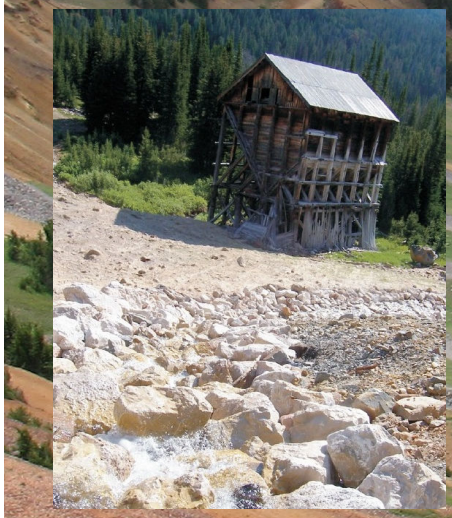
New World Project
Long-Term Operations and Maintenance Plan

New World Mining District
Response and Restoration Project



April 2020

United States Department of Agriculture
Forest Service
Gallatin National Forest

TETRA TECH

SITE-WIDE, LONG-TERM OPERATIONS AND MAINTENANCE PLAN
NEW WORLD MINING DISTRICT
RESPONSE AND RESTORATION PROJECT

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1.0 INTRODUCTION

Tasks completed in conjunction with response and restoration activities for the New World Mining District Response and Restoration Project in Park County, Montana (**Figure 1**) are described in the numerous Work Plans (Maxim, 1999b; 2000; 2001a; 2002a; 2003a; 2004a; 2005a; 2006a; Tetra Tech 2007a, 2008a, 2009a, and 2011a). Beginning in 2012, the project entered a 20-year long-term operations and maintenance phase with activities described in a Long-Term Operations and Maintenance Plan (Tetra Tech, 2009b) which was updated in 2012 to reflect federal acquisition of private land holdings, modification of reclamation monitoring methods, and decisions regarding surface and groundwater monitoring occurring after the 2009 plan was released (Tetra Tech, 2012).

The Site-Wide, Long-Term Operations and Maintenance Plan described below updates and modifies the 2012 plan and provides descriptions of annual monitoring tasks that will be completed to determine whether additional maintenance of reclaimed sites and associated facilities are needed, how maintenance work will be accomplished, and estimated costs of site-wide monitoring and maintenance. This long-term operations and maintenance plan for the project begins in 2020 and covers activities that will occur through the end of the long-term operations and maintenance period in the fall of 2032. This Plan is intended to modify the Overall Work Plan (Maxim, 1999a), the Repository Monitoring Plan (Maxim, 2006c), and the 2012 Long-Term Operations and Maintenance Plan (Tetra Tech, 2012) during the years of its implementation.

A general description of the site, project objectives, and project organization are provided in this introductory section. Following this introductory section is a detailed description of the operations and maintenance activities that will be completed, a project schedule, and project deliverables. For more detailed descriptions of the overall project, the reader can refer to the Overall Project Work Plan (Maxim, 1999a) and/or annual project summary documents produced in 2001 through 2008 (Maxim, 2001b; 2002b; 2003b, 2004b; 2005b; 2006b; Tetra Tech, 2007b and 2008b). These documents are available on the project website at,

https://www.fs.usda.gov/detail/custergallatin/landmanagement/?cid=stelprdb5407502

and at two project information repositories located at the Gallatin National Forest Supervisor's Office in Bozeman, Montana and at the Cooke City Chamber of Commerce office in Cooke City, Montana. The reader is encouraged to review these documents 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 Mines, 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, all interested parties and CBMI signed a Consent Decree (Decree). 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 are to be spent first 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**). If funds are available after District Property is cleaned up to the satisfaction of the United States, other mining disturbances in the District may be addressed.

The USDA Forest Service, as the lead agency responsible for implementing the cleanup, has assembled a management team and has published objectives to guide reclamation and restoration of the historic

mining impacts in the District. Under their Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority, the USDA Forest Service will execute the response and restoration project by following guidance provided by the Environmental Protection Agency (EPA) for non-time-critical removal actions (EPA, 1993). 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, 1993).

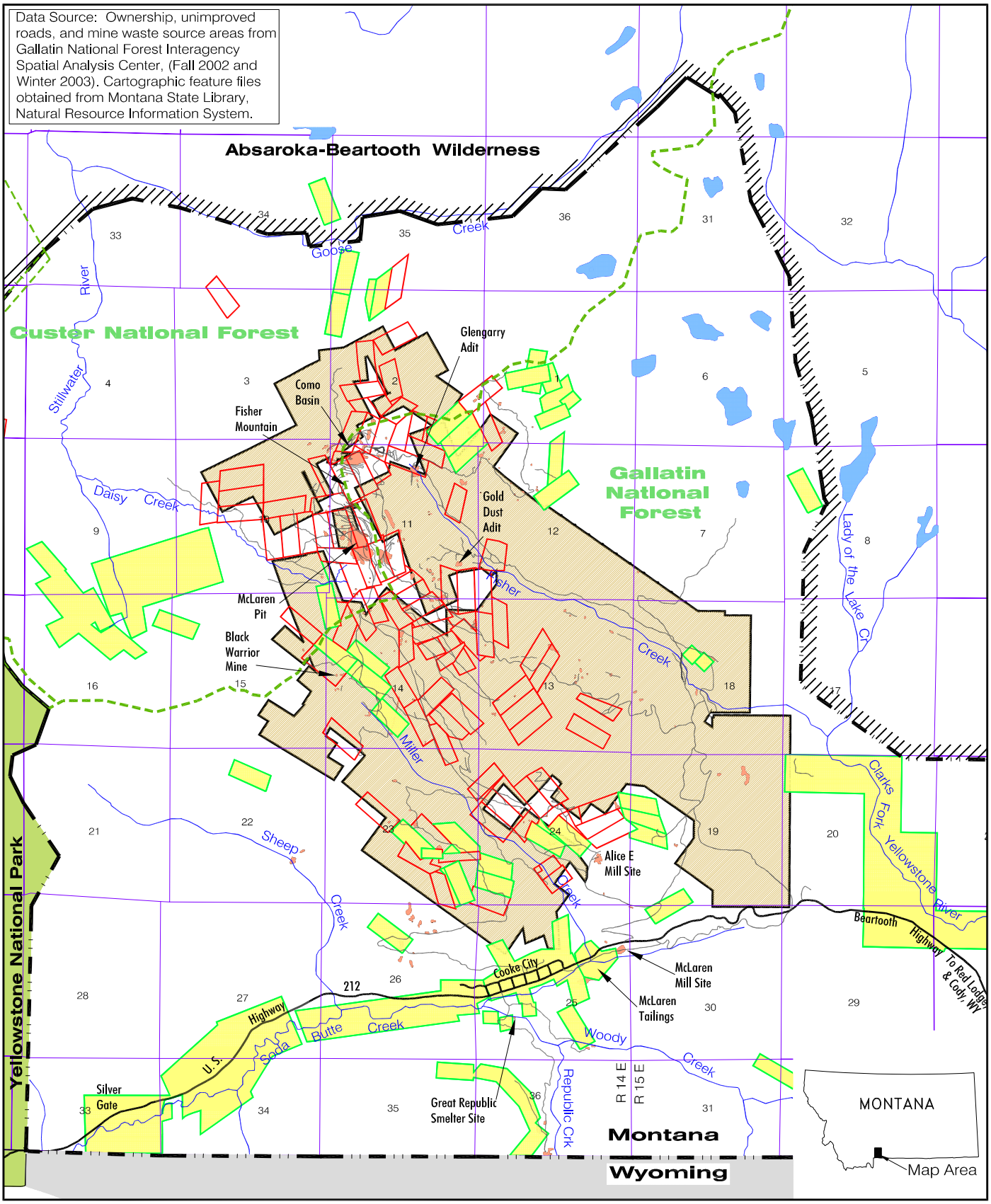
In 1995, EPA began a site investigation after initial announcement of the property transfer from CBMI. The EPA investigation involved installation of monitoring wells, surface water sampling, groundwater monitoring, and completion of a groundwater tracer study. In October 1998, the USDA Forest Service 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 Decree and Agreement, CBMI was required to submit petitions regarding temporary standards if requested by the USDA Forest Service. The Support Document and Implementation Plan (Stanley and Maxim, 1998) was submitted to the State of Montana Board of Environmental Review (BER) 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 BER 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 BER on June 4, 1999. The objective of the temporary standards program is to provide site specific temporary water quality standards along specified stream segments that are to be maintained, while allowing the project to implement various reclamation activities within the drainages. The temporary standards program envisions that as these reclamation activities are implemented in the affected stream segments (in this case portions of Fisher Creek, Daisy Creek, and the Stillwater River) water quality will improve to the point where these streams meet beneficial uses for waters classified B-1 under the classification standards established by the State of Montana.

In March 1999, the USDA Forest Service initiated the planning process for the project. Planning documents were in place in June 1999, and work began on the project with the monitoring of surface water and groundwater quality at selected monitoring points. All major reclamation work was completed by 2008 and additional road stabilization work was completed in 2011.

Site Location and Description

The New World Mining District falls within the Gallatin and Custer National Forests and lies adjacent to Yellowstone National Park's northeast corner. The Absaroka-Beartooth Wilderness Area bounds the District to the north and east, with the Montana-Wyoming state line forming the southern boundary of the District. The District lies entirely within Park County, Montana (**Figure 1**).

The communities of Cooke City and Silver Gate, Montana, are the only population centers near the District. The neighboring communities of Mammoth, Wyoming, and Gardiner, Montana, are located about 80 kilometers (50 miles) to the west. Red Lodge, Montana, is located about 105 kilometers (65 miles) to the northeast via the Beartooth Highway, and Cody, Wyoming, is located 95 kilometers (60 miles) to the southeast.



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

7561506.110

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

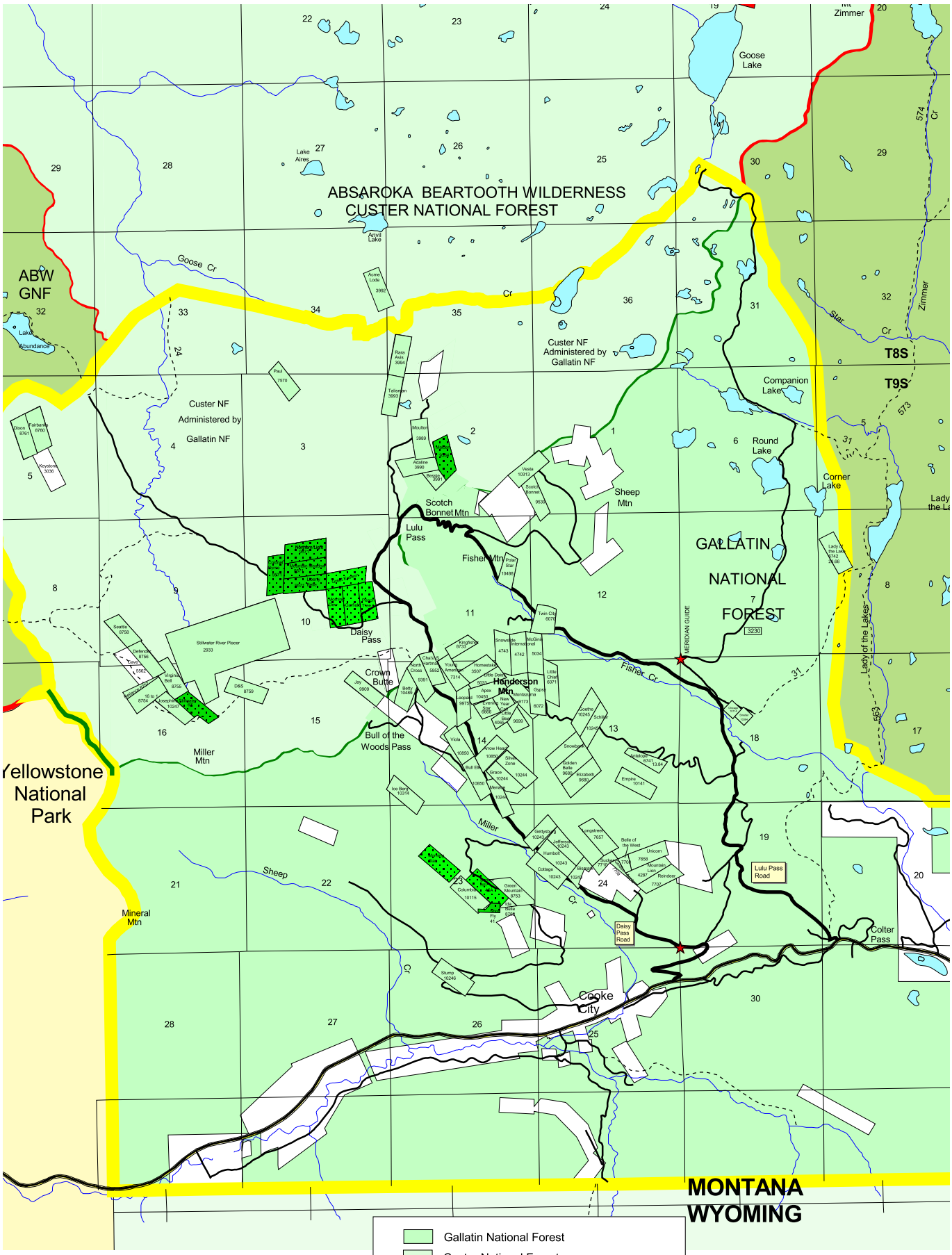
The District is located at an elevation that ranges from 2,400 meters (7,900 feet) to over 3,170 meters (10,400 feet) above sea level. The site is snow-covered for much of the year and only one route of travel is open on a year-round basis -- the highway between Mammoth and Cooke City. The Sunlight Basin road accesses the District from northwestern Wyoming during the spring, summer, and fall but only allows access to within a few miles of the District in winter. The Beartooth Highway allows access to the District from the east but is closed during winter.

The District covers an area of about 10,360 hectares (25,600 acres). Historic mining disturbances and contaminated metal source areas affect about 20 hectares (50 acres) located on District Property (**Figure 1**). Mining disturbances on non-District Property include the McLaren Tailings (**Figure 1**) and McLaren Millsite, which cover an additional 6.9 hectares (17 acres). Federal acquisition of the Reeb Estate land holdings in 2009 resulted in private land parcels becoming National Forest System lands and changed the land ownership throughout the District. (**Figure 2**).

The topography of the District is mountainous with prominent glacial erosional and depositional features and is situated at the headwaters of three river systems that all flow into the Yellowstone River. The three tributaries are the Clarks Fork of the Yellowstone, the Stillwater, and the Lamar. The Lamar River flows through Yellowstone Park. The major tributary streams in the District include Daisy, Miller, Fisher, Goose, Sheep, Lady of the Lake, Republic, Woody, and Soda Butte creeks.

1.2 PURPOSE AND OBJECTIVES

The primary purpose of this plan is to guide project activities that will be conducted for the remaining 12 years of operations and maintenance in the District. Sampling and analysis protocols and overall objectives for the Long-Term Operations and Maintenance Plan are consistent with those detailed in the Overall Project Work Plan (Maxim, 1999a) and those described in the Revised Support Document and Implementation Plan for Temporary Water Quality Standards (Maxim, 2003c). However, the actual number of sites to be sampled and analytical parameters are different. Primary objectives for work covered in the Long-Term Operations and Maintenance Plan are to document and monitor the effectiveness of reclamation response and restoration actions; to provide for maintenance actions as required to ensure long-term stability of the waste repository, surface drainage diversion channels, other erosion control features, and reclamation covers; and to monitor surface and groundwater quality . This Plan also provides an outline of specific tasks that form the basis for estimating costs for long-term operations, monitoring and maintenance tasks. This plan is not static and may be modified as needs arise due to changing site conditions (i.e. fire, seismic events, etc.) or decisions made after the release of this report.



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Gallatin National Forest
Custer National Forest
Patented Claims - Other Private Ownership
US and Other Private Ownership
Absaroka Beartooth Wilderness
New World Mining Withdrawal
National Forest Boundary

prepared by: Gallatin National Forest/jsr **November 4, 2011**

New World Mining District
Land Status After
Reeb Estate Acquisitions
Cooke City Area, Montana

FIGURE 2

2.0 SCOPE OF WORK

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

- Maintain community relations. It is anticipated that up to two meetings may be held annually. A summer meeting may be held in Cooke City and a winter technical meeting may be held in Bozeman.
- Update and maintain the project monitoring database.
- Continue monitoring surface water quality in the District, including monitoring surface water conditions downstream of the Como Basin capped reclamation area, downstream of the closed Glengarry Adit, and downstream and within the capped McLaren Pit.
- Continue to monitor the New World Waste Repository at select groundwater locations. Solution accumulating within the Repository is discharged through a drain field constructed in 2017, eliminating the previous need to pump and transport this fluid to an off-site location for disposal. The continuous water-level meter installed in the repository sump will be replaced as needed; however, meters installed in other wells will only be replaced on a to-be-determined basis.
- Monitor erosion and vegetation at all reclamation sites every 5 years (i.e. 2021, 2026, and 2031).
- Prepare abbreviated annual reports that summarize the work that was completed, present data gathered, and delineate the work that will be performed the following year.

This scope of work assumes that all surface water stations listed in the 2012 Long-Term Operations and Maintenance Plan will continue to be monitored through 2032. However, beginning in 2020 and continuing through 2032, the number of groundwater quality stations will be reduced to those described below in this updated plan. The decision to remove other surface water or groundwater stations from the monitoring schedule may be warranted at some point during the long-term operations and maintenance period.

This plan assumes that contractors would perform all work outlined in the Plan. USFS personnel would provide administration and oversight of the contractors and all project work.

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

2.1 COMMUNITY RELATIONS

A Community Relations Plan was developed for the project and is included in the Overall Project Work Plan (Maxim, 1999c). This plan describes community relation strategies used to share information with the public and obtain timely input on proposed project activities during the response and restoration project.

Community relations under the long-term operations and maintenance period allow up to two meetings to be held every year. At these meetings, summary monitoring data and results will be presented, and the meeting facilitated by a USFS representative. It is envisioned that these meetings could take place in the field during some years if desired by the participants. The project has evolved to the point where annual community meetings were unnecessary in recent years. It is more likely that meetings would be held to discuss technical issues with other agencies as the project moves towards completion.

2.2 MAINTAIN PROJECT DATABASE

Environmental data that have been collected at the New World site are cataloged in a Microsoft Access® database, and this database will continue to be updated as new project information is collected each year. Database queries or copies of the database would be available electronically from the USFS by request.

2.3 SURFACE WATER QUALITY MONITORING

Surface water and groundwater stations were monitored through 2019. This provides a 12- to 17-year period of post-reclamation sampling to gauge the effectiveness of response actions at the project site. This period also allows the evaluation of effectiveness over a range of wet, dry and normal precipitation years. Because of the extensive period of record, the 2012 Long-Term Operations and Maintenance Plan discontinued monitoring at select locations that were deemed unnecessary following discussions with BER (Tetra Tech, 2012). The decision to remove other stations from the long-term monitoring schedule may be warranted at some point during the long-term operations and maintenance period.

This section of the Site Wide, Long-Term Operations and Maintenance Plan describes long-term surface water monitoring activities that will be completed each year from 2020 through 2032.

2.3.1 Long-Term Surface Water Quality Monitoring

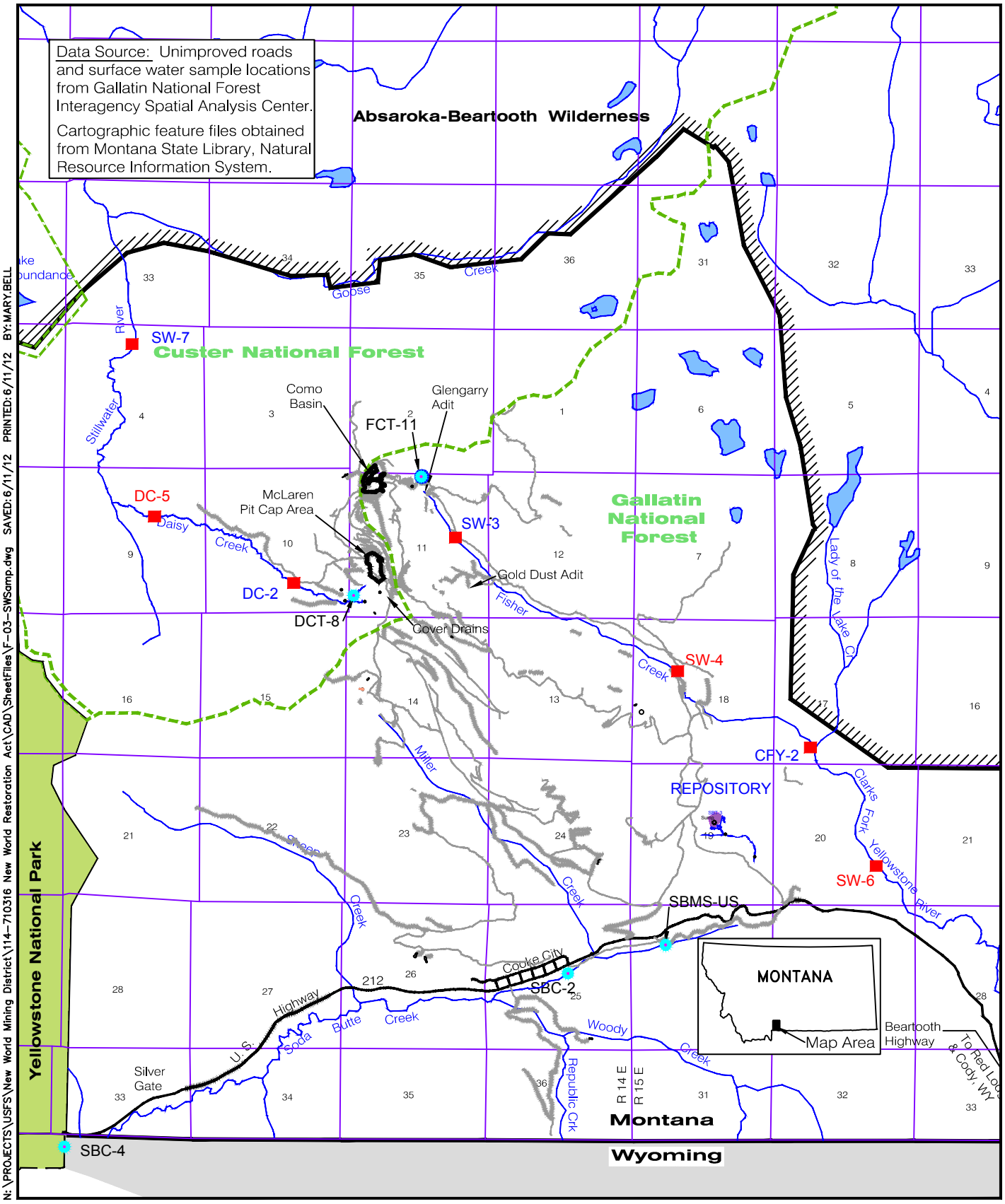
Surface water quality monitoring will be conducted each year at 10 of the 12 sampling stations identified in the Long-Term Surface Water Quality Monitoring Plan (Maxim, 1999d) plus two additional sites that were not in the long-term plan. These stations include the seven stations previously required for monitoring for compliance with temporary water quality standards (**Table 1**) (Stanley and Maxim 1998; and Maxim 2003c). Monitoring of stations SW-2 in Miller Creek and SBC-102, in Soda Butte Creek at the west end of the town of Cooke City was discontinued in 2012 while sites FCT-11 on a tributary of Fisher Creek draining the Como Basin area, and DCT-8 below the McLaren pit were added. Sampling sites for surface water during the Long-term Operations and Maintenance period (2012-2032) are shown on **Figure 3** and listed in **Table 1**. Samples will be collected twice per year, once during higher flow conditions in the spring (June/July), and once during low flow conditions in the fall (September/October).

Surface water samples would be collected and analyzed in accordance with procedures and methods described in the Site-Wide Sampling and Analysis Plan (SAP) (Maxim, 1999f). In addition to the analytical methods described in the Site-Wide SAP, analysis of dissolved metals was added to the parameter list for all sites in 2012 (**Table 1**). Analysis of dissolved metals allows further evaluation of reclamation success, particularly below the McLaren Pit and Como Basin areas, as dissolved metals analysis removes the contribution of metals present in suspended sediment. Analysis of common ions and select physicochemical parameters will be discontinued as these parameters are no longer necessary to assess reclamation success or to support geochemical modeling efforts.

Table 2 lists surface water field parameters and standard operating procedures (SOPs) from the Site-Wide SAP. **Table 3** lists preservation and bottle requirements and **Table 4** lists surface water analytical requirements and practical quantification limits (PQLs).

TABLE 1
SURFACE WATER SAMPLE SITES
Long-term Operations and Maintenance Plan

Site Name	Location	Monitoring Objective
Daisy Creek Drainage		
DCT-8	Daisy Cr. tributary south of McLaren Pit	Measures contribution of impacts from McLaren capped area to Daisy Creek.
DC-2	Daisy Creek below confluence of McLaren tributaries	Measures water quality at upper reach of main stem of Daisy Creek.
DC-5	Daisy Creek above confluence with Stillwater River	Measures water quality at lower reach of main stem of Daisy Creek.
SW-7	Stillwater River at Stillwater Trail Crossing	Measures water quality of Stillwater River at Wilderness boundary.
Fisher Creek Drainage		
FCT-11	Tributary below Como Basin	Measures contribution of impacts from Como Basin capped area to Fisher Creek.
SW-3	Fisher Creek below former Glengarry Adit	Measures water quality at upper reach of main stem of Fisher Creek below reclaimed Glengarry Adit.
SW-4	Fisher Creek at Lulu Pass Road Crossing	Measures water quality at middle reach of main stem of Fisher Creek.
CFY-2	Fisher Creek above Clarks Fork confluence	Measures water quality at lower reach of main stem of Fisher Creek.
Clarks Fork River Drainage		
SW-6	Clarks Fork Yellowstone River at Saw Mill Road	Measures water quality Clarks Fork of Yellowstone River.
Soda Butte Creek Drainage		
SBMS-US	Soda Butte Creek above confluence with Miller Creek	Measures water quality in Soda Butte Creek above McLaren tailings and mill-site, and above junction with Miller Creek.
SBC-2	Soda Butte Creek below McLaren Tailings	Measures water quality in Soda Butte Creek below McLaren tailings and mill-site, and below junction with Miller Creek.
SBC-4	Soda Butte Creek at Park Boundary	Measures water quality at the Park Boundary



New World Mining District Boundary
Unimproved Road
National Forest Boundary
Wilderness Boundary
Long-Term Monitoring Station
Long-Term Monitoring Station for Temporary Standards Review (Monitored every 3 years)

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Surface Water Monitoring Stations
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
FIGURE 3

TABLE 2
SURFACE WATER FIELD PARAMETERS
Long-Term Operations and Maintenance Plan

Parameter	SOP Number[1]	SOP Title	Event
Specific Conductance	SOP-05	Field Measurement of Specific Conductance	All
pH	SOP-06	Field Measurement of pH	All
Water Temperature	SOP-07	Field Measurement of Water Temperature	All
Flow	SOP-01	Stream Flow Measurement; Wading Technique	All

[1] Maxim Standard Operating Procedures (Appendix A, Site-Wide SAP)

TABLE 3
SURFACE WATER SAMPLING REQUIREMENTS
Long-Term Operations and Maintenance Plan

Parameter	Preservation[1]	Bottle Size/Type
Total Recoverable Metals	HNO3 to pH < 2; Iced to 4°C	250 milliliter polyethylene
Sulfate/Physicochemical	Iced to 4°C	500 milliliter polyethylene

[1] HNO_3 = nitric acid

TABLE 4
SURFACE WATER ANALYTICAL REQUIREMENTS
Long-Term Operations and Maintenance Plan

Parameter	PQL (mg/L)[1]	EPA Method No.	Max. Holding Time
Physicochemical			
Specific Conductivity	None	2310B	28 days
pH	None	150.1	Upon arrival at lab
Metals[2]			
Aluminum	0.05	200.8/200.7	6 months
Cadmium	0.0001	200.8/200.7	6 months
Copper	0.001	200.8/200.7	6 months
Iron	0.01	200.8/200.7	6 months
Lead	0.001	200.8/200.7	6 months
Manganese	0.003	200.8/200.7	6 months
Zinc	0.01	200.8/200.7	6 months
Other			
Sulfate	None	375.2	28 Days

[1]PQL = Practical Quantitation Limit in milligrams per liter (mg/L)
[2]Surface water parameters will be analyzed for total recoverable metals for all stations

2.4 GROUNDWATER QUALITY MONITORING

Between 2012 and 2019, groundwater monitoring was completed in accordance with the 2012 Long-Term Operations and Maintenance Plan (Tetra Tech, 2012). Analytical data show that groundwater quality is stable at most locations although incremental improvements have occurred at DCGW-104 (well completed within waste rock in the McLaren Pit) and FCGW-100 (well completed within the Glengarry Adit workings). There is no indication that groundwater quality will improve enough to meet ARARs at any location. For this reason, groundwater monitoring within the Daisy Creek and Fisher Creek basins will be discontinued. Monitoring of FCGW-100 will not be continued as part of long-term operations and maintenance work but this well will be retained as it provides a unique opportunity to evaluate changes to water quality in the workings of adits sealed with water-tight plugs.

Groundwater will continue to be monitored at the Repository Sump and downgradient groundwater wells SBGW-107 and SBGW-107T (**Figure 4** and **Table 5**) to fulfill DEQ monitoring recommendations related to the 2017 construction of a drain field to dispose of water accumulating in the Repository Sump (Tetra Tech, 2018). This monitoring will occur in June or July during the high flow surface water monitoring event to ensure a sufficient volume of groundwater is present for sampling as the two groundwater wells are often dry later in the year.

The groundwater monitoring event will include measuring water levels, measuring field parameters, and collecting samples for laboratory analysis (**Tables 6**, **7**, and **8**). Monitoring will also include maintaining

and downloading data from continuous water level measuring instruments installed in well SBGW-107T and in the Repository Sump.

It should be noted that some previously monitored wells were abandoned during 2006 and are no longer available for future monitoring. A list of these wells, along with others that are no longer monitored and scheduled for abandonment in 2020, is included in **Appendix A**. Wells scheduled for abandonment will be abandoned and documented in accordance with state laws.

TABLE 5
GROUNDWATER MONITORING WELLS
Long-Term Operations and Maintenance Plan

Well No.	Year Installed	Completion Formation	Monitoring Type
Repository Sump	2002	Not Applicable	**X W**
SBGW-107T	1999	Till	**X W**
SBGW-107	1999	Granite	**X**

Note: X Samples collected and analyzed for full suite of laboratory parameters
W Continuous water level monitoring

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SCALE IN FEET
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▲ Groundwater Monitoring Location
● Repository Sump
— Custer/Gallatin Forest Roads

Groundwater Monitoring Stations
New World Mining District
Response And Restoration Project
Cooke City Area, Montana
FIGURE 4

TABLE 6
GROUNDWATER FIELD PARAMETERS
Long-Term Operations and Maintenance Plan

Parameter	SOP Number[1]	SOP Title	Event
Specific Conductance	SOP-05	Field Measurement of Specific Conductance	All
pH	SOP-06	Field Measurement of pH	All
Water Temperature	SOP-07	Field Measurement of Water Temperature	All
Oxidation-Reduction	SOP-28	Field Measurement of Redox Potential (Eh)	All
Dissolved Oxygen	SOP-08	Field Measurement of Dissolved Oxygen	All
Depth to Water	SOP-20	Field Measurement of Groundwater Level	All

1 Maxim Standard Operating Procedures (Appendix A, Site-Wide SAP)

TABLE 7
GROUNDWATER SAMPLING REQUIREMENTS
Long-Term Operations and Maintenance Plan

Parameter	Preservation[1]	Bottle Size/Type
Dissolved Metals	Filtered through 0.45 micron filter; HNO3 to pH < 2; Iced to 4°C	250 milliliter polyethylene
Sulfate/Physicochemical	Iced to 4°C	500 milliliter polyethylene

1 HNO_3 = nitric acid

TABLE 8
GROUNDWATER ANALYTICAL REQUIREMENTS
Long-Term Operations and Maintenance Plan

Parameter	PQL (mg/l)[1]	EPA Method No.	Max. Holding Time
Physicochemical			
Specific Conductivity	None	2310B	28 days
pH	None	150.1	Upon arrival at lab
Metals[2]			
Aluminum	0.05	200.8/200.7	6 months
Arsenic	0.003	200.8/200.7	6 months
Cadmium	0.0001	200.8/200.7	6 months
Copper	0.001	200.8/200.7	6 months
Iron	0.01	200.8/200.7	6 months
Lead	0.001	200.8/200.7	6 months
Manganese	0.003	200.8/200.7	6 months
Mercury	0.001	245.1	6 Months
Zinc	0.01	200.8/200.7	6 months
Other			
Sulfate	None	375.2	28 Days

1 PQL = Practical Quantitation Limit in milligrams per liter (mg/L)
2 Groundwater parameters will be analyzed as dissolved constituents as filtered through a 0.45 micron filter

2.5 RECLAMATION MONITORING

Based on results of 2010 monitoring which showed successful establishment of vegetation on reclaimed areas, point-intercept species counts and quantification of vegetative cover along transects (i.e. cover monitoring) was discontinued in favor of less intensive "area-wide" observational monitoring of reclaimed areas (Tetra Tech, 2011b). Area-wide monitoring is conducted in accordance with monitoring procedures described in the Long-Term Revegetation Monitoring Plan (Maxim, 1999e) as modified by the New World Revegetation Monitoring: Review and Recommendations Technical Memorandum (Tetra Tech, 2009c).

Area-wide monitoring will be conducted at 5-year intervals with the first event completed in 2016 (Tetra Tech, 2016). The purpose of monitoring is to determine if there are any erosion problems warranting attention or whether there are germination failures in areas greater than 250 square feet. Area-wide monitoring will also monitor for the presence of invasive plants.

If bare or eroded areas are observed during monitoring, soil samples will be collected for laboratory analysis. Samples will be collected from a depth interval of 0-15 cm and placed in one-gallon polyethylene bags. Samples will be labeled by location and returned to a qualified laboratory for selected analyses in accordance with the parameters and methods in the Site-Wide SAP for native soil collection. Laboratory parameters may include USDA soil texture, coarse fragment content, organic matter, pH, electrical conductivity, nutrients, and total metals (aluminum, arsenic, cadmium, copper, lead, and zinc). Sample collection and parameter selection will be performed at the discretion of the field investigator to ensure site-specific conditions are being addressed. Following receipt of the laboratory analysis, recommendations will be made to amend soils or reseed barren areas.

2.6 MAINTENANCE AND EROSION CONTROL

It is anticipated that infrequent maintenance and erosion control measures will be implemented during the operations and maintenance period to correct rilling, slumping, or other erosion occurring on reclaimed areas in the District. Maintenance may also be required in response to changing site conditions related to fire, seismic events, or other unanticipated events. Such maintenance measures may include re-grading, ditch and culvert maintenance, re-seeding, and/or installation and maintenance of silt fences and erosion matting. Maintenance will also include abandonment of wells no longer needed for the project. Refer to Appendix A provides a list of wells to be abandoned in 2020 and a list of previously abandoned monitoring wells.

Work would also occur to address any other failures or potential failures associated with reclamation work such as leaking adit plugs, compromised impermeable liners, etc. It is also likely that periodic entry into the manhole outside the McLaren Adit will be required to flush the seepage collection piping system with a high-pressure hose (Werner, 2012). For purposes of cost estimating, it is assumed that such measures will be required once every three years as described in Appendix B.

2.7 PREPARE ANNUAL REPORTS

Two abbreviated project documents will be prepared annually during the long-term operations and maintenance period that include many of the items discussed in Section 2.0. These documents are summarized in **Table 9** along with a description of the document contents and approximate delivery schedule.

TABLE 9
PROJECT DOCUMENT LIST
Long-Term Operations and Maintenance Plan

Deliverable Title	Contents	Delivery Schedule
Annual Surface Water and Groundwater Monitoring Report	Results and analyses of ongoing surface water and groundwater monitoring	Every February through 2032
Annual Activities Report	Summary of project activities completed during the year, including reclamation monitoring results, and a summary of those to occur the following year.	Every February through 2032

2.8 AGENCY LIAISON

It is anticipated that a number of days will need to be devoted to agency liaison related issues. These issues would include such items as preliminary discussion of surface and groundwater quality data during preparation of annual monitoring reports and similar issues. Data and reports related to TMDL and site-specific water quality standards review may also be prepared for presentation to DEQ, BER, Consent Decree participants, and other interested parties during meetings. These meetings / data collection activities will involve both contractor and US Forest Service personnel coordination to produce various working documents and deliverables.

The budget for this task includes only contractor's costs. Forest Service costs are included in Task 2.9.

2.9 FOREST SERVICE COSTS

The Forest Service will have both administrative and other project oversight costs associated with the Site-Wide, Long-Term Operations and Maintenance Plan. These costs are included in **Appendix B**.

3.0 COST ESTIMATION

Costs for long-term operations and maintenance activities have been estimated and are provided in **Appendix B**.

4.0 REFERENCES

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APPENDIX A

Well Abandonment

Fifty-eight monitoring wells were identified for abandonment during the 2006 work season (**Figure A1**). Of these 58 wells, five could not be located in the field, 11 had water levels that were above the ground surface and were abandoned using pressure grouting, and the remaining 42 wells were abandoned by filling the well casing with bentonite, cutting the casing off three feet below the ground surface, backfilling the disturbance and revegetating. **Table A1** lists each of these wells and the date and method used for abandonment. **Table A2** listswells scheduled in for abandonment in 2020.

NEWWORLD\cadpro\workplan\2005\all_well_locations_04_05.dwg

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

N

0 Feet 2000
Scale 1:24,000

MAXIM TECHNOLOGIES 4560831.112

District Boundary
Forest Boundary
Roads

Groundwater Monitoring Well
Groundwater Monitoring Well Abandoned

Monitoring Wells Abandoned
New World Mining District
Response and Restoration Project
Cooke City Area, Montana
Figure A1

TABLE A1
2006 WELL ABANDONMENT PROGRESS LIST
NEW WORLD RESPONSE AND RESTORATION

Drainage	Well ID		Mine Coord	Mine Coord	Mine Elevation	Coordinates (State Plan NAD 83)			Location	Casing Diam. (in)	Approximate Cased Depth (ft below ground surface)	Well Screen (ft)	Well Protector		Water Measure Date	Depth to Water (fom TOC)	Casing Stickup	Water above or below GS	Needs pressure grouting? Yes/No	Field Observation	Date filled with bentonite chips	lbs bentonite used	Hydrated?	Date casings cut below grade and site restored
Fisher Ck	KP92	1	42831.38	61584.54	8797.74				Fisher Ck	1.5	35.5	25.5-35.5	4" steel		8/24/2006	6.8	2.5	below		50 ft W of Fisher Cr in trees along old access track, up from MW-4				9/29/2006
Fisher Ck	KP92	2	44900.67	57168.66	8902.32	89795.2	565872.3		Fisher Ck	1.5	43.8	33.8-43.8	4" steel		9/14/2006	3.4	1.9	below		Steel cap off	9/14/2006	32	yes	9/25/2006
Fisher Ck	KP92	4	43761.07	61221.74	8859.19	89442.6	567099.8		Fisher Ck	1.5	39.0	38.5-48.5	4" steel		8/23/2006	17.3	1.6	below		Up old track off Fisher Cr Rd. Track is 0.1 mile up from Goose Lake Rd	8/23/2006	20	yes	9/25/2006
Fisher Ck	KP92	5	44083.91	60308.71	8860.38	89541.92	566817.3		Fisher Ck	1.5	35.3	25.3-35.3	4" steel		8/23/2006	7.8	1.3	below			8/23/2006	25	yes	9/29/2006
Fisher Ck	KP92	6	44702.64	58848.41	8892.09	89734.1	566384.4		Fisher Ck											Cannot locate in field				
Fisher Ck	KP92	7	44715.75	58031.95	8705.13	89795.29	566135.3		Fisher Ck	1.5	38.5	28.5-38.5	4" steel	Artesian	8/23/2006	0.0	NM	--	YES	200 feet above Fisher Cr Rd via access track visible from road				9/28/2006
Fisher Ck	KP92	8	44611.37	57442.64	8894.73	89737.19	565978.8		Fisher Ck	1.5	51.0	41-51	4" steel		9/25/2006	2.2	1.2	below		On WEST side of Fisher Cr, can see from Fisher Cr Rd	9/25/2006	18	yes	9/25/2006
Fisher Ck	KP92	9	44254.85	58283.12	8872.12	89597.3	566156.4		Fisher Ck	1.5	50.0	41-51	4" steel		8/24/2006	4.4	2.2	below						9/28/2006
Fisher Ck	KP92	10	43564.77	58471.56	8953.69	89390.69	566264.4		Fisher Ck	1.5	94.5	74.5-94.5	4" steel		8/24/2006	+10		below		At end of track going uphill. Track is approx 480 ft downstream of SB-25				9/28/2006
Fisher Ck	KP92	11	44481.54	59504.18	8882.57				Fisher Ck	1.5	32.0	22-32	4" steel		8/23/2006	17.5	1.7	below			8/23/2006	22	yes	9/28/2006
Fisher Ck	KP92	12	43872.34	59344.71	8852.11	89484.16	566535.3		Fisher Ck	1.5	35.5	26.5-36.5	4" steel		9/14/2006	0.9	2.3	ABOVE	YES	Head down small road from SB-26				9/28/2006
Fisher Ck	KP92	13	43112.73	59702.55	8908.01				Fisher Ck	1.5	49.0	40-50	4" steel		8/24/2006	11.5	2.0	below		Head uphill in SE direction from wood debris pile (betw SB-26 and SB-27) into open area				9/28/2006
Fisher Ck	KP92	14	43251.84	60465.83	8848.81	89221.96	566834.2		Fisher Ck	1.5	37.0	27-37	4" steel		8/24/2006	5.3	2.2	below		Approx 250 ft downstream and 20 ft lower than SB-27				9/28/2006
Fisher Ck	KP92	15	41988.40	62045.23	8745.15	88908.36	567340.4		Fisher Ck	1.5	36.9	26.9-36.9	4" steel		9/14/2006	4.3	2.4	below			9/14/2006	28	yes	9/29/2006
Soda Butte	MW	12				86974.23	567566.1		1/4 mi W of Fisher Ck Rd	4	5.0	2.5-5.0	6" steel							Cannot locate in field				
Fisher Ck	SB	5	46113.22	55051.80	9010.1				Near MW-10	2	25.0	12-22	6" steel		8/23/2006	4.4	1.5	below		Track on right past MW-10A and 10B, off of Gold Dust road	8/23/2006	26	yes	9/26/2006
Fisher Ck	SB	9 B																		Cannot locate in field				
Fisher Ck	SB	9	46816.52	54679.72	9047.5				None given	2	20.5	13-20	NG	Artesian					YES					9/27/2006
Fisher Ck	SB	10 B							10' W of MW-10 -											Cannot locate in field				
Fisher Ck	SB	13	46352.99	54665.13	9068.4	90241.11	565112.9		Fisher Ck	1.5	99.0	70-99.5	6" steel		8/23/2006	9.9	2.4	below		Off track going to weather station from Gold Dust mine road, flagged	8/23/2006	65	yes	9/26/2006
Fisher Ck	SB	14	46624.89	54982.43	9056.2	90323.29	565212.2		Fisher Ck	1.5	100.0	85-99.5	6" steel		9/26/2006	9.3	2.3	below			9/26/2006	51	yes	9/26/2006
Fisher Ck	SB	14 A				90302.95	565229.9		Fisher Ck	2	45.3	25-45	4" steel		8/22/2006	13.1	2.5	below			8/22/2006	64	yes	9/26/2006
Fisher Ck	SB	14 B				90305.2	565189.4		8' NE of Bechtel's deep SB-14	2	71.5	56-71	4" steel		8/22/2006	11.9	2.2	below			8/22/2006	77	yes	9/26/2006
Fisher Ck	SB	15 A				90414.34	565345.5		Twinned with SB-15B Bechtel	2	37.0	12-37	4" steel		9/26/2006	17.5		below			9/26/2006	65	yes	9/26/2006
Fisher Ck	SB	15 (B)	46873.53	55358.39	9130.7	90401.24	565323.4		Fisher Ck	1.5	55.5	45.6-53.1	6" steel		9/26/2006	16.5		below			9/26/2006	32	yes	9/26/2006
Fisher Ck	SB	17 A				90415.35	565157.6		W of SB-14	2	30.0	15-30	4" steel		8/18/2006	15.3	1.9	below			8/18/2006	40	yes	9/26/2006
Fisher Ck	SB	17	46886.77	54903.80	9070.7	90404.75	565189.7		Fisher Ck	1.5	49.5	39.5-49.1	6" steel		8/18/2006	0.6	2.0	below			8/18/2006	30	yes	9/26/2006
Fisher Ck	SB	18	46732.04	56105.64	9195.5	90356.02	565548.1		Fisher Ck	1.5	48.0	27.3-46.5	6" steel	Artesian					YES	Turnoff at rock cairn, approx 300 ft below SB-14				9/27/2006
Fisher Ck	SB	19	47250.36	55443.93	9217.2	90514.34	565347.9		Fisher Ck	1.5	38.0	28.5-38.5	6" steel	Artesian					YES	Flagged through woods up old paths - start across from well SB-14				9/27/2006
Fisher Ck	SB	20	47866.87	54564.96	9230.7	90705.3	565086.9		Fisher Ck	1.5	49.0	29-48.6	4" steel		9/26/2006	20.7		below		E of Tredennic stream course above Fisher Cr road	9/26/2006	42	yes	9/26/2006
Fisher Ck	SB	21	48223.93	54020.61	9235.2	90814.93	564922.8		Fisher Ck	1.5	60.5	55-60	6" steel	Artesian					YES	Go up road approx. 300' from SW-3 st., then proceed uphill on old path approx. 300'				9/27/2006
Repository	SB	22	35960.03	64376.55	8169.8	87040.318	568049.4952	2492.25	SE of Repository	2	68.0	58.3-67.9	6" steel	Artesian					YES	Well protector is heavy gage steel casing				9/29/2006
Repository	SB	22 TS				87038.2658	568044.3602	2492.0787	SE of Repository	2	23.5	20.5-23.5	6' of 6" steel		8/23/2006	6.8	2.0	below			8/23/2006	21	yes	9/29/2006
Repository	SB	22 TD				87038.2658	568044.3602	2492.1242	SE of Repository	2	40.0	36-39	6' of 6" steel		8/23/2006	6.6	2.6	below			8/23/2006	50	yes	9/29/2006
Repository	SB	23	36593.85	64506.37	8252.1	87232.8052	568090.174	2517.2628	SE of Repository	2	70.5	50.7-70.3	6" steel		8/24/2006	8.9	2.6	below		Well protector is heavy gage steel casing		91	yes	9/30/2006
Repository	SB	23 TS				87225.7796	568092.3518	2517.2512	SE of Repository	2	8.0	6-9	6' of 6" steel		8/24/2006	7.2	2.0	below				11	yes	9/30/2006
Repository	SB	23 TD				87228.6375	568090.4857	2517.3823	SE of Repository	2	19.0	16-19	6' of 6" steel		8/24/2006	7.3	2.8	below				35	yes	9/30/2006
Repository	SB	24	35783.79	64645.47	8145.5	86986.769	568131.1882	2486.1071	SE of Repository	2	70.0	50-69.6	6" steel	Artesian	8/24/2006	0.6	2.0	ABOVE	YES	Well protector is heavy gage steel casing				9/30/2006
Repository	SB	24 T				86988.5467	568125.3697	2486.3698	SE of Repository	2	10.0	6-9	6' of 6" steel		8/24/2006	9.5	2.0	below						9/30/2006
Fisher Ck	SB	25	44090.00	58185.00	8720 NS				Fisher Ck	2	50.0	open end	6" steel	Artesian					YES	Visible from road on west side of Fisher Cr				9/28/2006
Fisher Ck	SB	26	43700.00	59110.00	8755 NS				Fisher Ck	2	60.0	open end	6" steel	Artesian					YES					9/28/2006
Fisher Ck	SB	27	43290.00	60145.00	8690 NS				Fisher Ck	2	68.0	open end	6" steel		8/24/2006	6.2	2.2	below		Continue on small road past wood debris pile				9/28/2006
Fisher Ck	SB	28	43440.00	61390.00	8810 NS				Fisher Ck	2	70.0	open end	NG							Cannot locate in field				
Repository	SB(GW)	101				87164.7862	567849.1789	2696.8306	S SE of Repository	2	100.0	92-102	6' of 6" steel	Artesian	9/14/2006	1.1	2.1	ABOVE	YES					9/30/2006
Repository	SB(GW)	101 TS				87160.0794	567843.4401		S SE of Repository	2	22.0	19-22	6' of 6" steel		8/24/2006	13.1	2.5	below			8/24/2006	30	yes	9/30/2006
Repository	SB(GW)	101 TD				87163.3731	567844.0073	2695.3896	S SE of Repository	2	33.0	29-33	6' of 6" steel		8/24/2006	11.5	1.7	below			8/24/2006	38	yes	9/30/2006
Repository	SB(GW)	101 TDD				87161.8165	567849.0346	2693.859	S SE of Repository	2	76.5	73.5-76.5	6' of 6" steel		8/24/2006	2.6	2.0	below						9/30/2006
Repository	SB(GW)	102				87015.8329	567878.326	2502.45	S SE of Repository	2	29.0	19.5-29.5	6' of 6" steel		9/14/2006	4.1	1.7	below			9/14/2006	39	yes	9/30/2006
Repository	SB(GW)	102 T				87019.7306	567884.6349	2502.627	S SE of Repository	2	8.0	5-10	6' of 6" steel		8/23/2006	7.9	2.4	below			8/23/2006	12	yes	9/30/2006
Repository	SB(GW)	103				87069.2003	568180.7927	2488.8189	S SE of Repository	2	50.0	40-50	6' of 6" steel		8/24/2006	1.8	2.0							9/29/2006
Repository	SB(GW)	103 TS				87068.4567	568173.2884	2489.3538	S SE of Repository	2	13.0	10-13	6' of 6" steel		8/24/2006	7.2	2.0	below				19	yes	9/29/2006
Repository	SB(GW)	103 TD				87070.3269	568176.4902	2489.3624	S SE of Repository	2	18.5	18-21	6' of 6" steel		8/24/2006	7.2	2.5	below				25	yes	9/29/2006
Fisher Ck	Tracer	7 (BC-12)				90527.03	564241.5		E flank Fisher Mtn.	3.5	49.0	--	none		9/28/2006	dry	1.7	below		Remote well	10/2/2006	70	yes	10/2/2006
Fisher Ck	FCGW	130				90527.03	564241.5		Upper Como Basin	2	9.0	4-9	6' of 6" steel		8/24/2006	dry	3.0	below			9/26/2006	15	yes	9/25/2006
Repository	WCW	1							Homestake & Lulu Rd Junction	2	16.0	--	none		9/28/2006	10.5	0.7	below		Observed white PVC pipes from roadside - NW well	10/2/2006	20	yes	10/2/2006
Repository	WCW	2							Homestake & Lulu Rd Junction	2	12.3	--	none		9/28/2006	10.6	1.7	below		Observed white PVC pipes from roadside - NE well	10/2/2006	17	yes	10/2/2006
Repository	WCW	3							Homestake & Lulu Rd Junction	2	19.4	--	none		9/28/2006	6.9	2.2	below		Observed white PVC pipes from roadside - SW Well	10/2/2006	26	yes	10/2/2006
Repository	WCW	4							Homestake & Lulu Rd Junction	2	11.2	--	none		9/28/2006	10.3	1.3	below		Observed white PVC pipes from roadside - SE well	10/2/2006	15	yes	10/2/2006

Notes: GS Ground Surface Artesian: Defined here as flowing well -- : Not determined

Well with groundwater level higher than ground surface and that required pressure grouting

Brown highlighting of fields indicates that well has been filled with bentonite, cut off approx. 3 feet below ground surface, backfilled, and site reclaimed

Blue highlighting of fields indicates that the well could not be located in the field

Summary:
Out of 58 wells scheduled for abandonment, five wells could not be located in the field and therefore, 53 were abandoned.
11 of these wells had water levels at or above ground surface during the time of abandonment in late September/October 2006
and therefore, had to be pressure grouted.

TABLE A2
WELLS SCHEDULED FOR ABANDONMENT IN 2020
NEW WORLD RESPONSE AND RESTORATION

DRAINAGE BASIN	WELL DESIGNATION	Mine Coord North (Log)	Mine Coord East (Log)	Mine Elevation (Log)	Coordinates (State Plan NAD 83) N	E	Elevation GS	DESCRIPTIVE LOCATION	PVC CASING DIAMETER	TOTAL (PVC) CASED DEPTH	SCREENED INTERVAL	SCREENED INTERVAL	PROTECTOR MATERIAL	BOTTOM OF STEEL CASING	APPROX DTGW
		feet	feet	feet	meters	meters	meters		inches	feet	From (feet)	To (feet		feet	feet
DAISY CR	DCGW 100							Above McLaren Pit	4	235.0	185	235	8" steel	15.0	100
DAISY CR	DCGW 101 S							Below McLaren Pit	2	12.0	7	12	5' of 6" steel	2.0	7
DAISY CR	DCGW 101 D							Below McLaren Pit	2	25.0	20	25	5' of 6" steel	2.0	5
DAISY CR	DCGW 102 S							Below McLaren Pit	4	29.0	19	29	10' of 8" steel	7.0	21
DAISY CR	DCGW 102 D							Below McLaren Pit	2	55.0	50	55	5' of 6" steel	2.0	5
DAISY CR	DCGW 103 S							Below McLaren Pit	2	30.0	25	30	5' of 6" steel	2.0	3
DAISY CR	DCGW 103 D							Below McLaren Pit	2	50.0	45	50	5' of 6" steel	2.0	Artesian
DAISY CR	DCGW 104				90152.147	563959.709		In McLaren Pit	2	21.5	16.5	21.5	5' of 6" steel	2.0	20
DAISY CR	DCGW 105				90264.942	564011.586		In McLaren Pit	2	27.0	22	27	5' of 6" steel	3.0	25
DAISY CR	DCGW 106				90194.087	563754.791	2905.555	Below McLaren Pit	2	42.5	31.5	42.5	5' of 6" steel	2.0	Artesian
DAISY CR	DCGW 107				90113.461	563748.053	2882.851	Below McLaren Pit	2	23.0	18	23	5' of 6" steel	2.5	16
DAISY CR	DCGW 108				90064.175	563718.251	2872.71	Below McLaren Pit	2	11.0	6	11	5' of 6" steel	2.5	17
DAISY CR	DCGW 109				90035.362	563762.601	2869.885	Below McLaren Pit	2	15.0	10	15	5' of 6" steel	2.5	7
DAISY CR	DCGW 110				90087.282	563661.528	2873.001	Below McLaren Pit	2	9.0	4	9	5' of 6" steel	2.5	6
DAISY CR	DCGW 111 S				90150.071	563913.678	2909.611	Below McLaren Pit	2	23.0	11	23	5' of 6" steel	3.0	4
DAISY CR	DCGW 111 D				90149.117	563915.379	2909.474	Below McLaren Pit	2	40.0	25	40	5' of 6" steel	3.0	11
DAISY CR	DCGW 112							Below McLaren Pit	2	35.0	20	35	5' of 6" steel	3.0	7
DAISY CR	DCGW 131				90270.175	563806.964	2922.835	Below McLaren Pit	2	20.0	17	20	5' of 6" steel	3.0	-2
DAISY CR	DCGW 132				89955.125	563791.489	2861.26	Below McLaren Pit	2	10.0	5	10	5' of 6" steel	3.0	5
DAISY CR	DCGW 133				90041.047	563842.482	2873.988	Below McLaren Pit	2	9.0	4	9	5' of 6" steel	3.0	4
DAISY CR	DCGW 134				89900.415	563735.538	2853.735	Below McLaren Pit	2	9.5	4.5	9.5	5' of 6" steel	3.0	4
DAISY CR	DCGW 135				89906.787	563892.725	2854.777	Below McLaren Pit	2	7.5	4	7.5	5' of 6" steel	3.0	6
DAISY CR	DCGW 136				89943.501	563574.17	2852.268	Below McLaren Pit	2	9.5	4.5	9.5	5' of 6" steel	3.0	3
DAISY CR	DCGW 137				89986.115	563499.153	2848.146	Below McLaren Pit	2	15.5	7.5	15.5	5' of 6" steel	2.5	3
DAISY CR	DCGW 138				89898.734	563878.805	2860.767	Below McLaren Pit	2	19.5	9.5	19.5	5' of 6" steel	2.0	5
DAISY CR	MW 2				90038.3	563901.8		McLaren Deposit	4	60.0	40	60	steel		1
DAISY CR	MW 3				90098.9	563902		Daisy Cr Bottom	4	46.0	16	46	6" steel	17.5	10
DAISY CR	MW 8				91259.99	563677		Waste Rock Area	4	39.0	19	39	6" steel	13.5	13
DAISY CR	TRACER 2				90406.14	564019.2		Above McLaren Pit	2	129.0			4" steel		23
FISHER CR	EPA 11				91305.84	564057		Como Basin	4	151.0			8" steel		94
FISHER CR	EPA 12				91247.4	564186		Como Basin	4	151.0			8" steel		22
FISHER CR	FCGW 130				91150.048	563836.781	3001.043	Como Basin	2	9.0	4	9	5' of 6" steel	2-3	11
FISHER CR	KP92 6	44702.64	58948.41	8892.09	89734.1	566384.4		No indication of well completion							
FISHER CR	MW 1				91223.44	564076.5		Como Deposit	4	105.0	85	105	3' of 6" steel		65
FISHER CR	MW 4				89100.85	567292.1		2.5 mi downstream of Glengarry adit	4	25.0	5	25	2' of 6" steel		21
FISHER CR	MW 9 A				90912.13	564727		Just off bench area, 100 yd below Glengarry adit	4	18.7	9	19	6" steel		5
FISHER CR	MW 9 B				90926.4	564713.2		12' NW of MW-9A	2	58.0	48	58	6" steel	6.0	Artesian
FISHER CR	MW 10				90128.16	565294.5		Just upstream from rd crossing to weather station on Fisher cr	NR	7.5	4	8	8" steel		3
FISHER CR	MW 10 A				90129.1	565297.6		Wells MW-10, 10A, 10-B are together	4	7.0			8" steel		3
FISHER CR	MW 10 B				90145.83	565232.4		10' W of MW-10, 20' S of Fisher cr near weather st	2	28.3	13.3	28.3	4" steel	3.0	Artesian
FISHER CR	MW 11				89778.51	565695.2		Bench on S side of Miller cr below mill location	2	18.5	8.5	18.5	8" steel		9
FISHER CR	MW 13				88407.57	566942.1		off rd accessing Henderson mtn from Fisher Cr Road, next to TP-9	4	8.0	5	8	5' of 6" steel		NR
FISHER CR	SB 10				90933.23	564615.3		No indication of well completion		21	11	21			
FISHER CR	SB 11 A	48858.75	53235.38	9247.3	90992	564682.4		None given	2	17.0	7	17	NG		NR
FISHER CR	SB 16 A				90334.24	565981.3		10' W of SB-16, 120' S of Fisher cr	2	12.0	7	12	5' of 4" steel		NR
FISHER CR	SB 16	46700.70	54559.67	9059.3	90334.22	565982.3			2	50.5	35.4	50	6" steel	2.9	11
FISHER CR	SB 20	43440.00	61360.00	8810				NR	2	70.0	open end		NG		0
FISHER CR	TRACER 4				91074.2	563978.7		At S edge of Como Basin	2	200.0			4" steel		100
FISHER CR	TRACER 5				90999.4	564180.3		S of SW station FCT-11 along reclaimed drill road	2	NG			4" steel		Artesian
MILLER CR	MW 5 A				88701.01	564304.4		U Miller Cr	4	30.0	20	30	6" steel	16.5	25
MILLER CR	MW 5 B				88768.15	564298.6		Miller Cr Drainage (bedrock)	4	93.0	63	93	6" steel	31.0	30
MILLER CR	MW 5 C							U Miller Cr	2	113.0	83	113	6" steel	54.0	43
MILLER CR	MW 5 P				88748.09	564301.2		U Miller Cr	4	93.0	63	93	6" steel	54.0	31
MILLER CR	MW 11 A							300' downhill of Daisy Pass Road and SW of Little Daisy Adit	2	260.0	230	260	12' of 6" steel		134
MILLER CR	MW 11 B							300' downhill of Daisy Pass Road and SW of Little Daisy Adit	2	242.0	212	242	12' of 6" steel		126
MILLER CR	MW 11 P							300' downhill of Daisy Pass Road and SW of Little Daisy Adit	4	245.0	195	245	20' of 6" steel	18.0	136
SB-REPOS	SBGW 105				87495.2	567637.3			2	34.0	29	34	4' of 6" steel		7
SB-REPOS	SBGW 105 T				87495.8	567640.9			2	15.0	12	15	5' of 6" steel		7
SB-REPOS	SBGW 108				87339.9838	567685.0283	2871.1105		2	31.0	26	31	5' of 6" steel	2.5	7
SB-REPOS	SBGW 108 T				87340.3585	567688.0768	2871.5037		2	13.0	10	13	5' of 6" steel	3.0	7
SODA BUTT	MW 6				87107.7	566286.8		Downgradient edge of the Alice E. pit	4	42.0	22	42	Steel		44
SODA BUTT	MW 12				86974.23	567566.1		1/4 mi W of Fisher cr rd at first large meadow from the beginning of the road	4	5.0	2.5	5	6" steel		NR

Notes: A blank field indicates that no information was found that particular well.
In addition to Mine Coordinates and State Plan NAD 83 Coordinates, many of the wells/piezometers have UTM coordinates. The UTM coordinates are not shown in this database.

ELEVATION GS : Elevation (in meters) at ground surface

TOTAL (PVC) : Approx. measurement from ground surface

SCREENED : Approx. measurement from ground surface

WELL COMPL : If yes, then abandonment could be conducted with PVC casing in place. If no, then borehole may need to be abandoned.

Well Information References:

1 of operations - New World Project, Volumes 4A and 7. Bozeman Storage: Shelf

2 t, Huntingdon E & E, Inc., February 1995. Bozeman Storage: File Cabinet 4, Drawer 1

3 oranda, Inc. New World Project Area, Hydrometrics, May 1990. Bozeman Storage: File Cabinet 2, Drawer 1.

4 World Mining District, Maxim Technologies, Inc., December 1999.

5 m GW monitoring log

6 :t Response and Restoration Project, Maxim Technologies, Inc., January 7, 2004.

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APPENDIX B

Cost Estimation

Costs for long-term operations and maintenance activities have been estimated and are shown for each year of the operations and maintenance period between 2020 and 2032 in **Table B1**.

Costs are estimated based on a number of assumptions including average annual inflation rate, discount rate, and frequency of certain operations and maintenance activities such as soil sampling during reclamation monitoring, reseeding, and replacement of culverts. These assumptions are explained in more detail below.

Average inflation rate was estimated using the data provided by Capital Professional Services (http://inflationdata.com/inflation/default.asp), particularly average inflation available for the years that the New World Mine Reclamation Project has been active; 2000 through 2018 (https://inflationdata.com/Inflation/Inflation/DecadeInflation.asp). These data indicate that 3 % is a reasonable estimate for annual inflation for the operations and maintenance period from 2020 through 2032.

A discount rate of 1.5 % was used to calculate Net Present Value for purposes of estimating the amount of money that should be invested in order to cover costs during the remainder of the 20-year operations and maintenance period (Werner, 2020).

Costs associated with surface water and groundwater quality monitoring are based on the assumption that only the monitoring stations listed in **Tables 1** and **5** (see report text) would be monitored for the entirety of the operations and maintenance period. However, the decision to remove additional stations from the monitoring schedule may be warranted at some point. Surface water and groundwater quality data will be reviewed, and Agency partners will be consulted to guide decisions on whether to continue monitoring at specific locations and/or times.

Costs associated with reclamation monitoring assume that site-wide area monitoring will occur every five years during the operations and maintenance period. The estimate also assumes that six soil samples will be collected and analyzed during each monitoring event.

Maintenance and erosion control costs were estimated assuming that such activities would occur once every three years. Material costs include cleaning ditches and culverts, regrading, re-seeding, erosion mat, and other miscellaneous items. Maintenance costs also include replacement of the continuous water-level meter installed in the repository sump. Meters installed in other wells are not included in the cost estimate and will only be replaced on a to-be-determined basis. These costs were amortized over all years of the operations and maintenance period.

TABLE B-1
COST ESTIMATE
Long-Term Operations and Maintenance Plan

Task		2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total
SUBTASK No. 1 - Project Administration		**$6,742**	**$6,958**	**$7,180**	**$7,409**	**$7,631**	**$7,860**	**$8,096**	**$8,338**	**$8,588**	**$8,845**	**$9,110**	**$9,382**	**$9,663**	**$105,803**
SUBTASK No. 2 - Public/Technical Meetings		**$11,412**	**$11,755**	**$12,109**	**$12,473**	**$12,827**	**$13,191**	**$13,565**	**$13,951**	**$14,348**	**$14,757**	**$15,177**	**$15,464**	**$15,909**	**$176,937**
SUBTASK No. 3 - Maintain Project Database		**$1,313**	**$1,355**	**$1,398**	**$1,443**	**$1,486**	**$1,531**	**$1,577**	**$1,624**	**$1,673**	**$1,723**	**$1,774**	**$1,828**	**$1,882**	**$20,605**
SUBTASK No. 4 - SURFACE WATER AND GROUNDWATER MONITORING															
4A - Surface Water/Groundwater Quality Monitoring - July Event		**$19,562**	**$20,071**	**$20,596**	**$21,135**	**$21,660**	**$22,199**	**$22,754**	**$23,324**	**$23,910**	**$24,512**	**$25,131**	**$29,105**	**$29,793**	**$303,752**
4B - Surface Water Quality Monitoring - September/October Event		**$15,358**	**$18,578**	**$19,074**	**$19,585**	**$20,082**	**$20,592**	**$21,117**	**$21,657**	**$22,212**	**$22,783**	**$23,370**	**$27,096**	**$27,748**	**$279,254**
4C - Surface Water/Groundwater Monitoring Report		**$5,214**	**$5,378**	**$5,548**	**$5,723**	**$5,893**	**$6,068**	**$6,248**	**$6,433**	**$6,624**	**$6,820**	**$7,023**	**$7,220**	**$7,434**	**$81,627**
4D - Repository Pumping		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SUBTASK No. 5 - Aquatics Monitoring		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SUBTASK No. 6 - Reclamation Monitoring		**$0**	**$8,498**	**$0**	**$0**	**$0**	**$0**	**$10,041**	**$0**	**$0**	**$0**	**$0**	**$11,516**	**$0**	**$30,055**
SUBTASK No. 7 - Maintenance and Erosion Control		**$10,883**	**$11,122**	**$11,366**	**$11,618**	**$11,863**	**$12,115**	**$12,374**	**$12,639**	**$12,911**	**$13,190**	**$13,476**	**$13,191**	**$13,487**	**$160,234**
SUBTASK No. 8 - Other Annual Reports (Scope of Work, Annual Activities Memo)		**$2,288**	**$2,361**	**$2,436**	**$2,514**	**$2,590**	**$2,667**	**$2,747**	**$2,830**	**$2,915**	**$3,002**	**$3,092**	**$3,185**	**$3,281**	**$35,908**
SUBTASK No. 9 - Agency Liaison		**$16,331**	**$16,847**	**$17,379**	**$17,928**	**$18,460**	**$19,007**	**$19,571**	**$20,152**	**$20,750**	**$21,366**	**$22,000**	**$22,618**	**$23,290**	**$255,699**
SUBTASK No. 10 - US Forest Service Administrative Costs		**$2,534**	**$2,610**	**$2,688**	**$2,768**	**$2,852**	**$2,937**	**$3,025**	**$3,116**	**$3,209**	**$3,306**	**$3,405**	**$3,507**	**$3,612**	**$39,568**
Total	Annual	$91,635	$105,531	$99,775	$102,598	$105,344	$108,168	$121,115	$114,063	$117,139	$120,303	$123,559	$144,112	$136,100	
	Cumulative	$91,635	$197,166	$296,940	$399,539	$504,882	$613,050	$734,165	$848,228	$965,367	$1,085,671	$1,209,230	$1,353,342	$1,489,442	$1,489,442
Net Present Value		**$90,280**	**$192,716**	**$288,132**	**$384,798**	**$482,584**	**$581,509**	**$690,637**	**$791,892**	**$894,340**	**$998,002**	**$1,102,895**	**$1,223,429**	**$1,335,579**	**$1,335,579**

Notes:
- Costs are based on updated (2020) Long-Term Operations and Maintenance Plan.
- Spreadsheet does not include $69,874.11 cost to abandon monitoring wells approved by Modification P00001 to Task Order 12034318F0599 Contract 12034318A0012.
- Tetra Tech labor rates (Tasks 1 through 9) for 2020 through 2023 are based on Option Years 1 through 4 for Contract 12034318A0012.
- Tetra Tech labor rates (Tasks 1 through 9) beginning in 2024 and USFS labor rates (Task 10) beginning in 2021 are based on 3% annual inflation rate.
- Indirect costs assume a 1% annual inflation rate.
- Disount Rate for Net Present Value calculation was assumed to be 1.5% based on current New World Mine account rate of return (Werner. 2020. Discount Rate for New World Mine Long-Term Operating and Maintencance Cost Projection. March 4).