposed Response Action for the Glengarry Mill Site Adit is expected to reduce contaminant mobility in the headwaters of Fisher Creek, especially during low flow conditions. The preferred Response Action is expected to eliminate or substantially reduce any water discharge.

d. Further Information

No further information is needed to select the proposed action.

e. Verify Extent of Contamination

Assessment work in the Glengarry Mill Site Adit will confirm the locations of water inflow to the workings, and the Response Action has been selected to provide a level of protection that will ensure elimination or substantial reduction of the discharge from the adit.

f. Sensitive Environments

The headwaters area of Fisher Creek, have been severely disturbed by mining and mining exploration activities, as well as disturbances from roads and all terrain vehicle travel along the Lulu Pass road. These disturbances have resulted in land that has little vegetation, numerous erosion features, and visually distinct iron staining in strembeds and gullies below the disturbances. The severity of metals impacts within the headwaters of Fisher Creek and downstream for several miles greatly reduce any likelihood of the presence of sensitive environments.

g. Uncertainties

Uncertainties associated with implementing this alternative include the uncertainty involved in predicting the effectiveness of the alternative on water quality improvement. Current models that estimate the loading of contaminants from the Glengarry Mill Site Adit show that metal loading to Fisher Creek will be significantly reduced by implementing this response action.

h. Institutional Controls

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

i. Off-Site Disposal

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

j. Post-Removal Site Controls

Post-removal site control involving monitoring to identify any problems with revegetation or erosion will be required at the Glengarry Mill Site Adit. Monitoring the surface water in Fisher Creek will also be required periodically at established stations.

k. Changes Resulting from Public Comments

Written comments on an internal review draft of the Como Basin/Glengarry Adit/Fisher Creek 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 Draft EE/CA was released to the public on January 10, 2007, and comments on it were received from the Greater Yellowstone Coalition, the Beartooth Alliance, the Center for Science in Public Participation, Montana Department of Environmental Quality (MDEQ) and Department of Interior National Park Service. Relative to the three sites in this action memo, the public recommended that the Glengarry Mill Site adit be monitored in order to make a determination if additional actions were needed at this site. Relative to the Lower Tredennic and Black Warrior sites, the public supported a no action alternative. Comments from the MDEQ outlined some of the requirements under Montana's comprehensive Environmental Cleanup and Responsibility Act. One applicable substantive requirement discussed in this comment letter was

ARM17.30.637 which lists prohibitions for discharges to State waters. This response action is addressing this specific requirement, as well as others.

The Draft EE/CA that was released to the public will require substantive changes based on the comments received. The Final EE/CA will be completed and released to public after completion of the additional, ongoing characterization work at the McLaren subdrains

2. Short-Term Impacts

The major short-term impact to the surrounding community, residents, and wildlife involves increased vehicle traffic. A minor increase in traffic will occur during mobilization and demobilization of construction equipment. Increased traffic may impact wildlife by either changing their daily migration patterns or exposing them to a higher potential for injury or death due to collisions with vehicles.

3. Contribution to Remedial Performance

The Glengarry Mill Site Adit Response Action is a proposed addition to several response actions (described bove) that have been completed in the District for the New World Mining District Response and Restoration Project. In so doing, this proposed Response Action would make a significant contribution toward improving water quality in Fisher Creek. Selection and construction of the preferred alternative will not prevent or inhibit any further response actions that may need to be taken in Fisher Creek to meet the terms and intent of the Settlement Agreement and Consent Decree.

4. Description of Alternative Technologies

The only other Response Actions considered for the Glengarry Mill Site Adit were Institutional Controls, Engineering Controls, and the No Action alternative.

a. Institutional Controls

Institutional controls include land use and access restrictions. Institutional controls by themselves will not prevent migration of the contaminants from the adit. Therefore, institutional controls as a separate alternative were not considered.

b. Engineering Controls

Engineering controls limit the release or threat of release of hazardous substances generally by limiting mobility through isolation, and/or by limiting physical processes necessary for mobility. Underground flow controls were considered for the Glengarry Mill Site Adit.

d. Miscellaneous Alternatives

Technology types and process options were screened in the Adit EE/CA to eliminate those technologies that are obviously unfeasible, while retaining potentially effective options. An evaluation of surface water and groundwater treatment was not conducted because source control technologies are considered the first step in cleaning up mining-related impacts. Water treatment technologies may be considered at a future time depending on the results of the source controls implemented as part of this Response Action.

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

An EE/CA that details site characteristics and identifies and develops alternatives was prepared by Tetra Tech (2006a). The USDA Forest Service interdisciplinary team and specialists from the cooperating agencies analyzed the effects of the alternatives identified in the EE/CA, and considered public comments. The Forest Service then selected a proposed Response Action specifically for the Glengarry Mill Site Adit. A copy of the Draft EE/CA is available at **http://www.fs.fed.us/r1/gallatin.**

6. 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 Adit Discharge Response Action EE/CA (Tetra Tech, 2006a).

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.

a. Federal Contaminant Specific Requirements

Groundwater Standards - Safe Drinking Water Act (Relevant and Appropriate)

The National Primary Drinking Water Standards (40 CFR Part 141), are not applicable to the Glengarry Mill Sit Adit Response Action because the aquifer underlying the area is not a current public water system, as defined in the Safe Drinking Water Act, 42 U.S.C. § 300f(4). These standards are relevant and appropriate standards, however, because groundwater in the area is a potential source of drinking water. In addition, because groundwater discharges to District tributaries that may be a source of drinking water, these standards are relevant and appropriate. Maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) are standards promulgated pursuant to both federal and state law. No State water quality standard is more stringent than the corresponding federal MCL.

Groundwater quality in the Fisher Creek drainage varies considerably. With the exception of iron and manganese concentrations, groundwater in the Fisher Creek valley bottom complies with groundwater quality standards in both shallow alluvium and Precambrian granite water-bearing units. Iron and manganese are ubiquitous in the District, and concentrations of these two metals are believed to be partially controlled by natural sources in bedrock. Groundwater on the east flank of Fisher Mountain (sampled from well Tracer 5, which is completed in the Fisher Mountain Porphyry) exceeds groundwater contaminant-specific standards for copper, iron, and manganese and has an acidic pH. Grouting, the Glengarry Mill Site Adit will reduce the discharge of acidic and metals contamination to the surface waters of Fisher Creek and may positively affect groundwater quality.

Surface Water - Ambient Standards and Point Source Discharges.

While CERCLA and the NCP provide that federal water pollution criteria are the usual surface water standards to be used as relevant and appropriate standards for removal action cleanups, the State of Montana has promulgated surface water quality standards pursuant to the State of Montana Water Quality Act that are as or more stringent than the federal standards. The State of Montana has designated uses for District tributaries as B-1 and has promulgated specific standards accordingly. Discussions of these standards are included in the State of Montana ARARs discussion.

Air Standards - Clean Air Act (Applicable)

Limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances are described in the federal action specific requirements.

b. Federal Location Specific Requirements

The National Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 470, 40 CFR § 6.310(b), 36 CFR Part 800) require federal agencies or federal projects 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, the National Register of Historic Places.

Compliance with this ARAR is being met through identifying cultural and historic sites and consultation with the State Historic Preservation Office (SHPO). Cultural and historic data collected during the mining company permit application were mapped and reviewed in detail by USDA Forest Service archaeologists. The USDA Forest Service has drafted a Memorandum of Agreement (Agreement) with SHPO that outlines the steps involved with historic resource delineation and protection.

Impacts to historic features associated with the Glengarry Mill Site/ Tredennic/Black Warrior Adits Response Action are limited to removing a building at the adit portal of the Glengarry Mill Site Adit. This removal of this feature has been reviewed and approved in consultation with both SHIPO and the USDA Forest Service archeologist.

Archaeological and Historic Preservation Act (Applicable)

This statute and implementing regulations (16 U.S.C. § 469, 40 CFR § 6.301(c)) establish requirements for evaluation and preservation of historical and archaeological data, including Indian cultural and historical resources, which may be destroyed through alteration of terrain as a result of federal construction projects or a federally licensed activity or program. If eligible scientific, prehistorical, or archaeological data are discovered during site activities, these resources will be preserved in accordance with these requirements. The procedure for addressing such discoveries is described under the previous National Historic Preservation Act discussion.

Historic Sites, Buildings, and Antiquities Act (Applicable)

This requirement states that "in conducting an environmental review of a proposed EPA action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts upon such landmarks. Those activities described for the National Historic Preservation Act provide procedures to comply with this ARAR.

Fish and Wildlife Coordination Act (Applicable)

These standards (16 U.S.C. §§ 661 et seq. and 40 CFR § 6.302(g)) require that federally funded or authorized projects ensure that any modification of any stream or other water body affected by a funded or authorized action provide for adequate protection of fish and wildlife resources. The USDA Forest Service is involved with discussions with the U.S. Fish and Wildlife Service (USFWS) and the State of Montana Department of Fish, Wildlife, and Parks (FWP) to comply with this ARAR.

Floodplain Management Order (Relevant and Appropriate)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,988) mandates that federally funded or authorized actions within the 100 year flood plain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain. Compliance with this requirement is detailed in EPA's August 6, 1985 "Policy on Floodplains and Wetlands Assessments for CERCLA Actions." The Floodplain and Floodway Management Act does not directly apply because the adit sites considered in this response action do not occur in designated 100-year floodplains.

Protection of Wetlands Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,990) mandates that federal agencies avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands. The order also provides that activities avoid construction in wetlands if a practicable alternative exists. Section 404(b)(1), 33 U.S.C. § 1344(b)(1) prohibits discharge of dredged or fill material into waters of the United States. No wetlands are expected to be impacted by the proposed Response Action.

The Endangered Species Act (Applicable)

This statute and implementing regulations (16 U.S.C. §§ 1531 - 1543, 50 CFR Part 402, and 40 CFR § 6.302(h)) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat.

Threatened and endangered species are present in or near the District. The U.S. Fish and Wildlife Service has identified the grizzly bear, bald eagle, Canada lynx, and gray wolf as threatened and endangered species that may be present in the project area. No critical habitat was designated or proposed in the project area, although the New World Mining District lies within the Grizzly Bear Recovery Zone for the Yellowstone area. Long-term impacts to threatened and endangered species from the proposed action are not expected, although risk to grizzly bear mortality may be higher due to the increased use of the area. Also, displacement of wildlife species such as the grizzly bear may be increased by reclamation activities in the short-term.

Although construction and implementation of the preferred alternative will require an increased level of activity, long-term maintenance will not require a level of activity that is greater than that existing under current conditions. In the long term, mitigation of mining-related water quality impacts in the District should serve to enhance wildlife habitat by removing contaminants from the environment. The overall impact of response and restoration activities is neutral to beneficial to wildlife, although road improvements that are being done over the life of the project could have long-term impacts on wildlife due to increased traffic, increased traffic speeds, and increased use of the area.

Migratory Bird Treaty Act (Applicable)

This requirement (16 U.S.C. §§ 703 et seq.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the USFWS during design and construction to ensure that cleanup does not unnecessarily impact migratory birds. The USDA Forest Service is involved with discussions with the USFWS to comply with this requirement, and measures will be taken to mitigate removal activities if adverse impacts are identified. The reclamation process will attempt to restore habitat and should have a long-term neutral to beneficial effect on migratory bird species, while reclamation activities may have a short-term disturbance or displacement effect on migratory bird species.

Bald and Golden Eagle Protection Act (Applicable)

This requirement (16 U.S.C. §§ 668 et seq.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the USFWS during remedial design and remedial construction to ensure that any cleanup of the site does not unnecessarily adversely affect the bald and golden eagle. The USDA Forest Service is involved with discussions with USFWS to comply with this requirement, and measures would be taken to mitigate removal activities if adverse affects are identified. Bald eagles do not nest in the area,

although golden eagles may nest in the project area. Both species may pass through the area to forage or during migration. The project is unlikely to have adverse effects on these species. Overall, impact of mining reclamation should be neutral to beneficial for most wildlife species, while disturbance associated with reclamation will be short-term for most bird species.

c. Federal Action Specific Requirements

RCRA Requirements (Relevant and Appropriate)

RCRA hazardous waste requirements are not applicable to District Property wastes in accordance with 40 CFR § 261.4(b)(7) (the Bevill exemption). In addition, many RCRA regulations are not applicable because these removal actions only attempt to remediate adit discharges with only minor mine site reclamation activities. Nevertheless, certain RCRA hazardous waste regulations (which are identical to state hazardous waste regulations) concerning covering waste piles and runon/runoff controls have been determined to be relevant and appropriate in the handling of these wastes. The following regulations are relevant and appropriate:

- RCRA regulations found at 40 CFR §§ 264.310(a), and (b)(1), and (5) (regarding final cover, run-on and run-off controls), which are identical to state solid waste regulations, are relevant and appropriate requirements for the consolidation site to be used for waste management and disposal, although the 40 CFR Part 258 standards for solid wastes provide more specific guidance.

All run-on and runoff controls will be engineered to handle water flows that arise during spring runoff. Upon completion of the Response Actions no point discharge of contaminants will be released from any of the adit sites.

Solid Waste Requirements (Relevant and Appropriate)

The Federal solid waste regulations (40 CFR Part 258) are not applicable because, under 40 CFR § 258.1(c), these criteria are only for new disposal units. Siting and location regulations are not relevant and appropriate because no siting of a new unit is taking place. Nevertheless, certain solid waste regulations concerning covering waste piles and runon/runoff controls have been determined to be relevant and appropriate in the handling of these wastes. The following regulations are relevant and appropriate:

- Requirements described at 40 CFR §§ 258.60(a) and 258.61(a)(1), governing cover requirements and runon/runoff controls.

Surface Mining Control and Reclamation (Relevant and Appropriate),

Regulations promulgated under the Surface Mining Control and Reclamation Act (30 CFR, Part 816 and 784) cover reclamation requirements for coal and certain non-coal mining operations. Revegetation requirements will follow prescriptions developed by the USDA Forest Service Rocky Mountain Research Station. These prescriptions are based on 23 years of site specific

research involving reclamation of mine wastes at high altitudes and restoration of native plant communities. Revegetation prescriptions have been designed to regenerate under the natural conditions prevailing at the site. Site specific research indicates that revegetation will be permanent, diverse, predominantly native, and of the same seasonality and utility found in similar pre-disturbance areas. Cover, planting, and stocking specifications are based on local and regional conditions.

Erosion control will be accomplished using best management practices to prevent deterioration of water quality or quantity and prevent erosion resulting from roads. Following removal, revegetated areas will be capable of supporting designated land uses, will blend with the surrounding topography, and meet slope restrictions.

Air Standards - Clean Air Act (Applicable)

The state standards, promulgated in accordance with Section 109 of the Clean Air Act, are applicable to releases into the air from removal action activities, but the national ambient air standards are not. Ambient air standards for lead are promulgated at Administrative Rules of Montana (ARM) 17.8.222 as part of a federally approved State Implementation Plan (SIP), in accordance with the Clean Air Act of Montana, §§ 75-2-101 et seq., Montana Codes Annotated (MCA). Corresponding federal regulations are 40 CFR § 50.12. The lead standard provides that no person shall cause or contribute to concentrations of lead in the ambient air that exceed 1.5 micrograms per cubic meter ($\mu g/m^3$) of air, measured over a 90-day average.

Regulations promulgated at ARM 17.8.223 as part of the SIP (§§ 75-2-101 et seq., MCA) apply to particulate matter that is 10 microns in diameter or smaller (PM-10). Corresponding federal regulations are 40 CFR § 50.6. According to this standard, no person shall cause or contribute to concentrations of PM-10 in the ambient air which exceed 150 $\mu g/m^3$ of air for a 24 hour average with no more than one expected exceedance per calendar year or 50 $\mu g/m^3$ of air on an annual average.

For the Response Action adit sites, sampling data indicated that lead concentrations are not at levels that are high enough to be of concern to human health. Furthermore, based on field investigation, dump materials, where present, are primarily of a grain size that is not susceptible to wind transport. Therefore, based on these characteristics, removal operations that involve excavation, loading, hauling, and placing of reclamation materials are not expected to exceed these two air quality standards. However, to ensure blowing dust is controlled, best management practices will be incorporated into the removal action as site conditions require mitigating actions.

Ambient air standards under Section 109 of the Clean Air Act are also promulgated for carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, and ozone. If emissions of these compounds were to occur at the site in connection with any cleanup action, these standards would also be applicable (40 CFR Part 50). Carbon monoxide, hydrogen sulfide, nitrogen dioxide, sulfur dioxide, or ozone are not expected to be generated during the removal action beyond those levels normally associated with internal combustion engines. Therefore, no measures will be needed to accommodate these standards.

Transportation of Hazardous or Contaminated Waste (Relevant and Appropriate)

40 CFR Part 263 establishes regulations for the transportation of hazardous waste. These regulations would govern any on-site transportation of material. No transportation of wastes will occur as a result of the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action.

Occupational Safety and Health Act (Applicable)

Occupational Safety and Health Administration requirements will be met by requiring appropriate safety training for all on-site workers during construction phase. Site activities will be conducted under the guidance of a Health and Safety Plan for the site per OSHA 29 CFR § 1910.120. Site personnel will have completed 40-hour hazardous waste operations and emergency response training and will be current with the 8-hour annual refresher training as required by OSHA 29 CFR § 1910.120.

d. Montana Contaminant Specific Requirements

Surface Water Quality Standards (Relevant and Appropriate)

Under the State of Montana Water Quality Act, §§ 75-5-101 et seq., MCA, the state has promulgated regulations to protect, maintain, and improve the quality of surface waters in the state. Although the point source discharge requirements of the Act are not applicable because the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action will eliminate and not create any point source discharge of contaminated water, the requirements listed below are relevant and appropriate water quality standards for the Response Action.

The State of Montana has classified the streams in the District as B-1. The definition of B-1 waters are waters that are suitable for drinking, culinary and food processing (after conventional treatment), bathing, swimming and recreation, growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers, and agricultural and industrial water supply. The B-1 stream classification also sets forth standards for coliform bacteria, dissolved oxygen content, pH, turbidity, temperature, sediment or floating solids, color, and concentrations of toxic or harmful parameters as specified in Circular WQB-7. The state is also in the process of developing total maximum daily loads (TMDLs) for the Cooke City Planning Area. A TMDL is a pollutant budget developed at a level where water quality standards will not be exceeded. The TMDL accounts for loads from point and non-point sources in addition to natural background loads. A final Water Quality Restoration Plan for the Cooke City Planning Area was released by the DEQ on September 23, 2002.

On June 4, 1999, the Montana Board of Environmental Review adopted a rule for temporary water quality standards on portions of Fisher Creek, Daisy Creek, and the Stillwater River. Temporary standards will be in effect for 15 years, at which time the water quality issues in the District will be reevaluated by the USDA Forest Service and the Montana Department of Environmental Quality.

For the Glengarry Mill Site/Tredennic/Black Warrior Response Action, the applicable temporary water quality standards for Fisher Creek apply at surface water station CFY-2, which is located about three miles below the Glengarry Mill Site Adit discharge at the confluence of Fisher Creek with the Clarks Fork of the Yellowstone. Narrative standards apply at any point on Fisher Creek, upstream of CFY-2. Narrative standards are based on plus or minus two (2) standard deviations from the mean for the sampling period of record. Numeric temporary standards for CFY-2 are listed below in micrograms per liter:

Parameter	CFY-2 (µg/L)
Aluminum	470
Cadmium	NA
Copper	110
Iron	750
Lead	2
Manganese	82
Zinc	44
pH	> 5.7 s.u.

Additional restrictions on any discharge to surface waters are included in ARM 17.30.637 (Applicable), which prohibits discharges containing substances 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 be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;

(c) produce odors, colors, or other conditions that create a nuisance, or render undesirable tastes to fish flesh or make fish inedible;

(d) create concentrations or combinations of materials that are toxic or harmful to human, animal, plant, or aquatic life;

(e) create conditions that produce undesirable aquatic life.

ARM 17.30.1203 (Applicable) adopts and incorporates the provisions of 40 C.F.R. Part 125 for criteria and standards for the imposition of technology-based treatment requirements in MPDES permits. The permit requirement would not apply to on-site discharges because it is not substantive, and the substantive requirements of Part 125 would not be applicable because there will be no point source discharge at the site.

One relevant and appropriate provision of the Act for both surface water and ground water, §75-5-605, MCA, provides that it is unlawful to cause pollution as defined in § 75-5-103 of any state waters or to place or cause to be placed any wastes where they will cause pollution of any

state waters. In this instance, the selected Response Action is in compliance because it prevents future pollution of state waters, and does not cause additional pollution.

Temporary water quality standards are currently being met in Fisher Creek under existing conditions. However, contaminant-specific standards associated with the Montana Water Quality Act, with the exception of chromium (which is already in compliance), will not be achieved under the preferred alternative without further remediation as part of a subsequent cleanup phase. The reasons for this are several, including the presence of a large body of near-surface sulfide mineralization present in the Fisher Mountain and headwaters areas of Fisher Creek that contributes metal and pH impacts to groundwater and surface water. This natural source of impacted drainage may be at levels that preclude aquatic life in Fisher Creek, regardless of mining impacts present in the headwaters area.

Surface water quality at Station SW-3 will improve as a direct result of implementing the Response Action. With the implementation of the Response Action for the Glengarry Mill Site Adit, reduction of the flow from the adit will lead to an additional reduction in loading during low flow and a more modest but still significant reduction in loading at high flow.

Water chemistry in the reaches below Station SW-3 appears to be controlled by mineral precipitates and sorption of metals, and by downgradient groundwater contributions rather than by upstream loading, so the impact to water quality in Fisher Creek below Station SW-3 are somewhat uncertain.

Groundwater Pollution Control System (Applicable)

ARM 17.30.1006 (Applicable) classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater, and states that groundwater is to be classified according to actual quality or actual use, whichever places the groundwater in a higher class. Class I is the highest quality class; Class IV the lowest. Based upon its specific conductance, the great majority of the groundwater in the District should be considered Class I groundwater.

Groundwater quality in the Fisher Creek drainage varies considerably. With the exception of iron and manganese concentrations, groundwater in the Fisher Creek valley bottom complies with groundwater quality standards in both shallow alluvium and Precambrian granite water-bearing units. Iron and manganese are ubiquitous in the District, and concentrations of these two metals are believed to be partially controlled by natural sources in bedrock. Groundwater on the east flank of Fisher Mountain (sampled from well Tracer 5, which is completed in the Fisher Mountain Porphyry) exceeds groundwater contaminant-specific standards for copper, iron, and manganese and has an acidic pH.

ARM 17.30.1011 (Applicable) generally prohibits the degradation of groundwater, and the Response Action will comply with this ARAR because grouting of the Glengarry Mill Site Adit will reduce the production of acidity and solution of metals in groundwater that currently occurs in the underground workings and subsequently discharges to Fisher Creek.

Air Quality

In addition to the standards identified in the federal action specific ARARs above, the State of Montana has identified certain air quality standards in the action specific section of the State action specific ARARs below.

e. Montana Location Specific Requirements

Floodplain and Floodway Management Act and Regulations (Applicable)

The Floodplain and Floodway Management Act (§§ 76-5-401 et seq., MCA) and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway and floodplain. No designated 100-year floodplain will be affected by the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action, and the Act and certain floodplain management regulations (ARM 36.15.602, .603, .604, .605) although applicable are not anticipated to be affected by the Response Action.

Solid Waste Management Regulations (Applicable)

Regulations promulgated under the Solid Waste Management Act, §§ 75-10-201 et seq., MCA, specify requirements that apply to the location of any solid waste management facility. Under a previous response action in the District (Selective Source Response Action), a lined and capped on-site facility was constructed. These regulations do not apply to the response actions proposed for the Glengarry Mill Site/Tredennic/Black Warrior adits.

Natural Streambed and Land Preservation Standards (Applicable)

Sections 87-5-502 and 504, MCA, (Applicable -- substantive provisions only) provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in approving removal actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, §§ 75-7-101 et seq., MCA, (Applicable -- substantive provisions only) includes similar requirements and is applicable to private parties as well as government agencies.

ARM 36.2.410 (Applicable) establishes minimum standards which would be applicable if a removal action alters or affects a streambed, including any channel change, new diversion, riprap or other streambank protection project, jetty, new dam or reservoir or other commercial, industrial or residential development. No such project may be approved unless reasonable efforts will be made consistent with the purpose of the project to minimize the amount of stream channel alteration, insure that the project will be as permanent a solution as possible and will create a reasonably permanent and stable situation, insure that the project will pass anticipated water flows without creating harmful erosion upstream or downstream, minimize turbidity,

effects on fish and aquatic habitat, and adverse effects on the natural beauty of the area and insure that streambed gravels will not be used in the project unless there is no reasonable alternative. Soils erosion and sedimentation must be kept to a minimum. Such projects must also protect the use of water for any useful or beneficial purpose. See §75-7-102, MCA.

The Natural Streambed and Land Preservation Act will be complied with by using earth and natural materials to construct mine portal collection aprons and other reclamation activities on the adit sites. All disturbed areas will be managed during construction to minimize erosion.

f. Montana Action Specific Requirements

In the following action-specific ARARs, the nature of the action triggering applicability of the requirement is stated in parentheses as part of the heading for each requirement.

Groundwater Act (Applicable) (Construction and maintenance of groundwater wells)

Section 85-2-505, MCA, (Applicable) precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained to prevent waste, contamination, or pollution of groundwater.

Monitoring wells have been constructed in the headwaters of Fisher Creek to monitor groundwater levels and water quality following capping of the Como Basin and closure of the Glengarry Adit. Any additional monitoring wells will be constructed in accordance with state monitoring well regulations to assure that pollution will not be spread between aquifers. Since monitoring wells are not producing wells, no groundwater will be wasted.

Air Quality Regulations (Applicable) (Excavation/earth-moving; transportation)

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions may be necessary to meet air quality requirements. Certain ambient air standards for specific contaminants and particulates are set forth in the federal action specific section above. Additional air quality regulations under the state Clean Air Act, §§ 75-2-101 et seq., MCA, are discussed below.

ARM 17.8.604 (Applicable) lists certain wastes that may not be disposed of by open burning, including oil or petroleum products, RCRA hazardous wastes, chemicals, and treated lumber and timbers. Any waste which is moved from the premises where it was generated and any trade waste (material resulting from construction or operation of any business, trade, industry or demolition project) may be open burned only in accordance with the substantive requirements of 17.8.612 or 611.

No burning of waste will be conducted to complete this project.

ARM 17.8.308(1) and (2) (Applicable) provides that no person shall cause or authorize the production, handling, transportation or storage of any material; or cause or authorize the use of any street, road, or parking lot; or operate a construction site or demolition project, unless

reasonable precautions to control emissions of airborne particulate matter are taken. Emissions of airborne particulate matter must be controlled so that they do not "exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes." ARM 17.8.308(1) and (2) (Applicable) and ARM 17.8.304 (Applicable).

In addition, state law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. ARM 17.8.220 (Applicable).

ARM 17.8.308(4) (Applicable) requires that any new source of airborne particulate matter that has the potential to emit less than 100 tons per year of particulates shall apply best available control technology (BACT); any new source of airborne particulate matter that has the potential to emit more than 100 tons per year of particulates shall apply lowest achievable emission rate (LAER). The BACT and LAER standards are defined in ARM 17.8.301. Precautions will be taken during construction to limit dust emissions from removal activities.

ARM 17.24.761 (Relevant and Appropriate) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities. Some of these measures could be considered relevant and appropriate to control fugitive dust emissions in connection with excavation, earth moving, and transportation activities conducted as part of the removal. Such measures include watering or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, restricting vehicle speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands.

Fugitive dust will be generated with earth moving activities and transportation of materials on unpaved roads. Road dust will be suppressed by the contractor through watering.

Solid Waste Regulations (Applicable)

The State regulations concerning final cover requirements, runon/runoff controls, and monitoring that are more specific than the Federal regulations are applicable to the Response Action. To some extent these regulations are superceded by State mine reclamation regulations, which are more specific. Implementing the preferred alternative for this Response Action will comply with the requirements for final cover, runon/runoff controls, and monitoring. Compliance with these requirements is explained in the discussion on Reclamation Requirements (below) and the Federal Action Specific Requirements section (above).

Reclamation Requirements (Relevant and Appropriate)

The Strip and Underground Mine Reclamation Act, §§ 82-4-201 et seq., MCA, technically applies to coal and uranium mining, but that statute and the regulations promulgated under that statute and discussed in this section set out the standards that mine reclamation should attain. To the extent they are more stringent than the federal regulatory scheme contained in the Surface Mining Control and Reclamation Act (see 30 CFR Parts 789, 816), the State requirements identified here have been determined to be relevant and appropriate requirements for this action.

Section 82-4-231 (Relevant and Appropriate) requires the reclamation and revegetation of the land. In developing a method of operation and plans of backfilling, water control, grading, topsoiling and reclamation, all measures shall be taken to eliminate damages to landowners and members of the public, their real and personal property, public roads, streams, and all other public property from soil erosion, subsidence, landslides, water pollution, and hazards dangerous to life and property.

Sections 82-4-231(10)(j) and (k) and ARM 17.24.751 (Relevant and Appropriate) provide that reclamation of mine waste materials shall, to the extent possible using the best technology currently available, minimize disturbances and adverse impacts of the operation on fish, wildlife, and related environmental values and achieve enhancement of such resources where practicable, and shall avoid acid or other toxic mine drainage by such measures as preventing or removing water from contact with toxic-producing deposits.

ARM 17.24.641 (Relevant and Appropriate) also provides that drainage from acid-forming or toxic-forming spoil into ground and surface water must be avoided by preventing water from coming into contact with such spoil. ARM 17.24.505 (Relevant and Appropriate) similarly provides that acid, acid-forming, toxic, toxic-forming or other deleterious materials must not be buried or stored in proximity to a drainage course so as to cause or pose a threat of water pollution.

Mine discharge control and revegetation will be an integral part of the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action design and construction package. Utilizing nearly 25 years of site specific revegetation trials, the USDA Forest Service has developed revegetation prescriptions that substantially comply with all requirements of the Strip and Underground Mine Reclamation Act. Revegetation is an integral part of the removal action because vegetation protects the removal sites and the Como Basin cap from erosion. Disturbed areas will be revegetated in accordance with the revegetation prescriptions such that revegetation is rapid and effective. Adit discharges to surface water will be eliminated or minimized, and otherwise controlled by directing the discharge to constructed infiltration basins.

Reclamation Activities - Hydrology Regulations (Relevant and Appropriate)

The hydrology regulations provide guidelines for addressing the hydrologic impacts of mine reclamation activities and earth moving projects and are relevant and appropriate for addressing these impacts associated with the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action.

ARM 17.24.631 (Relevant and Appropriate) provides that long-term adverse changes in the hydrologic balance from mining and reclamation activities, such as changes in water quality and quantity, and location of surface water drainage channels shall be minimized. Water pollution must be minimized and, where necessary, treatment methods utilized. Diversions of drainages to avoid contamination should be used in preference to the use of water treatment facilities. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.

During construction of the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action, storm water controls will be in place and vegetation will be established following construction to minimize erosion. Temporary diversion channels needed to direct stormwater runoff from the construction area will be constructed to minimize erosion.

ARM 17.24.635 through 17.24.637 (Relevant and Appropriate) set forth requirements for temporary and permanent diversions. Temporary diversion channels will be designed in consideration of the drainage basin contributing flow to the channels. Erosion will be avoided by using rock lining.

ARM 17.24.638 (Relevant and Appropriate) specifies sediment control measures to be implemented during operations. An erosion control plan will be required that sets forth methods to control sediment during construction.

ARM 17.24.640 (Relevant and Appropriate) provides that discharge from sedimentation ponds, permanent and temporary impoundments, and diversions shall be controlled by energy dissipaters, riprap channels, and other devices, where necessary, to reduce erosion, prevent deepening or enlargement of stream channels, and to minimize disturbance of the hydrologic balance. Drainages will be rock lined at the discharge points.

Reclamation and Revegetation Requirements (Relevant and Appropriate)

ARM 17.24.501 (Relevant and Appropriate) set forth general backfilling and final grading requirements. Excavated areas will be backfilled to blend with the surrounding undisturbed topography. Backfill will be suitable for establishment of vegetative cover.

ARM 17.24.519 (Relevant and Appropriate) provides that an operator may be required to monitor settling of regraded areas. Long-term monitoring of revegetated areas has been established as a project objective; planning documents provide guidance for long-term monitoring.

ARM 17.24.702 (Relevant and Appropriate) requires that during the redistributing and stockpiling of soil (for reclamation):

- Regraded areas must be prepared to eliminate any possible slippage potential, to relieve compaction, and to promote root penetration and permeability of the underlying layer; this preparation must be done on the contour whenever possible and to a minimum depth of 12 inches;

- Redistribution must be done in a manner that achieves approximate uniform thickness consistent with soil resource availability and appropriate for the postmining vegetation, land uses, contours, and surface water drainage systems; and

- Redistributed soil must be reconditioned by subsoiling or other appropriate methods.

These criteria will be addressed through the design of the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action. Regraded materials will have slopes that match the surrounding topography and will generally be constructed to be no steeper than 3H:1V. Thickness of topsoil or growth medium will be specified in the contract documents. Regraded soil surfaces will be chiseled using standard farming techniques to promote plant establishment.

ARM 17.24.703 (Relevant and Appropriate). When using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use, and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM 17.24.701 and 702.

ARM 17.24.711 (Relevant and Appropriate) requires that a diverse, effective, and permanent vegetative cover of the same seasonal variety and utility as the vegetation native to the area of land to be affected shall be established except on road surfaces and below the low-water line of permanent impoundments. The vegetative cover must also be capable of meeting the criteria set forth in 82-4-233, MCA. Vegetative cover is considered of the same seasonal variety if it consists of a mixture of species of equal or superior utility when compared with the natural vegetation during each season of the year. (See also ARM 17.24.716 below regarding substitution of introduced species for native species.)

ARM 17.24.713 (Relevant and Appropriate) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation.

ARM 17.24.714 (Relevant and Appropriate) requires use of mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions.

ARM 17.24.716 (Relevant and Appropriate) establishes the required method of revegetation, and provides that introduced species may be substituted for native species.

ARM 17.24.718 (Relevant and Appropriate) requires the use of soil amendments and other means such as irrigation, management, fencing, or other measures, if necessary to establish a diverse and permanent vegetative cover.

All revegetation requirements included in the above ARMs will be complied with using site specific revegetation research results. Nearly 25 years of research was conducted by the USDA Forest Service at the site, primarily through the guidance of Dr. Ray Brown, an eminent scientist stationed at the Rocky Mountain Research Station in Logan, Utah. Through his work, the USDA Forest Service has developed revegetation prescriptions that substantially comply with revegetation requirements. All disturbed areas will be revegetated in accordance with the revegetation prescriptions such that revegetation is effective, permanent, self-sustaining, and native. Soil amendments and revegetation treatments such as lime, fertilizer, mulch, erosion control blankets, and organic amendments are all included in the revegetation prescriptions.

g. Non-Compliance with ARARs

The preferred Response Action selected for the cleanup of mining-related impacts in the headwaters of Fisher Creek will move compliance with ARARs in a positive direction. Surface water and groundwater quality is expected to improve to some extent by implementing the Response Actions. Additional cleanup efforts will be evaluated as necessary, depending on results achieved. Implementing the preferred Response Action will not hinder further Response Actions that may be required at the site

7. Project Schedule

The Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action should be completed during the 2008 construction season.

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B. Estimated Costs

The total cost to implement the preferred Response Action alternative for the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action is $225,204. The Glengarry Mill Site Adit Response Action cost is estimated to be $217,640 (**Table 1**). This cost includes project design and construction supervision, site preparation, mining subcontractor, and site reclamation and closure costs.

TABLE 1
SUMMARY OF ESTIMATED COSTS FOR THE GLENGARRY MILL SITE ADIT RESPONSE ACTION
New World Mining District Response and Restoration Project
Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action

Response Action	Cost
Project Design and Construction Supervision	$ 18,440
Site Preparation	$ 2,000
Mining Sub-contractor Costs	$ 192,246
Reclamation and Closure, Travel, and Reports	$4,954
TOTAL ESTIMATED COST	**$ 217,640**

Cost of the construction of the collection apron to collect and redirect adit discharges from the Tredennic and Black Warrior Adit sites into previously constructed infiltration basins and subsequent site reclamation are estimated at $5,560 and $2,004, respectively.

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

If no action is taken to reduce or eliminate the adit discharge from the Glengarry Mill Site Adit or redirect adit discharges from the Tredennic and Black Warrior Adits surface water and groundwater at the site will continue to be degraded and present a risk to ecological receptors.

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 represents the Glengarry Mill Site/Tredennic/Black Warrior Adits Response Action for reduction of flow from the Glengarry Mill Site Adit using underground grouting methods, and redirection of remaining adit discharges from the Tredennic and Black Warrior Adits into previously constructed infiltration basins by the construction of collection aprons at the portal sites. The project is situated in the Gardiner Ranger District of the Gallatin National Forest. This document was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This decision is based on the administrative record for the site. 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 Date
On-Scene Coordinator (OSC)

I concur with the recommendation to implement the proposed alternatives as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for the Como Basin/Glengarry Adit/Fisher Creek Response Action, New World Mining District Response and Restoration Project.

_____ _____

Ken Britton Date
District Ranger
Gardiner Ranger District

I concur with the recommendation to implement the proposed alternatives as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for the Como Basin/Glengarry Adit/Fisher Creek Response Action, New World Mining District Response and Restoration Project.

_____ _____

Mary C. Erickson Date
Forest Supervisor
Gallatin National Forest

I concur with the recommendation to implement the proposed alternatives as described in this Action Memorandum and attached Engineering Evaluation/Cost Analysis for the Como

Basin/Glengarry Adit/Fisher Creek Response Action, New World Mining District Response and Restoration Project.

_____ _____

Bob Kirkpatrick Date
USDA Project Coordinator
Northern Region

I approve of the proposed removal action as outlined in the Action Memorandum and attached Engineering Evaluation/Cost Analysis for the Como Basin/Glengarry Adit/Fisher Creek Response Action, New World Mining District Response and Restoration Project.

_____ _____

Tom Tidwell Date
Regional Forester
Northern Region