

New World Mining District Response and Restoration Project

PROJECT SUMMARY

2007



United States Department of Agriculture
Forest Service
Northern Region
Gallatin National Forest



June 2007

**PROJECT SUMMARY
2007
NEW WORLD MINING DISTRICT
RESPONSE AND RESTORATION PROJECT**

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INTRODUCTION

The NewWorld Mining District (District) Response and Restoration Project officially began when the USDA Forest Service submitted an implementation plan to the State of Montana on January 22, 1999. Since that time, the Forest Service has engaged in a number of activities including collecting environmental and engineering data to better understand the site, further investigate portions of the District that were not well understood, and design and construct cleanup actions for the highest priority sites in the District.

Because a considerable amount of work has been done since the project was initiated by the USDA Forest Service, this Project Summary, which was first distributed in the fall of 2000 and updated annually, is being updated again this year to keep people abreast of on-going project activities. As with the 2006 Project Summary, this Project Summary focuses on project cleanup activities. Previous summary documents presented the project's history, mining-related problems, legal considerations, and cleanup process.

PROJECT SETTING

The District, which includes a mixture of National Forest and private lands, is a historic metals mining area located in the general vicinity of Cooke City, Montana, in the Beartooth Mountains. The historic mining district is centered northeast of Yellowstone National Park, and contains hard rock mining wastes and acid discharges that impact human health and the environment. Human health and environmental issues are related to elevated levels of heavy metals present in mine waste piles, acidic water discharging from mine openings, and stream sediments. Cleanup work is challenging in this harsh, mountainous environment due to a severe climate, short construction season, and large amount of snowfall that the District receives.

See Figure 1 for Project Location (p. 2)

The 40 square mile District is located at an elevation that ranges from 7,900 feet to over 10,400 feet above sea level and is snow-covered for much of the year. Historic mining disturbances affect about 65 acres with the largest disturbances attributed to the McLaren Pit (12 acres) and the McLaren Tailings (11 acres). The Glengarry Adit and the nearby Como Basin (5.5 acres)

are the other major source areas in the District that contribute pollutants to headwater streams.



View of Daisy Pass (center) & Crown Butte (right)

The District is situated at the headwaters of three river systems that all eventually flow into the Yellowstone River. These rivers include the Clarks Fork of the Yellowstone, the Stillwater, and the Lamar. The Lamar River flows through Yellowstone Park. The major tributary streams affected by mining disturbances within the District include Daisy, Miller, Fisher, and Soda Butte creeks.

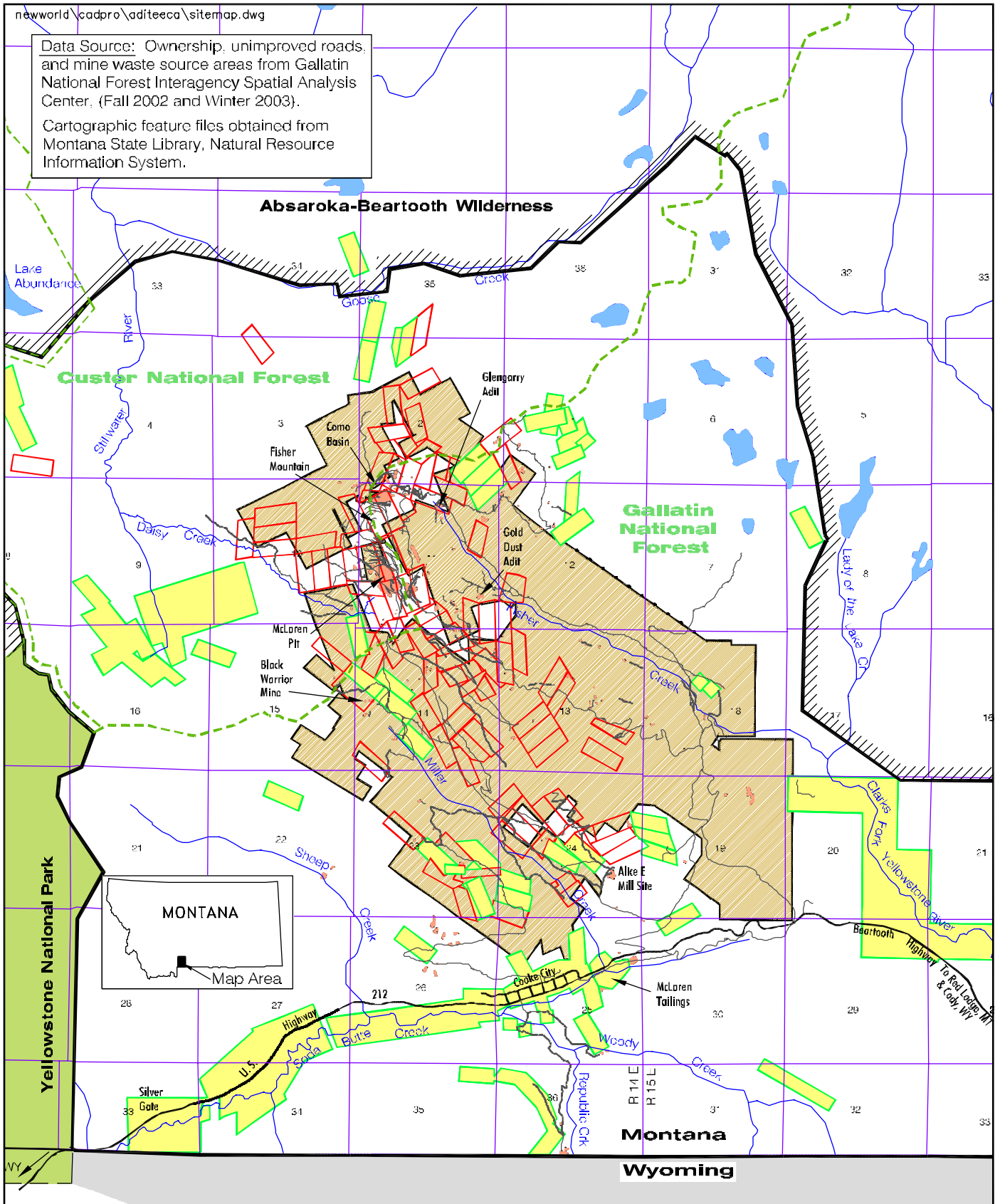
PROJECT RESOURCES

Maps of the project site, previous Project Summaries, and numerous technical documents concerning the site are available from the project website and at information repositories located in Cooke City at the Chamber of Commerce office and in Bozeman at the Gallatin National Forest Supervisor's Office. We encourage you to investigate these information sources to gain a more complete and detailed understanding of the NewWorld Mining District Response and Restoration Project.

Visit our project website for additional project information, project documents, and current activities.

<http://www.fs.fed.us/r1/gallatin>

Data Source: Ownership, unimproved roads, and mine waste source areas from Gallatin National Forest Interagency Spatial Analysis Center, (Fall 2002 and Winter 2003).
 Cartographic feature files obtained from Montana State Library, Natural Resource Information System.



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- District Property Boundary
- District Boundary
- Unimproved Road
- National Forest Boundary
- Wilderness Boundary
- Mine Waste Source Area
- District Property (Patented Claims)
- District Property (Unpatented Claims)
- Private Property

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

CLEANUP APPROACH

The USDA Forest Service is the lead agency responsible for implementing the cleanup of mining-related impacts in the District. Other state and federal agencies are cooperating with the effort, including the U.S. Department of Interior (DOI), the Environmental Protection Agency (EPA), and the Montana Department of Environmental Quality (DEQ). Numerous interested parties are also actively involved in following project activities and providing comments to the Forest Service. These groups include the Beartooth Alliance, Greater Yellowstone Coalition, Park County Environmental Council, Northern Plains Resource Council, and many concerned citizens and residents of Cooke City and Silver Gate.

The USDA Forest Service uses their authority granted under the Comprehensive Environmental Response, Compensation, and Liability Act (the Superfund enabling law) to proceed with the cleanup. Following EPA guidance, the Forest Service follows the Non-Time-Critical Removal Action process to implement the cleanup.

The overall goal for cleanup is to improve water quality in the District to the highest quality possible, and reduce or eliminate risks to people and the environment from historic mining impacts. The general strategy the USDA Forest Service is using on this project is to mitigate the readily identifiable solid waste sources as a first phase of cleanup. This is followed by a second phase that evaluates problems associated with the more difficult mine discharges.

To support activities that occur each year of the project, the USDA Forest Service prepares annual work plans that identify the work proposed each year. Recognizing that this project also involves restoration, the Forest Service integrates restoration elements within the cleanup process by including restoration in the overall strategy, where possible, for each of the cleanup projects undertaken.

A brief description of the approach used for cleanup is provided in the following discussion.

PRIORITIZING AND EVALUATING MINE WASTE SOURCES

One of the key parts of the cleanup evaluation was ranking the mine waste sites in the District using a modified hazard ranking system developed by the Montana DEQ. This system, the Abandoned and Inactive Mine Scoring System (AIMSS), uses site specific data to evaluate the risk of pollution from mine waste sources via four pathways: groundwater, surface water, direct contact, and air. About 50 site variables, including the results obtained from sampling waste materials, are input to the scoring system to determine both individual pathway scores and a total score. Higher weights are ascribed to the following: observed releases to groundwater and surface water, especially where an exceedance of a standard is documented; sources that are closer to a population base; and, higher contaminant concentrations, large contaminant quantities, and/or large areas of disturbance. Results of the AIMSS scoring have been presented in numerous project documents, including the Selective Source Response Action Engineering Evaluation/ Cost Analysis.

Using the goals and objectives outlined in the Consent Decree and the results of the AIMSS ranking, higher priority sites are waste sources that are in direct contact with surface water or groundwater, or that have discharges that impact water quality or human health. There are a number of District waste sites that fall into this category, such as the McLaren Pit, McLaren Adit, Como Basin, and Glengarry Adit. Waste sources that are relatively benign will be considered, but it is likely that only minor work would be involved with cleanup of the lowest ranked sites, if any work is contemplated at all.



Inside the Glengarry Adit

The Consent Decree and Settlement Agreement that form the framework of this project require that project funds be first expended on cleanup of mining wastes present on "District Property." District Property is defined in the Consent Decree as all property or interests in property that the mining company relinquished to the U.S. Government. The McLaren Pit and Glengarry Adit sites, for example, are on District Property. The McLaren Tailings site, on the other hand, is a non-District Property. Non-District Property cannot be cleaned up until the Notice of District Property Work Completion from the federal government and the State of Montana are received. However, the USDA Forest Service has included non-District Property in the assessment phase of the project. The USDA Forest Service, through other funding mechanisms, and its agency cooperators are involved in obtaining additional funding to cleanup non-District Property wastes.

ENGINEERING DESIGN AND CLEANUP CONSTRUCTION

Due primarily to weather limitations, cleanup construction in the District must be done during the short field season from mid-June to mid-October. Because of this, the USDA Forest Service has broken the cleanup into smaller projects that can be constructed in one to two seasons. To this end, cleanup actions are evaluated each fall/winter/spring in a Superfund document called an Engineering Evaluation/Cost Analysis (EE/CA).



Como Basin Reclamation - July 2006

In an EE/CA, source area characteristics are appraised and cleanup alternatives are developed to mitigate site-

specific problems. This process involves taking a comprehensive look at site characteristics and human health and environmental risks, and then follows an established procedure of screening relevant response options, developing response alternatives, and evaluating alternatives in detail.

The detailed analysis of alternatives in an EE/CA weighs the expected results of an alternative against seven criteria including overall protection of human health and the environment, compliance with laws and regulations, long- and short-term effectiveness, implementability, and cost. After weighing the pros and cons of a number of alternatives, the USDA Forest Service selects a preferred alternative and issues the EE/CA to the public to solicit comments. Significant comments are addressed in a final EE/CA and a decision document, called an Action Memorandum, is issued. EE/CAs have generally been prepared annually for the project.

PROJECT ACTIVITIES

In March 1999, the USDA Forest Service initiated the planning process for the project. Planning documents were in place by June, and work began with the monitoring of surface water and groundwater quality at selected monitoring points. Activities that the Forest Service has conducted to date include the following:

- *Prioritized mine waste sources in the District.*
- *Established a database management system for the Project.*
- *Cataloged existing information available for the site and completed a technical evaluation of existing data.*
- *Developed a suitable basemap to support engineering design.*
- *Obtained data to fill identified data gaps for proposed response actions at the site.*
- *Identified unrecorded cultural features.*
- *Conducted geochemical sampling of mine wastes throughout the District.*
- *Improved portions of the Daisy Pass and Lulu Pass roads to accommodate construction traffic.*
- *Completed a repository siting evaluation and collected hydrogeologic data on prospective repository sites.*

- Evaluated areas of erosion contributing excessive sediment to area drainages.
- Reopened the Glengarry Adit and Como Raise to more fully characterize underground sources of water within the mine.
- Completed a U.S. Geological Survey-led surface water tracer study on Daisy Creek and Miller Creek to determine surface water inputs of metal contaminants.
- Prepared EE/CAs for the following Response Actions: selective mine waste sources in Fisher Creek; the McLaren Pit; the Como Basin, Glengarry Adit, and remaining sources in Fisher Creek; mine waste sources in the Miller Creek drainage, and adit discharges in the District.
- Cleaned up selective waste dumps and placed about 66,900 cubic yards of mine waste in an engineered repository.

All activities completed have been documented in work plans, reports, or technical memoranda, and have been issued to DOJ, DEQ, EPA, and the public for review and comment.

- Reopened and investigated water sources discharging from the McLaren Mine.
- Grouted a borehole in the McLaren Mine and numerous boreholes in the Gold Dust mine to reduce inputs of surface water and groundwater that enter the mines.
- Covered McLaren Pit wastes with an engineered cover.
- Covered disturbed soils in the Como Basin with an engineered cover.
- Evaluated water quality treatment alternatives for acid mine discharges.
- Investigated soils impacted by metals on National Forest System lands in the vicinity of the Republic Smelter.
- Monitored revegetation success at reclaimed sites.
- Closed the Glengarry Adit using a combination of plugging, grouting and backfilling technologies.
- Monitored surface water and groundwater quality several times each year at numerous sites throughout the District.

CLEANUP ACTIVITIES

Numerous cleanup activities have been conducted to prepare for or to complete cleanup at prioritized sites. These activities and projects are described below.

REPOSITORY STUDY

One of the first priorities established by the project team was to identify a central repository site that could be used to isolate mining wastes that could not be reclaimed in-situ. The initial (Phase I) repository siting evaluation examined locations able to contain a minimum of 500,000 cubic yards of waste material.

Phase I was conducted in March through July 1999 and used existing technical information available from previous investigations to identify sites with physical and environmental characteristics that would be suitable for disposal of mining wastes. The data evaluated included groundwater, surface water, geology, soil, geotechnical, vegetation, and other environmental information. Phase II was conducted from July 1999 through September 2000 and involved collecting site-specific data at the highest ranked sites determined in the Phase I evaluation.



New World Waste Repository - June 2007

One site, located east of the Lulu Pass Road about 0.5 miles north of Highway 212, ranked the highest of the 28 sites evaluated. Evaluation criteria included: location of major faults; geologic setting; steepness of slopes; avalanche potential; precipitation and snowfall; and, access using existing roads. One of the key characteristics of this site is the presence of a relatively

thick surface deposit of glacial till, which is preferred to bedrock or alluvium because of its lower permeability and because it can be salvaged and used in repository construction. The amount of fine-grained material in the till results in relatively low horizontal and vertical hydraulic conductivity, two characteristics important in limiting the movement of leachate that could potentially migrate below a repository facility.

ROAD IMPROVEMENTS

To support cleanup construction, the Forest Service initiated a road improvement project in 1999 to enhance the two major roads in the District. Improvements to the Daisy Pass and Lulu Pass roads primarily involved regrading the road surface, improving drainage, and bringing in gravel surfacing to cover numerous soft spots in the road. In 2000, major road improvements were completed with the construction of two bridges on the Lulu Pass Road. The first bridge replaced the existing low water crossing of Fisher Creek. The second spans Polar Star Creek, a tributary to Fisher Creek just below the Glengarry Dump.

SELECTIVE SOURCE RESPONSE ACTION

Using the AIMSS list as a starting point, source area characteristics were appraised and an initial cleanup project was proposed in 1999. The first draft of the Selective Source Response Action EE/CA, which targeted removal of eight waste dumps impacting surface water in the Fisher Creek headwaters, was written, and the preferred alternative (waste removal to a repository) was selected. As a result of public comment, however, the 1999 cleanup work was delayed so that more groundwater information could be collected at the repository site.

Following an additional year of collecting data at the repository, the Selective Source Response Action EE/CA was released to the public in 2000 and the preferred alternative was selected. An engineering design package was prepared in the fall of 2000 which detailed reclamation plans for the removal sites, and presented plans and specifications for the construction of a repository with a bottom liner, leachate collection system, and a double-lined capping system.

The Selective Source Response Action was initiated in 2001 and was completed in 2002. This initial cleanup

project involved removing approximately 32,000 cubic yards of mine waste rock and mill tailings from nine mine waste areas, disposing of these wastes in the repository, and revegetating about 4.6 acres of the former waste areas. The waste sites cleaned up represent about 9% of the total acreage and 8% of the total volume of waste on District Property. The repository was designed for expansion, and it was reopened in 2005 to dispose of additional wastes remaining in the District.



**Expanding the New World Waste Repository
Bottom Liner - July 2005**

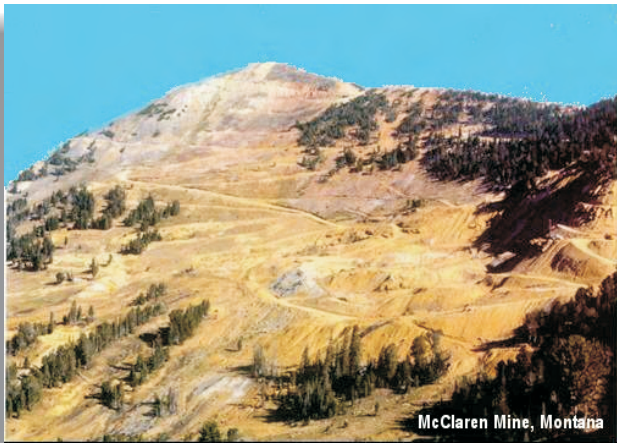
The major components of repository construction involved development of a rock quarry, construction of a substantial rock toe buttress, installation of a bottom liner system with toe drains and sump, and installation of temporary and permanent cover systems. Due to difficulties involved with construction and the short construction season, temporary measures used to winterize the site in 2001 could not prevent spring runoff from wetting the waste placed in the repository, which resulted in a sump designed to collect leachates from the waste filling with water in 2002. This sump was pumped down in 2002 and each year since with the water disposed at the Cody, Wyoming sewage treatment lagoon. With the permanent closing of the repository in 2006, systems designed to prevent water from entering the waste should substantially reduce this annual maintenance task.

**The initial cleanup project involved
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from nine mine waste areas....**

Removal of wastes from the former dump sites is expected to result in water quality improvements in tributaries draining the former waste areas, although improvements are likely to be gradual from this action alone and later augmented by additional work that was completed in the Fisher Creek drainage in 2005. Water quality will continue to be monitored at select stations downstream of the reclaimed sites to document water quality changes.

MCLAREN PIT RESPONSE ACTION

Planning and preparation for the McLaren Pit Response Action began in 1999. A considerable amount of environmental and engineering data was needed, and the 2000 field season was the time when most of these data were collected.



McLaren Pit Before Capping

The USGS, working under an arrangement with the Forest Service, conducted an ionic tracer study of metals loading in Daisy Creek in 2000, and the Forest Service's primary contractor, Tetra Tech, collected data in the McLaren Pit that would support the preparation of an EE/CA. Hydrologic and metals loading models were completed with these data, indicating that the McLaren Pit contributed from 20% to 50% of the metals load in Daisy Creek. With the results of these studies substantially complete in the fall of 2000, a draft of the McLaren Pit Response Action EE/CA was prepared and released to the public in May 2001.

Cleanup of the McLaren Pit involved consolidation of waste rock from dumps in the Daisy Creek headwaters into the McLaren Pit, and capping of the consolidated wastes with an impermeable cap. The

scope of the McLaren Pit Response Action was limited to reducing or eliminating uncontrolled releases of metals from mine waste material in the Daisy Creek headwaters. By addressing releases from mine wastes in the McLaren Pit and nearby mine dumps, some reduction in contaminant concentrations are expected in surface water and groundwater, along with an overall reduction in sediment production from the site.

Capping the McLaren Pit reduced the exposure of about 67% of the total waste present on District Property

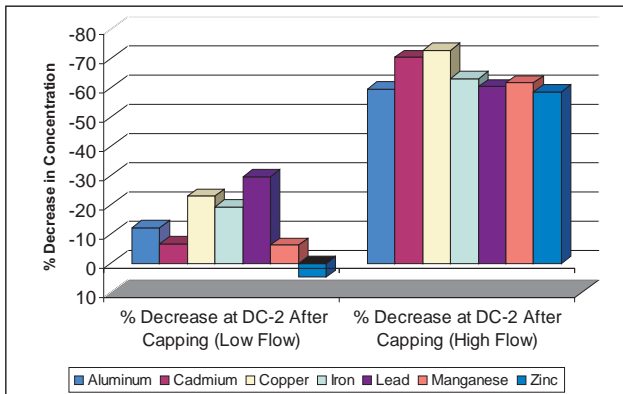


McLaren Pit After Capping

An engineering design and construction package for the McLaren Pit Response Action was completed in March 2002. The design involved consolidating about 24,000 cubic yards of waste in the pit, capping about 11 acres of the pit with a geomembrane, covering the geomembrane with a drainage layer and soil, and constructing runoff and runoff channels to convey water off the capped wastes. The project was initiated in 2002 with construction of the multi-layered cover completed by October 2003.

In Daisy Creek, mean concentrations and loads of all metals have declined since the capping of the McLaren Pit under both low and high flow conditions. The greatest changes have been manifested during high flow, when it is believed that a relatively greater amount of clean water moves off the cap during the snowmelt

period in the spring and early summer, providing enhanced dilution of metals during high flow. Post-capping mean low flow metals concentrations and loads are also lower at each of the Daisy Creek tributary and main stem monitoring stations, with this result likely attributed to the McLaren Pit cap, which reduces or eliminates precipitation received during the summer and fall from percolating through the capped waste rock. The following graph shows the changes in mean concentrations since the cap was completed as measured at Station DC-2, which is located about 0.5 miles downstream of the capped area.



COMO BASIN/GLENGARRY ADIT/FISHER CREEK RESPONSE ACTION

The Glengarry Mine has been targeted for rehabilitation since the inception of the Response and Restoration Project because it is one of the principal sources of metals loading in the headwaters of Fisher Creek. The mine historically discharged 23 to 57 gallons per minute (gpm) of low pH, iron-, zinc-, and copper-bearing water directly into Fisher Creek.

The Glengarry Mine consists of 3,060 feet of drifting and two nearly vertical raises. One of the raises extends 425 feet upward and surfaces in the Como Basin at the foot of the north flank of Fisher Mountain. The top of this raise passes through the Meagher Limestone formation and a massive sulfide ore deposit hosted in the Meagher.

In September and October 2000, the Glengarry was reopened for assessment purposes. During this first phase of assessment, accumulated debris and precipitated iron mud two to five feet deep were removed from the underground workings beginning at the portal and extending back to a "Y" intersection 1,540 feet in from the portal. The two branches of the



The Flooded Glengarry Workings Prior to Closure - July 2000

"Y" were made accessible, but debris and mud were not removed past the "Y" intersection. The following year, the second raise was reopened from the surface in the Como Basin and repaired down to a point well below the base of the Meagher Limestone. Three separate short horizontal workings were encountered in the raise in the Meagher Limestone at 35, 75, and 100 feet below the surface. At the first raise, debris was removed and temporary ladders were installed to determine the nature of the raise above a timbered bulkhead at the top of the raise. However, removing this bulkhead was considered too dangerous so no further reopening work was conducted in the first raise.

Using a detailed water sampling program within the Glengarry drift and the Como Raise, major inflows of water and metals loads were identified. Water flowing into the Glengarry comes from essentially three point sources and one diffuse source. The point sources are the Como Raise, the first raise, and a roof leak located 1,050 feet from the adit portal. Diffuse roof leaks were observed primarily in the first 1,200 feet in porphyritic rock. Load analysis showed that the vast majority of metals loading into the adit could be attributed to the raises and the 1050 roof leak, with the primary source of copper being the Como Raise. The 1050 roof leak contributed more arsenic, aluminum, and cadmium load than the raises, although roughly equal loads of iron, lead, and zinc were attributed to the raises and the 1050 roof leak.

A Draft EE/CA was released to the public in June 2002 that evaluated response action alternatives to address mining impacts from mining-related sources in Fischer Creek, including the Glengarry Adit, the Como Basin, and

remaining mine waste dumps in the Fisher Creek drainage. The EE/CA was structured around each of these three source areas, with source-specific response action alternatives developed for each. The preferred Alternative selected in the EE/CA was a combination of several alternatives that addressed each source area.

For the Glengarry Adit, the preferred alternative was selected to eliminate the adit discharge at the portal. This alternative included grouting and backfilling the



Como Basin Cap Area - August 2006

Como Raise, grouting the 1050 roof leak, installing several water tight plugs in the main drift, and partially backfilling the drift. For the Como Basin (the second source area), the preferred alternative involved capping unconsolidated and disturbed materials in the basin with an impermeable geomembrane capping system similar to that constructed in the McLaren Pit. For the soil cover over the impermeable liner, soil was salvaged from the capped area and amended with lime to make the soil suitable for revegetation. The preferred alternative for remaining mine dumps in the Fisher Creek drainage involved removing the two largest waste rock dumps (the Glengarry and Gold Dust) to the New World Waste Repository and implementing run-on and runoff controls at dumps that were identified as posing potential sediment and erosion hazards.

Construction cleanup work for the Glengarry/Como Basin/Fisher Creek source areas was initiated in 2003 and was completed in 2006.

Work on the preferred alternative for the Glengarry/Como Basin/Fisher Creek sources was initiated in 2003 in the Glengarry Adit and involved grouting the Como Raise and the 1050 roof leak, and preparing the plug sites. Plugging and backfilling the Glengarry was completed in 2005. Follow up monitoring at the backfilled Glengarry portal in June 2006 showed a 99% reduction in flow compared to flows measured in October 2000. Water quality of the remaining discharge (0.5gpm) improved as well, with the pH rising to 6.4 standard units (su) from about 3.0 su. Metals concentrations, particularly copper, aluminum, iron, cadmium, and zinc were notably lower than those measured prior to closure. The combined effect of lower flow and lower concentrations resulted in an average load reduction of 99.9% from those measured prior to closure.

Construction of the cap in the Como Basin, removing the Glengarry and Gold Dust dumps, and expansion of the repository was begun in 2005 and was completed in 2006. Implementing runoff and runoff controls at selected dumps in Fisher Creek was completed as a separate project in 2004.

MILLER CREEK RESPONSE ACTION

An EE/CA for sources located on District Property in the Miller Creek drainage was completed in June 2003 and released to the public for comment. This EE/CA evaluates response options and technologies to mitigate potential impacts from mine waste areas that contribute to surface water quality degradation.

The preferred alternative for the Miller Creek response action is removal of two of the larger dumps in the drainage to the New World Waste repository and implementing surface water controls at several other dumps. The remaining mine waste dumps in the Miller Creek drainage appear to contribute little in the way of impacts to water quality.

The Black Warrior dump is the only human health risk identified in the Miller Creek drainage. It contains about 22% of the total mine waste on District Property in the drainage. At the Little Daisy Mine, waste rock sits at the mouth of the adit and discharge from the adit flows through the dump. The adit discharge flows in the subsurface beneath shallow colluvial and talus material below the mine site, but the water does not obviously

come to surface further downslope. The Little Daisy dump is comparable in size to the Black Warrior, containing about 24% of the total waste on District Property in Miller Creek. Removing these two dumps to the repository eliminates 46% of the total volume of waste rock present in Miller Creek. Impacts to surface water from the Little Daisy Mine outflow and waste rock could not be detected by a synoptic sampling study completed by the USGS in Miller Creek. The Black Warrior and Little Daisy dumps were removed in 2005.

The Black Warrior Dump is the only site identified in the Miller Creek drainage with A human health risk.

Elsewhere in Miller Creek, environmental risks appear to be associated with mine waste that is in contact with surface water and/or groundwater. This is the case at only four dumps, while remaining waste dumps in the drainage lie topographically well above the valley bottom, in mostly dry locations, and present no risk to human health and little threat to surface or groundwater quality (except for brief periods during active precipitation or snowmelt). Work at the four dumps was completed in 2004.

NATURAL RESOURCES RESTORATION

In addition to alternatives related to mine waste dumps in the Miller Creek drainage, the Miller Creek EE/CA examined restoration actions to respond to impacts to natural resources that are related to sediment contamination derived from roadways throughout the District. Sediments derived from roads and trails impact surface water quality as well as aquatic habitat, and reducing sediment derived from roads and trails will improve water quality. Areas of known and potential acid production and other areas of anomalous metal concentrations in soil and bedrock represent significant sources of contamination, which are exacerbated by surface disturbances such as roads that expose these materials to ongoing erosion both on roadbeds and cut and fill slopes. Many of these roads were historically developed to access the numerous mines and prospects in the District. The Lake Abundance trail, which accesses the Lake Abundance road from Daisy Pass, was also identified as a site that contributes sediment and has been included in the restoration action. Another natural resource restoration issue considered in the Miller

Creek EE/CA is the replacement of damaged wetlands in front of the portal of the Glengarry Adit in Fisher Creek. These two items, along with cleanup of mining-related solid waste at the Cumberland Barrel Dump in Miller Creek, are considered ancillary actions to the preferred Miller Creek Response Action alternative.

ADIT DISCHARGE RESPONSE ACTION

Response Actions associated with adit discharges in the District are currently being evaluated in a separate EE/CA. There are 27 discharging adits in the District, and the likely response actions that would treat or eliminate these discharges are similar.



Lower Tredennic Adit Discharge

The EE/CA addresses risks to water quality from these discharges (except for the Glengarry discharge, which was mitigated under a separate cleanup action as described previously), and analyzes potential treatment scenarios and resulting load reductions that might be realized. The preferred alternative to address impacts from these discharges is continued monitoring and evaluation.

The USDA Forest Service is also continuing to evaluate grouting technologies in two of the accessible adits, the McLaren and the Gold Dust. Both contain exploratory

boreholes that are sources of water to the underground workings. A single borehole in the McLaren Adit at a distance of 366 feet in from the portal contributed more than 70% of the copper load measured in water discharging from the portal. This borehole was grouted shut in 2003, completely eliminating flow from the borehole. Numerous boreholes present in the Gold Dust workings were grouted in 2005 to determine the effectiveness of this technology in reducing adit discharge flows and associated metals loading. In September 2006, flow had been reduced to 3.6 gpm or about 70% from average flows measured previously.

MCLAREN MILLSITE AND REPUBLIC SMELTER

These two sites are located on non-District Property adjacent to Soda Butte Creek near Cooke City. The sites are situated on National Forest System (NFS) and private land and contained waste rock, concentrate, smelter waste, and metals contaminated soil that could potentially impact human health and the environment. The USDA Forest Service and the Montana DEQ conducted site investigations in 1999, 2000, and 2002. At the McLaren Millsite, laboratory analysis of soil samples collected from mine waste showed arsenic levels ranging between 8 and 46 milligrams per kilogram (mg/kg), copper between 170 and 5,770 mg/kg, and lead between 74 and 269 mg/kg. Soil pH was extremely acidic, ranging between 1.9 and 3.0 standard units. Analytical results for native soil underlying mine waste indicate that native soil has much lower concentrations of arsenic, lead, and copper.



Reclaimed McLaren Millsite - July 2006

Runoff discharging from the McLaren Millsite during two thunderstorm events was sampled in 2003, along with samples collected from Soda Butte Creek upstream and downstream of where runoff entered the creek. Results of these sampling events demonstrated that impacts to Soda Butte Creek water quality are measurable. Aluminum, copper, iron, and manganese concentrations were one to two orders of magnitude higher in Soda Butte Creek downstream of the runoff discharge point, which was high enough to exceed the acute aquatic standard for aluminum and copper and the chronic standard for iron. A noticeable decrease in pH, bicarbonate, and carbonate were also noted in the downstream sample, along with increases in specific conductance, total dissolved and suspended solids, and sulfate.

Investigations of the Great Republic Smelter site by the USDA Forest Service and the Montana DEQ indicate metal contaminants in soil surrounding the smelter site contained concentrations of lead in soil exceeding the project human health guideline for recreational use (1,100 milligrams per kilogram).

Using funding and resources separate from the New World Response and Restoration project, the USDA Forest Service completed an EE/CA that was released to the public in February 2004. The preferred alternative was total removal of wastes and contaminated soils from NFS lands at both sites to the New World waste repository. Cleanup work was conducted in 2005, with the USDA Forest Service leading the cleanup on NFS land and the EPA in charge of the cleanup on private lands at the smelter site. The total waste removed from both sites is about 10,200 cubic yards.

CLEANUP ACTIVITIES PLANNED FOR 2007

The following work activities are planned for 2007:

- *Maintain community relations, the project database, and the project website.*
- *Continue long-term monitoring of surface water and groundwater, and monitoring water quality at supplemental surface water stations, adit locations, and the repository.*
- *Prepare a site-wide long-term operations and maintenance plan that identifies project needs and estimated costs once the project reaches completion.*

- Monitor reclamation success at the New World Waste Repository, McLaren Pit and reclaimed dump sites in Miller Creek and Fisher Creek.
- Initiate road closures in the District and restoration work associated with the Lake Attendance Trail.
- Prepare the 2008/2009 Work Plan

WATER QUALITY IMPROVEMENTS

Water quality monitoring is an on-going activity conducted several times each year at numerous monitoring stations. Monitoring is done to detect and measure improvements that result from cleanup actions and to comply with the rules in place for water quality standards related to the project. Water quality monitoring results to date show improvements are beginning to be realized at the farthest downstream stations on Fisher Creek and the Stillwater River, and continuing improvements are expected to be measured in the future.

The full impact of this comprehensive cleanup project on water quality will not be evident for several years. However, some improvements are also beginning to be realized in the most upstream stations in the headwaters of Fisher Creek and Daisy Creek. The most conspicuous improvement to date is the elimination of the Glengarry Adit discharge, which for the first time in over 80 years was dry in April 2005 as a result of plugging and grouting operations. As reported previously in this document, base flows have been reduced by 99% and metals loading to Fisher Creek has been reduced by 99.9%. Flows from the Gold Dust were also reduced as a result of borehole grouting.



Reclamation Work in the Headwaters of Fisher Creek

On the Daisy Creek side, the lowest copper concentrations ever measured at the most upstream station below the McLaren Pit cap area have been measured each year during high flow conditions since the cap was completed in 2003. These lower copper concentrations, while not low enough to meet aquatic standards, directly resulted from capping wastes in the McLaren Pit.

Trends in measurements of pH and specific conductance and total recoverable concentrations of sulfate, copper, and iron during the high flow period at station DC-2 show that pH is becoming less acidic while other constituent levels are decreasing. Other water quality improvements are being noted as well in the McLaren Pit area with reduced metal loads measured in 2006 in two tributaries draining the pit area.

CLEANUP TIMETABLE

Table I shows the cleanup schedule for past work and work planned for the remaining years of the project. The first year of actual cleanup work was 2001. As shown in the table, project work on District Property is expected to be completed by 2008 with monitoring continuing in 2009 and subsequent years. Remaining work on Non-District Property (Table I) is contingent on receipt of a Notice of District Property Work Completion from the United States and the State of Montana, as well as availability of funding for cleanup. The schedule presented in Table I may require modification as the project proceeds, as the schedule may be affected by a variety of factors including, but not limited to, weather conditions, availability of materials, equipment, and/or supplies, contract administration delays, or contract appeals.

PROJECT CLOSURE

Long-term monitoring plans were developed to evaluate the beneficial effects of cleanup on surface water quality and effectiveness of revegetation establishment. With these monitoring plans in place, the USDA Forest Service can evaluate the results of the yearly cleanup projects in terms of both water quality and erosion protection, and then assess what additional actions will be necessary as the project proceeds. Once District Property wastes are cleaned up to the extent practicable, and a Notice of District Property Work Completion is received, remaining funds can be spent on non-District Property waste sites.

**TABLE I
CLEANUP TIMETABLE**

YEAR	PROJECT	NOTES
2001	Selective Source Response Action	Removal of waste from 8 sites
2002	McLaren Pit initial year	Waste rock consolidation and construction of drainage controls
	Monitoring and Maintenance	Surface water, groundwater, revegetation; Selective Source Repository sump repair
2003	McLaren Pit second year	Complete waste regrading; construct capping system
	Glengarry Adit initial year	Grout Como Raise; prepare Glengarry tunnel for grouting and backfilling
	District-Wide Monitoring	Surface water, groundwater, revegetation
2004	Glengarry Adit second year	Backfill Glengarry Tunnel; install cemented fill
	Fisher Creek Source Controls	Regrade/revegetate waste dumps at 8 sites
	Miller Creek Source Controls	Regrade/amend/revegetate waste dumps at 4 sites
	District-Wide Monitoring	Surface water, groundwater, revegetation
2005/2006	Glengarry Adit third year	Instal remaining plugs and cement backfill
	Como Basin	Cap and cover disturbed and metals-enriched soil materials in-situ
	Lulu Pass Road Reclamation	Reclaim cut across roads and improve drainage controls
	Fisher Creek Dump Removals	Glengarry and Gold Dust dumps
	Miller Creek Dump Removals	Black Warrior and Little Daisy dumps
	McLaren Millsite Removal	Non-District Property; cleanup funds obtained from source other than New World fund
	Republic Smelter Removal	Non-District Property; cleanup funds obtained from source other than New World fund
	Repository Expansion	Expanded repository for Fisher and Miller Creek dumps, McLaren Millsite, and Republic Smelter wastes
	Monitoring Well Abandonment	Abandon unused monitoring wells in District
District-Wide Monitoring	Surface water, groundwater, revegetation	
2007	Restoration Road Work	Initiate road closures; included in preferred alternative from Miller Creek EE/CA
	Relocate Lake Abundance Trail	Relocate and restore trail; included in preferred alternative from Miller Creek EE/CA
	Adit Discharge Response Action	Continued monitoring
	McLaren Pit Area Maintenance	Soil amendment and revegetation below capped area
2008	Remaining Road Restoration and District-Wide Monitoring and Maintenance	Complete work begun in 2007; continue monitoring surface water, groundwater, and revegetation
Contingent	Remaining Non-District Property	Response Actions following Notice of District Property Work Completion