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 1999, 2000, 2001, 2002/2003, 2003/2004, 2004/2005, 2005/2006, 2006/2007, 2007/2008, 2008/2009, and 2009/2010 Work Plans (Maxim, 1999b; 2000; 2001a; 2002a; 2003a; 2004a; 2005a; 2006a; Tetra Tech 2007a, 2008a, and 2009a).

The Final Revised Site-Wide, Long-Term Operations and Maintenance Plan (Tetra Tech, 2012) described below provides descriptions of annual monitoring tasks that will be completed to determine whether additional maintenance of reclaimed sites and the repository is needed, how maintenance work will be done, and estimated costs of site-wide monitoring and maintenance. This long-term operations and maintenance plan for the project begins after reclamation actions are complete and covers activities that will occur for the following 20 years. It is estimated the operations and maintenance period will begin in 2012 and end in 2032. This Plan is intended to modify the Overall Work Plan (Maxim, 1999a), and the Repository Monitoring Plan (Maxim, 2006c) during the years of its implementation.

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.

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 has 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.

1.1 PURPOSE AND OBJECTIVES

The primary purpose of this statement of work is to guide project activities that will be conducted for the first year of long term operations and maintenance work in the District in accordance with the Long-Term Operations and Maintenance Plan. Primary objectives for work covered in the Long-Term

Operations and Maintenance Plan are to document and monitor the effectiveness of reclamation response and restoration actions; to provide for maintenance actions as required to ensure long-term stability of erosion controls and reclamation covers; to monitor surface and groundwater quality and to satisfy the requirements of the rule allowing adoption of temporary water quality standards.

2.0 SCOPE OF WORK

The work for the first year (2012-2013) under the Site-Wide, Long-Term Operations and Maintenance Plan Tetra Tech, 2012) will include the following activities:

- Maintain community relations. It is anticipated that up to two meetings will be held annually. A summer meeting will be held in Cooke City on August 9, 2012. A winter technical meeting may be held in Bozeman.
- Maintain the project database.
- Continue monitoring surface water and groundwater quality in the District as required by the BER for verification that temporary water quality standards are being met.
- Continue monitoring surface water and groundwater quality in the District, including monitoring surface water and groundwater conditions downstream of the Como Basin capped reclamation area, downstream of the closed Glengarry Adit, and downstream and within the capped McLaren Pit. In connection with this monitoring, the USFS will continue to work with the State to determine the actions necessary to support an administrative wrap-up of the temporary water quality standards and the project, such as site specific standards if necessary or other resolution.
- Continue to monitor the New World Waste Repository at the Repository Sump and select groundwater locations. Solution accumulating within the Repository Sump will be pumped as necessary and pumping events are estimated to occur once a year.
- 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.

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 the restoration project.

As many as two public meetings will be held this year. At these meetings, summary monitoring data and results will be presented, and the meeting facilitated by a USFS representative. Tetra Tech will provide the technical support necessary to provide updated site information and any other logistical support for the meetings.

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

this year. Four copies of the updated database will be provided to the Forest Service on a compact disc. Database queries of the database will be made available on compact disc upon request from the USFS.

2.3 SURFACE WATER QUALITY MONITORING

Surface water quality monitoring will be conducted this 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 required for monitoring for compliance with temporary water quality standards (**Table 1**) (Stanley and Maxim 1998; and Maxim 2003c). Stations SW-2 in Miller Creek and SBC-102, in Soda Butte Creek at the west end of the town of Cooke City would no longer be monitored. Sites FCT-11 on a tributary of Fisher Creek draining the Como Basin area, and DCT-8 below the McLaren pit will be added. Sampling sites for surface water during this year are 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 would be added to the parameter list for all sites (**Table 1**).

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	Temporary water quality standard required monitoring station.
DC-5*	Daisy Creek above confluence with Stillwater River	Temporary water quality standard required monitoring station
SW-7*	Stillwater River at Stillwater Trail Crossing	Temporary water quality standard required monitoring station
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	Temporary water quality standard required monitoring station
SW-4*	Fisher Creek at Lulu Pass Road Crossing	Temporary water quality standard required monitoring station
CFY-2*	Fisher Creek above Clarks Fork confluence	Temporary water quality standard required monitoring station
Clarks Fork River Drainage		
SW-6*	Clarks Fork Yellowstone River at Saw Mill Road	Temporary water quality standard required monitoring station
Soda Butte Creek Drainage		
SBC-1A	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

* Indicates stations required for temporary water quality sampling by BER.

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
Dissolved Metals	Filtered through 0.45 micron filter; HNO3 to pH < 2; Iced to 4°C	250 milliliter polyethylene
Common Ions/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
Total Dissolved Solids	None	2340C	7 days
Total Suspended Solids	None	160.2	7 days
Hardness	None	2340B	6 months
Acidity	None	305.1	14 days
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
Common Cations[2]			
Calcium	1.0	200.8/200.7	6 months
Magnesium	1.0	200.8/200.7	6 months
Potassium	1.0	200.8/200.7	6 months
Sodium	1.0	200.8/200.7	6 months
Common Anions[2]			
Sulfate	None	375.2	28 Days
Bicarbonate	None	2320B	14 Days
Carbonate	None	2320B	14 Days
Chloride	None	325.3	28 Days

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

2.4 GROUNDWATER QUALITY MONITORING

Groundwater monitoring will be conducted at the wells listed in **Table 5**. The groundwater wells listed in Table 5 would be sampled in July for a full suite of field and laboratory parameters (**Tables 6**, **7**, and **8**). The July groundwater monitoring event would involve measuring water levels, measuring field parameters and collecting samples for laboratory analysis. **Table 6** lists field parameters that will be measured and **Tables 7 and 8** list groundwater analytical parameters and practical quantification limits (PQLs).

2.4.1 New World Repository Monitoring

Groundwater monitoring would be conducted at a select subset of wells at the New World waste repository in accordance with the methods and procedures described in the New World Waste Repository Long-Term Monitoring Plan (Maxim, 2006c) at sites listed in **Table 5**. Groundwater monitoring also includes measuring depth to water in the repository sump.

Groundwater monitoring will be conducted at one well pair location (SBGW-107, and -107T) and include maintaining and downloading water level data from the continuous water level measuring instrument installed in well SBGW-107T and collecting water quality samples. Repository wells will be sampled once in early July when water levels are typically at the highest level reached during the year. Groundwater samples will be submitted to an analytical laboratory for analysis of parameters listed in **Table 8**.

Monitoring would also include maintaining and downloading water level data from the continuous water level instrument installed in the repository sump. If the sump fills to capacity with water, water in the sump will be pumped into water trucks and disposed of at the Cody, Wyoming, sewage treatment ponds. It is assumed that the sump will only need to be pumped once each year and that this would typically take place in September or October of the year. Prior to pumping, a sample will be collected from the sump for analysis of surface water quality parameters listed in **Table 4**.

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

Well No.	Year Installed	Completion Formation	Monitoring Event		
			July	Sept	Continuous
Daisy Creek / McLaren Area					
DCGW-101S	2001	Colluvium	**X**	__	__
DCGW-101D	2001	Lulu Pass Rhyodacite Porphyry	**X**	__	__
DCGW-104	2001	Waste Rock	**X**	__	**W**
DCGW-105	2001	Waste Rock	**X**	__	**W**
DCGW-132	2002	Colluvium	**X**	__	__
DCGW-133	2002	Colluvium	**X**	__	__
Fisher Creek Area					
EPA-11	1996	Tertiary Intrusive Dike	**X**	__	__
EPA-12	1996	Scotch Bonnet Diorite	**X**	__	__
FCGW-100	2004	GlengarryAdit Workings	**X**	__	__
MW-1	1989	Wolsey Shale	**X**	__	__
MW-9A	1990	Alluvium	**X**	__	__
MW-9B	1990	Precambrian	**X**	__	__
Tracer-5	1997	Fisher Mtn. Intrusive	**X**	__	__
New World Waste Repository					
Repository Sump	2002	Not Applicable	__	**F(S)**	**W**
SBGW-107T	1999	Till	**X**	__	**W**
SBGW-107	1999	Granite	**X**	__	__

Note: X Samples collected and analyzed for full suite of laboratory parameters
F Samples collected and monitored for field parameters only
(S) Repository Sump sample is collected only if water level data indicates that pumping of sump is needed (for this document, one annual pumping/sampling event is assumed to occur)
W Continuous water level monitoring
-- Indicates no monitoring.

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
Common Ions/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
Total Dissolved Solids	None	2340C	7 days
Hardness	None	2340B	6 months
Acidity	None	305.1	14 days
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
Common Cations[2]			
Calcium	1.0	200.8/200.7	6 months
Magnesium	1.0	200.8/200.7	6 months
Potassium	1.0	200.8/200.7	6 months
Sodium	1.0	200.8/200.7	6 months
Common Anions[2]			
Sulfate	None	375.2	28 Days
Bicarbonate	None	2320B	14 Days
Carbonate	None	2320B	14 Days
Chloride	None	325.3	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 MAINTENANCE AND EROSION CONTROL

The erosion control work at the Como Basin area, uphill of the cover will be completed. The design for this work has been completed and rock has been hauled to the site for this work last year.

Work may also occur to address any other maintenance, erosion control or potential failures associated with reclamation work and this task order would be amended to address any additional work. Such work may include re-grading, ditch and culvert maintenance, re-seeding, and/or installation and maintenance of silt fences and erosion matting. The manhole outside the McLaren Adit will be inspected under this task.

2.6 PREPARE ANNUAL REPORTS

Two abbreviated project documents will be prepared that include discussions of 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	February 28, 2013
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.	February 28, 2013

2.7 AGENCY LIAISON

This work shall include various discussions of technical data and issues at the site, as well as construction issues related to reclamation and physical closure of various sites. Technical memos may be requested by the Forest Service to document this work. These issues may include items such as a discussion of surface and groundwater quality data for inclusion in the preparation of annual monitoring reports, and other issues such as the approach for upcoming aquatics monitoring or proposed actions for identified erosion and maintenance concerns. Data and reports related to TMDL, temporary water quality standards review, and groundwater control districts may also need to be prepared for presentation to DEQ, BER, Consent Decree participants, and other interested parties for formal meetings and discussions. These meetings / data collection activities will involve both contractor and US Forest Service personnel coordination to produce the required working documents and deliverables.

Under this Task Order there will be a need for technical coordination and the development of documents in support of the BER annual update for the temporary water quality standards. Additionally, an in-depth review and analysis of all water quality data for the groundwater wells in the upper Fisher Creek drainage will be completed. Additional work needed at the site to explain this geochemistry will be identified during this analysis. This may involve a comparison of groundwater data

and other information from adits that have not been closed relative to the re-established groundwater regime in the vicinity of the Glengarry Adit, as a means of demonstrating the geochemical results of closure activities. This analysis will compile all previous data for these groundwater wells, as well as the 2012 data, into a technical memo providing recommendations for any additional work needed to explain the changes in the groundwater quality since the closure of the Glengarry Adit.

3.0 REFERENCES

Tetra Tech, Inc. 2012. Final Revised Site-Wide, Long Term Operations and Maintenance Plan, New World Mining District Response and restoration Project. Prepared for US Forest Service Region 1, February 2012, 29p and appendices.