Final

2000 WORK PLAN
NEW WORLD MINING DISTRICT
RESPONSE AND RESTORATION PROJECT

Prepared for:

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1.0 INTRODUCTION

This document provides descriptions of work tasks to be completed during the 2000 calendar year in conjunction with response and restoration activities at the New World Mining District project in Park County, Montana (Figure 1). The 2000 work plan complements the Overall Project Work Plan (Maxim, 1999a) by providing a description of specific work elements that will be completed in 2000. This work plan initiates the project cycle for the second year of the project. Project activities conducted by the U.S. Department of Agriculture Forest Service (USDA-FS) began in 1999. Those activities are described in the 1999 Work Plan (Maxim, 1999b).

A general description of the site, project objectives, and project organization are provided in this introduction. More detailed descriptions of the project are described in the Overall Project Work Plan (Maxim, 1999a), which is available on the project Web site (http:/www.fs.fed.us/r1/gallatin) and at the three project information repositories. The reader is encouraged to review this document to gain a better understanding of the overall project.

1.1 PROJECT BACKGROUND

On August 12, 1996, the United States signed a Settlement Agreement (Agreement) with Crown Butte Mining, Inc. (CBMI) to purchase CBMI's interest in their New World Mining District (District) holdings. This transfer of property to the U.S. government effectively ended CBMI's proposed mine development plans and provided $22.5 million to cleanup historic mining impacts in the district. In June 1998, a Consent Decree (Decree) was signed by all interested parties and CBMI. The Decree, approved by the United States District Court, finalized the terms of the Agreement and made available the funds that are being used for mine cleanup. Monies available for cleanup will be first spent on District Property, which, as defined in the Decree, includes all property or interests in property that CBMI relinquished to the United States (Figure 1). As funds are available after District Property is cleaned up to the satisfaction of the United States, other mining disturbances in the District will be addressed.

The USDA-FS, as the lead agency responsible for implementing the cleanup, has assembled an organization and guiding objectives to proceed with reclamation and restoration of the historic mining impacts in the New World Mining District. Under their Superfund authority, the USDA-FS will execute the response and restoration project by following guidance provided by the EPA for Non-time-critical removal actions. Non-time-critical removal actions are defined by CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) as actions that are implemented by the lead agency 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, 1993a). Non-time critical removal actions respond to releases that can start six months after the determination that a response is necessary.

In 1995, EPA began a site investigation after the initial announcement of the property transfer from CBMI. The EPA investigation involved installation of monitoring wells, surface water sampling, groundwater monitoring, and completion of a groundwater tracer study. In October 1998, the USDA-FS assisted CBMI in completing and submitting a Support Document and Implementation Plan to support the CBMI petition for temporary modification of water quality standards. Under the Consent Decree and Settlement Agreement, CBMI is required to submit petitions regarding temporary standards if requested by the USDA-FS. The Support Document and Implementation Plan (Maxim, 1998) were submitted to the State of Montana Board of Environmental Review (Board) on January 22, 1999. The petition for the adoption of temporary standards for Fisher Creek, Daisy Creek, and a portion of the upper Stillwater River was accepted by the Board and noticed for public hearing. The proposed rule was modified to

reflect public comment and the temporary water quality standards were approved and adopted by the Board on May 14, 1999.

In March 1999, the USDA-FS initiated the planning process for the project. 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. In July, the USDA-FS began investigating potential repository locations for disposal of mining wastes in the District. Other activities conducted in 1999 included the following:

- Establishing a database management system for the project.
- Cataloging existing information available for the site.
- Completing a technical evaluation of existing information and data.
- Improving portions of the Daisy Pass and Lulu Pass roads to accommodate construction traffic.
- Improving a previously constructed surface water diversion around the Como Shaft.
- Developing a suitable map base of District Property to support engineering design.
- Evaluating areas of erosion contributing excessive sediment to area drainages.
- Completing a repository siting evaluation report and collecting hydrogeologic data on two prospective repository sites.
- Completion by the U.S. Geological Survey of a surface water tracer study on Daisy Creek to determine surface water inputs.
- Preparing the Draft 1999 Engineering Evaluation/Cost Analysis (EE/CA).
- Obtaining data to fill identified data gaps for proposed 2000 response actions at the site.
- Identifying unrecorded mine waste dumps, adits, and boreholes, and developing a database of site characteristics.
- Ranking mine waste sources according to a modified Hazard Ranking System to aid in the prioritization of sites slated for clean up.
- Identifying unrecorded cultural features.
- Determining the feasibility of reopening the Glengarry Adit.
- Evaluating water quality treatment alternatives for acid mine discharges.
- Preparing the 2000 EE/CA.
- Satisfying the requirements of the petition for temporary standards submitted by CBMI.

Following the preparation of the draft EE/CA, a decision was made by the USDA-FS to delay the 1999 Response Action. This decision was made to allow additional time to complete the study of potential mine waste repository sites and to further consider source area prioritization. As such, no decision document was issued for the 1999 Response Action. The 1999 Response Action will be included in the 2000 Response Action.

1.2 SITE LOCATION AND DESCRIPTION

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. The Montana-Wyoming state line forms the southern boundary of the District. The District lies entirely within Park County, Montana (Figure 1).
Figure 1 - Project Vicinity Map

Figure 1 - back page

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 50 miles to the west. Red Lodge, Montana is located about 65 miles to the northeast, via the Beartooth Highway, and Cody, Wyoming is located 60 miles to the southeast.

The District is located at an elevation that ranges from 7,900 feet to over 10,400 feet above sea level. The site is snow-covered for much of the year and only two routes of travel are open on a year-round basis -- the Sunlight Basin road, which allows access to within a few miles of the District in winter; and, the highway between Mammoth and Cooke City. The Beartooth Highway is closed during winter, as is Highway 212 from Cooke City to the Montana/Wyoming state line.

The District covers an area of about 40 square miles. Historic mining disturbances affect about 50 acres. The McLaren Tailings, which is not a District Property, covers an additional 33 acres. The topography of the District is mountainous, with dominant glacial features. 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 Clark's 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.

1.3 WORK PLAN ORGANIZATION

This work plan is organized into several sections. Following this introductory section is a description of the project goals and objectives (Section 2.0). Section 3.0 describes work tasks that will be completed during calendar year 2000. The project schedule for 2000 and project deliverables are presented in Sections 4.0 and 5.0, respectively.

2.0 PURPOSE AND OBJECTIVES

The primary purpose of the 2000 Work Plan is to guide project activities that are directed toward completing response and restoration actions to mitigate impacts, or the threat of impacts, that result from historic mining activities in the District. The objectives for the 2000 Work Plan are consistent with those detailed in the Overall Project Work Plan (Maxim, 1999a). The primary objectives for work done in 2000 include: conducting response actions; collecting sufficient information to support engineering analyses and designs for response actions to be completed during 2001; measuring water quality, vegetation, and erosion control parameters to document the results of response and restoration actions; and, satisfying the requirements of the rule allowing the adoption of temporary water quality standards.

3.0 SCOPE OF WORK

To meet the objectives for 2000, the following activities will be performed:

- Maintain community relations by implementing activities described in the Community Relations Plan (Maxim, 1999c).
- Maintain the project database and the project Web site.
- Continue long-term monitoring of surface water and revegetated areas as described in the respective long-term planning documents (Maxim, 1999d and e, respectively).
- Evaluate mass loading of metals from specific source areas to assist in the overall evaluation of potential response actions.
- Complete the hydrologic and geologic evaluation of the McLaren Pit area.

- Complete the repository siting evaluation.
- Continue to evaluate water quality treatment alternatives for acid mine discharges.
- Reopen the Glengarry Adit to assess the feasibility of potential response actions directed at reducing the input of acid mine drainage emanating from the adit.
- Evaluate and implement additional erosion control measures in the Como Basin area or other areas contributing excessive sediment to area drainages. Install and maintain sediment and stormwater management controls where needed.
- Monitor groundwater at selected locations in July 2000.
- Complete a surface water tracer study on Miller Creek.
- Complete the identification of unrecorded mine waste dumps, adits, and boreholes within the District.
- Complete the identification of the extent and character of underground mine workings on District Property.
- Complete road improvements initiated in 1999 and install a bridge across Fisher Creek at the current location of the low water crossing.
- Construct the 1999 Response Action and the 2000 Response Action in accordance with the preferred alternatives identified in the 2000 EE/CA.
- Identify potential response actions for implementation in 2001.
- Prepare the 2001 Work Plan.
- Prepare the 2001 EE/CA.

A more complete description of each of these activities is presented below.

3.1 COMMUNITY RELATIONS

A Community Relations Plan (CRP) has been developed for the project and is included in the Overall Work Plan (Maxim, 1999a). The CRP describes the community relations strategies that will be used to share information with the public and obtain timely input on proposed project activities. Community relations techniques include preparing news releases, preparing fact sheets, conducting technical workshops and public meetings, making project documents readily available to interested parties, and accepting and responding to public comment on project related documents.

Community relations activities described in the CRP will be used in 2000 to keep the public informed of project activities. Events expected for 2000 with the anticipated timing of the events are listed in Table 1. As other events arise during the year, the public will be informed in a timely manner in accordance with the CRP. If necessary, the CRP will be modified to insure all interested citizens are kept informed of project activities and are afforded ample opportunities to provide input to the response and restoration process. The public will be periodically interviewed to assure that the CRP is functioning as intended and providing the necessary level of information to the interested public.

3.2 MAINTAIN PROJECT DATABASE

The considerable environmental data that have been collected at the New World site were cataloged in 1999 in a Microsoft Access® database. This database will continue to be updated as new project information is collected during 2000. The database will be made available to the public through the

Table 1
Community Relations Activities
New World Mining District Response and Restoration Project
2000 Work Plan

Event/Task	Timing
Technical Workshop on 2000 Work Plan Activities	December 7, 1999 - Bozeman
News release	March 2000
Public review and comment on Draft 2000 EE/CA	March - April 2000
Public meeting	During 30-day EE/CA comment period
Prepare Response to Significant Comment	April 2000
Public Meeting	June 2000 - Cooke City
News release	Before beginning response action construction
Technical Workshop on 2001 Work Plan Activities	December 2000 - Bozeman

project Web site (see Section 3.3). The project database that is made available through the Web site will allow interested persons to view and query the data as well as print hard copy reports.

A library catalog of historical project reports will also be made available on the project Web site. Hard copies of these reports are generally available at the document repository located in Bozeman at the Gallatin National Forest Supervisor's Office.

3.3 MAINTAIN PROJECT WEB SITE

The project Web site will be maintained to disseminate information, reports, and data related to the project. The Web site currently includes information relative to project status, schedule, description, background, contacts, and other general information. The Web site includes a page where most project documents, including maps and graphics, can be accessed. Relevant reports prepared during 2000 will be posted to the Web site within a few days after the hard copy documents are released to the public.

3.4 SURFACE WATER QUALITY MONITORING

Surface water quality monitoring will be conducted in 2000 at the 12 sampling stations identified in the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d). Supplemental to these long-term monitoring activities, several other work tasks will be completed to answer specific questions on flow and metals loading to surface water in Fisher and Daisy creeks. These supplemental activities will include the following:

1) Sampling frequency will be increased at two of the long-term monitoring stations during the runoff period. This sampling will be done to better document diurnal fluctuations in flow and to obtain

additional water quality data. These additional data will be collected at stations SW-3 on Fisher Creek and DC-2 on Daisy Creek. Flow data and water quality samples will be collected in accordance with the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d). The following additional data will be collected:

& Flow data will be collected on three occasions during the runoff period (approximately late-May, mid-June, and mid-July) at stations SW-3 and DC-5. During each episode, flow data will be collected at four different times during the day, spread out at approximately equal intervals from early morning to late evening. No flow measurements will be made at night due to personnel safety issues. Field parameters including pH, specific conductance, and temperature will also be measured in addition to obtaining the flow measurements.

& Water quality samples will be collected during each flow measurement event described above. A limited suite of laboratory parameters including pH, specific conductance, total suspended solids, and total recoverable copper and zinc will be analyzed for three of the four samples collected during each sampling episode. Analytical methods for the limited suite will be the same as described in the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d). The other sample set collected during each sampling episode will be analyzed for the complete suite of water quality parameters listed in Table 3 of the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d).

2) One new sampling station will be established on Fisher Creek between SW-3 and SW-4 and one to two new stations will be established on Daisy Creek between DC-2 and DC-5, and possibly upstream of DC-2. These new stations are intended to bracket previously identified groundwater inflow areas and assist in determining metals loading from groundwater in these areas. The new stations will be located at established historic sample stations and will be determined in consultation with the USGS. Samples will be collected from these new stations during two of the three scheduled long-term monitoring events: during spring base-flow (April/May) and during fall low-flow (October).

3) Standard statistical test methods will be developed with which future data will be analyzed. These statistical methods will be used to quantify the statistical significance of water quality trends over time and to document response action effects on water quality.

4) A periphyton and macroinvertebrate survey will be completed at station SW-7 on the Stillwater River. Methods specified in the Site-Wide Sampling and Analysis Plan (Maxim, 1999f) will be followed for this survey. The survey will be conducted one time during the late July to early August period.

Long-term surface water sampling sites are shown on Figure 2 in the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d). Locations of the additional stations to be monitored (to be determined from historic sampling sites) are shown on Figure 2a and 2b in the Site-Wide Sampling and Analysis Plan (Maxim, 1999f). Results of water quality monitoring will be presented in the annual monitoring report.

3.5 REVEGETATION MONITORING

Revegetation monitoring will be conducted in 2000 in accordance with the Long-Term Revegetation Monitoring Plan (Maxim, 1999e). Some changes have been recommended to this monitoring plan based on 1999 monitoring results (Maxim, 1999g). Changes recommended to the long-term monitoring plan that will be implemented in 2000 are the following:

- Because it will be many years before performance on reclaimed areas are expected to approach native conditions, sampling of native transects associated with the McLaren Pit, Como Basin, and reclaimed roads will be deferred in the 2000 revegetation monitoring effort.

- Based on results of 1999 revegetation monitoring, reclaimed areas at the McLaren Pit, Como Basin, and reclaimed roads showed sub-optimal revegetation performance. Because of this, vegetation monitoring will be reduced in these areas to only record cover and not density.

- Locations of other CBMI reclaimed areas on Fisher Mountain will be field verified and included in revegetation monitoring in accordance with the revegetation monitoring plan. All known locations of CBMI revegetated areas were presented in the 1999 revegetation monitoring report (Figure 2; Maxim, 1999g).

- Locations and reclamation status of reclaimed areas presented in the 1999 revegetation monitoring report (Maxim, 1999g) will be field verified. This will involve a walking survey to record field observable reclamation. Location information will be updated using Global Positioning System (GPS) surveys where needed.

Results of revegetation monitoring will be presented in an annual report.

3.6 EVALUATE METALS MASS LOADING

Review of available hydrogeochemical data was completed during 1999. This review, along with results from previous studies by other investigators (Amacher, 1998; Kimball, et al, in progress), suggests that, while the Glengarry Adit and McLaren Pit are primary point sources for metal releases in the District, remaining point sources and non-point groundwater sources contribute a large percentage of the metals load to District streams. To better evaluate potential effectiveness and cost-benefit of various closure options, a District-wide mass load model will be developed to consider management options on a quantitative basis. This mass load model will be developed using available data.

3.7 COMPLETE THE EVALUATION OF THE MCLAREN PIT

The McLaren Pit was ranked as the highest priority of all the District Property waste sources using the score calculated by the Abandoned and Inactive Mines Scoring System (AIMSS). The high ranking of the pit results from a combination of specific site features including the following: large volume of waste rock present in the pit; relatively high metals concentrations in the waste; size and extent of the pit disturbance; and, measured impact on groundwater and surface water quality in the vicinity of the pit. Because of this, evaluating potential response actions for final closure of the pit will require a detailed understanding of the geotechnical, geochemical, and hydrogeological characteristics that interact to form current conditions present at the site. Developing this detailed understanding is the primary purpose of this 2000 work task.

Objectives for evaluation of the McLaren pit are twofold: 1) determine the geotechnical stability of mine waste in the pit under existing conditions and in the event additional waste rock is placed at the site; and, 2) perform a water balance analysis of the pit area. Each of these objectives will be accomplished by using existing data, obtaining new data during the 2000 field season, and then applying these data to standard models. Results of the evaluation will be presented in a technical memorandum.

Geotechnical stability will be determined using the PC-STABL6 model (U.S. Department of Transportation, 1986). Detailed topographic, subsurface, and waste rock material properties data will be

input to the model. Results of geotechnical modeling will be used to evaluate the feasibility of loading the pit with additional material as well as identify potential geotechnical issues that require consideration during the EE/CA process.

The water balance analysis of the McLaren Pit will be completed by partitioning precipitation that falls on the pit into infiltration, runoff, evaporation, and subsurface flow. Infiltration will be determined by measurement using double-ring infiltrometers and other methods. Evaporation will be measured with a standard evaporation pan. Hydraulic properties of the waste will be estimated using material sieve data. The following details the specific procedures that will be used for each of these measurements:

& Infiltration will be measured in both the surface and in the shallow subsurface. Infiltration will be measured using a double-ring infiltrometer following American Society for Testing and Materials (ASTM) Method D 3385-88 (ASTM, 1988). One large single ring infiltrometer measurement will also be made in the pit following a U.S. EPA flooding basin technique (EPA, 1981). Double-ring infiltrometers will be driven about five centimeters into surface material at each location. After a pre-wetting period, falling head readings will be collected at about 5, 10, 15, 30, 45, and 60 minutes into the test at each location by measuring the volume of water needed to fill the inner ring to a constant head. Such measurements will be made at about 10 locations in the pit (a spacing of about one for every two acres of reclaimed surface). The siting of each locations will be done using a 300-foot grid placed over the reclaimed area. A random start will be used to randomize the grid placement. At half of the surface infiltration sites, shallow subsurface measurements will also be made. Shallow subsurface double-ring infiltration tests will be done in pits excavated to a depth of about two feet and located about five feet away from the surface sites. The base of each pit will be cleaned with a hand shovel to a depth where the exposed subsurface horizon has not been disturbed.

& Evaporation will be measured with a standard evaporation pan used in concert with a climate station that will be installed in the McLaren Pit area in May. Climate data will include measurement of precipitation, solar radiation, and wind speed. Climate data will be collected from May through October.

& Hydraulic properties of waste material in the pit will be determined using the results of grain size analysis for samples collected during the 1999 geotechnical and revegetation evaluations conducted in the reclaimed pit. Textural data were also collected by CBMI in 1994 from about 10 locations in the pit shortly before waste material in the pit was limed and revegetated. Hydraulic conductivity will be calculated using grain size data and appropriate analytical methods (e.g. Masch and Denny, 1966). Estimation of hydraulic conductivity from grain size data is expected to give a range of hydraulic conductivity to within an order of magnitude of actual in-situ values. This degree of precision is acceptable for its use in the overall evaluation of the hydraulic properties of the pit.

In conjunction with determining hydraulic conductivity using grain size, a textural map of the pit will be made by mapping waste units with differing texture or lithology. Map units will be designated using standard field mapping techniques for soil mapping.

3.8 COMPLETE REPOSITORY SITING EVALUATION

A considerable effort was expended in 1999 at the two potential repository sites, SB-4B(B) and SB-4B(I), which were identified in the Draft Repository Site Evaluation Report (Maxim, 1999h). The characterization effort was initiated based on recommendations made in the draft report that indicated the need for detailed information on groundwater flow and subsurface geology characteristics. Interpretations of data collected to date indicate both sites have desirable geologic and hydrogeologic characteristics for a mine waste repository (Maxim, 1999i).

Discussions with the technical advisors to the project resulted in the development of this work plan activity for 2000. The main objective for this task is to compile groundwater level data for a complete hydrologic year and to gather data that will better describe groundwater flow paths. Measurements required to fill these data gaps include measuring water levels and collecting water samples for analysis of fluorescent dye. Fluorescent dyes were injected at three different sites within the SB-4B(I) and SB-4B(B) area on October 7, 1999. The dyes were injected to study groundwater movement in glacial till and bedrock water bearing units.

Water samples for fluorescent dye analysis will be collected from selected surface water and groundwater monitoring stations. These sites are identified in the Final 1999 Work Plan (Maxim, 1999b). The schedule for dye and water level sampling is expected to be once per month from January through April, and then once per week in May, June, and July. Sampling schedule and sampling stations monitored may be adjusted month to month based on the results of the previous month's water levels or dye detections (i.e. certain stations may be dropped or sampled on a more frequent or less frequent basis). All data for this task will be collected according to the Site-Wide Sampling and Analysis Plan (Maxim, 1999f). Water levels, dye detections, and an interpretation of data collected for the Phase II repository site investigation will be presented in an addendum to the Phase II Repository Site Investigation Report (Maxim, 1999i).

3.9 CONTINUE TO EVALUATE WATER TREATMENT ALTERNATIVES

An evaluation of preliminary water treatment alternatives to mitigate acid mine discharges present in the District was completed as part of the 1999 Work Plan. For 2000, this effort will take the results of the preliminary evaluation and further evaluate the feasibility of applying the most promising alternatives to specific point discharges. These specific discharges include the Glengarry and McLaren adits, although other point sources resulting from waste removal and construction activities may require water treatment. An evaluation of both permanent and temporary alternatives will be completed. A technical memorandum will be prepared outlining the results of this evaluation.

3.10 GLENGARRY ADIT ASSESSMENT

The Glengarry Adit portal will be rehabilitated such that safe entry of the adit by project personnel can be gained. The Glengarry Adit cannot currently be entered safely and flooding of the underground workings prevents access to workings that may provide information on the quantity and quality of groundwater entering the workings from discrete areas. The objectives of rehabilitating the Glengarry Adit are twofold: 1) draining pooled water in the underground workings will prevent a potential release of water and sediment from failure of the numerous impoundments created by the accumulation of debris in the floor of the workings; and, 2) examination of the location and character of groundwater draining into the underground workings will allow an evaluation of potential mitigation measures directed at reducing or eliminating acid discharges from the Glengarry into Fisher Creek. Current estimates of the contribution of metal loads to Fisher Creek indicate the Glengarry discharge makes up about 30% of the total copper load.

Rehabilitation of the adit will involve the following steps:

- Construct settling ponds, percolation ponds, or other water-treatment facilities as required to allow draining water ponded in the underground workings near the adit. Water released from the treatment system will comply with the rule for temporary water quality standards in Fisher Creek as adopted by the State of Montana.

- Gradually reduce the height of the muck dam located about 25 feet beyond the adit portal.

- Support the ground with a timber bulkhead at the bottom of the first raise from the portal.

- Muck-out debris sufficient to gain access to the first 70 feet of the drift. Evaluate ground conditions at this point; if conditions of the unsupported rock are stable, then proceed with constructing support for further entry. If conditions are unstable, evaluate potential alternatives for further work.

- Continue to muck out debris and water in the drift to bulkheads located 160 and 250 feet from the portal. Water drained from impoundments behind each of these bulkheads will be released to the water management/water treatment system.

- Install any needed ventilation measures so that the Glengarry drift can be inspected and the characteristics of water draining into the adit can be measured.

If sufficient entry into the Glengarry workings is achieved during this work task, an assessment of water quality at specific point discharges will be made. This assessment may include flow gauging, water quality sampling, laboratory analysis, use of dye tracer studies, or other appropriate means necessary to meet the task objectives. Once rehabilitation work is completed, additional work activities will be discussed with the agency coordinators and a plan for water quality assessment will be prepared and distributed to the public through the project Web site. At the completion of task activities, a brief technical memorandum will be prepared to present the results of the work and any assessment findings.

3.11 CONSTRUCT ROAD IMPROVEMENTS

Road improvements on the Daisy Pass and Lulu Pass roads will be completed to accommodate construction traffic. A bridge will be installed across Fisher Creek at the current location of the low water

crossing. Temporary road improvements will be made to roads that access specific areas to accommodate response actions specified in the preferred response action alternatives for 1999 and 2000. Road improvements could be made in accordance with USDA-FS standards and specifications.
If a site within the SB-4B area is selected as the preferred site for disposal of mine wastes, the USDA-FS may elect to construct a new cutoff road from the Daisy Pass road to the Lulu Pass road. This new cutoff road would replace the existing cutoff road that is in very poor condition.

3.12 EVALUATE AND IMPLEMENT ADDITIONAL EROSION CONTROL MEASURES

During 1999, certain erosion control measures in the Como Basin were improved to direct runoff away from the Como shafts. These improvements involved completing construction on several portions of the diversion ditches installed in the basin by CBMI. Beyond these improvements, gullying has occurred in a drainage below the shafts that is causing severe erosion of native soils into Fisher Creek. These gullies, and the circumstances creating these gullies, will be further evaluated to develop mitigation measures. These measures may include constructing drainage structures, repairing gullied areas, and installing erosion controls such as erosion blankets and vegetation.

Other areas with identified erosion/sedimentation impacts will be monitored and evaluated and control measures implemented, where appropriate. Existing control measures installed by the USDA-FS and CBMI will be monitored to insure the measures are working as designed.

3.13 OTHER 2000 FIELD STUDIES

In addition to long-term monitoring described in Sections 3.3 and 3.4, several other field studies will be completed during the 2000 field season in the District. These work tasks are generally described in "Year 2 Activities" of the *Support Document and Implementation Plan to the Petition for a Temporary Modification to Water Quality Standards* (Maxim, 1998). Other investigative activities will be completed to provide information needed to support the 2000 EE/CA. Other field study activities are described in the following subsections.

3.13.1 Complete the Characterization of Mine Waste Sources

During 1999, approximately 132 mine waste dumps and associated source areas were investigated by field crews to describe the physical condition of each site, determine the volume of mine waste present, and identify potential hazards. Mine waste samples were collected from more than half of these waste areas and 89 samples were submitted to the laboratory for analysis of certain physical and chemical characteristics. Sites that were initially identified on aerial photography by the USDA-FS Interagency Spatial Analysis Center were visited and evaluated in 1999. During the course of the 1999 field season, new sites were discovered and added to the mapping database. Only some of these new sites were investigated in 1999. Figures 3a and 3b illustrate locations of known mine waste dumps in the New World Mining District. For 2000, project personnel will complete a survey of remaining mine waste sites within the District.

Field personnel will locate new sites using resource-grade GPS equipment, and will provide volume estimates using field estimation techniques described in the project Site-Wide SAP (Maxim, 1999f). Attribute information about each mine waste source will be recorded with the GPS unit and on standard field forms. Locations will also be recorded on a field map. In addition, a material sample will be obtained from each source area for which analytical data do not exist in accordance with the Site-Wide SAP. Samples will be collected from selected dumps and analyzed for total and leachable metals (Maxim, 1999f).

Once the field effort is complete, electronic data will be downloaded, reconciled, and incorporated into the GIS data management system for the project. This information will be made available to project designers for use in prioritizing response actions.

3.13.2 Underground Mine Workings Assessment

During 1999, efforts were made to verify the extent and location of underground mine workings and exploratory borings on District Property and evaluate the need for and feasibility of accessing certain adits and shafts during subsequent years. Assessing potential impacts of underground workings and exploratory borings will be continued in 2000 by obtaining and reviewing available maps and geophysical information. This information will be field-verified, to the extent possible.

3.13.3 Groundwater Monitoring

Groundwater monitoring of selected wells will be conducted one time in July 2000 when water levels are typically at seasonal highs. Monitoring will include groundwater sampling, water level measurement, and laboratory analysis. Table 2 lists monitoring wells targeted for the 2000 sampling events. Figure 4 in the Site-Wide Sampling and Analysis Plan shows the location of wells listed in Table 2 (Maxim, 1999f).

Water samples will be collected from the monitoring wells using methods and procedures described in the Site-Wide Sampling and Analysis Plan (Maxim, 1999f). Groundwater samples will be submitted to Northern Analytical Testing in Billings, Montana for analysis of parameters listed in the SAP. Water levels will be measured in each monitoring well immediately prior to purging the wells.

3.13.4 Miller Creek Ionic Tracer Study

The goal of the Miller Creek metal-loading study is to quantify the magnitude and extent of sources of metal loading and the distribution of metal concentrations during low-flow conditions in Miller Creek. This goal will be accomplished by quantifying metal loads from individual sources, tributaries, and groundwater along the stream. Tracer-injection methods using a sodium chloride solution will be used to determine streamflow at numerous points, and spatially intensive synoptic water-quality sampling

will provide metal-concentration data. Together, these techniques will provide information for locating and quantifying individual natural and mining-related sources of metal loading to Miller Creek. Similar studies were conducted in Fisher Creek in 1997 and in Daisy Creek in 1999.

3.14 COMPLETE 1999 AND 2000 RESPONSE ACTION CONSTRUCTION

The 1999 and 2000 Response Actions will be constructed during the 2000 construction season (July to October). The USDA-FS delayed implementation of the 1999 Response Action so that additional information could be collected at potential repository sites, and so that source area AIMSS ranking could be completed. Response action construction for 2000 will be determined as the preferred alternative is selected from the evaluation of alternatives presented in the 2000 EE/CA. Release of a draft 2000 EE/CA is planned for mid-February.

Table 2
Monitoring Wells Scheduled for Sampling
New World Mining District Response and Restoration Project
2000 Work Plan

Well No.	Year Installed	Completion Formation
McLaren Pit Area		
EPA-1	1996	Wolsey Shale
EPA-2	1996	Fisher Mtn. Intrusive/Wolsey Shale
EPA-3	1996	Waste Rock
EPA-4	1996	Waste Rock
EPA-5	1996	Fisher Mtn. Instrusive
EPA-6	1996	Fisher Mtn. Instrusive
EPA-7	1996	Waste Rock
EPA-8	1996	Meagher Limestone
EPA-9	1996	Wolsey Shale
EPA-10	1996	Meagher Limestone
MW-2	1989	Wolsey Shale
Tracer-2	1997	Fisher Mtn. Instrusive
Como Basin Area		
EPA-11	1996	Tertiary Intrusive Dike
EPA-12	1996	Scotch Bonnet Diorite
MW-1	1989	Wolsey Shale
MW-8	1989	Lulu Pass Rhyodacite
Tracer-4	1997	Fisher Mtn. Instrusive
Tracer-6	1997	Scotch Bonnet Diorite
Fisher Creek Area		
MW-9A	1990	Alluvium
MW-9B	1990	Precambrian
MW-10A	1990	Alluvium
MW-10B	1991	Precambrian
MW-11	1990	Precambrian
SB-16	1991	Precambrian
Tracer-5	1997	Fisher Mtn. Instrusive
Miller Creek Area		
MW-5A	1989	Alluvium
MW-5P	1989	Wolsey Shale
Daisy Creek Area		
MW-3	1989	Wolsey Shale

Note: Well locations shown on Figure 4 in the Site-Wide Sampling and Analysis Plan (Maxim, 1999f)

The proposed 2000 Response Action will address source areas that have been scored and ranked using AIMSS. AIMSS scoring was completed on 132 source areas as part of the 1999 Work Plan. Source areas that will be included in the 2000 Response Action will depend on several factors. These factors include the following: overall AIMSS site ranking (based on total score); surface water and groundwater pathway scores; other work planned in the vicinity of the source area or in the source area watershed (such as that planned for Miller Creek, as described in Section 3.13.4); the amount of work involved at each site; and, the limitations of the construction season.

Several of the higher ranking District Property sites require further assessment before response actions can be considered. Work on these sites, including the McLaren Pit (ranked No. 1), McLaren Pit spoils (ranked No. 9), McLaren multicolored dump (ranked No. 16), and Glengarry Adit (ranked No. 15), will be delayed for one to two years until assessment work is completed. Therefore, source areas included in the 2000 Response Action will be selected from lower ranked source areas. An initial list of potential 2000 Response Action source areas is shown in Table 3. The source areas shown in Table 3 were selected from the AIMSS list because the sites rank relatively high on the list, directly impact surface water (i.e. have a high surface water pathway score), or are located adjacent to a high ranking source area (i.e. Small Como Dump).

Table 3
Potential 2000 Response Action Source Areas
New World Mining District Response and Restoration Project
2000 Work Plan

Site Name	AIMSS Rank	Waste Volume (CY)	Adit Discharge
Rommel Tailings	19	7,300	No
Little Daisy Adit and Dump	20	900	Yes
Lower Spaulding	23	2,630	Yes
Gold Dust	24	5,700	Yes
Lower Tredennic Adit and Dump	28	3,430	Yes
Upper and Middle Spaulding	34	740	No
Upper Tredennic Dump Two	36	310	Yes
Soda Butte Tailings Dump	40	440	No
Middle Tredennic Dump One	45	820	Yes
Small Como Dump	95	410	No

Several other considerations will come into play as potential source areas are further evaluated for inclusion in the 2000 Response Action. First, ownership status will be confirmed, as only District Property sites will be included in the response action. Second, final closure of discharging adits associated with the selected dumps will be evaluated before closure of the dump is included in a response action.

The 2000 EE/CA will include those aspects of the proposed 1999 response action that tie in with the additional sites selected for 2000. A complete analysis of the combined response actions will be presented in the 2000 EE/CA along with any design considerations for the selected repository site. Of the

two potential repository sites currently being considered for mine waste disposal of District Property waste, Site SB-4B(B) is preferred. Briefly, the SB-4B(B) site is preferred to the SB-4B(I) site because groundwater levels in the glacial till at the site are lower, the topography is gentler, and the site is not directly visible from the highway. A complete discussion of repository site selection will be presented in the 2000 EE/CA. A preferred alternative will also be clearly identified in the 2000 EE/CA, including the preferred repository design option.

An engineering design of the preferred 2000 response action will be prepared in accordance with USDA-FS standard specifications. Construction drawings and specifications will show in detail the work required to complete construction.

Project engineers will provide oversight of the construction projects that will be completed in 2000. In completing this oversight effort, field engineers will monitor the construction project to insure the project is completed in accordance with the design. This will involve on-ground oversight, coordination among agency and contractor personnel, documentation of construction activities, and generation of daily and weekly construction summaries. Lines of communication will be established to insure decision-makers are apprised of project progress and any issues that may develop. A construction report will be prepared following completion of construction. The report will include a project narrative, as-built drawings, important construction documents, and a summary of any problems encountered or recommended solutions for future construction related problems. Video and/or photographs of important construction activities will be obtained and presented in the report.

In conjunction with the construction oversight effort, field personnel will monitor surface water quality and quantity at locations immediately downgradient of construction activities. Specific monitoring locations will be field-determined and will be located to provide for early-detection of impacts created by the construction activities. Field measurements to be obtained at these locations will include:

- Flow
- pH
- Temperature
- Specific Conductivity
- Turbidity
- Field analyses of iron, copper, and sulfate

These measurements will be obtained in accordance with procedures and methods described in the Site-Wide SAP (Maxim, 1999f). As a means to verify the field measurements, one out of every 20 surface water samples collected will be split and rush-analyzed at Northern Analytical Laboratories in Billings for metals parameters listed in the Site-Wide SAP. Where significant changes in water quality are noted either through review of field or laboratory analyses, prompt and appropriate actions will be taken to mitigate the problems identified up to and including halting the construction project.

3.15 PREPARE 2001 WORK PLAN

A work plan similar to this plan will be prepared to guide specific work activities to be completed during the 2001 calendar year. These activities will complement those performed under the longer-term plans and will likely be oriented toward filling data gaps for the construction projects identified for the 2002 construction season. In addition, work tasks to complete many of the engineering tasks during the 2001 calendar year will be described.

3.16 PREPARE 2001 EE/CA

An EE/CA for 2001 will be prepared to evaluate alternatives for the annual response action. Potential source areas included in the response action will be determined from the AIMSS ranking. Baring any unanticipated conditions or other problems associated with the upcoming McLaren Pit evaluation, the McLaren Pit is expected to be the major source area included in the 2001 EE/CA.

Key sections of the EE/CA will include:

- Executive Summary
- Site Background
- Waste Characteristics
- Streamlined Risk Assessment
- Removal Action Goals and Objectives
- Screening and Development of Alternatives
- Detailed Analysis of Alternatives
- Comparative Analysis of Alternatives

The EE/CA will contain figures and tables summarizing supporting information and will have appendices of laboratory analytical data and cost estimates. The EE/CA will be prepared in accordance with EPA guidance for preparing non-time-critical removal actions (EPA 1993b). Responses to significant comments on the draft EE/CA will be provided in a separate submittal or will be incorporated into the final EE/CA.

4.0 PROJECT SCHEDULE

Figure 2 illustrates the schedule for 2000 activities identified in Section 3.0.

Figure 2 - Project Schedule

Figure 2 - Back page

5.0 REPORTS

Numerous reports will be prepared during 2000 as a result of completing the scope of services described in Section 3.0. These reports are summarized in Table 4 along with a description of the report contents and approximate delivery schedule.

TABLE 4
List of Reports
New World Mining District Response and Restoration Project
2000 Work Plan

Deliverable Title	Contents	Delivery Schedule
2000 Work Plan	This Document	Draft – December 1999 Final – March 2000
2000 EE/CA	Evaluation of alternatives for 1999 response action	Draft – March 2000 Final – April 2000
2000 Response to Significant Comments	Response to significant comments on 2000 EE/CA	April 2000
2000 Action Memorandum	Decision document for 2000 response action	April 2000
2000 Design Package	Engineering Design Drawings, Technical Specifications, and Bid Package	May 2000
Water Treatment Alternatives Analysis Technical Memorandum	Results of water treatment technology screening; comparative analysis of treatment alternatives	September 2000
Underground Mine Workings Technical Memorandum	Extent and location of underground workings; feasibility and costs associated with providing safe underground access	October 2000
Glengarry Adit Rehabilitation Technical Memorandum	Results and observations of Glengarry Adit reconditioning and drain-down	December 2000
McLaren Pit Technical Memorandum	Results and interpretation of McLaren Pit evaluation	December 2000
Annual Revegetation Monitoring Report	Results and trend analyses of ongoing revegetation monitoring	December 2000
Annual Surface Water and Groundwater Monitoring Report	Results and analyses of ongoing surface water and groundwater monitoring	January 2001
2000 Construction Report	Summary of construction field notes; as-built drawings for 2000 construction projects	January 2001
2001 Work Plan	Proposed activities for calendar year 2001	Draft – December 2000 Final – January 2001
2001 EE/CA	Findings from 2000 field investigations; Engineering evaluation of alternatives developed for annual response action	Draft – February 2001 Final – March 2001

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