

Record of Decision

Montanore Project

February 2016



Cabinet Mountains

Photo by M. Holdeman



**Montana Department of
Environmental Quality**



February 12, 2016

Dear Interested Party,

In December 2015, the Kootenai National Forest (KNF) and the Montana Department of Environmental Quality (DEQ) issued a Joint Final Environmental Impact Statement (Joint Final EIS) for the Montanore Project, a proposed copper and silver underground mine located about 18 miles south of Libby near the Cabinet Mountains of northwestern Montana. The KNF and DEQ issued a Draft EIS for the Montanore Project on February 27, 2009, for public comment. In response to public comment, the agencies revised the mine alternatives (Alternatives 3 and 4) and transmission line alignments (Alternatives C, D, and E) and issued a Supplemental Draft EIS on October 7, 2011. On April 1, 2015, the KNF issued a Final EIS and a Draft Record of Decision (ROD) to provide for a pre-decisional objection process in compliance with 36 CFR 218.

The Joint Final EIS included responses to comments on the Draft EIS and Supplemental Draft EIS and incorporated changes based on those responses. The Joint Final EIS also included revisions made as part of the Forest Service objection process. DEQ identified Mine Alternative 3 and Transmission Line Alternative D-R as its preferred alternatives in the Joint Final EIS.

DEQ has set forth its final decision and rationale in a ROD. The DEQ ROD can be downloaded as a PDF from DEQ's web page (<http://deq.mt.gov/Land/hardrock/Montanore-Mine-Project>). The KNF has documented its decision in a separate ROD. Decisions by other agencies that cooperated in the environmental review also will be documented in separate decision documents.

The DEQ ROD documents DEQ's decisions on the following: 1) the amendments to the provisions of Operating Permit No. 00150 pertaining to the Evaluation Phase of the Montanore Project to make those provisions consistent with Mine Alternative 3; 2) the Certificate of Compliance for the transmission line (Alternative D-R); and 3) the air quality permit for the Montanore Project. The Certificate of Compliance and the final decision on the air quality permit are included as attachments to the DEQ ROD. Notice of DEQ's mine, air quality, and transmission line decisions will be posted on DEQ's website and included in the KNF's notice of its decision in *The Missoulian*.

The Montana Pollutant Discharge Elimination System (MPDES) permit will not be reissued at this time. DEQ received substantial comments on the draft permit during the public comment period in October, 2015. In response to comments DEQ is making changes to the draft MPDES permit specific to effluent limits, monitoring requirements, and permit conditions. DEQ will be reopening the public comment period before reaching a final decision on the MPDES permit.

For more information, please contact the DEQ Project Coordinator: Craig Jones, Director's Office, DEQ, 1520 East Sixth Avenue, Helena, MT 59620-0901, 406-444-0514.

Sincerely,

A handwritten signature in blue ink that reads "Tom Livers".

Tom Livers
Director
Montana Department of Environmental Quality

Contents

1.1	Introduction	3
1.2	Existing Permits and Approval	4
1.2.1	Operating Permit No. 00150.....	4
1.2.2	BHES Order.....	5
1.2.3	MPDES Permit MT0030279	5
1.2.4	Permit Revisions Regarding Libby Adit.....	5
1.3	Purpose, Benefit, and Basis of Need	6
1.4	Issues Considered and Addressed.....	7
1.5	Description of the Mine and Transmission Line Alternatives	9
1.5.1	Mine Alternatives	9
1.5.2	Alternatives Eliminated from Detailed Consideration.....	14
1.6	DEQ Decisions	14
1.6.1	Amendments to Hard Rock Operating Permit No. 00150.....	14
1.6.2	Transmission Line Certificate.....	20
1.6.3	Air Quality Permit	20
1.7	DEQ Rationale for Decisions	21
1.8	Permits, Licenses, and Authorizations Needed to Implement the Decision	31
1.9	Public and Agency Participation.....	34
1.9.1	Public Participation.....	34
1.9.2	Comments Received from Tribes, Agencies, and the Public and the Agencies' Response	34
1.10	Reclamation Bond (Financial Assurance)	35
1.11	Appeal of DEQ's Decision	35
1.12	Additional Information	36
1.13	Approvals	37

Tables

Table 1. Permits, Licenses, and Approvals Required for the Montanore Project.	32
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Figures

Figure 1. Location Map, Montanore Project, Kootenai National Forest.	38
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Attachments

- Attachment 1 – Conceptual Monitoring Plans
- Attachment 2 – Major Facility Siting Act Certificate
- Attachment 3 – Air Quality Permit

Acronyms

Acronym	Definition
ARM	Administrative Rules of Montana
BHES	Board of Health and Environmental Sciences
BMU	Bear Management Unit
BORZ	(Grizzly) Bear Outside the Recovery Zone
BPA	Bonneville Power Administration
CMW	Cabinet Mountains Wilderness
CYE	Cabinet-Yaak Ecosystem
DEQ	Montana Department of Environmental Quality
DNRC	Montana Department of Natural Resources and Conservation
DSL	Montana Department of State Lands (now DEQ)
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
INFS	Inland Native Fish Strategy
KFP	Kootenai National Forest Land Management Plan
KNF	Kootenai National Forest
LAD	Land Application Disposal
LAU	Lynx Analysis Unit
MAQP	Montana Air Quality Permit
MCA	Montana Code Annotated
MEPA	Montana Environmental Policy Act
MFSA	Montana Major Facility Siting Act
MMC	Montanore Minerals Corporation
MMI	Mines Management, Inc.
MMRA	Metal Mine Reclamation Act
MPDES	Montana Pollutant Discharge Elimination System
MR	Minor Revision
NEPA	National Environmental Policy Act
NFS	National Forest System
NMC	Noranda Minerals Corporation
PSU	Planning Sub-Unit
ROD	Record of Decision
USDA	U.S. Department of Agriculture
USFWS	USDI Fish and Wildlife Service

Record of Decision Amending Operating Permit No. 00150 (Montanore Project)

1.1 Introduction

This document is the Department of Environmental Quality's (DEQ) Record of Decision (ROD) approving amendments to Operating Permit No. 00150. Operating Permit No. 00150 was issued in 1992 and is held by Montanore Minerals Corporation (MMC). It authorizes construction and operation of an underground copper and silver mine (Montanore Project) near Libby, Montana (Figure 1). DEQ's decision in regard to the operating permit amendments is governed by the Metal Mine Reclamation Act, Title 82, part 3, Montana Code Annotated (MCA).

In addition to requesting amendments to its operating permit, MMC submitted an application to DEQ for a Certificate of Compliance authorizing the construction and operation of a transmission line to provide power to the Montanore Project. DEQ's consideration of MMC's application for a Certificate of Compliance is governed by the Major Facility Siting Act (MFSA), Title 75, part 20, MCA. MMC also has submitted to DEQ an application for an air quality permit and an application for a Montana Pollutant Discharge Elimination System (MPDES) permit that covered additional discharges not currently permitted under the existing MPDES permit for the Libby Adit.

The Montanore Project, including the proposed transmission line, will also affect National Forest lands. Federal approval for the Montanore Project was initially issued in 1992 but was allowed to lapse in 2002. Therefore, MMC is required to obtain approval of a new plan of operations from the U.S. Department of Agriculture, Forest Service, Kootenai National Forest (KNF). KNF's authority applies only to National Forest System lands and does not extend to private lands within the KNF. DEQ's authority applies to private, state, and federal lands.

MMC must also obtain other permits or approvals from the Bonneville Power Administration (BPA), the U.S. Army Corps of Engineers (Corps), and other state and local agencies.

DEQ and the KNF determined that respective state and federal action regarding the Montanore Project may significantly affect the quality of the human environment. As a result, DEQ and the KNF were lead agencies in preparing an environmental impact statement pursuant to the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA). The environmental review covered both the proposed amendments to Operating Permit No. 00150 and the proposed transmission line.

DEQ and the KNF issued a Draft EIS for the Montanore Project on February 27, 2009 for public comment. In response to public comment, the agencies revised the mine alternatives and transmission line alignments and issued a Supplemental Draft EIS on October 7, 2011. DEQ and KNF issued a Joint Final Environmental Impact Statement in December 2015. The Final EIS describes the proposed action and alternatives to the proposed action. It also describes the affected environment and the potential environmental consequences of implementing the proposed action or the alternatives to the proposed action. Finally, the Joint Final EIS includes responses to comments on the Draft EIS and Supplemental Draft EIS and incorporates changes based on those responses.

The Joint Final EIS is on file and available at the DEQ office in Helena, Montana, and the KNF Supervisor's office in Libby, Montana. The Joint Final EIS may also be accessed on the lead agencies' and the U. S. Environmental Protection Agency's (EPA) web sites.

DEQ's decisions on the Certificate of Compliance for the transmission line and draft air quality permit for the Montanore Project are included in this ROD. The Certificate of Compliance (Attachment 2) and the final air quality permit (Attachment 3) are included as attachments to this ROD.

The KNF has documented its decision in a separate ROD. Decisions by other agencies that cooperated in the environmental review also will be documented in separate decision documents.

1.2 Existing Permits and Approval

The permitting process for the Montanore Project began in 1989 when Noranda Minerals Corporation (NMC), a subsidiary of Noranda Finance Inc., obtained approval under an exploration license from the Montana Department of State Lands (DSL) (DEQ's predecessor agency) and other associated permits for construction of an exploration adit from private land in upper Libby Creek. Background on the project's mineral rights is in Chapter 1 of the Joint Final EIS. Soon after obtaining approval, NMC began excavating the Libby Adit. NMC also submitted a "Petition for Change in Quality of Ambient Waters" (Petition) to the Board of Health and Environmental Sciences (BHES) requesting an increase in the concentration of select constituents in surface water and groundwater above ambient water quality, as required by Montana's 1971 nondegradation statute. After constructing about 14,000 feet of the Libby Adit, NMC ceased construction in 1991 in response to elevated nitrate concentration in surface water and low metal prices.

Although exploration adit construction ceased in 1991, the permitting process continued. Specifically, the KNF, the Montana Board of Health and Environmental Sciences, the Montana Department of Natural Resources and Conservation (DNRC), and the DSL prepared a Draft, Supplemental, and Final EIS on the proposed project. The environmental review process culminated in 1992 with BHES's issuance of an Order approving NMC's Petition and the DSL's issuance of a ROD and Hard Rock Operating Permit No. 00150 to NMC. In 1993, the KNF issued its ROD, the DNRC issued a Certificate of Environmental Compatibility and Public Need under MFSA, and the Corps issued a 404 permit. These decisions approved mine and transmission line alternatives that allowed for the construction, operation, and reclamation of the project.

By 2002, many of NMC's permits for the Montanore Project terminated or expired, such as DEQ's air quality permit, the Corps' 404 permit, KNF's approval, and the state's certification of the transmission line. In 2002, NMC notified the KNF it was relinquishing the authorization to operate and construct the Montanore Project. Operating Permit No. 00150 and MPDES Permit MT0030279, however, remain in effect because reclamation of the Libby Adit was not completed.

1.2.1 Operating Permit No. 00150

Operating Permit No. 00150 issued to NMC in 1992 authorizes the development of what is now referred to as the Montanore Project, located 18 miles south of Libby, Montana. The Montanore Project consists of the proposed development of a 20,000 ton per day underground mine. While the ore body to be mined is located beneath the Cabinet Mountains Wilderness, all access and surface facilities approved under the operating permit are to be located outside the wilderness boundary.

Under the current operating permit, ore would be accessed via two adits from portals in the Ramsey Creek drainage. Ore would be crushed underground and conveyed to a mill at the surface near the Ramsey

Creek portals. Ore would be ground at the mill and the silver and copper concentrated by conventional froth flotation. Tailings material from the mill process would be conveyed through pipelines to a tailings disposal impoundment 4 miles from the mill in the Little Cherry Creek drainage. The impoundment would require diversion of Little Cherry Creek. A portal for an access adit would be located in the lower Libby Creek drainage 2 miles southwest of the Ramsey Creek Plant Site. The existing Libby exploration adit, partially constructed under an exploration license, would be used for ventilation. Two land application disposal (LAD) areas would be used to treat and discharge excess water. The ROD issued in 1992 also authorized the construction of a 17-mile, 230-kV transmission line from a new substation at Sedlak Park along the Miller Creek drainage to the Ramsey Creek Plant Site.

1.2.2 BHES Order

The BHES Order, issued to NMC in 1992, authorizes degradation and establishes limits in surface water and groundwater in the Libby, Poorman, and Ramsey Creek watersheds adjacent to the Montanore Project for discharges from the project. The BHES Order establishes numeric limits for total dissolved solids, chromium, copper, iron, manganese, and zinc in both surface water and groundwater; nitrate+nitrite in groundwater only; and total inorganic nitrogen (nitrate+nitrite+ammonia) in surface water only. For the parameters not covered by the authorization to degrade, the applicable nonsignificance criteria established by the 1994 nondegradation rules apply, unless MMC obtains an authorization to degrade under current statute. Pursuant to BHES' Order, these limits apply to all surface water and groundwater affected by the Montanore Project. The limits remain in effect during the operational life of the mine and for so long thereafter as necessary. The BHES Order is presented in Appendix A in the Joint Final EIS.

1.2.3 MPDES Permit MT0030279

In 1997, DEQ issued a MPDES permit to NMC (MT0030279) to allow discharges of water flowing from the Libby Adit to Libby Creek. Three outfalls are included in the permit: Outfall 001 – percolation pond, Outfall 002 – infiltration system of buried pipes, and Outfall 003 – pipeline outlet to Libby Creek. Surface discharge from the adit ceased in 1998 and water in the adit flowed to the underlying groundwater.

The DEQ renewed the MPDES permit in 2006. A minor modification of the MPDES permit in 2008 reflected an owner/operator name change from NMC to MMC. In 2010, MMC applied to the DEQ to renew the existing MPDES permit and requested the inclusion of five new stormwater outfalls under the permit. MMC submitted supplemental information in 2011 (Geomatrix 2011b). In 2011, the DEQ determined the renewal application was complete and administratively extended the permit (ARM 17.30.1313(1)) until MMC receives the renewed permit. The DEQ issued a draft renewal MPDES permit in July 2015 and held a public hearing on the draft permit in August 2015. MMC also held MPDES permit MTR104874 from stormwater discharges from the Libby Adit. These discharges were incorporated into the draft renewal MPDES permit.

1.2.4 Permit Revisions Regarding Libby Adit

Following the acquisition of NMC and Operating Permit No. 00150, MMC submitted two requests for revisions (MR 06-001 and MR 06-002) to Operating Permit No. 00150, which DEQ approved in 2006. The minor revisions involved reopening the Libby Adit and reinitiating the evaluation drilling program that NMC began in 1989. The key elements of the revisions included re-excavation of the Libby Adit portal, initiation of water treatability analyses, installation of ancillary facilities, dewatering of the Libby Adit decline, extension of the current drift, and underground drilling and sample collection.

Under the revisions, the Libby Adit would be dewatered and water would be treated before discharging to one of three MPDES permitted outfalls. The Libby Adit would be rehabilitated and the drift extended

3,300 feet. An additional 7,100 feet and 16 drill stations would be developed under the currently defined ore zones. An estimated 545,300 tons (246,000 cubic yards) of waste rock would be generated and stored at the Libby Adit site.

The evaluation drilling program (MR 06-002) is designed to delineate the first 5 years of planned production. An estimated 35,000 feet of primary drilling and 12,800 feet of infill drilling are planned. The drill core would be used to support resource modeling, mine planning, metallurgical testing, preliminary hydrology assessment, and rock mechanic studies for the full Montanore Project. If adit closure and site reclamation were necessary after completion of the evaluation drilling program, MMC would install a concrete-reinforced hydraulic plug in bedrock, reconstruct the original adit plug, remove all surface facilities, and regrade and revegetate the disturbed areas. Additional information about the evaluation drilling program and site operations and reclamation can be found in MMC's submittal, Notification to Resume Suspended Exploration and Drilling Activities for the Montanore Project (MMC 2006), on file with the lead agencies.

MMC requested a revision to its operating permit that involved the relocation of fuel and oil storage areas at the Libby Adit and the addition of more fuel storage capacity. The DEQ approved the minor revision in 2009 (MR 08-001), and indicated the reclamation bond will be reviewed in its entirety with the next 5-year bond review or earlier as needed.

The KNF determined the activities associated with the Libby Adit evaluation drilling were a new proposed Plan of Operations, and that MMC needed KNF approval before dewatering and continuing excavation, drilling, and development work at the Libby Adit. Under the authority of Revision 06-002 of DEQ Operating Permit No. 00150, which was approved in 2006, MMC installed a Water Treatment Plant and is treating water from the adit.

In 2006, the KNF initiated an analysis that included public scoping for the proposed road use and evaluation drilling at the Libby Adit Site. In 2008, the KNF decided the best approach for disclosing the environmental effects of the Libby Adit evaluation program was to consider the activity as the initial phase of the overall Montanore Project in the EIS.

1.3 Purpose, Benefit, and Basis of Need

MEPA and its implementing rules (Administrative Rules of Montana (ARM) 17.4.601, *et seq.*) require that EISs prepared by state agencies include a description of the purpose and benefits of the proposed project. The basic project purpose is to provide copper and silver to meet a portion of current and future public demands. Because of its properties of thermal and electrical conductivity, malleability, and resistance to corrosion, copper has become a major industrial metal, ranking third after iron and aluminum in terms of quantities consumed. In 2012, building construction was the single largest market for copper, followed by electric and electronic products, transportation equipment, consumer and general products, and industrial machinery and equipment. Domestic (U.S.) consumption of copper in 2012 (1.7 million metric tons) exceeded domestic production (1.2 metric tons), a pattern that has existed for over 10 years. Demand for silver is generated by four primary uses: electrical and electronics, coins and metals, photography, and jewelry and silverware. Together, these four categories represented 78 percent of annual silver consumption in 2012. Domestic (U.S.) consumption of silver in 2012 (190 million Troy ounces) exceeded domestic mine production (34 million Troy ounces), a pattern that has existed for over 10 years (USGS 2013). Benefits of the proposed project include increased employment in the project area, increased tax payments, and the production of copper and silver to help meet public demand for these metals.

The MFSA (75-20-101 et seq., MCA) and an implementing rule (ARM 17.20.920) require that the DEQ determine the basis of the need for a facility and that an application for an electric transmission line contain an explanation of the need for the facility. No electrical distribution system is near the project area. The nearest electrical distribution line parallels US 2 and is not adequate to carry the required electrical power. A new transmission line is needed to supply electrical power to construct, operate, and reclaim the proposed mine facilities.

1.4 Issues Considered and Addressed

The agencies identified seven key issues through the public and agency scoping process; each issue is briefly discussed in the following sections. Each resource section in Chapter 3 of the Joint Final EIS describes how the effects on each resource were evaluated.

Issue 1: Potential for acid rock drainage and metal leaching

Drainage from waste rock, tailings, and stormwater runoff may adversely affect water resources in the project area. Effects were assessed through predicted changes in water quality due to acid generation and near-neutral pH metal leaching and release of elevated concentrations of trace elements as a result of weathering of mined materials, based on geochemical characterization data.

Issue 2: Effects on quality and quantity of surface water and groundwater resources

Groundwater Flow and Quality

Underground mining activities may affect groundwater in the mine area, which may indirectly affect Rock Lake and other waters in the Cabinet Mountains Wilderness (CMW) located above the mine. Appropriations from or discharges to groundwater, such as from the proposed land application disposal (LAD) areas and the tailings impoundment, may affect groundwater flows and quality. Effects were assessed through two-dimensional and three-dimensional models, which evaluated potential quantity impacts on mine area groundwater and overlying and surrounding surface water during construction, operations, and post-mining periods. Effects on groundwater at other facility locations were assessed through estimating changes in flow path, quantity, and quality from discharges.

Surface Water Flow

Changes in groundwater flow paths due to underground mining operations, discharges, and altered topography may change surface water flow and lake levels. Effects were predicted by evaluating changes in surface water flow in area springs, lakes, and streams. For lower altitude spring and streamflows, changes were estimated for mine operation appropriations from or discharges from or to streams.

Surface Water Quality

Discharges or flow from mined areas containing metals, nutrients, or sediments may affect surface water quality in project area lakes, streams, and rivers. Effects were predicted by estimating changes in selected water quality parameters.

Issue 3: Effects on fish and other aquatic life and their habitats

Discharges and changes in surface water flows may affect fish and other aquatic life; the threatened bull trout and designated critical habitat in the project's analysis area are particularly of concern. Riparian habitat alteration from construction and operation of mine and transmission line facilities may affect Kootenai National Forest Land Management Plan (KFP) Inland Native Fish Strategy (INFS) riparian management objectives for facilities located within riparian habitat conservation areas (RHCA's). The effects were predicted by estimating changes in surface water and groundwater parameters, changes in habitat quality, and changes in abundance and composition of aquatic life.

Issue 4: Changes in the project area's scenic integrity

The proposed mine and transmission line may change the existing visual character of the project area. Effects were predicted by estimating change in line, color, texture, form, and character of the landscape, and evaluating compliance with the 2015 KFP's scenic integrity objectives. Effects were also assessed quantitatively by determining mine facilities and miles of transmission line visible from key observation points, important travel corridors, and the CMW.

Issue 5: Effects on threatened or endangered wildlife species

Grizzly Bear

Construction and operation of mine and transmission line facilities may impact grizzly bear habitat and may increase grizzly bear mortality and displacement. Effects were evaluated by estimating changes in percent of core habitat, percent open motorized route density greater than 1 mile per square mile (mi/mi²), percent total motorized route density greater than 2 mi/mi², and displacement effects in affected Bear Management Units (BMU) in the Cabinet-Yaak Ecosystem (CYE) Recovery Zone. The Joint Final EIS also evaluated effects in the Cabinet Face Bears Outside of the Recovery Zone (BORZ) by estimating changes in the baseline total linear miles of road and total linear miles of open road on National Forest System land. Effects within the Cabinet-Yaak Ecosystem Recovery Zone and Cabinet Face BORZ were also assessed qualitatively by evaluating potential changes in effectiveness of grizzly bear movement corridors, human activity, and attractant availability.

Lynx

Construction and operation of mine and transmission line facilities may disturb or degrade lynx habitat. Effects were evaluated by assessing the proposed activities compliance with the applicable objectives, standards, and guidelines of the Northern Rocky Lynx Management Direction in each affected Lynx Analysis Unit (LAU). Effects on lynx habitat components within the affected LAUs were also assessed. Effects also were assessed qualitatively by evaluating connectivity between habitat blocks in affected and adjacent LAUs, linkage areas between LAUs, habitat for alternative prey, and traffic-related mortality risks in affected LAUs or adjacent LAUs.

Issue 6: Effects on wildlife and their habitats

Key Wildlife Habitats

Construction and operation of mine and transmission line facilities may impact the quality or quantity of old growth, snags, and down wood habitat. Effects were predicted by determining the following:

- Acres of vertical structure removed in growth
- Acres of edge habitat
- Acres of interior old growth
- Acres of snag habitat
- Coarse woody debris removed

Pileated Woodpecker

Construction and operation of mine and transmission line facilities may directly or indirectly impact cavity-nesting species, such as the pileated woodpecker. Effects were evaluated based on impacts to important attributes of pileated woodpecker habitat including old growth, down wood and snag habitat and indirect disturbance to pileated woodpeckers.

Issue 7: Effects on wetlands and streams

Construction and operation of mine and transmission line facilities may affect, directly or indirectly, wetlands and streams, altering wetland function and values. Effects were predicted by estimating the number of acres and feet of stream filled, dewatered, or otherwise affected. Changes in wetland function and values were evaluated qualitatively.

1.5 Description of the Mine and Transmission Line Alternatives

1.5.1 Mine Alternatives

1.5.1.1 Alternative 1—No Action, No Mine

In this alternative, MMC would not develop the Montanore Project, and no surface resource-disturbing activities on National Forest System lands associated with the project would occur. Although MMC holds DEQ Operating Permit No. 00150, the Montanore Project, as permitted by DEQ, cannot be implemented without a corresponding Forest Service approval of a Plan of Operations. Under Alternative 1, the existing environmental, social, and economic conditions described in Chapter 3 of the Joint Final EIS would continue, unaffected by this mine or transmission line. DEQ's Operating Permit No. 00150, as revised in Revisions 06-001, 06-002, and 08-001 would remain in effect. MMC could continue with the permitted activities on private land associated with the Libby Adit evaluation program that did not affect National Forest System lands. The No Action Alternative provides a baseline for estimating the effects of other alternatives and is required by NEPA.

1.5.1.2 Alternative 2—MMC's Proposed Mine

Alternative 2 is MMC's proposed Plan of Operations. MMC would construct, operate, and reclaim the Montanore Project as proposed in their 2004 Plan of Operations and as updated in 2008. This plan was not modified to respond to the key issues. Rather, scoping was conducted to gather public comment on the proposed Plan of Operations. Key issues (Section 1.4) were identified from the resulting comments.

As proposed by MMC, the Montanore Project would consist initially of a 12,500-ton-per-day underground mining operation that would expand to a 20,000-ton-per-day rate. The surface mill (the Ramsey Plant Site) would be on National Forest System lands outside of the CMW in the Ramsey Creek drainage. The proposed project also would require constructing about 16 miles of high-voltage electric transmission line from a new substation adjacent to BPA's Noxon-Libby transmission line to the project site. The 230-kV transmission line alignment would be from the Sedlak Park Substation in Pleasant Valley along US 2 and then up the Miller Creek drainage to the Ramsey Plant Site. The proposed transmission line is considered as a separate alternative below (see Alternative B).

The orebody would be accessed from two adits adjacent to the mill in the Upper Ramsey Creek drainage. Two other adits, an evaluation/ventilation adit and a ventilation adit, both with entrances located on private land, also would be used during the project. The evaluation/ventilation adit would be located in the upper Libby Creek drainage. The ventilation adit would be located on MMC's private land (patented claim HR 134) in the upper East Fork Rock Creek drainage near Rock Lake.

Ore would be crushed underground and conveyed to the surface plant located near the Ramsey adits. Copper and silver minerals would be removed from the ore by a flotation process. Tailings from the milling process would be transported through a pipeline to a tailings impoundment located in the Little Cherry Creek drainage, about 4 miles from the Ramsey Plant Site.

Access to the mine and all surface facilities would be via US 2 and the existing NFS road #278, the Bear Creek Road. With the exception of the Bear Creek Road, all open roads in the proposed operating permit areas would be gated and limited to mine traffic only. MMC would upgrade 11 miles of the Bear Creek Road and build 1.7 miles of new road between the Little Cherry Creek Tailings Impoundment Site and the Ramsey Plant Site. Silver/copper concentrate from the plant would be transported by truck to a rail siding in Libby, Montana. The rail siding and Libby Loadout facility are near one of the facilities considered in the 1992 Final EIS. The concentrate would then be shipped by rail to an out-of-state smelting facility.

In Alternative 2, MMC's proposed tailings impoundment would be in Little Cherry Creek, a perennial stream, and the impoundment would require the permanent diversion of the upper watershed of Little Cherry Creek. Numerous wetlands and springs are in the Little Cherry Creek Tailings Impoundment Site.

MMC would discharge excess mine and adit wastewater at one of two LAD Areas. Additional water treatment would be added as necessary before discharge at the LAD Areas. Water treatment also would continue at the Libby Adit Site, if necessary. MMC would be required to submit a complete MPDES application for all additional outfalls. Additional proposed discharges include the LAD Areas, the Ramsey Plant Site, and the Little Cherry Creek Tailings Impoundment Site should this alternative be selected. MMC would not discharge mine and adit inflows during operations, and would use them in the mill for ore processing.

Mining operations would continue for an estimated 16 to 19 years once facility development was completed and actual mining operations started. Three additional years may be needed to mine 120 million tons. The mill would operate on a three-shifts-per-day, seven-days-per-week, yearlong schedule. At full production, an estimated 7 million tons of ore would be produced annually during a 350-day production year. Employment numbers are estimated to be 450 people at full production. An annual payroll of \$12 million is projected for full production periods.

The operating permit area would be 3,628 acres and the disturbance area would be 2,582 acres. The operating permit area would encompass 425 acres of private land owned by MMC at the Little Cherry Creek Tailings Impoundment Site, the Libby Adit Site, and the Rock Lake Ventilation Adit Site. All surface disturbances would be outside the CMW. MMC developed a reclamation plan to reclaim disturbed areas.

1.5.1.3 Alternative 3—Agency Mitigated Poorman Impoundment Alternative

In Alternative 3, three major mine facilities would be located in alternative locations. MMC would develop a Poorman Tailings Impoundment Site north of Poorman Creek for tailings disposal, use the Libby Plant Site between Libby and Ramsey Creeks, and construct two additional adits in upper Libby Creek. MMC would use Libby Creek Road and Upper Libby Creek Road as primary access roads during the Evaluation Phase and Bear Creek Road for the primary access road during the Operations Phase. The operating permit area will be 2,157 acres and the disturbance area will be 1,542 acres. The permit area will encompass 75 acres of private land owned by MMC at the Libby Adit Site and the Rock Lake Ventilation Adit Site. The Libby Adit evaluation program will be the initial phase of the project and will be completed before the Construction Phase of the project.

The LAD areas would not be used. MMC would treat and discharge all mine and adit inflows during all phases. During mill operations, MMC would divert water from Libby Creek near the impoundment site during high flows to provide adequate water for mill operations. MMC would cease diversions from Libby Creek and discharge treated water to Libby Creek from the water treatment plant during low flows to avoid adversely affecting senior water rights.

During the Evaluation Phase, MMC will access the Libby Adit Site via NFS road #231 (Libby Creek Road) starting at US 2 to the intersection with NFS road #2316. NFS road #2316 will then be used to reach the Libby Adit Site. During all other mine phases, with the exception of road upgrades during the Construction Phase, access to the Montanore Mine will be via NFS road #231 (Libby Creek Road) starting at US 2 to the intersection with NFS road #278 (Bear Creek Road). From there, NFS road #278 and a short segment of NFS road #4781 south of Poorman Creek will be used until it intersects the proposed mine haul road between the Libby Plant Site and the Poorman Tailings Impoundment Site. The mine haul road (NFS roads #4781 and #6210) will be used to access the Libby Plant Site and the Poorman Tailings Impoundment Site, and NFS road #2316 west of the intersection with NFS road #6210 will be used to access the Libby Adit Site. During the Construction Phase, upgrading of the three mine access roads, bridge construction, and other necessary closures of Libby Creek Road, the Bear Creek Road starting at US 2 will be the temporary approved access route to the mine, private property, and recreation sites along the Libby Creek Road south of the closure.

1.5.1.4 Alternative 4—Agency Mitigated Little Cherry Creek Impoundment Alternative

In Alternative 4, MMC would use the Libby Plant Site between Libby and Ramsey creeks, construct two additional adits in upper Libby Creek, and modify the proposed Little Cherry Creek Tailings Impoundment Site operating permit and disturbance areas to avoid RHCAs (Issue 3) and old growth (Issue 6) in the Little Cherry Creek drainage. Borrow areas would be reconfigured to maximize disturbance within the impoundment footprint, and to reduce disturbance of RHCAs (Issue 3), core grizzly bear habitat (Issue 5), and old growth (Issue 6). Waste rock would be stored temporarily within the impoundment footprint to address potential acid rock drainage and metal leaching (Issue 1) and water quality and quantity (Issue 2). The proposed permanent Little Cherry Creek Diversion Channel below the engineered upper section would be modified so it would adequately convey anticipated flows. At closure, surface water runoff would be directed toward the Little Cherry Creek Diversion Channel, and not Bear Creek, an important bull trout stream. The operating permit area would be 2,979 acres and the disturbance area would be 1,924 acres. The operating permit area would encompass 276 acres of private land owned by MMC at the Little Cherry Creek Tailings Impoundment Site, the Libby Adit Site, and the Rock Lake Ventilation Adit Site.

Much of the mitigation developed for Alternative 3 would apply to Alternative 4. Mitigation plans for bull trout, grizzly bear, lynx, gray wolf, big game, mountain goat, migratory birds, old growth and snags would be the same or similar between the two alternatives. The Forest Service developed a conceptual mitigation plan for wetlands and streams for Alternative 4 for analysis purposes in the Joint Final EIS. A total of 48.8 acres of off-site mitigation were identified for Alternative 4. MMC would implement the wetland rehabilitation and stream restoration at Swamp Creek, the culvert replacement and the bridge replacement on NFS road #278 at Poorman Creek, and culvert removal on lands acquired for grizzly bear mitigation. Jurisdictional wetlands would be replaced at a ratio determined by the Corps while isolated wetlands would be replaced using the Corps' 2005 ratios. Insufficient mitigation sites were identified to achieve the Corps' minimum ratios for effects on jurisdictional wetlands, and additional mitigation sites would be necessary.

1.5.1.5 Alternative A—No Transmission Line, No Mine

In this alternative, MMC would not build a 230-kV transmission line to provide power. The BPA would not tap the Noxon-Libby 230-kV transmission line nor would it build the Sedlak Park Substation. The environmental, social, and economic conditions described in Chapter 3 of the Joint Final EIS would continue, unaffected by the construction and operation of the transmission line. DEQ's approval of the mine, as permitted by DEQ Operating Permit No. 00150, would remain in effect. MMC could continue

with the permitted activities on private land associated with the Libby Adit evaluation program that did not affect National Forest System lands and that did not require a transmission line for power.

1.5.1.6 Alternative B—MMC's Proposed Transmission Line (North Miller Creek Alternative)

Alternative B reflects MMC's proposed transmission line alignment. It was not developed to respond to the key issues. Rather, scoping was conducted to gather public comment on the proposed alignment, and the key issues (Section 1.4) were identified from the resulting comments.

MMC's proposed transmission line alignment would be in the watersheds of the Fisher River, Miller Creek, a tributary to Miller Creek, Midas Creek, Howard Creek, Libby Creek, and Ramsey Creek. The proposed alignment would head northwest from the substation for about 1 mile east and uphill of US 2 and private homes and cabins, and then follow the Fisher River and US 2 north 3.3 miles. The alignment would then turn west and generally follow the Miller Creek drainage for 2.5 miles, and then turn northwest and traverse up a tributary to Miller Creek. The alignment would then cross into the upper Midas Creek drainage, and then down to the Howard Creek and Libby Creek drainages. The alignment would cross the low ridge between Libby Creek and Ramsey Creek, and then would generally follow Ramsey Creek to the Ramsey Plant Site. Access roads on National Forest System lands would be closed and reseeded after the transmission line was built, and reclaimed after the transmission line was removed at the end of operations.

MMC's proposed alignment would end at a substation at the Ramsey Plant Site; the lead agencies' alternatives would end at a substation at the Libby Plant Site, making the lead agencies' alternatives shorter.

1.5.1.7 Alternative C-R—Modified North Miller Creek Transmission Line Alternative

Alternative C-R was developed to respond to key issues regarding potential adverse effects of the proposed alignment. The agencies developed two primary alignment modifications to MMC's proposed North Miller Creek alignment in Alternative B. One modification would route the line on an east-facing ridge immediately north of the Sedlak Park Substation instead of following the Fisher River. The modification would address issues associated with water quality and aquatic life (Issues 2 and 3) by crossing less area with soils that are highly erosive and subject to high sediment delivery. The modification also addresses the issue of scenic quality (Issue 4) by reducing the visibility of the line from US 2. Fewer residences would be within 0.5 mile of the line. The other alignment modification was developed following comment on the Draft EIS. The modification, which would use an alignment up and over a ridge between West Fisher Creek and Miller Creek, would increase the use of public land and reduce the length of line on private land. During final design, MMC would submit a final Vegetation Removal and Disposition Plan to minimize vegetation clearing, particularly in riparian areas.

Wooden H-frame structures, which generally allow for longer spans and require fewer structures and access roads, would be used on Alternative C-R. In some locations, a helicopter would be used for vegetation clearing and structure construction. The lead agencies selected helicopter use so the need to use or construct roads in or adjacent to core grizzly bear habitat was eliminated. Helicopter use also would reduce effects on lynx habitat. Access roads on National Forest System lands would be placed into intermittent stored service after construction, and decommissioned after the transmission line was removed at the end of operations. Unless otherwise specified by a landowner, new roads on private land would be managed in the same manner as on National Forest System lands. These modifications would address issues associated with water quality, aquatic life, threatened or endangered species, and wildlife (Issues 2, 3, 5, and 6) by reducing clearing and wildlife displacement associated with new access roads.

Modifications described under the selected mine alternative for the mine, such as seed mixtures, revegetation success, and weed control, would be implemented in Alternative C-R.

The agencies developed mitigation measures that would reduce or minimize the effects of the transmission line in Alternatives C-R, D-R, and E-R. Snags and up to 30 tons per acre of coarse woody debris would be left in the clearing area. No transmission line construction in elk, white-tailed deer, or moose winter range would occur between December 1 and April 30 unless approved by the agencies. No additional motorized routes would be open to the public during hunting season. MMC would fund or conduct field and/or aerial reconnaissance surveys to locate any new bald eagle or osprey nests along specific segments of the transmission line corridor, or would not remove vegetation in the nesting season. To mitigate, MMC would secure or protect replacement grizzly bear habitat on 28 acres of private lands in the CYE. Transmission line construction and decommissioning on National Forest System and State trust lands would be limited to between June 16 and October 14. The KNF would restrict access on 2.8 miles of NFS road #4725 in an unnamed tributary of Miller Creek in Alternative C-R after construction.

1.5.1.8 Alternative D-R—Modified North Miller Creek Transmission Line Alternative

Alternative D-R, the selected transmission line alternative, is described in Attachment 2. The selected transmission line alternative incorporates modifications and mitigating measures proposed by the agencies to reduce or eliminate adverse environmental impacts. As part of the selected transmission line alternative, MMC is required to implement the agencies' Environmental Specifications for transmission line construction, operation, maintenance, and decommissioning activities (see Attachment 2).

The BPA will design, construct, own, operate, and maintain the Sedlak Park Substation and loop line that will connect the substation to the Noxon-Libby 230-kV transmission line. BPA's proposed Sedlak Park Substation Site at the Noxon-Libby 230-kV transmission line is in an area known locally as Sedlak Park, 30 miles southeast of Libby on US 2. MMC will be responsible for funding construction of the transmission line, substation, and loop line. The BPA is prohibited by law from directly serving the mine; Flathead Electrical Cooperative will be the retailer of power to the mine project.

From the Sedlak Park Substation, the alignment will traverse an east-facing ridge immediately north-northwest of the substation and will cross Hunter Creek 2 miles north-northwest of the substation. After crossing Hunter Creek, the alignment will head west, crossing US 2, the Fisher River, West Fisher Creek, and NFS road #231 (Libby Creek Road). The alignment then will head northwest, up and over the ridge between West Fisher Creek and Miller Creek. After the alignment crosses the ridge between West Fisher Creek and Miller Creek, the alignment will follow NFS road #4724 (South Fork Miller Creek Road) to a ridge separating Miller Creek from the Standard Creek drainage. The alignment will traverse the ridge into the Howard Creek drainage. The centerline will be about 500 feet east of the northeast corner of a private land parcel about 0.5 miles south of Howard Lake. North of the private land, the alignment will generally parallel Howard Creek, then cross Libby Creek and end at a substation at the Libby Plant Site selected as a component of Alternative 3. The transmission line will be 13.7 miles long and will cross primarily National Forest System lands and lands owned by Plum Creek Timberlands LLP.

Wooden H-frame structures will be used to reduce structure height. H-frame structures also provide for longer span lengths and consequently fewer structures and access roads. Using H-frame structures will require more right-of-way and tree clearing. To eliminate the need to use or construct roads that may affect core grizzly bear habitat, a helicopter will be used for structure construction at 16 locations in the Miller Creek and Howard Creek drainages.

1.5.1.9 Alternative E-R—West Fisher Creek Transmission Line Alternative

Alternative E-R also was developed to respond to key issues regarding potential adverse effects of the proposed alignment.

This alternative includes modifications to MMC's transmission line proposal regarding H-frame structures, helicopter use, vegetation clearing, and other modifications described under Alternative C-R. Some steel monopoles will be used in the steep section 2 miles west of US 2. This alternative could be selected with any of the mine alternatives. For analysis purposes, the lead agencies assumed this alternative will terminate at the Libby Plant Site.

As in the Modified North Miller Creek Alternative (Alternative C-R), this alternative modifies MMC's proposed North Miller Creek alignment by routing the line on an east-facing ridge immediately north of the Sedlak Park Substation. The modification will address issues associated with water quality (Issue 2) by crossing less area with soils that are highly erosive and subject to high sediment delivery. The issue of scenic quality (Issue 4) was addressed by this modification by reducing the visibility of the line from US 2. Fewer residences will be within 0.5 mile of the line.

The primary difference between the West Fisher Creek Alternative (Alternative E-R) and the North Miller Creek Alternative (Alternative B) is routing the line on the north side of West Fisher Creek drainage to Miller Creek to minimize effects on core grizzly bear habitat. As in the Miller Creek Alternative (the selected transmission line alternative), this alternative will use an alignment about 0.5 mile east of Howard Lake, a popular recreation facility in the project area. Wooden H-frame structures, which generally allow for longer spans and require fewer structures and access roads, will be used on this alternative in most locations to minimize the visibility of the line from Howard Lake (Issue 4). In some locations, a helicopter will be used for timber clearing and structure construction. New access roads on National Forest System lands will be managed in the same manner as Alternative C-R. These modifications will address issues associated with water quality, aquatic life, threatened or endangered species, and wildlife (Issues 2, 3, 5, and 6) by reducing clearing and wildlife displacement associated with new access roads. Mitigation described for Alternative C-R will be implemented. MMC will secure or protect replacement grizzly bear habitat on 30 acres of private lands in the CYE.

1.5.2 Alternatives Eliminated from Detailed Consideration

A number of alternatives to the Proposed Action were evaluated but were eliminated from detailed consideration. An in-depth discussion of these alternatives appears in Section 2.13 of the Joint Final EIS along with the agencies' rationale for dismissal. These potential alternatives were identified as a result of public participation as well as agency concerns. Alternatives in each of the following categories were evaluated and dismissed from detailed consideration due to technical, operational, economic, or environmental considerations; alternative mine location or combined mine operations; tailings backfill options; tailings impoundment location options; plant site and adit location options; surface tailings disposal method options; LAD areas; transmission line alignment options; underground installation of transmission line; and change in transmission line voltage.

1.6 DEQ Decisions

1.6.1 Amendments to Hard Rock Operating Permit No. 00150

As indicated in Section 1.2.1, MMC currently holds Operating Permit No. 00150 authorizing completion of the Libby Adit and construction, operation, and reclamation of the Montanore mine. MMC has requested the following modifications to Operating Permit No. 00150:

1. Construction of an additional underground ventilation infrastructure that would result in an acre of disturbance on private land near Rock Lake.
2. Relocation of the concentrate loadout facility to the Kootenai Business Park located in Libby (private land).
3. Other amendments that may be required to conform DEQ Operating Permit No.00150 to the alternative selected by the KNF in its ROD.

In order for DEQ to consider the latter category of amendments, MMC indicated its desire that DEQ participate in the KNF's preparation of an environmental impact statement for the Montanore Project under NEPA.

In its ROD, the KNF selected Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative and Transmission Line Alternative D-R – Miller Creek Transmission Line Alternative. While federal regulations require operators to comply with applicable state water quality standards, federal regulations allow the KNF to rely on certifications or other approvals issued by state agencies to make that demonstration. Thus, KNF is relying on DEQ's decision regarding compliance with state water quality standards.

Evaluation Phase

As Director of DEQ, I have decided to conditionally approve amendments to the provisions of Operating Permit No. 00150 pertaining to the Evaluation Phase of the Montanore Project to make those provisions consistent with Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative. The Evaluation Phase is described in Section 2.5.2 of the Final EIS. As discussed below, I am able to determine that activities associated with the Evaluation Phase will comply with the MMRA and the WQA, including the nondegradation provisions, with the exception of the discharges to surface water during the evaluation phase. MMC currently holds MPDES Permit No. MT0030279 allowing discharges of water flowing from the Libby Adit to Libby Creek and has filed an application with DEQ to renew MPDES Permit No. MT0030279. Thus, my approval of the amendments to Operating Permit No. 00150 pertaining to the Evaluation Phase is conditioned on MMC receiving DEQ's approval of the renewal of MPDEQ Permit No. MT0030279.

The amendments necessary to make the provisions of Operating Permit No. 00150 regarding the Evaluation Phase consistent with the KNF's approval of Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative are as follows:

- MMC will submit an annual report to DEQ. The report will include a discussion of MMC's compliance with all monitoring and mitigation requirements specified in this ROD regarding the Evaluation Phase.
- MMC will comply with all applicable state fire laws and regulations, take all reasonable measures to prevent and suppress fires on the area of operations, and require employees, contractors and subcontractors to do likewise within the permit boundary.
- During the Evaluation Phase, when diesel generators are needed for power, MMC will use Tier 4, if available, or Tier 3 engines that meet EPA's Tier 4 or 3 nitrogen oxides emission standards and comply with federal engine emission limitations. MMC will also use Tier 4, if available, or Tier 3 engines on underground mobile equipment and emergency generators, if available. MMC will use ultra-low sulfur diesel fuel in those engines.

- MMC will comply with the limits, emission controls, and mitigations required by its air quality permit; with the limits, monitoring and discharge locations of its MPDES permit; the conditions and requirements of a Corps-issued Section 404 permit for jurisdictional wetlands and other waters of the U.S.; and the requirements of DEQ's Section 401 certification for jurisdictional wetlands and other waters of the U.S.
- Storm Water Pollution Protection Plan (SWPPP) best management practices (BMPs) will be implemented and will be inspected at least monthly (during snow-free periods) until revegetation is successful and within 24 hours after any precipitation event of 0.25 inch or greater or a snowmelt event that produced visible runoff. Inspection and monitoring of stormwater BMPs will continue until the areas disturbed are finally stabilized (a vegetation cover has been established with a density of at least 70 percent of the pre-disturbed levels, or equivalent permanent, physical erosion control reduction methods have been employed).
- MMC will submit final mitigation plans consistent with Alternative 3 – Agency Mitigated Poorman Impoundment Alternative and Alternative D-R – Modified North Miller Creek Transmission Line Alternative, the Biological Assessments, the terms and conditions of the Biological Opinions, and other state and federal permits or approvals.
- MMC will submit plans for monitoring during the Pre-Evaluation and Evaluation Phases consistent with 1) the Conceptual Monitoring Plans, as specified in Attachment 1¹; 2) the Terms and Conditions in the U.S. Fish and Wildlife Service (USFWS) Biological Opinions; 3) conditions of any other issued permit or approval, such as an MPDES permit, a 404 permit, a 401 certification, or a beneficial water use permit deemed necessary for the Evaluation Phase.
- MMC will implement all monitoring, including water resources monitoring, for all resources required before initiating the Evaluation Phase consistent with approved monitoring plans.
- MMC will conduct Pre-Evaluation Phase water resources monitoring (surface and groundwater monitoring and groundwater dependent ecosystem inventory and monitoring) as described in Section C.10 of Attachment 1.
- MMC will conduct wildlife monitoring as described in Section C.5 of Attachment 1.
- The Forest Service, DEQ, Montana Department of Fish, Wildlife and Parks (FWP), and MMC will develop a MOU to establish roles, responsibilities, and timelines for an Oversight Committee comprised of members of the Forest Service, FWP, and other parties deemed appropriate by the parties named. The USFWS will be an ex-officio, non-voting member of the Oversight Committee, with only advisory responsibilities. Only the Forest Service, DEQ and FWP will be signers on the MOU. The Oversight Committee will develop a comprehensive grizzly bear management plan of Cabinet Mountains portion of CYRZ, and will be operational prior to the Evaluation Phase. Details of the

¹ The Conceptual Monitoring Plans contain conceptual plans that were developed for all phases of the Montanore Project. MMC is required to submit monitoring plans consistent with the Conceptual Monitoring Plans for the Pre-Evaluation and Evaluation Phases. Some of these monitoring plans are designed to obtain additional baseline data that would be used in the event that MMC subsequently gains DEQ's approval to proceed with the Construction, Operations and Closure Phases of the Montanore Project.

required contents of the MOU and the Grizzly bear management plan and roles, responsibilities and timelines of the Oversight Committee are specified in the KNF ROD.

- MMC will drill ahead of the drifts, install and monitor piezometers described in Section C.10.4.4.1 of Attachment 1, and keep all drill stations 300 feet from the Rock Lake Fault and 1,000 feet from Rock Lake until additional data collections and analysis are complete.
- During the Evaluation Phase, MMC will use an on-site sewage treatment and disposal system at the Libby Adit Site. The system will consist of four components: four 1,000-gallon septic tanks, a two-pod treatment unit and combination recirculation tank/drainfield dosing tank, effluent distribution system, and infiltrator trenches.
- Before and during the Evaluation Phase, MMC will conduct aquatic biological monitoring, as described in Section C.11 of Attachment 1. The monitoring will include the monitoring required by the USFWS' Biological Opinion.
- MMC will implement the Geochemistry Sampling and Analysis Plan (SAP), as described in Section C.9.4 and Table C-8 of Attachment 1. The SAP seeks to prioritize sampling and testing to ensure that data needed to modify waste management plans are available if MMC is allowed to proceed beyond the Evaluation Phase.
- MMC will complete and provide to DEQ a detailed surficial geologic survey of lands overlying the proposed mine area to identify structures that could affect subsidence potential and implement the Evaluation Phase activities described in the Rock Mechanic's Monitoring Plan, Attachment 1, Section C.7.
- MMC will update the 3D groundwater models for the proposed mine area and the proposed Poorman Impoundment Site, incorporating the hydrologic and geologic information collected during the Evaluation Phase, as described in Section C.10 of Attachment 1.
- MMC will conduct Evaluation Phase water resources monitoring (surface and groundwater monitoring and groundwater dependent ecosystem inventory and monitoring), as described in Section C.10 of Attachment 1.
- MMC will use the Swamp Creek Site, which is considered an off-site wetlands mitigation site, as compensatory mitigation for all unavoidable effects on jurisdictional wetlands. MMC will use Swamp Creek, Little Cherry Creek, Poorman Creek, and grizzly bear mitigation sites as compensatory mitigation for all unavoidable effects on streams. MMC will be responsible for meeting the Corps' mitigation requirements for jurisdictional wetlands and other waters of the U.S. The monitoring of the mitigation sites is described in Section C.4 of Attachment 1.
- MMC will file for a change of use for the Swamp Creek water right to an instream flow right.
- Maintenance, monitoring, and performance standards for wetland mitigation sites are described in Section C.4 of Attachment 1. The maintenance, monitoring, and performance standards for jurisdictional wetlands and streams may be modified in accordance with any 404 permit issued for the project.

- MMC will create 4.5 acres of new wetlands at the Little Cherry Creek Sites and 3 acres at the Gravel Pit Site for compensatory mitigation of unavoidable effects on isolated wetlands. The monitoring of the mitigation sites is described in Section C.4 of Attachment 1.
- MMC will acquire a beneficial permit for the created wetlands if the DNRC determines water use for creating wetlands is a beneficial use.
- The Libby Adit will be dewatered and water will be treated before discharging to one of three permitted outfalls.
- If the full project is not approved after the Evaluation Phase, or if MMC decides not to proceed with the project, MMC will reclaim facilities associated with the evaluation program.

Construction, Operation, Closure and Post-closure Phases

While I can determine that completion of the Libby Adit during the Evaluation Phase will comply with all water quality standards, including nondegradation provisions set forth in administrative rules, the 3D model results included in the Joint Final EIS do not demonstrate compliance with the nondegradation provisions for the other phases of the Montanore Project. In regard to the Construction Phase, which as modeled includes two years of mining, the 3D model results do not affirmatively demonstrate compliance with the nondegradation provisions. In regard to the Operation, Closure, and Post-Closure Phases, the 3D model results predict decreases in the baseflow of surface water in the CMW greater than what is considered nonsignificant under ARM 17.30.715. Therefore, the 3D model predicts violations of Montana's nondegradation provisions. Surface waters located within the boundaries of the CMW are outstanding resource waters. Authorizations to degrade may not be issued for state waters that are classified as outstanding resource waters

While the 3D model results included in the Joint Final EIS are the best currently available estimate of impacts that can be obtained using currently available data, there is uncertainty in the model. The principal cause of uncertainty is the lack of site-specific hydrogeologic data collected near the mineral deposit, particularly from the Rock Lake Fault, a structure which may be the dominant influence controlling groundwater flow in the area. These data would normally be obtained via drilling from the surface and the installation and testing of monitoring wells. Because the Montanore deposit is located beneath a wilderness, data collection via drilling from the surface is not practicable.

MMC will install piezometers and pressure transducers from underground during the Evaluation Phase to collect additional hydrogeologic data characterizing bedrock permeability adjacent to the proposed mine void, transmissivity of the Rock Lake Fault zone, and baseline groundwater elevations. I expect that another nondegradation compliance determination for operation of the mine may be made after this additional information is collected during the Evaluation Phase. The updated nondegradation compliance determination would have greater certainty than the 3D model results discussed in the Joint Final EIS. Therefore, I am holding in abeyance a decision on whether to amend the provisions of Operating Permit No. 00150 regarding the Construction, Operation, Closure and Post-Closure Phases of the Montanore Project to make it consistent with the KNF's selection of Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative.

After the additional information is gathered during the Evaluation Phase, MMC may submit analysis of the additional information demonstrating that any changes in stream flow from construction, operation, closure and post-closure of the mine will be in compliance with the nondegradation requirements. MMC

also may choose to modify their underground mine design and propose additional mitigating measures in order to reduce impacts to stream flow. Because the new information would bear on the impacts of the proposed action and would change the basis of DEQ's decision, an additional MEPA review will be required. I expect the scope of additional MEPA review would be relatively narrow, tiering to the Joint Final EIS and focusing on the analysis of new information obtained during the Evaluation Phase and any modifications or mitigation measures proposed by MMC. MMC is not authorized to proceed past the Evaluation Phase of the Montanore Project while I am holding my decision on the subsequent phases of the Montanore Project in abeyance.

Requirements before Evaluation Phase Initiation

MMC must complete the following items and receive DEQ approval prior to proceeding with the Evaluation Phase. Certain monitoring and mitigation activities are required before MMC starts the Evaluation Phase. Such activities are described as occurring in the Pre-Evaluation Phase:

- Submit a reclamation performance bond acceptable to the agencies for the Evaluation Phase.
- Submit plans for monitoring during the Pre-Evaluation and Evaluation Phases consistent with 1) Conceptual Monitoring Plans, as specified in Attachment 1; and 2) conditions of any other permit or approval, such as a 404 permit, a 401 certification, or a beneficial water use permit;
- Implement the monitoring for any resource, such as water resources, required in the Pre-Evaluation and Evaluation Phase, consistent with the approved monitoring plans;
- Submit final mitigation plans consistent with selected mine and transmission line alternatives, the KNF's mitigation plans, the terms and conditions of the Biological Opinions, and other state and federal permits or approvals;
- Implement all mitigation for all resources (such as fisheries or wildlife) and modifications required before initiating the Evaluation Phase, as outlined in the selected mine and transmission line alternatives;
- Obtain a 404 permit from the Corps and a 401 certification from the DEQ for that permit should pre-Evaluation Phase or Evaluation Phase activities include the discharge of fill material into waters of the U.S.

Requirements during Evaluation Phase:

- MMC will extend the existing evaluation adit by 3,300 feet, to within 300 feet of the Rock Lake Fault (Joint Final EIS at page 126, Section 2.5.2.2), and also construct two parallel drifts to within 300 feet of the Rock Lake Fault. Sixteen drill stations will be established along these three drifts. DEQ requires that all hydrogeologic monitoring equipment (Attachment 1, Figure C-6) be installed and data collection initiated before adit extension for those monitoring locations originating in the adit, and as soon as possible following drift construction for those monitoring locations originating beneath the ore body. MMC may not establish drill stations and initiate ore delineation drilling until all hydrogeologic monitoring for the Pre-evaluation and Evaluation Phases described in Joint Final EIS Section 2.5.2.2 or in Attachment 1, Section C.10, is initiated.
- MMC must implement or continue all required monitoring for the Evaluation Phase as described in Attachment 1, Section C.10.

1.6.2 Transmission Line Certificate

Under Section 75-20-301, MCA, DEQ is required to approve a transmission line facility as proposed or as modified or an alternative to a proposed facility if DEQ makes the requisite findings set forth in that statute. Based on the findings set forth in Section 775-20-301, MCA, I conditionally approve Transmission Line Alternative D-R - Miller Creek Transmission Line Alternative. Section 75-20-301(1)(a), MCA, requires DEQ is determine the basis of the need for the facility. Because DEQ's determination that the transmission line is needed is based on MMC gaining approval for the construction and operation of the Montanore Mine, the authorization set forth in the Certificate of Compliance is likewise conditioned on MMC gaining approval for the construction and operation of the Montanore Mine

The Certificate of Compliance for the Montanore Project is attached as Attachment 2 to this ROD.

1.6.3 Air Quality Permit

The Montanore Project is required to have a Montana Air Quality Permit (MAQP) because the facility has the potential to emit more than 25 tons per year (tpy) of one or more criteria air pollutants (see Section 1.7.1.6 for a discussion of compliance with the Clean Air Act of Montana).

MMC submitted a MAQP application to DEQ on January, 16, 2006, and DEQ determined the application to be complete on July 21, 2006. As part of the MEPA environmental review process, DEQ issued Preliminary Determination (MAQP #3788-00) on August 30, 2006 for public comment. DEQ and KNF issued a Draft EIS for the Montanore Project on February 27, 2009 (see Section 1.1). In order to respond to public comment on the Draft EIS, including comments from the EPA (see Appendix K in the Joint Final EIS), DEQ requested additional information from MMC to address the new National Ambient Air Quality Standards for oxides of nitrogen (NO_x) and sulfur dioxide (SO₂). After several new submittals from MMC, DEQ again determined MMC's MAQP application to be complete on May 18, 2011. DEQ issued a Supplemental Preliminary Determination on September 7, 2011, proposing to issue a permit, with conditions. The public had the opportunity to provide comment on the Supplemental Preliminary Determination until October 7, 2011.

In 2015, additional modeling was conducted to include off-site emissions from both the proposed Rock Creek and the Troy Mine. The additional modeling demonstration results were added to the permit. Additional comments have also been added to address the earlier part of the construction phase where Tier II engines will be temporarily used at the site under an existing air quality permit but only after an "intent to transfer" process has been initiated to bring the engines onto the site. Finally, a review of the Best Achievable Control Technology (BACT) was completed as the previous BACT analysis had expired since the previous draft permits had never become final. The public had the opportunity to provide comment on the 2015 Supplemental Preliminary Determination until September 28, 2015. The determination remained as preliminary pending a Final EIS.

As Director of DEQ, I approve MAQP #3788-00. A copy of MAQP #3788-00 is attached as Attachment 3 to this ROD.

Key items that MMC must complete prior to the Evaluation and Construction Phases of the Montanore Project are summarized below. Transmission line requirements are in the Environmental Specifications (see Attachment 2).

1.7 DEQ Rationale for Decisions

As DEQ Director, my decisions are based on a thorough review of the Joint Final EIS, review of public and agency concerns received on this project, consultation with cooperating and regulatory agencies, and the project record. I considered relevant scientific information, public concerns and opposing viewpoints, scientific uncertainty, and risk, which are discussed in the resource sections in Chapter 3 of the Joint Final EIS. I met with interested members of the public to listen to their concerns and issues to help me in formulating my decisions. As DEQ Director, my decisions must comply with MEPA, MMRA, MFSA, Montana Water Quality Act, Clean Air Act of Montana, and the administrative rules adopted under these statutory provisions. Below is the rationale for my decisions, including how the amendments to Operating Permit No. 00150 and Alternative D-R – Miller Creek Transmission Line Alternative complies with state laws and/or regulation and policy mandates.

1.7.1.1 Montana Environmental Policy Act

MEPA requires DEQ to conduct an environmental review prior to making a permitting decision that may have a significant impact on the environment. MEPA and its associated administrative rules define the procedure to be followed when conducting the environmental review. In regard to MMC's applications to amend its operating permit for the Montanore Mine and to construct the associated transmission line, DEQ engaged in a joint environmental review with the KNF, culminating in the issuance of the Final EIS, which complies with the procedural requirements of MEPA.

1.7.1.2 Major Facility Siting Act

The MFSA requires that the proposed transmission line be approved if DEQ makes the requisite findings set forth in 75-20-301, MCA. Under this statute, DEQ can approve a transmission facility as proposed, as modified by DEQ, or an alternative to the proposed facility. Under 75-20-301(1)(c), MCA, DEQ must find and determine that the facility minimizes adverse environmental impacts, considering the state of available technology and the nature and economics of the various alternatives. DEQ's findings are documented in the Certificate of Compliance for the transmission line (Attachment 2) and are hereby incorporated herein by reference.

1.7.1.3 Montana Metal Mine Reclamation Act

Lands disturbed by hardrock mining must be reclaimed consistent with the requirements and standards set forth in 82-4-336, MCA. In most cases, disturbed land must be reclaimed to comparable utility and stability as that of adjacent areas. DEQ's 2006 approval of the reclamation and closure plan for the Libby Adit is not changed by my decision and remains in effect.

1.7.1.3.1 Procedural Compliance

In 2011, the Montana Legislature made procedural changes to the permitting provisions of the MMRA by enactment of Senate Bill 312 (see Section 82-4-337, MCA). Because the permitting process for the Montanore Project began prior to the enactment of this law, the new permitting provisions do not apply to the Montanore Project.

1.7.1.3.2 Air

Measures included to prevent air pollution and ensure the project complies with the Clean Air Act of Montana are summarized below in Section 1.7.1.6 and detailed in the MAQP #3788-00 (Attachment 3). Air resources monitoring requirements are in Attachment 1.

1.7.1.3.3 Water

Measures included to prevent water quality and quantity impacts are summarized above in Section 1.4. Compliance with the Montana Water Quality Act is discussed below in Sections 1.7.1.4 and 1.7.1.5, respectively. Water resources monitoring requirements are in Section C.10 of Attachment 1.

1.7.1.4 Montana Water Quality Act

All of the waters in the analysis area are high-quality waters. High-quality waters are those in which the quality is higher than the established standards (high-quality state waters are defined in the Montana Water Quality Act (75-5-103(13), MCA)). The Montana Water Quality Act prohibits degradation of high-quality waters unless DEQ issues an authorization to degrade. The Montana Water Quality Act defines “degradation” as a change in water quality that lowers the quality of high-quality waters for a parameter, unless the change is nonsignificant. The current nondegradation rules were adopted in 1994 in response to amendments to Montana’s nondegradation statute in 1993 and apply to any activity that is a new or increased source that may degrade high-quality water. These rules do not apply to water quality parameters for which an authorization to degrade was obtained prior to the 1993 amendments to the statute.

ARM 17.30.715(1) states that changes in existing surface water quality resulting from the activities that meet the criteria listed below are nonsignificant, and are not required to undergo degradation review:

- Activities that would increase or decrease the mean monthly flow of a stream by less than 15 percent or the 7-day, 10-year (7Q10) low flow of a stream by less than 10 percent;
- Discharges containing carcinogenic parameters, such as arsenic or beryllium, or parameters with a bioconcentration factor greater than 300, such as mercury, at concentrations less than or equal to the concentrations of those parameters in the receiving water;
- Discharges containing toxic parameters, including ammonia, nitrate plus nitrite, nitrite, aluminum, antimony, barium, cadmium, chromium, copper, lead, nickel, selenium, silver, and zinc, which will not cause changes that equal or exceed the trigger values in Circular DEQ-7. Whenever the change exceeds the trigger value, the change is not significant if the resulting concentration outside of a mixing zone designated by DEQ does not exceed 15 percent of the lowest applicable standard;
- Discharges containing harmful parameters, such as iron, turbidity, total nitrogen, and total phosphorus, that do not cause changes outside the mixing zone greater than 10 percent of the applicable standard where the existing concentration is less than 40 percent of the standard;
- Discharges causing changes in the quality of water for any parameter for which there are only narrative water quality standards if the changes do not have a measurable effect on any existing or anticipated use or cause measurable changes in aquatic life or ecological integrity;
- Changes in the concentration of nitrate in ground water which will not cause degradation of surface water if the sum of the predicted concentrations of nitrate at the boundary of any applicable mixing zone will not exceed the following values:
 - (i) 7.5 mg/L for nitrate sources other than domestic sewage;
 - (ii) 5.0 mg/L for domestic sewage effluent discharged from a conventional septic system;
 - (iii) 7.5 mg/L for domestic sewage effluent discharged from a septic system using level two treatment, as defined in ARM 17.30.702; or
 - (iv) 7.5 mg/L for domestic sewage effluent discharged from a conventional septic system in areas where the ground water nitrate level exceeds 5.0 mg/L primarily from sources other than human waste.

For purposes of this subsection, the word “nitrate” means nitrate as nitrogen; and

- Changes in concentration of total inorganic phosphorus in groundwater if water quality protection practices approved by the DEQ have been fully implemented and if an evaluation of the phosphorus adsorptive capacity of the soils in the area of the activity indicates that phosphorus will be removed for a period of 50 years prior to a discharge to any surface waters.

Notwithstanding compliance with the nonsignificance criteria in ARM 17.30.715(1), DEQ may determine that a change in water quality is degradation based on the following criteria: a) cumulative impacts or synergistic effects, b) secondary byproducts of decomposition or chemical transformation, c) substantive information derived from public input, d) changes in flow, e) changes in the loading of parameters, f) new information regarding the effects of a parameter, or g) any other information deemed relevant by DEQ and that relates to the criteria in ARM 17.30.715(1) (ARM 17.30.715(2)). Under ARM 17.30.715(3), DEQ may determine that a change in water quality is nonsignificant based on information submitted by an applicant that demonstrates conformance with the guidance found in 75-5-301(5)(c), MCA which are: i) potential for harm to human health, a beneficial use, or the environment; ii) strength and quantity of any pollutant; iii) length of time the degradation will occur; and iv) the character of the pollutant so that greater significance is associated with carcinogens and toxins that bioaccumulate or biomagnify and lesser significance is associated with substances that are less harmful or less persistent.

1.7.1.4.1 Existing Permits and Authorizations

In 1989, NMC submitted a “Petition for Change in Quality of Ambient Waters” (Petition) to the BHES requesting an increase in the concentration of select constituents in surface water and groundwater above ambient water quality, as required by Montana’s 1971 nondegradation statute. NMC submitted supplemental information in support of the petition in 1992. The BHES Order, issued to NMC in 1992, authorized degradation and established limits in surface water and groundwater in the Libby, Poorman, and Ramsey Creek watersheds adjacent to the Montanore Project for discharges from the project. The BHES Order established numeric limits for total dissolved solids, chromium, copper, iron, manganese, and zinc in both surface water and groundwater; nitrate+nitrite in groundwater only; and total inorganic nitrogen (nitrate+nitrite+ammonia) in surface water only. Pursuant to the BHES Order, these limits remain in effect during the operational life of the mine and for so long thereafter as necessary. For the parameters listed in the BHES Order, the limits contained in the authorization to degrade apply. For those parameters not covered by the authorization to degrade, such as flow, the applicable nonsignificance criteria established by the 1994 rules apply (ARM 17.30.715 or 17.30.716) unless MMC obtains an authorization to degrade under the current statute.

DEQ issued an MPDES permit to MMC in 1997 for Libby Adit discharge to the local groundwater or Libby Creek. Three outfalls are included in the permit: Outfall 001 – percolation pond, Outfall 002 – infiltration system of buried pipes, and Outfall 003 – pipeline outlet to Libby Creek. Only Outfall 001 has been used since permit issuance. DEQ renewed the permit in 2006. A minor modification of the MPDES permit in 2008 reflected an owner/operator name change from NMC to MMC. In 2011, MMC applied to DEQ to renew the existing MPDES permit and requested the inclusion of five new stormwater outfalls under the permit. DEQ will be reissuing the draft renewal MPDES permit for public comment and will finalize the permit following the review of public comment.

1.7.1.4.2 Final EIS Analysis

Because bedrock groundwater hydrology data from the proposed mine area are limited, DEQ relied on two separate numerical groundwater models to evaluate potential hydrology impacts of mine and adit dewatering. The results of the 2D model were provided in the Draft EIS. Subsequently, MMC prepared a more complex and comprehensive 3D groundwater model of the same analysis area. The results of the 3D model were used in the Supplemental Draft EIS and Final EIS to evaluate the site hydrogeology and to

analyze potential impacts due to mining. The mine-area 3D groundwater model provides a more detailed analysis by incorporating the influence of known or suspected faults on groundwater hydrology and recent underground hydraulic testing results from the Libby Adit. The mine area 3D groundwater model also uses a more comprehensive calibration process and better simulates vertical hydraulic characteristics of the geologic formations that will be encountered during the mining process. MMC developed a separate 3D groundwater model for the Poorman Tailings Impoundment Site to evaluate effects of pumpback well operation.

Section 3.8.3 of the Joint Final EIS discusses the development of 7Q10 streamflow estimates. Section 3.11 of the Joint Final EIS discusses the analysis of effects on streamflow and water quality. Section 3.6.4 of the Joint Final EIS discusses the analysis of effects of streamflow and water quality changes on aquatic life. The uncertainty of the groundwater models and an analysis of effects are discussed in Sections 3.10.4.3.4, 3.11.4.4.5, and 3.13.4.5 of the Joint Final EIS.

The KNF's Biological Assessment provides more detail on bull trout and bull trout critical habitat. In its 2014 bull trout Biological Opinion, the USFWS indicated that the project as proposed in Mine Alternative 3 (the Agency Mitigated Poorman Impoundment Alternative) and Transmission Line Alternative D-R (the Miller Creek Transmission Line Alternative) will not jeopardize bull trout, and is not likely to destroy or adversely modify bull trout critical habitat.

The project's water management plan varies by mine phase. The 3D groundwater model results presented in the Joint Final EIS are estimates of stream base flow reduction for numerous stream reaches at specific dates following the initiation of mining, including year 2 (end of Evaluation Phase), year 8 (end of Construction Phase and two years of mining), year 22 (end of Operations Phase), and year 38 (projected date of most severe stream base flow reductions in response to mine dewatering). Therefore, MMC's compliance with nondegradation rules is discussed by mine phase in subsequent sections.

1.7.1.4.3 Uncertainty

Both the 2D and 3D model reports include a discussion of the respective model's sensitivity to a range of hydrologic characteristics. The sensitivity analysis for the mine area 3D model indicates that increasing or decreasing hydraulic conductivity values for the various layers by one order of magnitude (10 times) in either direction provides estimates of mine inflow rates that are considered possible. When the higher or lower values for hydraulic conductivity were used in the model, however, it did not calibrate as well to measured groundwater discharges such as inflows to the existing Libby Adit and outflows from the Heidelberg adit. The selected hydraulic conductivity values in the 3D groundwater model result in predicted mine inflows of 370 gpm (Joint Final EIS at page 591). The sensitivity analysis of increasing or decreasing hydraulic conductivity values used in the 3D model by a factor of 10 resulted in a range of mine predicted inflows between 130 and 1,800 gpm. Based on historical and current inflow data from the Libby Adit, steady-state mine inflows of 130 or 1,800 gpm are unlikely, indicating the hydraulic conductivity values used in the calibrated model run are more likely and provide a reasonable estimate of mine inflow, groundwater drawdown, and changes to baseflow within the constraints of other parameters used in the models.

Each model report discusses overall uncertainty of the respective model results. There is uncertainty associated with the hydraulic properties of the bedrock and faults; predictions of mine inflows and impacts to water resources are sensitive to permeability of major fault zones. With the data currently available, the model results provide a potential range of mine dewatering and pumping (in the case of the tailings impoundment model) rates and streamflow impacts. They are the best currently available estimates of impacts and associated uncertainty that can be obtained using currently available data in the groundwater models. Both 3D groundwater flow models (mine area and tailings impoundment area) will

be refined and rerun after data from the Evaluation Phase are incorporated into the models (see Section 2.5.2.6.5, Joint Final EIS, page 138). Following additional data collection and modeling, the predicted impacts on surface water resources in the analysis area, including simulation of mitigation measures, may change and will have greater certainty.

In addition to model uncertainty, there is also the issue of measurability. The numerical models predict baseflow changes at various locations along streams draining the mine area, but the models do not consider what is possible to detect or measure. Other factors should be considered when reviewing and interpreting predicted baseflow. For example, baseflow at any one location along a stream may not be easily defined within the range of the model-predicted changes. Impacts from dewatering the mine and adits may be expressed in other ways, such as changing the elevation at which streams began to flow. Mine dewatering (and resultant groundwater drawdown) may cause this elevation to be lower in a drainage. Section 3.11.4.4.5 of the Joint Final EIS discusses streamflow variability and measurability. Measurement error in overall streamflow measurement can be discussed in terms of a “typical” scenario, a “best case” scenario, and a “worst case” scenario. The best case scenario represents measurement procedures used with a concentrated effort in quality assurance/quality control (QA/QC) unconstrained by financial and personnel resource limitations and in ideal hydrologic conditions. The typical scenario represents measurement procedures conducted with a moderate effort at QA/QC and under typical hydrologic conditions. For a typical scenario, estimated measurement error averages 10 percent and ranges from 6 percent to 19 percent for a range of conditions. The estimated measurement error is 3 percent for the best case scenario, which includes flow measurement under ideal hydrologic conditions, specifically a precalibrated flow control structure (stable bed and channel) and a stilling well for stage measurement. Most measurements will have standard errors ranging from about 3 percent to 6 percent, with a low of 2 percent under ideal conditions.

The natural variability in streamflow also influences the ability to detect a mining-induced change in streamflow. The average variability in low flows in streams at the periphery of the Montanore Project area is 20 percent. In stream reaches when and where the only source of water to streams is deep bedrock groundwater, it is expected that flow variability will be less. A sufficient number of streamflow measurements could be collected to determine whether the streamflow that may be affected by mining is statistically different from the streamflow that occurred pre-mining, regardless of variability. Although mining-induced streamflow changes will initially be small and gradually increase, a trend should be observable given adequate streamflow monitoring before mining began, during all mining phases, and after mining ceased.

1.7.1.4.4 Compliance Determination

Determination of 7Q10 and Mean Monthly Flow

ARM 17.30.715(1) states that changes in existing surface water quality resulting from the an activity that increases or decreases the mean monthly flow of a stream by less than 15 percent or the 7Q10 low flow of a stream by less than 10 percent is nonsignificant. Because meeting the 7Q10 flow is more stringent than the mean monthly flow when there is a flow decrease, the 7Q10 flow criterion will always achieve compliance with the mean monthly flow criterion. For activities that reduce flow, only nondegradation compliance with respect to the compliance with 7Q10 flow criterion will be discussed in this determination. For activities that will increase flow, such as discharges or watershed modifications, nondegradation compliance with respect to both criteria will be discussed.

The 7Q10 flow cannot be estimated directly because streamflow in analysis area streams has not been continuously gaged for an extended period. In the Joint Final EIS, DEQ estimated 7Q10 flow for analysis area streams using a regression equations method developed by the U.S. Geological Survey (USGS). The USGS used multiple linear regression analyses to develop equations for estimating 7Q10 flow at ungaged,

unregulated streams in northeast Idaho and northwest Montana. Based on the regression analysis, the USGS developed specific equations using different variables for eight regions of the study area, one of which (Region 2) encompassed the Montanore Project area. The USGS developed standard error of prediction ranges for each 7Q10 flow equation. The standard error of prediction includes the model error as well as an estimate of the sample error and is a better indicator of the model's overall predictive ability. In Region 2, the standard error of prediction for the 7Q10 equation was +113 percent to -53.1 percent.

Drainage area and mean annual precipitation were the location-specific variables in the final equations for Region 2 developed by the USGS to estimate 7Q10 flow. The drainage area of the USGS Region 2 ranged from 3 to 2,443 square miles, and the mean annual precipitation ranged from 24.8 to 69.4 inches. The mean annual precipitation for the monitoring sites in the analysis area is greater than 69 inches at higher elevations, such as within the CMW and in the upper half of the Poorman Creek watershed. The streamflow estimates may not be reliable for surface water monitoring sites with drainage areas and/or precipitation values outside the range of values used to develop the equations, or are near the maximum and minimum values used in the equations.

The upper reaches of each drainage potentially affected by mine dewatering (mostly within the CMW) are characteristically steep, with exposed bedrock and little, if any, surficial deposits. Runoff from precipitation generally is rapid and there is little porous material for seasonal groundwater storage. Consequently, the USGS method may overestimate 7Q10 flow. MMC has monitored streamflow in upper Libby Creek (at LB-200) since 2009. The estimated 7Q10 flow at LB-200 using the USGS method is 2.35 cubic feet per second (cfs), with an estimated range of 1.1 cfs to 5.0 cfs. Measured flow averaged less than 2.35 cfs for 7 consecutive days between October 5, 2009 and October 14, 2009. The lowest 7-day average flow was 1.90 cfs on October 14. Based on the Poorman SNOTEL site, 2009 was the driest year in the past 10 years in the project area. Despite its limitations, DEQ considers the USGS method the best available information on 7Q10 flow of analysis area streams for locations without continuous flow measurements. The estimated 7Q10 flow of analysis area streams developed using the USGS method in the Joint Final EIS is suitable for making the compliance determinations in this ROD. The hydrology monitoring plan in the Conceptual Monitoring Plans (Attachment 1) is designed to monitor surface water resources in sufficient detail to assist in assessing compliance with nondegradation rules.

For streamflow effects in upper Libby Creek (LB-100, LB-200, and LB-300), the compliance determinations in this ROD will use MMC's streamflow measurements at LB-200 collected since 2009. The lowest 7-day average flow was 1.90 cfs in 2009. Because 2009 was the driest year in the past 10 years in the project area, the 7-day average flow of 1.90 cfs in 2009 will be used to represent the 7Q10 at LB-200. The lowest monthly flow at LB-200 occurred in February, with a mean monthly flow of 5.83 cfs. Because LB-100 is 0.7 mile upstream from LB-200, and LB-300 is 1.4 miles downstream of LB-200, a proportional area approach will be used to estimate 7Q10 and mean monthly flow at these locations. The estimated 7Q10 at LB-100 is 1.16 cfs and the mean monthly February flow is 3.58 cfs. The estimated 7Q10 at LB-300 is 2.74 cfs and the mean monthly February flow is 8.54 cfs.

Evaluation Phase Findings

1. Evaluation Adit and Adit Dewatering

During the Evaluation Phase, MMC will dewater the full extent of the existing Libby Adit, extend the adit 3,300 feet to beneath the ore zones, and develop an additional 7,100 feet of drifts and 16 drill stations. Groundwater in the vicinity of the adit and drifts will flow toward the adit and drift void. Based on the groundwater model results, DEQ estimates average mine and adit dewatering over this 2-year phase will

be 230 gpm of water flowing into the adit and drifts and 30 gpm of water from mineralized zones, or mine water.

I find that MMC's proposed activities associated with mine and adit dewatering during the Evaluation Phase will result in nonsignificant changes in water quality. Model-predicted changes in streamflow from mine and adit dewatering during the Evaluation Phase during low-flow periods will be small (0.01 to 0.02 cfs). Potentially affected drainages are Libby Creek, East Fork Rock Creek, and East Fork Bull River. Flow changes in Libby Creek from dewatering would occur above LB-300, where treated waste water will be discharged. Streamflow changes will be less than 10 percent of the estimated 7Q10 flow in all potentially affected streams.

I am required by ARM 17.30.715(2) to consider other factors in my determination. Because the Montana Water Quality Act does not identify flow as a pollutant, the criteria in ARM 17.30.715(2)(b), (e), and (f) do not apply. ARM 17.30.715(2)(a) requires consideration of cumulative impacts or synergistic effects. Streamflow changes during the Evaluation Phase will not have cumulative impacts or synergistic effects. The streamflow analysis was available for public comment during two separate periods, and no substantive or new information was provided by the public during the comment period that suggested streamflow changes during the Evaluation Phase are not nonsignificant. I considered all other relevant information as it relates to the criteria in ARM 17.30.715(1), including the length of time the effect will occur. Based on the applicable criteria in ARM 17.30.715(2), I find that all of MMC's mine and adit dewatering during the Evaluation Phase will result in nonsignificant changes in water quality.

If mining activity is terminated following the Evaluation Phase, the Libby Adit would be allowed to flood and water treatment would be maintained until sediment and nitrogen concentrations decrease to levels that comply with MPDES permit criteria without treatment. This is expected to occur within a few years following flooding of the adit. At that time, an adit plug would be installed and flow of groundwater from the adit would return to natural pathways through the surrounding bedrock. Long term water treatment would not be required to prevent degradation of water quality, and any alterations of streamflow associated with dewatering, development, and subsequent flooding of the adit would not persist after that adit is plugged.

2. Evaluation Adit and Adit Discharges

Discharges from the Libby Adit Water Treatment Plant will alter the timing of flows in Libby Creek below the Water Treatment Plant outfall. All of the water currently being discharged and most of the water that will be discharged during the Evaluation Phase will come from groundwater stored in fractures, groundwater that would have flowed to Libby Creek or East Fork Rock Creek, or surface water intercepted from Libby Creek. Adit inflows over the past 3 years have averaged about 70 gpm. MMC currently discharges adit inflows at rates averaging between 300 and 350 gpm from 180 to 200 days per year. Frequency and rates of discharge will increase during the Evaluation Phase and may approach 500 gpm when the remainder of the existing Libby Adit is dewatered.

MMC's existing MPDES Permit MT0030279, which was issued in 1997, allows discharges of water flowing from the Libby Adit to Libby Creek. MMC has applied to DEQ to renew the existing MPDES permit and requested the inclusion of five new stormwater outfalls under the permit. Compliance of the evaluation adit discharges with applicable state laws will be discussed in DEQ's action on MMC's request to renew MPDES Permit MT0030279. As previously discussed, DEQ's approval of amendments to Operating Permit No. 00150 pertaining to the Evaluation Phase of the Montanore Project is conditioned on MMC obtaining approval of the Libby Adit discharges in the MPDES renewal process.

Construction Phase Findings

In MMC's model, the Construction Phase was combined with the first two years of mining; modeling of activities of just the Construction Phase was not completed. The modeled period had estimated average inflows of 450 gpm of adit water and 30 gpm of mine water. Model-predicted changes in streamflow from mine and adit dewatering during the Construction Phase (through year 8 of the project) during low-flow periods would be small, with the largest reduction predicted in Libby Creek of 0.13 cfs at LB-300. The effect during the Construction Phase on low flow in Ramsey, Poorman, and Little Cherry Creeks will be small (-1 to +3 percent). Streamflow changes would be less than 10 percent of the estimated 7Q10 flow in all streams. However, the groundwater model's predicted effects of mine void development on stream flow *during* the Construction Phase do not necessarily represent the most severe stream flow effects that may eventually result from completion of the Construction Phase as modeled. This conclusion is based on other results of the model. Specifically, although mining and mine dewatering are projected to conclude during project year 22, the greatest stream base flow reductions in response to mine dewatering are not projected to occur until year 38. Therefore, it is uncertain whether actions conducted during the Construction Phase and the first two years of mining (up through project year 8) would result in temporary degradation of stream flows at a later time.

Based on the uncertainty of the model predictions discussed previously, I am unable to determine that stream flow changes resulting from the proposed Construction Phase (including mining activity through project year 8) would remain in compliance with the nondegradation rules

Operation, Closure, and Post-Closure Phases Findings

MMC's 3D model included mitigation proposed by MMC as modified by DEQ, including one or more bulkheads left in place to reduce potential impacts on streamflow in East Fork Rock Creek and East Fork Bull River and buffer zones next to Rock Lake and the Rock Lake Fault. The 3D model results predict that by the end of the Operation Phase, stream base flows within the CMW would be reduced by as much as 25% in the upper East Fork of Rock Creek (at EFRC-50), 17% in the upper East Fork of Bull River (at EFBR-300), 20% in upper Libby Creek (at the wilderness boundary at LB-100), and 8% in Ramsey Creek (at the wilderness boundary at RA-100) (Joint Final EIS Table 99, Page 595). By year 38 during the Post-Closure Phase (sixteen years after mining has ceased), these base flow reductions are projected to reach a maximum baseflow change of 100% in the upper East Fork of Rock Creek (at EFRC-50), 97% in the upper East Fork of Bull River (at EFBR-300), 11% in upper Libby Creek (at the wilderness boundary at LB-100), and 4% in Ramsey Creek (at the wilderness boundary at RA-100) (Joint Final EIS Table 101, Page 602).²

Rules implementing the Montana Water Quality Act's Nondegradation Policy (ARM 17.30.715(1)) state that activities that would increase or decrease the mean monthly flow of a surface water by more than 15 percent or the seven-day ten-year low flow by more than 10 percent are degradation. Furthermore, under Section 75-5-316(2)(a) MCA, degradation of outstanding resource waters, which includes all streams within wilderness areas, cannot be authorized. Therefore, the 3D model results predict that development of the proposed mine void beneath the CMW would result in reductions of stream base flows that cannot be authorized. Surface waters located within the boundaries of the CMW are outstanding resource waters.

² The predicted effects on streamflow do not include mitigation measures not provided in MMC's 3D model, such as increasing buffer zones or using multiple plugs in adits during closure. Such mitigation would reduce the maximum drawdown and maximum changes to baseflow and would be evaluated after additional data were collected during the Evaluation Phase. As indicated previously, analysis of the information obtained from the Evaluation Phase, along with the incorporation of any additional mitigation measures in the 3D model, would be subject to appropriate MEPA review.

Authorizations to degrade may not be issued for state waters that are classified as outstanding resource waters.

As noted previously (ROD at Section 1.7.1.4.3), there is uncertainty associated with the groundwater modeling presented in the Joint Final EIS because it is not based on sufficient site-specific data. There is a reasonable expectation that such data can be obtained during the Evaluation Phase of the Montanore Project. Such new information may provide sufficient credible data to conclude that development of the mine void as proposed would not result in the degradation of wilderness streams or that modification of the mining plan or other mitigations could avoid such degradation.

1.7.1.5 Federal Clean Water Act – Section 401 Certification

Under Section 401 of the federal Clean Water Act, DEQ can review and approve, condition, or deny all federal permits or licenses, such as a Section 404 permit, that might result in a discharge to state waters, including wetlands. It is anticipated that one or more Montanore Project facilities will need a 404 permit from the Corps since both Alternative 3 – Agency Mitigated Poorman Impoundment Alternative and Alternative D-R -Miller Creek Transmission Line Alternative (and all other action alternatives) involve the potential discharge of fill material or excavation into wetlands or waters of the U.S. Because a Section 404 permit is needed, MMC must also apply for 401 Water Quality Certification from DEQ (ARM 17.30.101, et seq.). The Section 401 review allows for better consideration of state-specific concerns, and DEQ may add conditions to the Section 404 permit, if necessary, to ensure that state water quality standards are met.

In 2011, MMC submitted a Section 404 permit application to the Corps for both Alternative 3 – Agency Mitigated Poorman Impoundment Alternative and Alternative D-R -Miller Creek Transmission Line, and the Corps and DEQ jointly issued a 60-day public notice on the permit application. The application described the amount and types of wetlands and other waters of the U.S. that would be affected by proposed facilities. The permit application also included a draft conceptual mitigation plan to mitigate impacts to wetlands and other waters of the U.S.

MMC has not submitted an application for 401 certification to DEQ, and DEQ's 2011 public notice is no longer valid for the 401 certification process. Before issuing a 404 permit for the Montanore Project, the Corps will require DEQ's 401 certification for the issued permit or notice that it intends to waive certification. If not otherwise certified, DEQ intends to request that MMC submit an application for 401 certification to DEQ when the Corps is close to issuing a 404 permit, which will allow DEQ to fully understand the activity being certified. At that time, DEQ will issue a new public notice on the certification application.

1.7.1.6 Clean Air Act of Montana

An air quality permit to construct and operate a new or altered air pollution source cannot be issued unless the source is able to comply with the applicable regulations and requirements of the federal Clean Air Act and the Montana Clean Air Act, and any applicable control strategy contained in the Montana State Implementation Plan. The applicant must also demonstrate that the source will not cause or contribute to a violation of a Montana or national ambient air quality standard. The limits in MAQP #3788-00 ensure that all potential sources of air pollutants from the Montanore Project comply with the federal Clean Air Act, the Clean Air Act of Montana, and the Montana State Implementation Plan (see Attachment 3).

MMC will implement emission controls at the proposed mine that will constitute best available control technology, as required by ARM 17.8.752(1)(a). Mine operations will not significantly affect PM_{2.5} concentrations within Libby's nonattainment area and will comply with the Montana State Implementation Plan. MMC will develop a general operating plan for the tailings impoundment site

including a final fugitive dust control plan to control wind erosion from the tailings impoundment site. Spigots distributing wet tailings material and water will cover about one-half of the total tailings at any time. The spigots will be moved regularly and will cause wetting of all nonsubmerged portions of the tailings impoundment to occur each day. This wetting will be supplemented by sprinklers as necessary when weather conditions exist to cause fugitive dust. These measures will minimize windblown tailings at the tailings impoundment.

A buried 34.5-kV transmission line along Bear Creek Road and the Ramsey Plant Access Road may be installed to replace the generators before the installation of the main transmission line. Once this underground transmission line is operational, the operation of the diesel engine being used for emergencies and rated up to 1500 brake horsepower will not exceed 16 hours during any rolling 12-month period. Using Tier 4 engines and ultra-low sulfur diesel fuel in underground mobile equipment will substantially reduce nitrogen and sulfur emissions. Construction activities and facility operations will not result in exceedances of any National or Montana ambient air quality standards.

DEQ's findings demonstrating compliance with the Clean Air Act of Montana are documented in MAQP #3788-00 (see Attachment 3). Other conditions and limitations on air emissions are also described in the permit.

1.7.1.7 Montana Hard Rock Impact Act

Lincoln County approved an updated Hard Rock Mining Impact Plan for the Montanore Project in 2007. The plan describes how the Montanore Project will affect local government services, facilities, costs, and revenues. The plan specifies the measures MMC will undertake to mitigate adverse fiscal impacts on local governments. MMC will prepay about \$180,000 in taxes before construction to offset the net negative fiscal impact on the county budget during the first year. Because employment projections may change, MMC submitted a petition for an amendment for consideration by the Hard Rock Mining Impact Board. The board approved the petition for amendment in 2008.

1.7.1.8 Montana Noxious Weed Act and County Weed Control Act

The Lincoln County Weed Board administers the County Noxious Weed Control Act (7-22-2101 through 2153, MCA) for any land-disturbing activities within their jurisdiction. MMC has a Weed Control Plan approved by Lincoln County Weed Control Board. The plan will be modified as described in Attachment 1 and submitted to the KNF and DEQ during final design for their approval. Following KNF's and DEQ's approval of the final Weed Control Plan, MMC will submit it to the Lincoln County Weed Control Board for approval. Weed control measures will be applied to all permit areas and all currently unopened roads used for transmission line access. DEQ will accept the Lincoln County Weed Board's decision regarding a Weed Control Plan for the Montanore Project.

1.7.1.9 Montana Private Property Assessment Act

Section 3.26.6 of the Joint Final EIS disclosed the costs of various components or mitigations measures that will increase costs from MMC's mine proposal (Alternative 2). Alternative D-R -Miller Creek Transmission Line Alternative will not affect MMC's private land and is therefore not included in the Joint Final EIS analysis. Alternative 3 – Agency Mitigated Poorman Impoundment Alternative and Alternative D-R -Miller Creek Transmission Line Alternative with the applicable mitigation measures will not prohibit development of the proposed project, but will require MMC to spend additional funds. The higher the costs associated with regulatory compliance, the less the economic benefit gained from the use of the property, and the more restrictive the regulatory action is to the use of private property.

The agencies have determined that each of the modifications and mitigations of the Alternative 3 – Agency Mitigated Poorman Impoundment Alternative and Alternative D-R -Miller Creek Transmission Line Alternative will be the least restrictive means of accomplishing the purpose of the modifications and mitigations. The DEQ cannot condition a permit based on alternatives developed through the MEPA impact analysis process unless they also are required under state laws or by the consent of the operator. The modifications and mitigations allowed by state law are specified in the Joint Final EIS; generally excluded are those mitigating impacts on wildlife, aesthetics (visual and sound), fisheries, and threatened and endangered species.

1.8 Permits, Licenses, and Authorizations Needed to Implement the Decision

Besides DEQ, federal and other state agencies require permits or have review authority for the Montanore Project. Federal agencies include the KNF, USFWS, Corps, BPA, and EPA. State and local agencies include DEQ, FWP, DNRC, the Montana Department of Transportation (MDT), Montana State Historic Preservation Office (SHPO), and the Lincoln County Weed Board. The roles and responsibilities for each of these agencies are described in Chapter 1 of the Joint Final EIS.

Table 1 below lists the permits, licenses, and approvals required from each state and local agency for the Montanore Project.

Table 1. Permits, Licenses, and Approvals Required for the Montanore Project.

Permit, License, or Approval	Purpose
<i>Montana Department of Environmental Quality</i>	
Hard Rock Operating Permit Modification (MMRA)	To allow a change in an approved operating plan. Proposed activities must comply with state environmental standards and criteria. Approval may include stipulations for final design of facilities and monitoring plans. A sufficient reclamation bond must be posted with the DEQ before implementing an operating permit modification. Coordinate with the KNF.
Transmission Line Certificate (MFSA)	To allow the construction and operation of a 230-kV transmission line more than 10 miles long. Reclamation plans and a bond can be required. Coordinate with the KNF, FWP, DNRC, Montana Departments of Commerce, Revenue, and Transportation, and Montana Public Service Commission.
Montana Air Quality Permit	To control criteria air pollutants when the potential to emit is more than 25 tons per year.
MPDES Permit (Montana Water Quality Act)	To establish effluent limits, treatment standards, and other requirements for point source discharges, including stormwater discharges to state waters including groundwater. Coordinate with the EPA.
Public Water Supply and Sewer Permit	To allow construction of public water supply and sewer system and to protect public health.
Water Quality Waiver of Turbidity (318 Permit) (Montana Water Quality Act)	To allow for short-term increases in surface water turbidity during construction. Request may be forwarded from the FWP.
401 Certification (Clean Water Act)	To ensure that any activity that requires a federal license or permit (such as the Section 404 permit from the Corps) complies with Montana water quality standards.
Hazardous Waste and Solid Waste Registration (various laws)	To ensure safe storage and transport of hazardous materials to and from the site and proper storage, transport, and disposal of solid wastes. Some classes of solid waste disposal are covered under the MMRA. Solid wastes may be addressed under the operating permit.

Permit, License, or Approval	Purpose
<i>Montana Department of Natural Resources and Conservation</i>	
Beneficial Water Use Permit (Montana Water Use Act)	To allow the beneficial use of groundwater or surface water.
Floodplain Development Permit (Montana Floodplain and Floodway Management Act)	To allow construction of mine facilities within a 100-year floodplain.
310 Permit (Montana Natural Streambed and Land Preservation Act)	To allow mine-related activities that physically alter or modify the bed or banks of a perennially flowing stream.
Streamside Management Zone Law	To control timber harvest activities within at least 50 feet of any stream, lake, or other body of water.
Burning Permit	To control slash or open burning outside the open burning season.
Access Road Easement	To allow road construction on State lands.
<i>Montana State Historic Preservation Office</i>	
Cultural Resource Clearance (Section 106 Review)	To review and comment on federal compliance with the NHPA.
<i>Montana Fish, Wildlife and Parks</i>	
310 Permit (Natural Streambed and Land Preservation Act)	To allow mine-related construction activities by nongovernment entities within the mean high water line of a perennial stream or river. Coordinate with the DNRC and Lincoln County Conservation District. The FWP works with conservation districts to review permit and determine if a Water Quality Waiver of Turbidity (318 Permit) from the DEQ is needed.
Transmission Line Approval	To allow construction of the 230-kV transmission line across the Thompson Fisher conservation easement.
<i>Montana Department of Transportation</i>	
Approach Permit	To allow safe connection of mine-related roads to state highways.
Utility Occupancy and Location Agreement or Encroachment Permit	To allow mine-related utility or construction access roads within MDT rights-of-way.
<i>Montana Department of Commerce, Hard Rock Impact Board/Lincoln County</i>	
Fiscal Impact Plan (Hard Rock Mining Impact Act)	To mitigate fiscal impacts on local government services.
<i>Lincoln County Weed District</i>	
Noxious Weed Management Plan	To minimize propagation of noxious weeds.

1.9 Public and Agency Participation

1.9.1 Public Participation

Public participation has and continues to play an important role in decision-making for this project. Public scoping was conducted to identify significant issues and develop key mitigation and monitoring measures. During the official public comment period on the Draft and Supplemental Draft EISs, the public had the opportunity to submit comments, which DEQ and the KNF responded to in the Joint Final EIS. Finally, DEQ reviewed comments and input received from the public and other agencies and tribal representatives throughout the MEPA process.

Opportunity for public involvement began when scoping was initiated on MMC's proposal. A Notice of Intent was published on July 14, 2005, in the Federal Register. This notice described the Forest Service's and DEQ's intent to prepare an EIS for the proposed Montanore Project, set the dates for public scoping meetings, and solicited public comments. In addition, as part of the public involvement process, the lead agencies issued press releases, mailed scoping announcements, and held three public meetings.

The dates of all public meetings, as well as copies of notices and news releases that invited comment or provided informational updates on the EIS process can be found in the project record, which is available for public review at the KNF Supervisor's office in Libby, Montana. Meetings and hearings were held to provide information and receive comment on the Draft EIS and Supplemental Draft EIS. Notification of comment periods, open houses, hearings, and meetings were published or broadcast in numerous papers and television/radio stations between Missoula and Kalispell. Notices of Availability and copies of the Draft and Supplemental Draft EIS were emailed or mailed to interested individuals and organizations. Notices of Availability were published in the Federal Register. In addition to holding public meetings, the agencies hosted field trips for the interdisciplinary team and meetings to discuss and resolve issues and concerns for alternatives development.

During the public comment period for the Draft EIS, the agencies received 40,097 letters, comment sheets, and transcripts, including 39,923 form letters. During the public comment period for the Supplemental Draft EIS, the agencies received 44,759 letters, comment sheets, and transcripts, including 44,641 form letters. The responses to Draft EIS and Supplemental Draft EIS comments are included in Appendix M of the Joint Final EIS.

Public participation does not end with the permitting of the Montanore Project. The public has the right to review permit files and monitoring reports at any time. If a person or organization believes there is an unreported violation or potential for environmental harm, that person has the right to file a complaint with the agencies and expect it to be investigated.

1.9.2 Comments Received from Tribes, Agencies, and the Public and the Agencies' Response

Comment letters received from Native American tribes and federal, state, and local agencies on the Draft EIS and Supplemental Draft EIS are included in Appendix M to the Joint Final EIS. The agencies' responses are presented alongside each comment. MMC's comments on the Draft EIS and Supplemental Draft EIS were also reproduced and responded to in the same manner.

Substantive comments received by individuals and organizations on the Draft EIS and Supplemental Draft EIS were organized for response according to issue codes. To reduce repetition, similar comments were grouped together and responded to collectively. An alphabetical list of individuals and organizations that provided comments along with associated issue codes can be found in Appendix M to the Joint Final

EIS. Responses to substantive comments are organized by issue codes and can be found in the same appendix. Where appropriate, the text of the Final EIS was revised and the section where the change was made is noted in the response to comments.

DEQ must be responsive to all substantive comments; however, not all comments received were substantive. According to MEPA regulations, a final environmental impact statement must include “a list of all sources of written and oral comments on the draft EIS, including those obtained at public hearings, and, unless impractical, the text of comments received by the agency (in all cases, a representative sample of comments must be included) and the agency’s responses to substantive comments, including an evaluation of the comments received and disposition of the issues involved.” (ARM 17.4.619). All of the original comments (substantive and nonsubstantive) on the Draft EIS and Supplemental Draft EIS that the agencies received are available for public inspection at the addresses listed in the abstract at the front of the Joint Final EIS.

1.10 Reclamation Bond (Financial Assurance)

DEQ and the Forest Service executed a MOU allowing the agencies to accept a joint bond that satisfies both state and federal reclamation requirements. Forfeiture of the reclamation bond may be caused jointly by the agencies or by one of the agencies acting without the concurrence of the other agency. Even if forfeiture of the reclamation bond is caused by one of the agencies, the bond must be expended in a manner that satisfies both federal and state reclamation requirements.

Pursuant to the MMRA and administrative rules adopted thereunder, a mine operator is required to submit a reclamation bond to the DEQ before DEQ may issue an operating permit, or permit amendment. The reclamation bond may not be less than the estimated cost to the State to ensure compliance with the Clean Air Act of Montana, the Montana Water Quality Act, the MMRA, the administrative rules adopted under the MMRA, and the operating permit. The reclamation bond may be in the form of a surety bond, an irrevocable letter of credit, a certificate of deposit, or cash. The bond for larger mining operations is usually in the form of a surety or irrevocable letter of credit because of the significant financial obligation that reclamation typically represents.

Agency engineers calculate the reclamation bond amount after an alternative has been selected for implementation and a ROD or decision is issued by each agency.

Additional information on the reclamation bond and how it is calculated can be found in Chapter 1 of the Joint Final EIS.

1.11 Appeal of DEQ’s Decision

Notice of the decisions and any permit issuance will be published in *The Missoulian* (Missoula, Montana) and on DEQ’s website. DEQ’s decision regarding MMC’s operating permit is subject to a court appeal by the applicant and other parties and must be filed within 90 days after the date of this ROD under Section 82-4-349(1), MCA. An applicant for a permit amendment may request an administrative hearing under the Montana Administrative Procedure Act on a denial of the application. A written request for a hearing must be filed within 30 days of receipt of this ROD pursuant to Section 82-4-353(2), MCA. The request must state the reason that the hearing is requested.

A person aggrieved by DEQ’s final decision on MMC’s application for a Certificate of Compliance for the transmission line may within 30 days of the date of this ROD file an appeal with the Board of Environmental Review (Board) under Section 75-20-223, MCA. Except as provided in that statute, the contested case provisions of the Montana Administrative Procedure Act apply to a hearing before the

Board. A person aggrieved by the final decision of the Board may obtain judicial review of that decision pursuant to Section 75-20-406, MCA.

A person directly and adversely affected by the DEQ's decision to approve or deny an air quality permit application may request a hearing before the Board under Section 75-2-211(10), MCA. The request must be filed within 15 days after DEQ renders its decision. The contested case provisions of the Montana Administrative Procedure Act apply to the hearing before the Board. An affidavit setting forth the grounds for the request for hearing must be filed with the Board within 30 days after DEQ renders its decision. DEQ's decision is not final until 15 days have elapsed from the date of the decision. The filing of a request for a hearing does not stay DEQ's decision unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA.

Any action or proceeding challenging a final agency decision alleging failure by DEQ to comply with or inadequate compliance with a MEPA requirement must be brought within 60 days after issuance of the ROD pursuant to Section 75-1-201(5)(a)(ii), MCA.

For additional information concerning these decisions or DEQ's appeal process, contact Craig Jones, Director's Office, DEQ, 1520 E. Sixth Avenue, Helena, MT, 406-444-0514.

1.12 Additional Information

Copies of the Montanore Project Joint Final EIS are available for review at the Montana Department of Environmental Quality, Lee Metcalf Building in Helena; the USFS Supervisor's Office, Kootenai National Forest in Libby; the Montana State Library in Helena; the Mansfield Library, University of Montana in Missoula; and public libraries in Libby, Heron, Thompson Falls, Clark Fork and Sandpoint. The Joint Final EIS may also be accessed on the Internet at DEQ's website at <http://deq.mt.gov/Land/hardrock/Montanore-Mine-Project>.

Electronic (on compact disc) copies of this ROD and the Joint Final EIS are available upon request. The supporting project record is available for review at the Montana Department of Environmental Quality, Environmental Management Bureau at 1520 East Sixth Avenue, PO Box 200901, Helena, MT 59620-0901.

1.13 Approvals

This ROD is effective on signature.

Tom Livers
Tom Livers, Director
Montana Department of Environmental Quality

2/12/16
Date

For additional information on the mining, operation, and closure plan; this Record of Decision; or the Environmental Impact Statement, please contact Craig Jones, Director's Office, DEQ, 1520 East Sixth Avenue, Helena, MT 59620-0901, 406-444-0514.

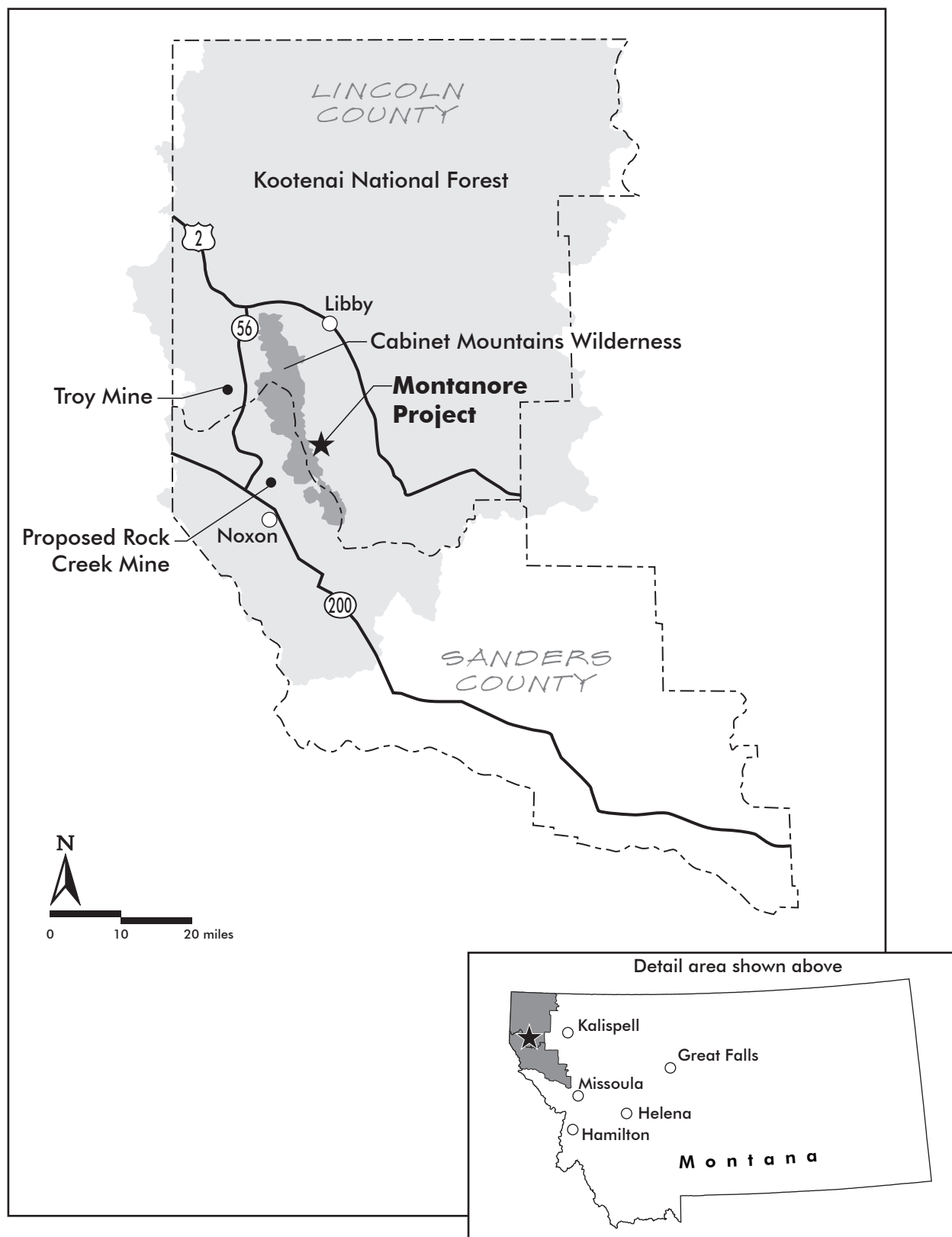


Figure 1. Location Map, Montanore Project, Kootenai National Forest.

Attachment 1 – Conceptual Monitoring Plans

Attachment 1. Conceptual Monitoring Plans

C.1	Introduction.....	1
C.2	Air Quality	1
C.3	Cultural Resources	4
C.4	Wetlands and Other Waters of the U.S.....	6
C.5	Wildlife	10
C.6	Geotechnical	12
C.7	Rock Mechanics.....	15
C.8	Reclamation	18
C.9	Geochemistry	20
C.10	Water Resources.....	39
C.11	Aquatic Biology	85
C.12	Wilderness.....	93
C.13	References.....	95

Tables

Table C-1.	Air Monitoring Locations, Parameters, and Frequency.....	2
Table C-2.	Geotechnical Monitoring.	14
Table C-3.	Estimated Material Balance, by Phase of Mine Life, Alternative 3.	24
Table C-4.	Summary of Geochemical Analyses and In Situ Water Quality Data.	25
Table C-5.	Summary of Material Types.	26
Table C-6.	Evaluation Phase Geochemical Testing.	27
Table C-7.	Summary of GDE Monitoring in the CMW.....	44
Table C-8.	Groundwater Dependent Ecosystem Monitoring Options.	56
Table C-9.	Surface Water Monitoring Locations—Evaluation Phase.....	58
Table C-10.	Flow and Field Parameters for Surface Water Samples and Required Reporting Values.	60
Table C-11.	Monitoring Parameters and Required Reporting Values for Surface Water Samples.....	61
Table C-12.	Monitoring Parameters and Required Reporting Values for Groundwater and Mine and Tailings Water.	65
Table C-13.	Groundwater Monitoring Requirements.	66
Table C-14.	Surface Water Monitoring Locations (Excluding Stormwater Monitoring)—Construction and Operations Phases.	71
Table C-15.	Monitoring Parameters and Required Reporting Values for Stormwater Samples from Outfalls 004 through 008.....	75
Table C-16.	Water Balance Monitoring Requirements.	79
Table C-17.	Action Levels for Groundwater Compliance Wells downgradient of the Tailings Impoundment Pumpback Well System.	81
Table C-18.	Aquatic Biology Monitoring Stations.	91
Table C-19.	Aquatic Biology Monitoring.	92

Figures

Figure C-1. Decision Matrix for Geochemical Sampling and Analysis.....	22
Figure C-2. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations.	41
Figure C-3. Groundwater Dependent Ecosystem Inventory and Monitoring Area.....	46
Figure C-4. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Mine Area.	47
Figure C-5. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Upper Libby Creek.	49
Figure C-6. Proposed Underground Piezometers.....	63
Figure C-7. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Impoundment Area.	69

C.1 Introduction

This appendix contains the agencies' conceptual monitoring plans for Alternative 3. MMC would develop final monitoring plans for the agencies' approval. Final monitoring plans would be incorporated as a component of appropriate permits and plans administered by the various agencies. Identification of these plans and the timing for their submittal and approval is discussed in the following sections of this Appendix. Where applicable, plans would include a section on quality assurance measures that ensure the reliability and accuracy of monitoring information as it was acquired. For example, surface water quality sampling would follow DEQ's *Quality Assurance Project Plan (QAPP), Sampling and Water Quality Assessment of Streams and Rivers in Montana, 2005* (DEQ 2005a). Each plan would describe data quality objectives for sampling, which would include specific methods for analysis and quantification, and criteria for assessment of the data. All plans would identify action levels, which when reached would require MMC to implement a corrective measure. MMC would update the closure plan, including long-term monitoring plan, during the Construction Phase in sufficient detail to allow development of a reclamation bond.

All monitoring would require an annual report unless otherwise specified. Final reporting requirements would be described in applicable permits or approvals or in MMC's final monitoring plans. The format and requirement needs for reporting would be finalized by the agencies. Reports would be submitted to other agencies as identified by the KNF and the DEQ. After submittal of a monitoring report, the agencies may call a meeting with all other relevant agencies to review the monitoring plan and results, and to evaluate possible modifications to the plan or permitted operations.

MMC would submit as part of its annual report to the lead agencies a discussion of its compliance with all the monitoring and mitigation requirements specified in the DEQ Operating Permit and the KNF's approved Plan of Operations. Each monitoring and mitigation requirement of the selected alternative would be listed in the report.

MMC's monitoring plans would have four overarching objectives: 1) to supplement available information in areas where there is uncertainty; 2) to validate predictions of impacts on each resource; 3) to assess if the alternative selected in the KNF's ROD is adversely affecting the environment; and 4) to monitor the effectiveness of the agencies' mitigation measures described in the EIS and ROD and any additional mitigation measures implemented by MMC to reduce adverse effects of mining. The monitoring plans are expected to be dynamic, and change as new data were collected and analyzed. Monitoring data would be used to assess the potential effects of mining, determine if additional monitoring was needed, update the 3D groundwater models to reassess effects to water resources, and, if needed, require corrective action by MMC to mitigate adverse effects of mining on analysis area resources. Monitoring data would be made available for public review.

C.2 Air Quality

Most of the following air monitoring is based on DEQ's supplemental Preliminary Determination issued in 2011. The DEQ may change the monitoring requirements when it issues a final Montana air quality permit.

C.2.1 Objective

The objectives of air monitoring are to monitor annual production information and emission sources, and to assess effectiveness of wind erosion control measures at the tailings impoundment site.

C.2.2 Locations, Parameters, and Frequency

MMC would submit to the agencies for approval a general operating plan for the tailings impoundment site including a fugitive dust control plan to control wind erosion from the site. The plan would include, at a minimum, the embankment and cell (if any) configurations, a general sprinkler arrangement, and a narrative description of the operation, including tonnage rates, initial area, and timing of future enlargement.

MMC would install, operate, and maintain three air monitoring sites in the vicinity of the mine and facilities. The exact location of the monitoring sites would be approved by the agencies and meet all applicable siting requirements contained in the Montana Ambient Air Monitoring Program Quality Assurance Project Plan (2013a), ARM 17.8.202 and 17.8.204; the EPA Quality Assurance Manual (EPA 2008a, 2008b); and 40 CFR 50, 53, and 58; or any other requirements specified by the DEQ.

MMC would begin air monitoring at the commencement of mill facilities or the tailings impoundment and continue air monitoring for at least 1 year after normal production was achieved. MMC would monitor nitrogen and sulfur emissions at the Libby Adit for a minimum of 2 years. MMC would analyze for metals shown in Table C-1 on the PM₁₀ filters once the mill facilities and tailings impoundment were operational. At that time, the DEQ and the KNF would review the air monitoring data and determine if continued monitoring or additional monitoring was warranted. The DEQ and the KNF may require continued air monitoring to track long-term impacts of emissions for the project or require additional ambient air monitoring or analyses if any changes took place regarding quality and/or quantity of emissions or the area of impact from

Table C-1. Air Monitoring Locations, Parameters, and Frequency.

Location	Site	Parameter	Frequency
Plant Area	Site #1	PM-10 ¹ As, Cu, Cd, Pb, Zn ² PM-2.5 ³	Every 3 rd day according to EPA monitoring schedule
Tailings Area (Up-drainage)	Site #2	PM-10 ¹ As, Cu, Cd, Pb, Zn ² PM-2.5 ³	Every 3 rd day according to EPA monitoring schedule
Tailings Area (Down-drainage)	Site #3	PM-10 ¹ / PM-10 ¹ Collocated As, Cu, Cd, Pb, Zn ² PM-2.5 ³ / PM-2.5 ³ Collocated Wind speed, Wind Direction, Sigma theta ⁴	Every 3 rd day according to EPA monitoring schedule (Collocated every 6 th day) Continuous

¹ PM-10 = particulate matter less than 10 microns.

² As = Arsenic, Cu = Copper, Cd = Cadmium, Pb = Lead, Zn = Zinc.

³ PM-2.5 = particulate matter less than 2.5 microns.

⁴ Sigma Theta = Standard Deviation of Horizontal Wind Direction.

the emissions.

C.2.3 Inspections

DEQ's Air Resources Management Bureau personnel would perform on-site inspections of the operation on a random basis on a frequency of at least once per year. The overall effectiveness of the proposed air pollution control measures, with emphasis on the adequacy of wind erosion prevention at the tailings impoundment, would be evaluated on an ongoing basis.

C.2.4 Reporting

MMC would use air monitoring and quality assurance procedures that are equal to or exceed applicable requirements. MMC would provide the DEQ and the KNF with annual production information for all emission points in the annual emission inventory request. The request would include all sources of emissions identified in the emission inventory contained in the permit analysis. The following information would be provided:

- Amount of ore and waste handled
- Amount of diesel used (surface equipment and underground equipment separately)
- Amount of propane used
- Amount of explosives used (RU Emulsion explosive and High Explosive separately)
- An estimate of vehicle miles traveled on on-site access roads
- Amount of disturbed acreage (including tailings impoundment area)
- Other emission-related information the DEQ may request

MMC would submit quarterly data reports within 45 days after the end of the calendar quarter and an annual data report within 90 days after the end of the calendar year. The annual report may be substituted for the fourth quarterly report if all required quarterly information is included in the report. The quarterly report would consist of a narrative data summary and a data submittal of all data points in AIRS format. This data would be submitted electronically. The narrative data summary would include:

- A topographic map of appropriate scale with coordinates and a true north arrow showing the air monitoring site locations in relation to the plant, any nearby residences and/or businesses, and the general area
- A hard copy of the individual data points
- The quarterly and monthly means for PM₁₀, PM_{2.5}, and wind speed
- The first and second highest 24-hour PM₁₀, PM_{2.5} concentrations and dates
- A quarterly and monthly wind roses
- A summary of the data collection efficiency
- A summary of the reasons for missing data
- A precision and accuracy (audit) summary
- A summary of any ambient air standard exceedances
- Calibration information

The annual data report would consist of a narrative data summary containing:

- A topographic map of appropriate scale with UTM coordinates and a true north arrow showing the air monitoring site locations in relation to the plant, any nearby residences and/or businesses, and the general area
- A pollution trend analysis
- The annual means for PM₁₀, PM_{2.5}, and wind speed
- The first and second highest 24-hour PM₁₀, PM_{2.5} concentrations and dates
- The annual wind rose
- An annual summary of data collection efficiency
- An annual summary of precision and accuracy (audit) data
- An annual summary of any ambient standard exceedance
- Recommendations for future monitoring

Using the nitrogen and sulfur monitoring data, MMC would update the nitrogen and sulfur deposition analysis and compare the updated model results to the current FLM deposition analysis thresholds. MMC would also assess potential effects on lake ANC if appropriate methods were available. If modeled results using the Libby Adit monitoring data were greater than current FLM deposition analysis thresholds, MMC would develop a plan for agencies' review that evaluated all available control technologies to reduce pollutant emissions.

C.3 Cultural Resources

C.3.1 Objective

Cultural resources would be monitored to ensure protection for cultural resources or human remains not identified during initial surveys from adverse effects during construction, and that all cultural resources that were to be avoided were not adversely affected during construction.

C.3.2 Locations, Parameters, and Frequency

In Alternatives 3 and 4 before any ground-disturbing activities, MMC would complete an intensive cultural resources survey on all areas proposed for disturbance for any areas where such surveys have not been completed and that would be disturbed by the alternative. Surveys would meet the requirements of the 36 CFR 800 regulations, following the guidelines in the 2011 KNF Site Inventory Strategy. Eligibility assessments for historic properties within the selected alternatives, as outlined in the KNF's ROD, would be completed and formally resolved through the SHPO and/or the Keeper of the National Register pursuant to 36 CFR 800, before project impacts to properties occurred. MMC would prepare a mitigation plan for all NRHP-eligible properties determined through a formal determination of effect to be adversely affected by the project. The mitigation plan would be submitted for approval by the KNF if on National Forest System lands in consultation with the SHPO and the Advisory Council on Historic Preservation. The survey, eligibility assessment, and mitigation planning would be completed by a qualified archaeologist meeting the Secretary's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716).

In 2010, the KNF and Montana SHPO entered into a Programmatic Agreement that described certain requirements of the parties to mitigate the unavoidable adverse effects on historic properties and to manage inadvertent discovery of historic properties. Monitoring would be

required during any land disturbing activity that has potential to adversely affect unidentified sites. Monitoring would be completed by a qualified archaeologist meeting the Secretary's Standards and Guidelines for Archeology and Historic Preservation (48 FR 44716). The KNF would contact the Confederated Salish & Kootenai Tribes and the Kootenai Tribe of Idaho (collectively the Tribes) to determine if they were interested in monitoring mine construction activities on National Forest System lands and transmission line construction on National Forest System, State or private lands. If either or both tribes expressed an interest, MMC would develop a Tribal Monitoring Plan in cooperation with the KNF, DEQ, and the Tribes. This plan would facilitate the presence of tribal monitors from the Tribes during construction. The plan would outline the tribal monitor's qualifications, responsibilities, and capabilities as well as establish funding, which would be MMC's responsibility. The plan would be submitted to the KNF and DEQ for review at least 90 days prior to the beginning of construction. The KNF and DEQ would have 30 days to review the plan. The KNF and DEQ would invite the SHPO and the DNRC to comment on the draft plan. The approved plan would be incorporated into the Environmental Specifications (Appendix D).

If previously unrecorded cultural properties, human remains, or funerary objects are discovered during any activity by MMC, MMC would immediately:

- Cease the activity in the area of the discovery and secure the area with a 100-foot (30-meter) buffer by attaching temporary fencing to trees. No disturbance would occur in securing the site.
- Notify the KNF Forest Archaeologist if the discovery was on National Forest System lands or the SHPO Archaeologist if the discovery was on lands other than National Forest System lands.
- If the discovery was human remains or funerary objects, notify the county coroner and the KNF Forest Archaeologist if the discovery was on National Forest System lands or the county coroner and the SHPO Archaeologist if the discovery was on lands other than National Forest System lands.

Following notification, the KNF would:

- Determine appropriate mitigation measures for the discovery of cultural properties following Native American Graves Protection and Repatriation Act procedures outlined in 43 CFR 10, if on National Forest System lands, or the Montana Human Skeletal Remains and Burial Site Protection Act procedures outlined in 22-3-801, MCA, if on lands other than National Forest System lands.
- Consult with Montana SHPO on the proposed mitigation measures, and the Tribes on the proposed mitigation measures if the properties were prehistoric.
- Follow procedures for submitting mitigation measures outlined in the Montana Human Skeletal Remains and Burial Site Protection Act in the event that the Native American remains or funerary objects were discovered on state or private lands.
- Oversee the implementation of any agreed upon mitigation measures.

C.3.3 Reporting

As part of the report submitted annually to the agencies, MMC would provide information on the mitigation implemented during the prior year pursuant to the Agreement. The report also would discuss any previously unidentified cultural resources encountered during construction.

C.4 Wetlands and Other Waters of the U.S.

C.4.1 Objective

The Corps would use monitoring to determine if the compensatory mitigation for jurisdictional wetlands and other waters of the U.S. was meeting the performance standards established in any 404 permit issued for the project. The monitoring described in this section may be modified in a Corps 404 permit. Monitoring would follow the Corps' Regulatory Guidance Letter (RGL 06-3) (Corps 2008a) that addresses monitoring requirements for compensatory mitigation projects. Final performance standards for the jurisdictional mitigation sites would be established in the 404 permit. Similarly, the KNF would use monitoring to determine if the compensatory mitigation for isolated wetlands was meeting the performance standards established in the approved Plan of Operations.

The objective of the wetlands monitoring also would be to evaluate the possible indirect effects of the project. Because the possible indirect effects on wetlands would be associated with the pumpback well system, wetland monitoring is discussed in section C.10.5.5.2, Pumpback Well System Monitoring. Wetland monitoring overlying the mine area is discussed in section C.10.3.2, Groundwater Dependent Ecosystem Inventory and Monitoring.

C.4.2 Locations, Parameters, Frequency, and Performance Standards

This section discusses monitoring of sites used for mitigation of impacts to waters of the U.S. Inventory and monitoring of groundwater dependent ecosystems, including wetlands, is described in section C.10.3.2.2, Continued GDE Monitoring. Monitoring of wetlands and springs in the impoundment area is described in section C.10.5.5.2, Pumpback Well System Monitoring.

C.4.2.1 Swamp Creek Wetland Mitigation Site

MMC's mitigation for impacts to wetlands is wetland rehabilitation at the Swamp Creek site. The following sections describe MMC's proposed maintenance, monitoring and performance standards for the site. The proposed maintenance, monitoring, and performance standards may be modified in accordance with any 404 permit issued for the project.

C.4.2.1.1 Maintenance and Monitoring

Maintenance would consist of inspecting the site on an at least monthly schedule to identify any maintenance control problems, such as erosion, sedimentation, instability, weeds, wetland vegetation degradation, and structure/fence damage. If any such problems were identified, corrective action would be initiated promptly. Inspection results would be described in the annual monitoring report. A weed monitoring and control program would be implemented to minimize invasive species. The following tasks would be performed and photo-documented during the non-winter period (May-October) for the wetland mitigation site:

- **Vegetation:** Determine boundaries of dominant, species-based vegetation communities once per year during the last half of the growing season. Characterize plant type and density in quadrats established along one or more transects (depending on wetland size) through the center of representative new wetlands in each of the three mitigation areas. Locations and types of noxious weeds would be identified and noted on a site map.
- **Hydrology:** Monitor groundwater levels monthly during the growing season in piezometers installed within the mitigation areas and in nearby wetland and upland areas. Delineate presence or evidence of moving and/or standing surface water within the wetland areas. This information would be compared to the existing dewatered state to assure water is present for an extended period of time to support rehabilitation of the degraded wetlands.
- **Soil:** Characterize shallow soil conditions at representative locations in the new wetland area using soil cores/samples obtained from a hand-auger or sharpshooter shovel.
- **Wildlife:** Record direct and indirect observations of site use by mammals, reptiles, amphibians, and bird species. Indirect use indicators include tracks, scat, burrow, eggshells, skins, and bones.
- **Functional Assessment:** Evaluate functions and services once per year during the last half of the growing season using established lists of site-specific functions and services to be achieved at the new wetland site.

Photo-points would be established at each wetland mitigation site to document site-specific conditions and changes from year to year. Field information obtained for each of the above-listed six monitoring categories would be recorded on monitoring forms. The monitoring period would be sufficient to demonstrate that the mitigation met the performance standards, but not less than 5 years. Some aspects of compensatory mitigation may require inspections or monitoring more frequently than annually during the early stages of development to identify and address problems that may develop. Annually, the Corps would review all monitoring results to determine if changes to the monitoring program were warranted, and whether other mitigation measures were necessary. The Corps would also determine when monitoring could be terminated after successful self-sustaining mitigation sites were established.

C.4.2.1.2 Performance Standards

The performance standards for the Swamp Creek wetland mitigation site proposed by MMC for Alternative 3 (MMC 2014a) could be modified by the Corps in accordance with any 404 permit issued for the project. MMC would request that monitoring cease and the site be transferred to the KNF when the follow performance standards were met for two consecutive years a minimum of 2 years after active management ceased:

Wetlands

- Water saturation levels are within 12 inches of the surface, and/or standing water
- Water is present for at least 12.5 percent of the growing season (20 consecutive days) at the far edges of the hayfield where conditions currently were dewatered for agricultural use
- Aerial cover of facultative or wetter species cover meets or exceeds 60 percent of combined cover

- State listed noxious weeds do not exceed 10% after 5 years and for at least 2 consecutive years without maintenance to demonstrate sustainability of the site
- More than three wetland species are present, one species does not exceed 30% of the total cover, and reed canarygrass was not a dominant species for the vegetation community
- Planted and volunteer native woody species (alder, willow and other wetland species) are at least 174 stems per acre in the planted areas

Upland Buffer

- Maintain a predominance of native vegetation communities (including trees and shrubs) in the upland buffer areas. Native vegetation is at least 80% of the plant communities compared to surrounding upland areas
- MT state listed noxious weeds do not exceed 10% after five years and for at least two consecutive years without maintenance to demonstrate sustainability of the site
- Buffers remain undisturbed to the maximum extent practicable allowing for sound management practices

C.4.2.2 Swamp Creek Stream Mitigation Site

C.4.2.2.1 Maintenance and Monitoring

Maintenance would consist of inspecting the site on an at least monthly schedule to identify any maintenance control problems, such as erosion, sedimentation, instability, weeds, wetland vegetation degradation, and structure/fence damage. If any such problems were identified, corrective action would be initiated promptly. Inspection results would be described in the annual monitoring report. A weed monitoring and control program would be implemented to minimize invasive species. The following monitoring would be performed and photo-documented during the non-winter period (May-October) for the stream mitigation project sites:

- ***Riparian Corridor:*** Characterize plant type and density, including locations and types of noxious weeds.
- ***Stream Channels:*** Assess stream cross-sections to monitor channel form and function, natural channel migration, vertical stability (down-cutting), sediment deposition, and stream bank vegetation development.
- ***Aquatic Life and Habitat:*** Characterize aquatic life and fisheries, where applicable, following accepted protocols.
- ***Functional Assessment:*** Evaluate functions and services based on site-specific goals.

C.4.2.2.2 Performance Standards

The performance standards for the Swamp Creek stream mitigation site proposed by MMC for Alternative 3 (MMC 2014a) could be modified by the Corps in accordance with any 404 permit issued for the project. The Montana NRCS Riparian Assessment Method (MT RAM) would be used to evaluate performance of stream and riparian buffer areas. The MT RAM incorporates geomorphological features and processes (pattern, dimension, profile, incisement, and bank stability) with ecological features (riparian vegetation composition and condition) to quantitatively establish the system as Unsustainable, At Risk, or Sustainable. The stream bank and riparian buffer would meet the following performance standards before release of all credits:

- 1) Attain a cumulative rating score on the MT RAM of “Sustainable” for two consecutive years, including the final year of monitoring. Since component criteria in Questions 1 – 3 and Question 10 can be somewhat qualitative, the following would be used as a refinement:
 - One cross-section per 1,000 feet of assessed reach, beginning at the edge of the designated floodplain, and extending perpendicular across the stream to the opposite floodplain edge. Evidence of active headcuts or low vertical edge (scarp) at the toe of the stream bank, particularly on the inside of a meander, as determined by this cross-section would affect scoring negatively.
 - The project must experience at least one observed bank-full event during the monitoring period to successfully complete this rating; should the project not experience a bank-full event during the initial five-year monitoring period, the USACE may require additional monitoring until a bank-full event occurs. In the situation where a bank-full event has not occurred but all other performance standards have been met, a partial bond release would occur. Regarding scoring the scrub-shrub component of the riparian buffer where this is a component of the climax community, a calculation must be made to determine eventual coverage class of the buffer at maturity.
 - Using the Cowardin et al. classification for scrub-shrub areas of 30% cover at maturity, the standard would be 174 stems per acre of native shrub species (alder and willow). Should other species be proposed for the community, a separate calculation would be required for this performance standard based on the estimated canopy cover at maturity of the proposed species assemblage.
- 2) Less than 10% cover of exotic/noxious species as listed by the Montana Department of Agriculture, state noxious weeds list; and
- 3) Buffers remain undisturbed to the maximum extent practicable allowing for sound management practices.

C.4.2.3 Culvert Removal and Replacement and Bridge Removal

Monitoring and performance standards described for the Swamp Creek wetland and stream mitigation site would be used for culvert removal and replacement and bridge removal sites.

C.4.2.4 Isolated Wetland Mitigation Sites

Wetland monitoring and performance standards for the compensatory mitigation for the isolated wetlands would be a component of the approved Plan of Operations for the Forest Service. MMC would be responsible for developing mitigation requirements for submittal to the KNF. Standards would be approved by the agencies prior to the Construction Phase of the project. The Forest Service would use the Corps and EPA's compensatory mitigation regulations (33 CFR 332 and 40 CFR 298) and the Corps' Regulatory Guidance Letter (RGL 06-3) as a guide for establishing monitoring and reporting requirements and performance standards. MMC would be responsible for the isolated wetland mitigation sites and the proper management of those sites until performance standards were met.

C.4.3 Reporting

MMC would submit monitoring reports to the Corps, KNF, and DEQ that follow the requirements described the Corps' RGL 06-3. The Corps would review the reports annually to assess the status

of the compensatory mitigation and to evaluate the likelihood of the mitigation to meet the performance standards. Monitoring would continue until all performance standards were met.

C.5 Wildlife

C.5.1 Objective

The objective of the wildlife monitoring would be to evaluate the effects of the mine and the effectiveness of mitigation measures during all mine phases. In addition, as described below, MMC would contribute to efforts to monitor grizzly bear movements between the Cabinet-Yaak Ecosystem and Northern Continental Divide Ecosystem. If appropriate, mitigation measures may be modified based on results of monitoring.

C.5.2 Locations, Parameters, and Frequency

C.5.2.1 Grizzly Bear

MMC would remove big game animals killed by any vehicles daily from road rights-of-way within the permit area and along roadways used for access or hauling ore (NFS roads #231, #278, #4781, and #2316 and new roads built for the project) for life of mine. Road-killed animals would be moved at least 50 feet beyond the right-of-way clearing or as far as necessary to be out of sight from the road. Beginning prior to the Evaluation Phase and continuing through construction and the first 3 years of mill operations, MMC would monitor the number of big game animals killed by vehicle collisions on these roads and report findings annually. The numbers of animals killed by vehicle collisions would be reviewed by the KNF, in cooperation with the FWP, and if necessary, mitigation measures would be developed and implemented to reduce mortality risks.

MMC would also monitor and report (within 24 hours) all grizzly bear, lynx, wolf, and black bear mortalities within the permit area and along the access roads for life of the mine. If a T&E species mortality occurred, MMC would be required to haul future road-killed animals to a disposal location approved by FWP (thus modifying the disposal requirement described in the previous paragraph), if deemed necessary by the grizzly bear specialists or law enforcement officer to avoid additional grizzly bear or other T&E species mortality.

Under the direction of the KNF, MMC would implement or fund access changes on numerous roads before either the Evaluation Phase or the Construction Phase for grizzly bear mitigation. For the life of the project, MMC would implement or fund monitoring of the effectiveness of the closure devices at least twice annually, and complete any necessary repairs immediately.

Prior to Forest Service approval to initiate the Construction Phase, MMC would provide funding for bear monitoring in the area along U.S. 2 between the Cabinets and the Yaak River and/or the area between the Cabinet-Yaak Ecosystem and Northern Continental Divide Ecosystem as identified by FWP. The linkage identification work along U.S. 2 would involve 3 years of monitoring movements of grizzly and black bears along the highway to identify movement patterns and key movement sites. Funding would cover aerial flights for 2 hours per week, 30 weeks per year for 3 years, salary for one seasonal worker for 6 months per year for 3 years, salary for one GIS technician for 6 months per year for 3 years, and 10 GPS collars and collar rebuilds each year for 3 years. Other monitoring methods may be considered if approved by the Oversight Committee. Should a permitted project be implemented or a future project be proposed that has adverse effects on the grizzly bear in the Cabinet-Yaak Ecosystem, funding for this

monitoring could be required of those projects, potentially changing the funding required by MMC.

MMC would contribute funding to support monitoring of bear movements and population status in the Cabinet Mountains to confirm the effectiveness of mitigation measures implemented to provide a secure north to south movement corridor. The Forest Service would ensure that adequate funding, provided by MMC, is available to monitor bear movements and use of the Cabinet Mountains to confirm the effective implementation of mitigation measures. Information gained would be useful in determining whether the mitigation plan was working as intended. If not, the information would help in developing new management strategies that would be incorporated in the Biological Opinion through appropriate amendments. Funding would supplement ongoing research and monitoring activities in the Cabinet-Yaak Ecosystem, would be conducted or coordinated by the USFWS' grizzly bear researcher in Libby or the equivalent, and would focus on grizzly bears in the Cabinet Mountains. Funding would include money for the following (but not limited to): trapping, hair sampling and analysis, radio collars, flight time, monitoring native and augmented grizzly bears, and data analysis, including all equipment and support materials needed for such monitoring. The Forest Service would ensure that funding, provided by MMC, is available on an annual basis, 2 months in advance of the fiscal year (October) of the year it is to be used for the life of the mine. Details of the monitoring activities and budget would be outlined in the Management Plan. Funding would be provided prior to starting the Construction Phase and would continue throughout the life of the mine through the Closure Phase.

C.5.2.2 Lynx

The KNF would monitor new snow compaction activities (such as snowmobiling) in the project area and take appropriate action if compaction monitoring identified increased predator access to new areas.

C.5.2.3 Mountain Goat

MMC would fund surveys to monitor mountain goats to examine response to mine-related impacts. The surveys would be integrated into the current monitoring effort of the FWP. Aerial surveys would be conducted three times annually (winter-late spring-fall) by the FWP along the east front of the Cabinet Mountains from the Bear Creek drainage south to the West Fisher drainage. Surveys would be conducted for 2 consecutive years prior to construction, and every year during construction activities. Survey results would be analyzed by the KNF, in cooperation with the FWP, at the end of the construction period to determine the appropriate level and type of survey work needed during the Operations Phase. If the agencies determined that construction disturbance was significantly affecting goat populations, mitigation measures would be developed and implemented to reduce the impacts of mine disturbance. Surveys would be conducted using the current protocol of the FWP. Currently, the FWP conducts one aerial survey of the east Cabinet Mountains every other year. This additional level of monitoring would provide information on the status of mountain goat use adjacent to the project area, and potential effects of the project.

C.5.2.4 Migratory Birds

MMC would coordinate with the KNF and Regional bird monitoring partnership group to fund monitoring of landbird populations as part of the Forest Service Regional effort of the "Integrated

Monitoring in Bird Conservation Regions” (IMBCR). The KNF is located with the Northern Rockies Bird Conservation Region 10 (BCR 10), which is characterized by high-elevation mountain ranges with mixed conifer forests and intermountain regions dominated by sagebrush steppe and grasslands (Partners in Flight 2000). BCRs approximate an eco-province, and are the scale recommended by Partners in Flight for monitoring. Across the KNF, transects were identified in 2010, with at least 10 transects monitored each year. Two of these 10 annually monitored transects are located within the Crazy and Silverfish PSUs.

Prior to the Evaluation Phase, and continuing for the life of the mine, MMC would coordinate with the KNF and Forest Service Region 1 bird monitoring specialist to fund and initiate annual monitoring of up to 12 ICMBR transects; up to eight within a 1 mile influence zone of the proposed facilities or transmission lines (MT-BCR10-K078; MT-BCR10-KO271; MT-BCR10-KO102; MT-BCR10-KR53; MT-BCR10-KR229; MT-BCR10-KR133; MT-BCR10-KR277; MT-BCR10-KO138 if transmission line Alternative C-R was selected), and an additional four transects outside of the facilities and transmission line influence zones for comparison with the influence zone transects.

The monitoring effort would continue to provide data to the IMBCR project that would allow inferences to avian species occurrence and population trend from both the local level, such as the PSUs where project activities are proposed to Bird Conservation Regions (BCR) scales, facilitating conservation at local and national levels.

C.5.3 Reporting

Reporting requirements would be described in a Comprehensive Grizzly Bear Management Plan. This plan is discussed in greater detail in the agencies’ wildlife mitigation plans for Alternatives 3 and 4 in Chapter 2.

C.6 Geotechnical

C.6.1 Objective

Prior to commencement of mine construction, MMC would prepare and present to the agencies a tailings impoundment (i.e., geotechnical) monitoring plan. Specific monitoring requirements such as information needs, monitoring location, instrument type, monitoring frequency, reporting requirements, and threshold values for remedial action would be finalized in a stand-alone geotechnical monitoring plan developed during the final design process for the tailings impoundment (See section 2.5.2.5.2, Final Design Process in Chapter 2). The plan would identify monitoring requirements for pre-construction, construction, operations, and closure. The plan would be submitted for agency approval prior to the agencies approving the Construction Phase and incorporated into a monitoring plan approved by the agencies and incorporated into an amended plan of operations or updated operating permit prior to project initiation.

The objectives of the geotechnical monitoring program as it pertains to the tailings impoundment, and appurtenances, and other facilities as appropriate, would be to:

- Collect additional analytical data for use in ongoing impoundment design and operations
- Identify previous unknown site conditions

- Confirm critical design assumptions
- Monitor site conditions during construction and operations
- Monitor impoundment performance during construction and operations
- Assist in assessing material used in dam construction
- Estimate tailings quantities and physical characteristics of impounded tailings
- Establish requirements and a schedule for annual reporting

C.6.2 Locations, Parameters, and Frequency

The monitoring program would emphasize the following tailings impoundment related components: foundation conditions, dam construction, operational stability, material balance, impoundment capacity, and water balance. Because the coarse (sand) fraction of the tailings would be used in the construction of the tailings embankment, a material mass balance would be carried out on an annual basis to assess embankment material needs and whether sufficient building materials would be available to meet the construction requirements. Quantities of tailings from the mill, waste rock from mine development, and borrow materials from on-site sources would be recorded to document material type and quantities used in embankment construction as well as the fine grained tailings material sent directly to the impoundment.

A geotechnical monitoring plan adopted for all action alternatives would incorporate many if not all of the monitoring elements listed in Table C-2. The exact type of monitoring technique used for data collection, location of monitoring devices and frequency of data collection would be finalized during the final tailings impoundment design process and incorporated into a monitoring plan presented to the agencies prior to project initiation. The monitoring plan would require MMC to submit an annual tailings impoundment construction and performance report.

The use of piezometers to monitor interstitial pore pressures is an industry accepted practice, and the array of available instrumentation for this purpose is extensive. Devices have been adapted for continuous recording and for monitoring from off-site locations. At Montanore, piezometers would be installed in the dam foundation to measure pore pressures during construction, with particular attention given to areas where the glaciolacustrine clay may be present in the foundation. Appropriate pore pressure “trigger” levels would be established based on stability analyses to provide a management tool to respond to higher than predicted pore pressures if encountered. Piezometers would be installed in the cycloned sand dam as it is constructed in order to monitor the pore pressure build-up and to assess “drawdown” of cyclone water within the dam embankment. The piezometer cables would be buried and lead to a common readout station at the toe of each dam where continuous data reading equipment would be installed out of the way of the embankment construction operation.

Inclinometers would be used to monitor potential deformation of the tailings embankment which could be an indication of foundation failure. The inclinometers would be extended up through the embankment as it was constructed. It is highly likely some inclinometers would be damaged during the embankment raising process and would have to be abandoned. They would be replaced as needed over the course of the impoundment life.

Table C-2. Geotechnical Monitoring.

Monitoring Location	Item	Monitoring Parameters	Frequency	Comments
Embankment Foundation	Piezometers	Pore pressures	Monthly	Simple standpipe, and electronic pressure transducers; monitoring during construction and operations; visual inspections by mine personnel
Impoundment Embankment	Piezometers - Main dam - Saddle dam - Beach area	Pore pressures	Monthly	Simple standpipe, and electronic pressure transducers; monitoring during construction and operations. Monitoring of potential pore pressures and phreatic surface in the embankment and tailings; visual inspections by Professional Engineer
	Inclinometers - Main dam	Deformation (inches)	Monthly	
	Material quantities: Cycloned sand, borrow, and mine waste rock	Tons, and cubic yards per year	Annually	Annual reconciliation of fill materials; visual inspections by Professional Engineer
	Material properties	Density and gradation	Weekly	A QA/QC program would be implemented to measure and monitor density and gradation; visual inspections by Professional Engineer
Impoundment Area	Pressure transducer Pond elevation	Tailings density Tailings water volume	Annually	Estimate of in situ tailings density; remaining impoundment capacity Tailings water volume

Visual observation would be a critical component of the monitoring program. Mine personnel would be assigned inspection responsibilities to be conducted as part of their assigned duties. A quarterly inspection report would be submitted to the agencies as part of the monitoring requirements. Items such as embankment seepage, freeboard adequacy, beach width, cracks in the embankment, evidence of slope failure, erosion features along the dam and abutments, and changing trends in seepage quantities, piping, and wet spots, are representative of the kinds of observational features which could be indicative of potential problems with the tailings impoundment and the kinds of features which would be noted and documented during a visual inspection.

During the construction phase of the impoundment, QA/QC of dam construction activities would be carried out by a qualified third party engineering consultant. Prior to the commencement of construction, the responsibilities of the third-party consultant would be detailed in an agency-approved field manual and would include standard field and laboratory quality control tests.

During the operation phase of the tailings impoundment, geotechnical monitoring would continue at the locations and frequency established in the monitoring plan. Of particular interest for monitoring during operations would be pore pressures in the impoundment embankment and foundation as the embankment was constructed. In situ tailings consolidation within the impoundment would also be monitored to assist with closure planning. The monitoring program would continue into the closure stage, although the frequency of monitoring would likely be reduced as steady state conditions within the impoundment and embankment were approached. The following type of monitoring could be incorporated into a closure monitoring program:

- Installation of piezometers within the tailings impoundment pond area to monitor the progressive “drawdown” of the phreatic surface
- Installation of settlement plates and in situ pressure transducers within the tailings to monitor the consolidation and settlement of the tailings to help confirm the predicted consolidation behavior of the tailings at closure.

C.6.2.1 Reporting and Third-Party Review

During the final tailings impoundment design, and during operations and closure, MMC would fund an independent technical advisor to assist the agencies in ongoing oversight and review of the tailings impoundment. The duties of the third-party technical advisor would be similar to those of consultants retained by the Technical Advisory Group as part of the review of the final tailings design. The technical advisor would be selected, directed by, and report to the agencies through an agreement with MMC. MMC would provide site access, logistical support, and all information required by the technical advisor to complete ongoing reviews of the tailings impoundment. MMC would submit an annual tailings impoundment construction and performance report to the agencies, which would detail tailings impoundment construction, monitoring, and performance.

C.7 Rock Mechanics

C.7.1 Subsidence

A subsidence (underground geotechnical) monitoring plan would be implemented as part of all action alternatives. A final subsidence monitoring plan would be developed during final design, and approved by the agencies and implemented before any underground development began during the Construction Phase. The subsidence monitoring would incorporate the geotechnical monitoring procedures and methods specified in DEQ’s Operating Permit #00150 and the 1993 ROD. MMC would submit a final subsidence monitoring plan for agency approval following completion of the Libby Adit evaluation program (Evaluation Phase). Subsidence monitoring would incorporate both a surface and underground monitoring with objectives to 1) identify pre-subsidence indicators in advance of their developing into surface subsidence so mitigations can be implemented to prevent subsidence, and 2) to collect data that will be used in refining mine design elements such as room and pillar size, pillar orientation, and buffer zone dimensions,

during the course of operations to ensure underground mine stability is maintained and subsidence prevented.

C.7.1.1 Surface Monitoring

MMC would complete a pre-mining baseline topographic survey during the Evaluation Phase over the ore body using aerial methods (LiDAR, InSAR, or equivalent) approved by the agencies. This type of technology can measure small deviations over large surface areas which otherwise would be impossible or impractical to measure using standard geodetic surveying techniques. Surveys would be repeated periodically prior to production mining to 1) identify limitations with the survey technique and to make adjustments in its use to ensure accuracy, and 2) establish a pre-mine reference surface for comparing to the ground surface once mining has commenced. During operations, these surveys would be required to monitor for any surface movement that may be induced by the mining operation. The selection of surveying technique and the schedule for surface monitoring and reporting would be established as part of the subsidence monitoring plan developed during the final mine design phase.

MMC would also complete and provide to the agencies a detailed surficial geologic survey of lands overlying the mine area during the Evaluation Phase to map faults, rock joint patterns, and other geologic structures that may affect mine design.

C.7.1.2 Underground Monitoring

The specific details of a subsidence monitoring plan would be developed during final mine design, and would be subject to approval by the agencies prior to the agencies approving the Construction Phase. Should mining be approved, monitoring information would be evaluated in conjunction with data collected from a rock mechanics testing program and from underground and surface mapping of geologic structures and discontinuities (e.g., faults, joint sets) collected during the Evaluation Phase. Collectively, over time the data from these various sources would help develop a model of rock behavior in response to underground mining which could be used to guide ongoing mine development in an environmentally safe manner. Subsidence monitoring data would be reported to the agencies in an annual report.

The type of data collected would include logging drillholes and geologic mapping of mine workings and surface features to obtain an initial overview of the geologic profile of the site. More detailed data would include rock quality analysis, which would evaluate fracture and fault frequency, structure orientation, laboratory testing for rock strength parameters, and in situ geomechanical tests. Gaining a detailed understanding of rock strength, including the potential for shear failure at the pillar/roof or pillar/floor interface, and the overall mine structural setting, including faulting, jointing, bedding, horizontal stress regime, would improve the Montanore mine design.

Microseismic monitoring would be used to assess rock response to underground mining both during operations and post-closure, and would include installation of sensors in operating and abandoned sections of the mine. Stress monitors would be located near or on faults, barrier pillars, sill pillars, and other important geologic structures. Data would be compiled, assessed, and reported to the lead agencies in an annual report.

MMC has completed some initial numerical modeling to examine the issue of pillar and sill stability between the two ore zones as the influence and interaction of stacked workings may be

critical to overall pillar and sill stability. Numerical modeling would part of the ongoing mine development during operations, and would be applicable to all areas of the mine and not just where the ore horizon is thick or where there are rooms stacked on one another.

During final design, the agencies would provide MMC with data from the Troy Mine, which has experienced pillar stability problems resulting in surface subsidence. The data collected and analyzed from the Troy Mine will aid the agencies in their evaluation of MMC's proposed design and monitoring plan. For example, data from the Troy Mine indicates that adverse pillar orientation with regard to bedding dip may have played a role in some of the pillar instability. Further, the Troy Mine sinkhole events appear to be related to encroaching too close to known faults. This information would be used to aid in the development of MMC's underground mine design.

The monitoring plan would be in a continual process of modification throughout the course of mining as new data was collected and analyzed. Due to the variability in geologic conditions and the physical response of the underground environment to mine development, modifications to the mine plan may need to be incorporated to safeguard against adverse environmental conditions.

C.7.1.3 Reporting and Third-Party Review

During the Evaluation, Construction, and Operations phases, MMC would fund an independent technical advisor to assist the agencies in review of MMC's subsidence monitoring plan, underground rock mechanics data collection program, and MMC's mine plan. The technical advisor would be selected and directed by the agencies through an agreement with MMC. MMC would provide the agencies and their representatives access to the underground workings to observe data collection and mine development. MMC would provide mine access, logistical support, and all information required by the technical advisor to complete a review of underground rock mechanics data and MMC's mine plan. The technical advisor would have no financial interest in the project.

Assessments of the underground workings by the technical advisor may occur as frequently as quarterly, with the results of the inspections compiled into an annual assessment report. This annual report from the technical advisor would incorporate data collected as part of the ongoing monitoring program, and would be in addition to the annual report prepared by MMC.

C.7.2 Underground Mining Boundary Monitoring

To ensure MMC only mined ore within its valid existing rights and that the underground mine development adhered to required buffer zone boundaries, the Plan of Operations and DEQ operating permit would include requirements for underground monitoring. MMC would fund and facilitate biannual surveys of the underground workings that would be completed by an independent certified mine surveyor. The surveyor would be selected and directed by the agencies through an agreement with MMC. The surveyor would have no financial interest in the Montanore Project. The agencies may also require more frequent surveys and/or as-built drawings if discrepancies arose. MMC would provide mine access, logistical support, and all information required by the surveyor to complete independent inspections and resulting documentation for the identified tasks. This would include all company-conducted mine surveys of the underground workings. After completing the monitoring survey, the independent surveyor would submit maps of the workings to the agencies and would report any ground disturbances

that crossed the established extralateral rights boundary, entered into designated buffer zones, or deviated from agency approved mine design.

C.8 Reclamation

C.8.1 Objective

The objectives of reclamation monitoring would be to:

- Assess the success of reestablishing a viable vegetation community following reclamation
- Determine the appropriate fertilizer mix and organic amendments required for successful reclamation
- Assess the effectiveness of weed control measures
- Determine if the criteria for revegetation success and for bond release are met

C.8.2 Locations, Parameters, and Frequency

MMC would submit a reclamation monitoring plan that would establish the soil testing protocol to determine the appropriate fertilizer mix required for successful reclamation. The final monitoring plan would describe sample locations, frequency, and analysis. The fertilizer type, mix, and rate would be approved by the agencies before being used. Interim reclamation activities would provide opportunities to monitor and evaluate the most effective use of fertilizers for final reclamation.

The vegetation cover, species composition, and tree planting success would be evaluated during the first year following reseeding or replanting. In addition to a general evaluation, MMC would conduct vegetation monitoring every 2 years during operations at sites representative of various types of disturbance. Control sites in areas unaffected by the project would be established to provide information on site conditions. At the end of mine operations, MMC would conduct similar vegetation monitoring every year at sites representative of various types of disturbance until bond release. The number and location of representative sites would be approved by the agencies. The following characteristics would be evaluated:

- Plant species responses (germination, growth, competition)
- Total and vegetation cover
- Plant species and plant diversity (including weeds)
- Procedures to reclaim steep rocky slopes
- Soil redistribution depth
- Soil rock fragment content
- Effects of fertilizer rates
- Tree planting techniques
- Tree stocking rates
- Viability of bare-root versus containerized stock

Vegetation monitoring also would assess noxious weeds. MMC has a Weed Control Plan approved by Lincoln County Weed Control District. The plan would be modified as described in this section and submitted to the lead agencies during final design for their approval. Following KNF's and DEQ's approval of the final Weed Control Plan, MMC would submit it to the Lincoln County Weed Control District. These measures would be applied to all permit areas, and all currently unopened roads used for transmission line access. Measures outlined in MMC's Weed Control Plan approved by the Lincoln County Weed Control District and the KNF would be followed during operations and reclamation to minimize the spread of weeds to reclaimed areas. If weed content were above 10 percent, MMC would implement additional weed control methods and apply weed control treatment for 2 years.

C.8.3 Reporting

MMC would submit an annual report to the lead agencies describing weed control efforts. The report would provide a map showing areas of weed infestation that were treated in the preceding year. It also would provide a qualitative evaluation of the weed control efforts.

A report summarizing survey data would be submitted annually to the agencies. MMC would develop reclamation bond release criteria as part of the overall reclamation plan approved by the agencies. Part of the release criteria would involve specific, qualitative measurement of revegetation success.

MMC would report soil stockpile volumes and disturbance acres in each annual report to the lead agencies. MMC would prepare an annual soil reconciliation report to document that the soils in stockpiles were sufficient to reclaim the current disturbed acres. If a shortfall existed, MMC would submit a plan to make up for the soil shortfall in the following year (see next section regarding replaced soil thickness).

C.8.4 Reclamation Bond Release

The following criteria for all reclaimed areas, including the transmission line right-of-way and access roads, would be used to determine revegetation success and bond release for that component of the reclamation bond. Minimum vegetation cover would be 80 percent of the control site total cover. If the required minimum cover were not obtained, MMC would implement remedial action such as reseeding with a modified seed mixture, mulching, fertilizer, or other changes to address the issue. If after two remedial attempts the particular site still did not meet the minimum vegetation cover standard but met 80 percent of the average of selected control sites, did not exhibit rills or gullies, and met the weed standard, the bond would be released. If the site continued to fall short of meeting the cover requirement, a third remedial effort, approved by the lead agencies, would be applied. If the standard still were not met but the site had 70 percent of the control cover and did not exhibit rills and gullies and met the weed standard, the bond would be released.

MMC and the lead agencies would establish control sites for the project before operation activities. These sites should be similar to the reclaimed areas and be in close proximity to the mine area. MMC would develop a vegetation monitoring plan from these sites and collect vegetation data during the mine life. This information would be used to validate the release criteria numbers with respect to minimum cover requirements, tree/shrub density, weeds, and other provisions preliminarily set in the EIS. The intent is to provide long-term site-specific data to support the release criteria established for the project. The monitoring plan would be approved

by the lead agencies and would require the report be submitted annually or as outlined in the plan or as approved by the lead agencies. Monitoring would continue for 20 years after planting or seeding to ensure revegetation requirements were met, or less if the project bond were released by the lead agencies before this period expired.

Category 1, 2, and 3 noxious weed species cover would have less than or equal to the cover of noxious weed species present on agency-approved disturbed/reclaimed control sites in the area. Category 2 and 3 (new invaders and potential invaders) are described in the latest edition of the KNF Noxious Weed Handbook. A minimum of 400 trees and 200 shrubs per acre would be living after 15 years (density may be lower in some areas where no trees or shrubs were planted, such as herbaceous wetlands and meadows).

C.9 Geochemistry

C.9.1 Introduction

Although the risk of acid generation and trace metal release from the project is generally low, some rock to be mined has the potential to affect surface water and groundwater resources. For this reason, the agencies' alternatives (3 and 4) would require additional geochemical characterization and monitoring of water flow and quality in the Libby Adit, to address uncertainty and validate predictions of future water quality provided in the EIS. Until such data became available, the agencies' alternatives require that rock be placed on a liner and managed to control potential impacts to water quality. This mitigation strategy recognizes that additional material needed for testing would be accessible during the Evaluation Phase. It also recognizes the value of historical Libby Adit and active Troy Mine workings as full-scale, real-time geochemical analogs for the proposed Montanore facilities. Waste rock management would be adapted as additional monitoring data become available to inform the mitigation strategy for various facilities under changing water balance conditions throughout mine life.

MMC presented a comprehensive summary of the available static geochemistry data characterizing rock for the proposed Montanore and Rock Creek mines by test method in tables appended to their waste rock management plan (Geomatrix 2007), as well in their review of waste rock characterization (MMC 2009). It also provided a general plan for additional geochemical characterization work including:

- Collection of representative waste rock samples from the adits, ore zones, barren zones, and above and below ore zones, at least every 500 feet in adits and for every 100,000 tons of waste rock produced in mine workings.
- Analysis of samples using static test methods (acid base accounting, total sulfur, and pH measurements).
- Kinetic or metal mobility testing of select samples, based on static test results.
- Characterization of residual water-soluble nitrate on waste rock mined during the Evaluation Phase, for use in predicting nitrate concentrations in meteoric water from waste rock placed outside the mine.
- Designation of fixed sampling points for in situ characterization of pH changes over mine life, based on rock sampling.
- Correlation of sample and analytical geochemistry data with water quality data.

- Re-evaluation of sampling and waste rock management plans based on cumulative data.
- Annual reporting of sampling, analysis, and results.

Review of the Draft EIS raised concern about perceived uncertainty in the data, and requested additional detail about the specific timing, intensity, and methods of proposed sampling and analysis. In particular, concern was raised about the coordinating the collection and interpretation of Evaluation Phase data with management of mined rock during operations, and a plan for integrating new information with baseline data was requested.

In response to these concerns, a hydrogeochemistry working group comprising agency and interdisciplinary team members reviewed all available hydrogeochemical data, discussed apparent uncertainties, and reconsidered sampling and analysis needs. A portion of that committee focused specifically on geochemistry issues. This Sampling and Analysis Plan (SAP) presents the recommendations of the geochemistry working sub-group and expands upon the approach described by Geomatrix (2007), with a goal of informing the development of risk-based mitigation strategy. MMC would develop a final SAP for the agencies' approval before the Evaluation Phase. The SAP would comply with the selected alternative as outlined in the KNF's Montanore Project ROD.

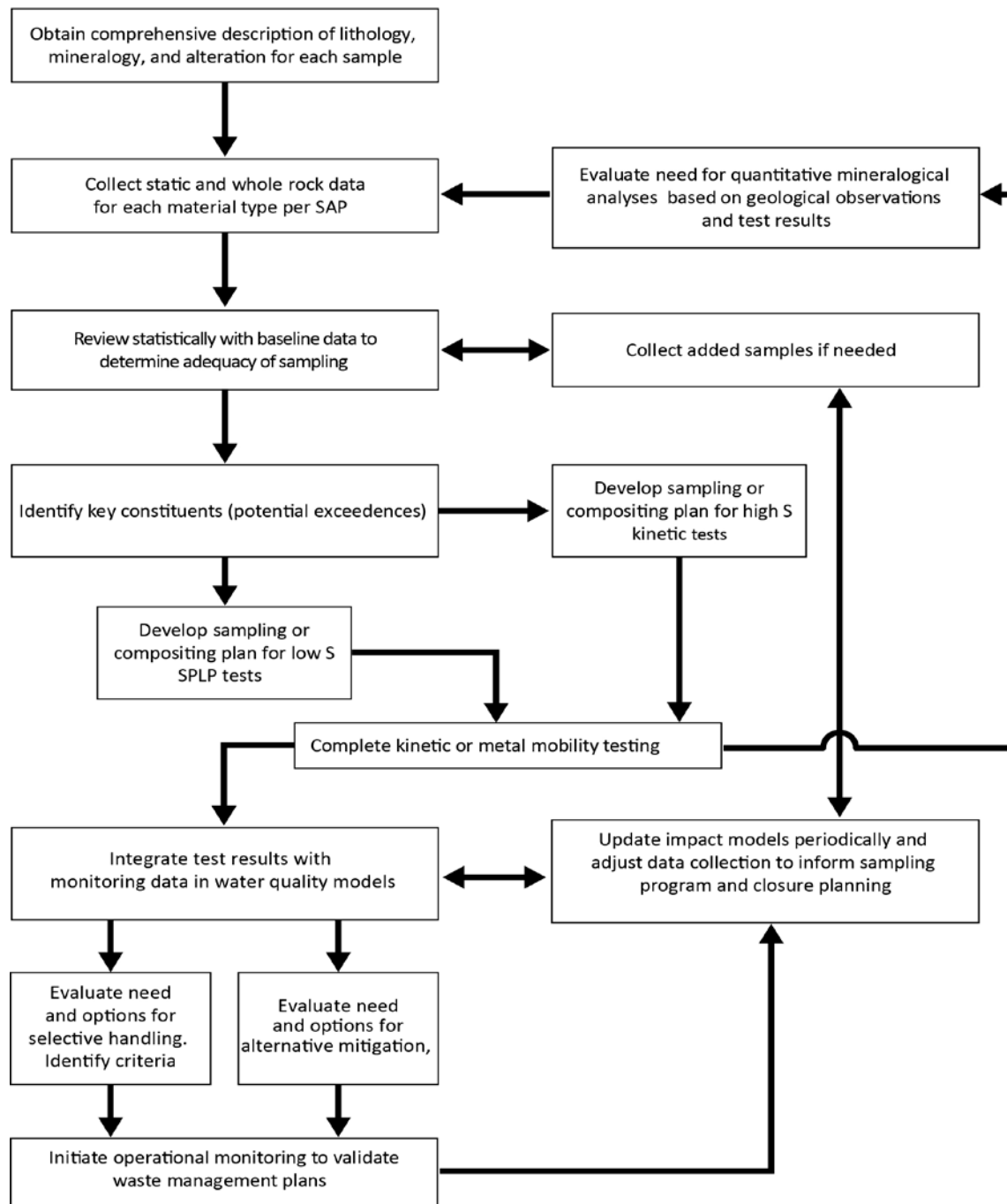
The goal of the SAP is to ensure adequate characterization of acid generation and metal release potential for each of the proposed mine facilities throughout the mine life cycle. The general approach to the sampling and analysis program is summarized in Figure C-1. Two distinct phases of data collection, during the Evaluation/Construction and Operations phases of mine life, are identified in this SAP. Data from both phases would be evaluated statistically to determine overall sampling adequacy and to update mass balance analysis periodically, thus ensuring appropriate mitigation and closure planning.

Data addressing perceived gaps that may influence water quality predictions and waste management practices would be collected during the Evaluation Phase, prior to initiation of construction and operations. During the Evaluation Phase, additional rock would be exposed for sampling and analysis of its potential to release metals, allowing the mine plan to be revised for any needed mitigation. This SAP also provides guidance for integration of Evaluation Phase with EIS analysis and waste rock management plans, prior to initiation of construction, as well as establishment of selective handling criteria as appropriate. This would ensure proper management of mined materials in protecting water resources. As the agencies' mitigation would require that all mined material be managed as though there is potential impact to water quality, until additional testing or monitoring data demonstrate otherwise, there is little risk to the environment using this approach.

An ore production-based strategy for operational verification of the EIS assessment is also provided, which mirrors the approach suggested by Geomatrix (2007) and described in the Draft EIS. Data collected during mine construction and operations would be used to update water quality predictions for comparison with water flow and quality monitoring data and reported for agency review, as suggested by Geomatrix (2007).

Data produced under the Operations Phase SAP would be integrated with the EIS and Evaluation Phase data going forward, to evaluate rock management effectiveness and provide data for facility closure.

Figure C-1. Decision Matrix for Geochemical Sampling and Analysis.



C.9.2 Mine Plan and Material Balance

Waste rock would be produced from the Prichard and Burke Formations during development of access, ventilation, and conveyor adits. Waste rock would also be produced from a barren lead zone that separates two copper-silver ore zones within the upper portion of the lower member of the Revett Formation, and from mineralized (non-ore) zones that lie between the ore zone and the underlying Prichard and Burke Formations. MMC's estimate of tonnage for waste rock, ore, and tailings production during each phase of mine life is summarized in Table C-3.

During the Evaluation Phase, MMC would sample the ore zone to revise resource models and facilitate metallurgical testing as needed. Rock would be exposed in all waste zones during the Evaluation Phase and can be sampled for characterization as appropriate. Metallurgical testing of bulk samples obtained during the Evaluation Phase could provide samples of tailings for additional environmental characterization.

Upon completion of the Evaluation Phase and receipt of the agencies' approval to proceed with the Construction Phase of the mine, MMC would proceed with construction of additional adits that would expose (similar to the Libby Adit) more of the Prichard and Burke Formations. Development would also begin in the lower Revett Formation during construction, which would continue and expand during mining operations. The volume of rock produced from each formation would vary over mine life (Table C-3).

C.9.3 Baseline Geochemistry and Water Quality Data

Geochemical and in situ monitoring data for Montanore available for inclusion in the impact analysis are summarized in Table C-4. Together with geochemical data from other Revett-type copper-silver deposits at Troy and Rock Creek, and monitoring data from the Libby Adit and Troy Mine, these data indicate low overall potential for acid generation, with low to moderate associated potential for metal release. Use of differing approaches to sampling and analysis over time has produced a data set that is inconsistent in terms of detection limits, suites of analytes, and frequency of sampling. Uncertainty that arises from these issues can be resolved through sampling of rock as it becomes available during the Evaluation Phase of development.

The specific type, quality, and adequacy of data available for incorporation into the EIS is discussed in detail in reports by Geomatrix (2007), Enviromin (2013), ERO Resources Corp. (2011), and discussions of the Montanore hydrogeochemistry workgroup (see minutes of meetings from 2009 and 2010 on file with the agencies). In-depth review of these data is not repeated in this plan.

In situ monitoring data collected within and adjacent to the Libby Adit, and water quality data from the Troy Mine, provide further information that can also be used to inform decisions about relative need for additional geochemical characterization and rock management. The Libby Adit provides a real-time, full-scale geochemical analog for Prichard and Burke Formation waste that is currently exposed in underground workings, and the Troy mine data describe a comparable analog for the Revett Formation where it is exposed underground. Available water quality data collected in and around the Libby and Troy adits were discussed in the Draft EIS, as well as in Geomatrix 2007. More recent data were integrated with pre-2007 data in a comprehensive water quality report (ERO Resources Corp. 2011). A statistical summary of these data, together the number of detected values and data reduction methods necessary to analyze baseline conditions, are provided in the report.

Table C-3. Estimated Material Balance, by Phase of Mine Life, Alternative 3.

Rock Type	Current	Evaluation	Construction	Operations Year 1-5	Operations Year 6+	Closure and Post- closure	Total	Proposed Placement Pending Analysis
Prichard waste rock	377,700	0	1,163,700	0	0	0	1,541,400	Tailings impoundment/ construction
Burke waste rock	42,500	0	151,200	0	0	0	193,700	Tailings impoundment/ construction
Revett waste rock (non-lead)	4,200	0	801,000	85,000	121,400	0	1,011,600	Tailings impoundment/ construction
Revett barren lead waste rock		0	134,900	245,000	231,300	0	611,200	Underground
Revett combined waste rock		545,300	0	0	0	0	545,300	Lined Libby Adit pad
Total waste rock	424,400	545,300	2,250,800	330,000	352,700	0	3,903,200	
Revett ore		Core	148,000	22,852,000	97,000,000	0	120,000,000	Mill
Tailings		Pilot	0	23,000,000	97,000,000	0	120,000,000	Tailings impoundment

All units are tons; conversion from bank cubic yards presented in MMC 2009 based on a density of 12.18 cubic feet/ton

Prichard includes Prichard-Burke transition rock

Revett waste reported as combined when data do not distinguish barren lead from other altered zones

Operational rock type defined by formation and mineralization

Source: MMC 2009.

Table C-4. Summary of Geochemical Analyses and In Situ Water Quality Data.

Test	Prichard	Burke	Revett Waste (non-lead)	Revett Barren Lead	Revett Combined	Revett Ore	Tailings
Static	70	19	41	25		35	1
Kinetic	2	0	1	1	1	1	ND
Metals	2	0	0	13	14	12	ND
Mineralogy	ND	ND			10	17	13
Intended location of rock	Adit, then tailings dam construction		Underground workings				Tailings
Source of <i>in situ</i> Monitoring	Libby Adit and Waste Rock Sump (WRS)		Troy Mine				
In situ Parameters	pH, metals, nutrients		pH, metals, nutrients				

ND = No data

C.9.4 Evaluation Phase Sampling and Analysis

This section describes sampling and analyses needed to address uncertainties in existing geochemical data and to delineate a plan for applying those data, together with water quality data, to rock management in a timely manner. Following review of available data by lithology and waste type throughout the mine life cycle, and review of chemistry data for geochemical analogs at Rock Creek, the Libby Adit and the Troy Mine, the geochemistry workgroup agreed that available in situ data reduce the need for further pre-construction characterization of the Revett ore, Prichard waste rock, and Burke waste rock zones that are already exposed. Confirmation sampling in zones that have not yet been mined is needed for these lithologies. The lower Revett altered waste and barren lead zones are also not addressed by these analogs and require further evaluation. The fundamental approach relies on a combination of available in situ water quality and geochemical data from all Revett copper-silver deposits, together with Evaluation Phase data, to reduce risk through adaptive waste rock management. The SAP seeks to prioritize sampling and testing to ensure that data needed to modify waste management plans are available at the start of construction. A decision matrix to be used in refining the SAP, based on data as they become available, is provided as Figure C-1. The following explanations are provided to guide sampling and analysis efforts.

Sample Type: The purpose of geochemical characterization is to describe the acid generation potential (using static and kinetic methods), metal/metalloid release potential, and nitrate release potential for mined ore, waste rock, and impounded tailings. Waste rock would be exposed in underground workings or used in surface construction at the proposed mine. There are multiple waste lithologies, which include the Prichard, Burke, and several altered waste zones within the Revett Formation. These materials would be exposed to changing weathering conditions throughout mine life; during active mining, or where placed above ground, rock would be exposed to oxygen; following closure, when underground workings would be flooded, oxygen exposure and related oxidation would be greatly reduced. Materials requiring geochemical characterization are summarized based on lithology, grade, geochemical conditions, and placement in Table C-5.

Table C-5. Summary of Material Types.

Location	Weathering Condition	Material Type	Lithology
Underground Rock left in back and rib, or backfilled within mined out workings. Rock exposed in adits	Partially saturated, aerobic, during dewatering and active mining	Ore	Revett – ore
		Waste	Revett – barren lead
			Revett – chalcopyrite
			Revett – pyrite
			Revett – sphalerite
			Burke
			Prichard
	Saturated, anaerobic, post-dewatering and following groundwater rebound	Ore	Revett – ore
		Waste	Revett – barren lead
			Revett – chalcopyrite
			Revett – pyrite
			Revett – sphalerite
			Burke
			Prichard
Surface Rock stockpiled at adit on liner Rock stockpiled within tailings impoundment footprint on liner Rock used in construction of tailings dam	Variably saturated, aerobic	Waste	Burke
			Prichard
Tailings impoundment	Saturated, anaerobic under active placement conditions	Tailings	Processed Revett ore
	Unsaturated tailings post-dewatering		

Number: Number of samples to be collected is based on minimum requirements for a simple, normally-distributed data set, and would be modified in the context of observed lithological and mineralogical variability. Sampling density would also consider results of preliminary geochemistry analyses and in situ monitoring data. During baseline characterization, sampling would focus on covering the range of variability in mineralization, rather than on spatial or volumetric coverage which would be the focus during operational validation. Tonnage-based guidelines, such as those provided by the Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009), are more appropriate for operational monitoring programs. Determination of adequate sampling would be an iterative process, involving review of known information with new data to determine whether the number of samples is sufficient to describe the observed variability, such as suggested in the Global Acid Rock Drainage Guide (International Network for Acid Prevention 2008). Appropriate statistical tests of initial data, such as T-test/ANOVA or Keyser-Meyer-Olkin tests, would be used to determine sampling adequacy.

The sufficiency of characterization would also be considered in context of the capacity of the mitigation strategy to address uncertainty as well as the potential cost of failed mitigation. For example, collection of more samples of a single rock type to identify variations in metal concentration that lie within the capacity of a planned water treatment plant may be less important than collecting samples from distinct rock types which may identify different metals that would need to be incorporated into the design of that treatment plant. Likewise, extensive characterization of a rock type that represents a small percentage of total mined material (like the lower Revett altered waste zones) is less likely to reduce future costs of water treatment than thorough characterization of rock (like the Prichard) that represents a large portion of the waste.

The number and type of geochemical tests are shown in Table C-6. The specific available geochemical and monitoring data, identified risk, uncertainty about existing information, conclusions of the geochemistry sub-group, requirements for additional geochemical sampling and analysis, and requirements for water quality monitoring for geochemistry during the Evaluation Phase are described below for each rock type.

The sampling and analysis plans would be reviewed, and if appropriate, modified by the geochemist charged with implementing this program, in consultation with the agencies. The intensity of future sampling and method of analyses would be determined by geological observation and review of available data. A thorough geological description by a qualified person, to obtain data describing lithology, mineralogy, and alteration data as a foundation for all subsequent sample collection and analysis, would be required. The need for more comprehensive

Table C-6. Evaluation Phase Geochemical Testing.

Test	Prichard	Burke	Revett Waste (non-lead)	Revett Barren Lead	Revett Ore	Simulated Bench-Scale Tailings	Total Samples
ABA	8 ¹	8 ¹	24 ¹	8	8	5	61
Whole Rock	8 ¹	8 ¹	24 ¹	8	8	5	61
Kinetic (acid)	1 ^{2,3,4}		3 ^{1,2,3,4}	2 ^{2,3,4}			6 ^{3,4}
Particle size	1 ²		3 ^{1,2,3}	2 ^{2,3,4}			6
SPLP (non-acid)	8 ¹	1 ¹			2	5	16
Mineralogy	4 ⁵	1 ⁵	3 ⁵	2 ⁵	2	5	17
<i>In situ</i> Monitoring	Libby Adit inflow quality; waste rock stockpile				Review of Troy Mine data		
<i>In situ</i> Parameters	pH, metals, nutrients						
Use of rock	Adit, construction, tailings impoundment		Underground workings			Tailings impoundment	

¹Or more as appropriate, per geological description

²Composite

³Unsaturated kinetic columns

⁴Saturated kinetic columns

⁵As appropriate

analytical mineralogy would be determined based on initial geological description as well as results of geochemical test work (Figure C-1).

C.9.4.1 Prichard Formation

C.9.4.1.1 Available Geochemical and Monitoring Data

Adequate static testing has been completed (n=70). Limited laboratory kinetic tests were completed, which included analysis of arsenic, cadmium, copper, iron, lead, manganese, silver and zinc (Geomatrix, 2007, Appendix B-2). Metal mobility tests and mineralogical analyses have not been completed. A better geological delineation of operational distinction between Burke and Prichard Formations, along with revised tonnage estimates, is needed. There is also a need to clarify factors influencing nitrate release from Prichard waste after blasting. Long-term in situ monitoring of pH, nutrients, and metal release from the Prichard has been conducted at the Libby Adit (sample IDs: RAW and RAW-1), and more recently for the waste rock stockpile on the pad outside of the Libby Adit (sample IDs: WRS and WRS-1). Monitoring has been conducted upgradient of the Libby Adit at LB-200 and downgradient, in monitoring wells MW-07-01 and MW-07-02 and at surface water station LB-300. These data are summarized statistically in the Surface Water Quality Technical Report (ERO Resources Corp. 2011).

C.9.4.1.2 Risk

The risk of acid generation by the Prichard Formation is low. The more important risk associated with waste mined from the Prichard is metal and nitrate release via adit water or seepage from surface facilities constructed with Prichard waste rock. Of particular concern is the tailings impoundment, which is planned to be constructed partly with Burke and Prichard waste rock. A secondary risk of metal and nitrate release from Prichard exposed within the adits also exists.

C.9.4.1.3 Uncertainty

Key issues include:

- Range of ABA values in Prichard Formation yielding NP/AP ratios that suggest a potential for acid generation that is inconsistent with results of in situ monitoring data, which show consistently neutral pH. This suggests mineralogical encapsulation of reactive minerals in non-reactive silica, similar to that observed in the Revett Formation, which has not been verified through mineralogical testing of the Prichard Formation.
- Limited humidity cell testing confirms the overall non-acid generating results of the more comprehensive in situ monitoring record.
- An incomplete list of metal analytes, which were measured in prior kinetic tests at relatively high detection limits (above concentrations currently needed to evaluate compliance), does not fully address metal release questions.
- Possible differences in metal release potential between expansion areas within the Prichard (*e.g.*, areas that have not yet been exposed) and areas that have already been characterized. This would be addressed using SPLP tests with analysis of a complete list of metals at appropriate detection limits. These data would support development of a composite for a humidity cell test to confirm previous findings and collect a complete metal analysis.

- The relatively massive and consistent character of the Prichard waste rock suggests that sub-handling of portions of this unit (based on selective handling criteria) may be problematic if future tests indicate that mitigation to meet water quality standards would be needed. This would be considered in light of any potential for long-term metal release.

C.9.4.1.4 Conclusions

- The available results of metal and nutrient release testing on the Prichard Formation as waste rock, particularly for antimony, arsenic, copper, lead, and nitrate, confirm the fact that additional monitoring is required.
- Historical, ongoing, and continued monitoring of water quality within and downgradient of the Libby Adit is more valuable in predictions of water quality than additional kinetic testing.
- As the mine expanded into undisturbed portions of the Prichard Formation, limited geological, mineralogical, and geochemical analyses would be conducted to test for geochemical variability within the formation and validate baseline analysis as mining proceeds.

C.9.4.1.5 Future Geochemical Analyses

- Additional characterization of metal release potential, either through SPLP, kinetic testing or monitoring work, is needed to validate the conclusions of existing mass balance analysis of potential impacts associated with water quality in adits and downgradient of facilities constructed with Prichard waste rock (such as the tailings impoundment). Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- Geological description and hand specimen mineralogy would be used to describe new exposures of Prichard and link those exposures to historically monitored Prichard exposed in the Libby Adit and on the waste rock pad outside the adit.
- QEMSCAN (quantitative evaluation of minerals by scanning electron microscopy) or petrography (XRD/SEM-EDS) of a small number of representative samples (here estimated as 4, which would be adjusted to fit geological observations) would be used to compare new and historically mined Prichard, and to explain observed differences between static and kinetic tests of ARD potential.
- Acid base account (Modified Sobek), whole rock (*e.g.* 55 element ICP using Chemex method MEMS41, aqua regia digestion) and SPLP (EPA Method 1312 as modified) testing of 8 to 10 representative samples collected from any portions of Prichard not currently exposed or previously sampled. One kinetic test of composited Prichard, with compositing based on ABA, whole rock, and SPLP results, to confirm non-acid characteristics and measure metal release potential.
- Nitrate and trace metal release would be monitored using data from mine and adit water before treatment (*e.g.*, RAW-1) and from waste rock stockpiles (*e.g.*, WRS-1).
- Particle size analysis of run-of-mine Prichard rock using standard ASTM methods would be needed to scale laboratory results to prediction of field scale processes.
- Compare laboratory test results with water quality sample results.

C.9.4.2 Burke Formation

C.9.4.2.1 Available Geochemical and Monitoring Data

There have been enough static tests completed (n=19) to describe the underlying range of acid generation characteristics, but no kinetic, metal release potential, or analytical mineralogy tests of the Burke Formation have been completed. Better geological delineation of operational distinction between Burke and Prichard Formations, with revised tonnage estimates is needed, along with clarification of potential for nitrate release. Burke rock mined from the Libby Adit is monitored in situ, as discussed above for the Prichard Formation.

C.9.4.2.2 Risk

The risks associated with the Burke Formation are negligible.

C.9.4.2.3 Uncertainty

A small quantity of Burke rock would be disturbed during adit development. Acid risk is low, and potential for nutrient and metal release is as described above for the Prichard Formation. Specific issues include:

- Range of ABA values in Burke Formation yield NP/AP ratios that suggest little potential for acid generation, consistent with results of in situ monitoring which show neutral pH.
- Potential metal release by Burke Formation rock where exposed underground or in constructed surface facilities requires evaluation. These data need to be sufficient to support mass balance analysis of adit water quality and predictions of water quality downgradient of facilities constructed with Burke Formation rock.

C.9.4.2.4 Conclusions

- No humidity cell testing is warranted for Burke rock due to consistently high ABA values. Historical, ongoing, and continued monitoring of water quality within and downgradient of the Libby Adit is more important to predictions of water quality than kinetic testing of the Burke Formation.
- Metal and nutrient issues, and sampling and analysis, are the same as those described for the Prichard Formation.
- As the mine expanded into undisturbed portions of the Burke Formation within the new adits, limited geological, mineralogical, and geochemical data would be collected to verify consistency within the formation as mining proceeds.

C.9.4.2.5 Future Geochemical Analyses

- Geological description and hand specimen mineralogy.
- Acid base and whole rock “fingerprint” analysis of 8 to 10 samples.
- SPLP testing of at least one composited sample that represent the range of mineralogy and chemistry observed in the Burke formation, based on geological mapping and the range of metal content observed in the whole rock analyses. Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- Use acid base, whole rock, and SPLP results to determine if kinetic tests also need to be performed.

- More detailed mineralogy, and additional SPLP tests, if elevated metal levels were to be noted in these tests, to understand metal mineral residence and mobility.
- Nitrate release would be predicted using in situ monitoring data from RAW-1, WRS-1, and runoff from any future waste rock stockpiles.
- Particle size analysis of run-of-mine Burke rock using standards ASTM methods would be conducted following kinetic tests to scale laboratory results to prediction of field scale processes.
- Water quality monitoring as described for the Prichard Formation.

C.9.4.3 Revett Formation – Waste Rock

Mineral zonation within the lower Revett was mapped in detail at Troy by Hayes (1983) and Hayes and Einaudi (1986), who identified multiple sulfide-carbonate facies surrounding the copper-sulfide mineralization of the ore body. These pyrite-calcite, chalcopyrite-calcite, and sphalerite-calcite sulfide altered waste zones, are likely to be intercepted by the Montanore adits below the ore zone. Zones of galena-calcite are also recognized, which occur as interbeds in immediate proximity to the ore zone, and are referred to as the “barren lead zone.” During exploration, the barren lead zone was sampled and characterized as potentially acid generating based on humidity cell tests. The other altered zones that are likely to exist below the ore zone have not yet been drill tested and their extent, character, and probable production volume are not well known, although preliminary data suggest that they are thin at Montanore. For this reason, testing of the “barren lead” zone are distinguished from the “non-barren lead” zones in the following discussion.

C.9.4.3.1 Revett Barren Lead Waste Zone (Galena)

Available Geochemical and Monitoring Data

Static (n=25) and kinetic (n=1) tests of acid drainage potential have been completed. Metal concentrations were measured in humidity cell effluent (n=1) for an incomplete list of analytes at relatively high detection limits and there is no analytical mineralogical characterization of this zone at Montanore, making comparison with geological analogs exposed at the Troy Mine less robust. Water quality data collected in the underground workings at Troy represent the cumulative effect of water interacting with all of the Revett waste and ore zones. It is not possible to assign water quality to individual altered waste zones.

Risk

Kinetic testing in a humidity cell indicates potential for acid generation and associated metal release from the lead zone. MMC has designated this material for special handling and would design underground facilities to minimize its disturbance. Barren zone (non-ore) containing galena that is mined and removed to surface would be placed on a lined pad, until it can be replaced underground. While on the pad and stored underground, this material would be exposed to partially saturated, aerobic conditions until dewatering ends and the backfilled mine void is saturated with groundwater. The extent of groundwater rebound may vary, and groundwater modeling results suggest that the entire void would not fill for 490 years. For the purposes of this SAP, it is assumed that barren lead waste would be exposed to weathering under both aerobic and anaerobic conditions. The potential for oxidation, with associated acid production and metal release, would change depending upon oxygen availability and encapsulation.

Uncertainty

It is likely that barren zone leachate would be acidic, with elevated metal concentrations. The principle uncertainty is about the magnitude of metal release, and its response to variable oxygen exposure.

Conclusions

- Although this material is designated for selective handling, further characterization under unsaturated, aerobic conditions is needed to understand its metal release potential within the underground workings during mining and the following refilling period.
- Further, as its geochemical behavior is expected to change as a result of saturation when groundwater rebounds at closure, additional characterization of acid generation and trace metal release potential under saturated conditions is also warranted.
- As the mine expands into undisturbed portions of the barren lead zone, limited geological, mineralogical, and conformational geochemical analysis would be conducted to verify mineralogical and geochemical consistency with the tested zones as mining proceeds.

Future Geochemical Analyses

- Geological description and hand specimen mineralogy.
- Acid base account and whole rock testing of 8 to 10 representative samples collected from the barren lead zone during Evaluation Phase. Number of samples would be adjusted to represent range of mineralization.
- Two kinetic tests (ASTM humidity cell test method, run until steady state chemistry is observed) of representative rock composited based on static tests to confirm magnitude of potential acid generation and analyze for a complete suite of metals at appropriate detection limits. One test would be run under unsaturated conditions and one would be saturated, to represent variable weathering conditions. Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- QEMS or petrography (XRD/SEM-EDS) of two samples, weathered under both aerobic and anaerobic test conditions (or more, based on geologic observations) would be used to establish baseline within barren lead zone for future mineralogical assessment of variability.
- Particle size analysis of run-of-mine Revett barren lead waste rock using standard ASTM methods is needed to scale laboratory results to prediction of field scale processes.

Water Quality Monitoring

- Continued evaluation of available monitoring data from Troy Mine.
- Water quality samples would be collected downgradient of barren lead zone material following underground placement.
- Chemistry of water in saturated zones would be monitored as they are developed to predict long-term chemistry for closure work.

- Changes in nutrient concentrations would be monitored in situ to predict underground nutrient loading from the barren lead waste.

C.9.4.3.2 *Revett Formation–Non-Lead Barren Waste Zone*

Available Geochemical and Monitoring Data

Limited geological description of volume and mineralogy is available. Static tests have been completed for lower Revett waste (n=41), but the relationship of these samples to the individual altered waste zones is unclear. Limited (n=1) kinetic tests of acid drainage potential for a composite of lower Revett waste has been completed, with analysis of a limited suite of metals at relatively elevated detection limits. No analytical mineralogy has been completed. Water quality data collected in the underground workings at Troy represent the cumulative effect of water interacting with all of the Revett waste and ore zones. It is therefore not possible to assign water quality to individual altered waste zones using Troy monitoring data.

Risk

Detailed mapping of the individual altered waste zones present at Montanore has not been completed and production volumes have not been calculated. It is possible that small (inconsequential) amounts of this rock would be intercepted, yet presence of divalent (iron) sulfide minerals in the altered waste zones as mapped at Troy suggests risk for sulfide oxidation and acid generation. Results of the available kinetic test data do not support acid risk or release of elevated metal concentrations.

Uncertainty

The risk associated with this material may be minimal due to anticipated small volumes of rock from each altered waste zone. Uncertainty exists about potential for acid, metal, and nutrient release.

Conclusions

- Characterization of Revett altered waste zone behavior under unsaturated, aerobic conditions is needed to understand its chemical behavior as a source term in the underground workings, as well as its behavior if used as construction material.
- As the geochemical behavior of this zone would be expected to change as a result of saturation when groundwater rebounds at closure, additional characterization of acid generation and trace metal release potential under saturated conditions could be useful if material is shown to be acid generating.
- The relative volume and extent of altered waste zone exposure, as well as static test results, would dictate whether saturated and unsaturated kinetic testing is warranted for the individual altered waste zones. The need for testing is contingent upon the volume identified during the Evaluation Phase.

Future Geochemical Analyses

- Detailed, well-documented geological description and hand specimen mineralogy, to map altered waste zones.
- Revise calculated production volumes for altered waste zones
- Acid base account and whole rock “fingerprint” analysis of 8 to 10 samples to characterize geochemical variability of rock for development of a composite for kinetic testing.

- Test a composited sample from each mapped altered waste zone in a kinetic test (including a complete suite of metals at appropriate detection limits). As this rock is likely to report to surface facilities, use standard unsaturated kinetic test methods. Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- If >1% of waste by volume were produced from an altered waste zone with static test results that suggest strong potential to generate acid, which would then trigger selective handling with subsequent underground placement, conduct additional column test work under saturated conditions to produce data representing underground long-term behavior of this material.
- As the mine expanded into undisturbed portions of the barren lead zone, limited geological, mineralogical, and conformational geochemical analysis would be conducted to verify consistency within the formation as mining proceeded.
- Particle size analysis of run-of-mine non-lead Revett waste rock using standard ASTM methods would be needed to scale laboratory results to prediction of field scale processes.

Water Quality Monitoring

- Evaluation of ongoing, publicly available monitoring data from Troy Mine.
- When possible, collect water quality samples downgradient of any reactive altered waste zone material following underground placement.
- Monitor chemistry of water from saturated zones as they were developed to predict long-term chemistry for closure work.
- Changes in nutrient concentrations in situ would be monitored to predict nutrient loading from the blasted portions of the non-ore altered waste zones.

C.9.4.4 Revett Formation – Ore

C.9.4.4.1 Available Geochemical and Monitoring Data

Static tests of ore have been completed (n=25). Kinetic testing (n=1) with characterization of metal release potential for an incomplete suite of metals at elevated detection limits has also been completed. More comprehensive characterization of metal release potential, together with analytical mineralogy, has been completed for ore within the Rock Creek portion of the Rock Creek-Montanore deposit (Enviromin 2013; Maxim Technologies, Inc. 2003). Water quality data collected in the underground workings at Troy represent the cumulative effect of water interacting with all of the Revett waste and ore zones. It is not possible to assign water quality specifically to ore zones.

C.9.4.4.2 Risk

Long-term monitoring of the mined underground workings at Troy, where ore left underground is exposed to groundwater, indicates neutral pH with low but increased concentrations of metals common in the ore zone, such as copper, silver, and lead.

C.9.4.4.3 Uncertainty

Uncertainty about the environmental geochemistry of ore left underground is primarily related to the prediction of metal concentrations post-mining.

C.9.4.4.4 Conclusions

- Static test results suggest that a portion of the ore zone has potential to generate acid, yet the kinetic test and in situ monitoring results do not support the potential for acid generation. This has been shown to be the result of non-acidic sulfide minerals and silica encapsulation of sulfide minerals within the Revett ore zone (Maxim Technologies, Inc. 2003).
- Characterization of ore behavior under unsaturated, aerobic conditions is needed to understand its chemical behavior as a source of metals in the underground workings.
- As its geochemical behavior would be expected to change as a result of saturation when groundwater rebounds, additional in situ monitoring of acid generation and trace metal release from backfilled waste under saturated conditions is needed to predict chemistry of the mine pool post closure.

C.9.4.4.5 Future Geochemical Analyses

- Acid base account and whole rock “fingerprint” analysis of 8 samples to characterize geochemical variability of samples for use in composite for kinetic testing.
- Metal mobility tests for one or more composited samples with a complete suite of metals at appropriate detection limits. Static test results would be used to develop composites. Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- Analytical mineralogy quantifying sulfide mineralogy and silica encapsulation would be completed for Montanore and Troy, to compare with that completed by Maxim (2003) for Rock Creek. This would support the use of the Troy and Rock Creek ore deposits as geochemical analogs for Montanore, and confirm the predicted lack of acid generating sulfides and low reactivity of encapsulated sulfides in the ore zone.

C.9.4.4.6 Water Quality Monitoring

- Evaluation of available monitoring data from Troy Mine.
- Monitor chemistry of water from saturated zones as they were developed
- Changes in nutrient concentrations in situ would be monitored to predict nutrient loading from the blasted portions of the ore zone.

C.9.4.5 Tailings**C.9.4.5.1 Available Geochemical and Monitoring Data**

Static tests of tailings reject from the process proposed for Montanore (n=1) have been completed with no kinetic tests of acid drainage potential or characterization of metal release potential. Analytical mineralogy and whole rock analyses were completed for tailings that was produced using a similar process to float ore samples from the Rock Creek portion of the Montanore-Rock Creek deposit (n=13). Due to limited access to bulk samples for metallurgical testing, no tailings would be available for further environmental testing until the exploration adit was completed. Water quality data collected from the Troy tailings impoundment, and from downgradient water resources at Troy, are believed to represent conditions anticipated for Montanore, which would use a similar process to concentrate ore by flotation (Enviromin 2013).

C.9.4.5.2 Risk

Total sulfur analyses of tailings generated through bench-scale testing of ore from Rock Creek shows low concentrations of sulfur with little potential for acid generation. The relatively high surface area of the ground tailings does increase metal release in tailings effluent. Long-term monitoring of the impoundment at Troy indicates neutral pH with elevated concentrations of metals common in the ore zone, such as copper, silver and lead. The primary risk associated with tailings is metal release, with secondary risk of elevated nitrate concentrations.

C.9.4.5.3 Uncertainty

The potential for acid generation by Montanore tailings would likely be low based on negligible levels of post-flotation sulfur content in samples from Rock Creek, but would be confirmed through testing of Montanore tailings when samples were available. The geochemical behavior of tailings would be expected to change as a result of desaturation when dewatering occurred at closure, but no kinetic test data are available to represent this process.

C.9.4.5.4 Conclusions

- Tailings are highly homogeneous and therefore can be represented with a composite sample from the metallurgical testing reject sample.
- Characterization of its behavior under saturated, anaerobic conditions is needed to understand its chemical behavior as a source term in the operational impoundment.
- Additional characterization of acid generation and trace metal release potential under unsaturated conditions is also warranted.

C.9.4.5.5 Future Geochemical Analyses

- Acid base accounting and whole rock “fingerprint” analysis of a composited sample to characterize geochemical variability of tailings.
- Evaluate whether routine quality control measurements in mill could provide a measure of geochemical variability, thereby reducing the magnitude of this testing.
- Kinetic tests may not be necessary, due to low sulfide content, but metal release potential tests using SPLP methods would be conducted on a representative suite of samples. As metallurgical testing proceeds, tailings characteristics may vary. Possible classes of material to be studied using SPLP would include whole tailings, and coarse and fine tailings fractions. This would to a certain extent be defined by the metallurgical test work. As tailings are expected to be highly homogeneous, no compositing strategy would be required. Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.
- A particle size analysis of tailings, using standard ASTM sieving protocols, would be needed for evaluation of silica encapsulation influence on metal and sulfur reactivity in ground tailings.

C.9.4.5.6 Water Quality Monitoring

- Evaluation of ongoing, publicly available surface water and groundwater monitoring data from the Troy Mine impoundment.
- Monitoring of chemistry of water from the impoundment would continue as the impoundment water balance changes through mine life.
- Monitoring of changes in nutrient concentrations would facilitate prediction of tailings seepage chemistry.

C.9.5 Operations Phase Sampling and Analysis

Operational sampling and analysis would focus on validation of baseline conclusions, through periodic collection of Burke, Prichard, and Revett waste rock samples. Samples would be collected based on tonnage, at a rate that provides coverage of the mineralogical variability observed in mined rock. Geomatrix recommended sampling at least every 500 feet in adits and for every 100,000 tons of waste rock (Geomatrix 2007). This level is approximately consistent with guidelines provided by the Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009), which suggest 50 samples per 4 million tons of waste. Likewise, a sample of tailings can be collected periodically at the tailings line drop box, although collection of sampling can be less frequent than waste rock due to the relative homogeneity and characterization that is done for metallurgical processing. Ultimately, the relative frequency of sampling would be based on “variability within the analysis results for critical parameters, prediction objectives, and required accuracy” (Price 2009).

If test work conducted during the Evaluation Phase allowed rock mined during Construction and Operations phases to be classified for management (*e.g.*, there are no inconclusive kinetic tests, and rock requiring management is clearly delineated), static testing of volumetrically representative rock samples using mineralogical description, whole rock analysis, acid base accounting, with occasional metal mobility testing of composites, would provide an adequate basis for evaluating the consistency of mined rock with baseline samples. Water quality monitoring would be as described in section C.10, Water Resources. Following the Evaluation and Construction phases, and the first 5 years of Operations Phase, the agencies would review the data to determine adequacy of sampling and analysis, and management practices.

Of particular interest for operational sampling are locations where waste rock was exposed to oxidation, in surface stockpiles, constructed facilities, or as backfill in underground workings. Periodic collection of water quality samples downgradient of such facilities would allow long-term behavior to be evaluated in support of closure planning.

C.9.6 Sample Collection and Analysis

C.9.6.1 Collection

Sampling during the Evaluation Phase is focused on addressing specific gaps in existing knowledge, or on comparison of newly mined rock from a given lithology with rock that was mined and sampled historically. Sampling would specifically follow the guidelines provided in the SAP, as approved by the agencies, and would be focused on collection of samples across the range of observed mineralization and geological conditions observed. Sampling would proceed as follows:

- Sites would be located on a map and photographed
- Geological description, including lithology, structure, mineralogy, evidence of sulfide, carbonate, and iron oxide, would be completed at each site.
- A representative sample of at least 2 kilograms, allowing sufficient mass for preparation of splits suitable for completion of baseline static ABA, whole rock, and metal mobility tests with enough material archived for composite development and/or mineralogy would be collected.

- The number of samples would follow the guidelines provided in Table C-6, but may vary to accommodate the range of observed mineralogical variation.
- Material would be dried, bagged in plastic to prevent oxidation for shipment to a lab.
- Sample would be crushed to passing 3/8" sieve, and then randomly split using established protocol to obtain subsamples for relevant analyses.
- Care would be taken to document elements of sampling and analytical uncertainty.

C.9.6.2 Analytical Methods

Samples would be analyzed using the following methods, or by comparable methods approved in advance by the agencies:

- Whole rock metal content – EPA method 3050B
<http://www.epa.gov/wastes/hazard/testmethods/sw846/pdfs/3050b.pdf>, or ALS Chemex method MEMS41 aqua regia digestion followed by ICP, contact www.alsglobal.com
- Acid Base Accounting (ABA) – modified Sobek Method, after Lawrence and Wang, 1997 [http://technology.infomine.com/enviromine/ard/Acid-Base%20Accounting/acidbase.htm#Lawrence Sobek](http://technology.infomine.com/enviromine/ard/Acid-Base%20Accounting/acidbase.htm#Lawrence%20Sobek)
- Synthetic Precipitation Leachability Procedure – EPA Method 1312, <http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/1312.pdf>
- Analyses of effluent from short and long term leach testing (*e.g.*, SPLP, humidity cells, and *in situ* monitoring) would be reviewed to identify constituents of concern at appropriate levels of detection.

C.9.7 Data Analysis

As operational data were collected, they would be summarized in an accessible spreadsheet or database format, and evaluated statistically to evaluate sampling adequacy and modify sampling goals as appropriate. Specifically, the distribution of values would be plotted and standard descriptive statistics would be calculated. The relative adequacy of sampling would be calculated, so that the need for additional sampling could be considered. As a general rule, greater characterization would be needed for material posing more risk to water quality.

Criteria to be used for evaluation of individual sample results include comparison of whole rock analyses with standard crustal abundance for elements of concern and comparison of metal mobility results with water quality standards. Metal concentrations in whole rock cannot be directly correlated with metal mobility due to solubility constraints imposed by the minerals that host the metals.

Acid base account results would be evaluating using the following criteria. Rock that is potentially acid generating has an NNP (calculated as NP minus AP, in units $\text{TCaCO}_3/\text{kTon}$) less than 20, or an NP/AP ratio of less than 1. Rock that is non-acid generating has an NNP greater than 20 or and NP/AP ratio greater than 3. Values that lie between these values are uncertain and require kinetic testing.

Kinetic tests using ASTM standard method D5744-96 would be conducted for a minimum of 20 weeks testing and terminated only with regulatory approval. For interpretation of the results, guidance is provided in the Global Acid Rock Drainage Guide (International Network for Acid

Prevention 2008) or Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials (Price 2009) for prediction of acid generation and metals mobility potential.

The mass loading analysis (Appendix G) used to predict future water quality would periodically be revised to incorporate new data. Results of this analysis would identify the need to adopt or modify selective handling criteria, if appropriate, to mitigate impact based on consultation between agencies and mine site geology staff. The analysis would be updated prior to start of construction, and every 5 years through mine life, if water quality standards change or if unanticipated changes in water quality were observed.

Data would be reviewed in the context of waste management and risk mitigation strategies, and used to evaluate the most relevant closure strategies (*e.g.*, bulkheads, flooding, etc.). Following completion of the Evaluation Phase, the need to handle material selectively would be reevaluated and criteria for material placement would be established. Where possible, trigger values that would enable mining personnel to identify rock for selective handling or to determine the need for mitigation would be identified. A routine reporting schedule would be developed in consultation with the agencies.

C.10 Water Resources

C.10.1 Introduction and Objectives

MMC and its predecessors have collected and reported ambient surface water and groundwater quantity and quality data as well as aquatic biology data (see Chapter 3). Additional monitoring would be required to supplement this original data collection and provide long-term monitoring for the project. The objective of the monitoring is to provide a long-term assessment of the water resources and groundwater dependent ecosystems that could be affected by the mine. Monitoring would be maintained during the life of the project. Post-mining surface water and groundwater monitoring would be continued for a period of time to be specified by the agencies during review of MMC's Final Closure Plan.

The following monitoring would be implemented in one or more of six phases of the project: Pre-Evaluation, Evaluation, Construction, Operations, Closure, and Post-Closure. The first phase would be a Pre-Evaluation Phase of data collection and monitoring to collect additional data before additional dewatering and extension of the Libby Adit started. Monitoring during the next phase, Evaluation Phase, would be designed to monitor the potential effects of the dewatering of the Libby Adit, and the storage of waste rock at the Libby Adit Site. The activities associated with the Evaluation Phase are described in section 2.5.2 in Chapter 2. Monitoring during the next two phases, Construction and Operations, would generally be the same, except for the addition of sediment monitoring, as discussed during those phases. The Closure Phase would cover the period when mill operations ceased, and site reclamation and closure were implemented. The last phase, Post-Closure, would be the monitoring conducted after the adits were plugged, and reclamation of mine facilities was completed. The objectives described in the following sections apply to facilities proposed in Alternative 3. Objectives would be similar for other alternatives and would reflect the facility location of each alternative. An overview of the hydrology and aquatic biology monitoring locations for Alternative 3 is shown in Figure C-2.

C.10.2 Funding

The Montana Board of Health and Environmental Sciences (the Board of Environmental Review's predecessor) approved a "Petition for Change in Quality of Ambient Waters" to increase the concentration of select constituents in surface water and groundwater above ambient water quality (Appendix A). The Order remains in effect and MMC would be responsible for ensuring compliance with the Order's provisions. One provision of the Order was the requirement that Noranda (now MMC) provide funding to the DHES (now DEQ) so that the DEQ could perform sufficient independent monitoring to verify monitoring performed by Noranda (now MMC). The funding would not exceed the actual cost of the agencies' independent monitoring, and or \$35,000 annually, whichever was less (in 1992 dollars).

The monitoring may include independent collection or analysis of surface water, groundwater, or aquatic life samples, independent interpretation of monitoring data, or other activities the agencies deemed necessary to verify MMC's monitoring. Beginning in the year in which additional dewatering and extension of the Libby Adit began, MMC would provide \$59,300 annually to the DEQ; \$35,000 in 1992 dollars is \$59,300 (2014 \$), using the Consumer Price Index as the inflation factor. Any funding exceeding the agencies' actual cost would be returned to MMC annually or rolled over for the following year. The funding would increase annually in accordance with the Consumer Price Index. The funding would continue throughout the project until the Post-Closure Phase and final bond release, or the agencies' approval to cease monitoring.

C.10.3 Pre-Evaluation Phase

C.10.3.1 Objective

MMC is maintaining groundwater levels in the Libby Adit at 7,200 feet from the adit portal. Water from the adit is pumped to the surface, treated at the Water Treatment Plant, and then discharged at a MPDES-permitted outfall at the site. The Pre-Evaluation Phase covers monitoring up to when MMC would begin additional dewatering of the Libby Adit. The objectives of data collection and monitoring during this phase are to:

- Characterize groundwater conditions overlying portions of the Libby Adit
- Characterize groundwater quality flowing into the Libby Adit
- Identify and characterize groundwater dependent ecosystems (GDEs) in the upper Libby Creek, upper East Fork Rock Creek, and East Fork Bull River drainages
- Characterize water levels, water supply, and water quality of Rock Lake
- Characterize streamflow and water quality in upper East Fork Rock Creek, and East Fork Bull River
- Characterize flows and water quality of benchmark streams near, but outside of the range of influence of expected mine or adit inflows (such as Bear Creek east of the divide, and Swamp Creek west of the divide)
- Characterize changes in water levels and water quality in benchmark lakes near, but outside of the range of influence of expected mine or adit inflows (such as Wanless Lake)
- Assess effects of discharge of treated water on surface water and groundwater adjacent to the Libby Adit

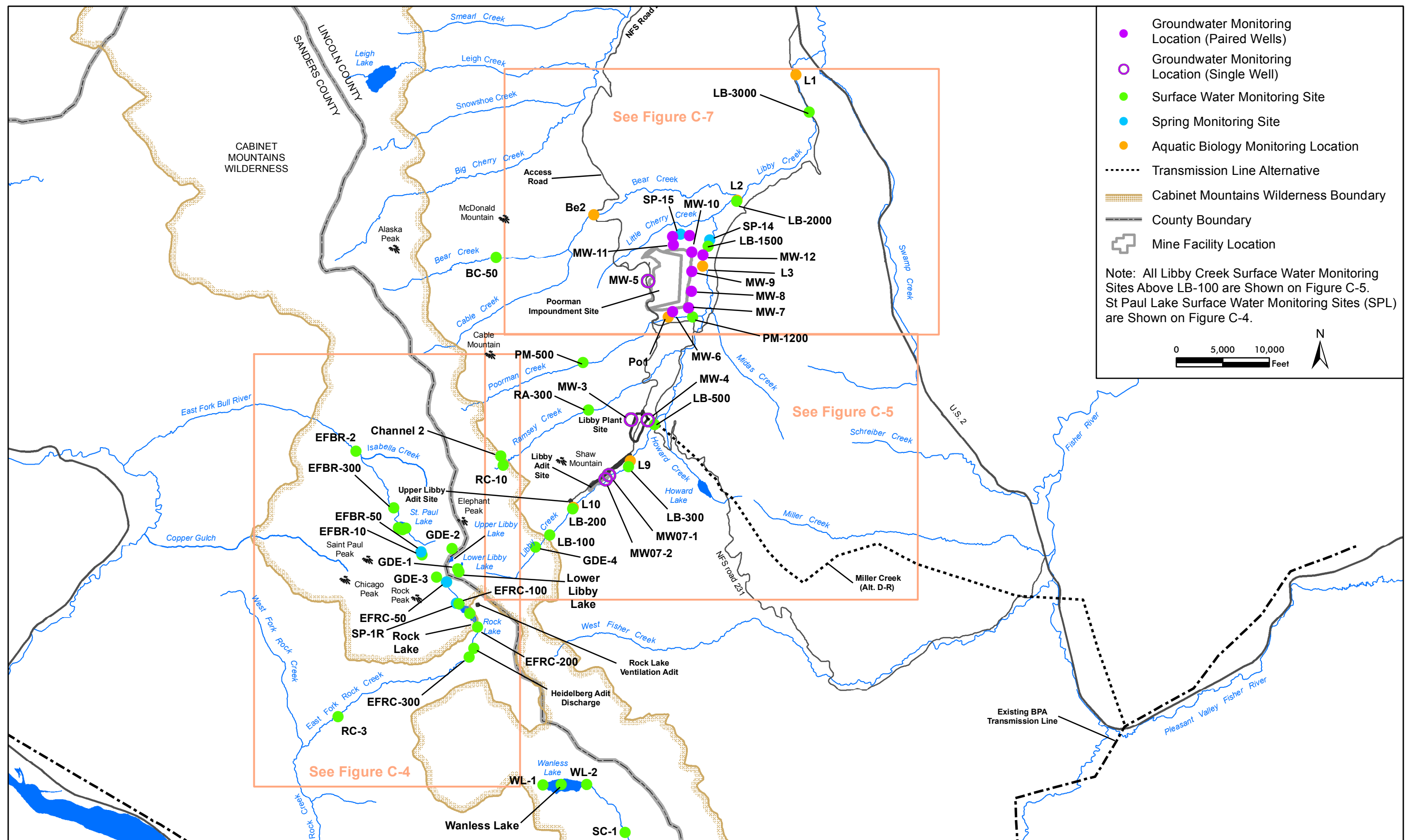


Figure C-2. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations

C.10.3.2 Groundwater Dependent Ecosystem Inventory and Monitoring

C.10.3.2.1 Previous Inventory and Current GDE Monitoring

In 2009, MMC completed a groundwater dependent ecosystem (GDE) inventory focusing on areas at or below about 5,600 feet on the north side of the Libby Creek watershed (Geomatrix 2009a). Additional inventory in the Libby Creek drainage was conducted in 2010. The additional inventory consisted of inventorying GDEs identified in 2009 and the threatened, endangered, and Region 1 sensitive species lists (Geomatrix 2010b). An inventory of other mine areas, such as the Ramsey Creek, East Fork Rock Creek, and East Fork Bull River drainages, was conducted in 2012. Additional areas were inventoried by MMC in 2013, including upper Libby Creek, upper Ramsey Creek and Ramsey Lake, upper East Fork Bull River at and above St. Paul Lake, upper East Fork Rock Creek at and above Rock Lake, and the Libby Lakes basin (MMC 2014b). MMC provided data collected in 2013 and 2014 from GDE sites in the CMW (Klepfer Mining Services 2015a). GDE monitoring completed through 2014 in the CMW is summarized in Table C-7.

MMC completed surveys for wetlands, springs, and perennial and ephemeral streams in the Impoundment Sites in 2005 and 2007 and the Corps issued a preliminary jurisdictional determination for waters of the U.S. at both sites. Surveys for sensitive plants, amphibians, and reptiles also were completed at both sites. No additional GDE inventory of the impoundment sites is needed. In 2011 and 2012, MMC installed and measured water levels in shallow piezometers in wetlands in the Poorman Impoundment Site and the Little Cherry Creek Impoundment Site. Water samples and a snow sample also were collected and analyzed for isotopes.

East Fork Rock Creek

MMC is currently monitoring GDEs in the East Fork Rock Creek and Rock Lake areas (Figure C-4). GDE monitoring activities are:

- Measuring water levels in Rock Lake continuously using a pressure transducer datalogger in the lake and a nearby barometric pressure datalogger (minimum of one data point every hour) and downloading data twice per year (early summer and early fall)
- Measuring water levels using a permanent datum in Rock Lake in early summer and early fall
- Measuring flow and field parameters (pH, specific conductance, dissolved oxygen, and temperature) in Heidelberg Adit discharges in early summer and early fall

Upper Libby Creek

MMC and the KNF currently monitor GDEs and water quality in Libby Creek and Lower Libby Lake (Figure C-5). Monitoring activities are:

- Measuring water levels in Lower Libby Lake using a pressure transducer datalogger in the lake continuously (minimum of one data point every hour) and downloading data twice per year (early summer and early fall)
- Measuring flows and field parameters at seeps side of Lower Libby Lake (GDE-1)
- At the spring/seep complex in upper Libby Creek (located at GDE 4), measuring groundwater levels at two nested piezometer sites and collecting vegetation information annually at transects and quadrants using the Forest Service Level 2 monitoring protocol as a basis for a project specific protocol

Current surface water monitoring is discussed in section C.10.3.3, *Surface Water Monitoring*.

Table C-7. Summary of GDE Monitoring in the CMW.

Site	Dates	Data Collected	Report
<i>Upper Libby Creek</i>			
LB-50 and LB-100	2009-2014 (32x) 2009-2014 (27x)	Flow Field parameters	Geomatrix 2009a, 2010b, 2011d; NewFields 2013a; MMC 2014d; Klepfer Mining Services 2015a
LB-20, LB-30, LB-40, LB-70, and LB-80	2012-2014 (16x) 2012-2014 (14x)	Flow Field parameters	NewFields 2013a; MMC 2014d; Klepfer Mining Services 2015a
GDE-4 (formerly named Spring 8)	2010-2013 2010 and 2012 2010-2014 (7x) 2009-2013 (4x)	Flow and field parameters Isotopes Water levels Wetland indicator species transects	Geomatrix 2009a, 2010b, 2011d; NewFields 2013a; MMC 2014d; Klepfer Mining Services 2015a
Lower Libby Lake	2010-2014 (continuous)	Lake level	
GDE-1	2013	Partial GDE Level 2 inventory	MMC 2014d
<i>Upper Ramsey Creek</i>			
RC-10	2012 2013 (3x)	Flow and field parameters	NewFields 2013a; MMC 2014d
Channel #2	2013	Observation of flow	MMC 2014d
Ramsey Lake	2012 2013 (3x)	Flow and field parameters	NewFields 2013a; MMC 2014d
<i>Upper East Fork Bull River and St. Paul Lake Area</i>			
GDE-2	2013	Partial GDE Level 2 inventory	MMC 2014d
EFBR-10	2013 (1x)	Field parameters	MMC 2014d
EFBR-50	2013 (4x) 2013-2014 (continuous)	Field parameters Stage	MMC 2014d
EFBR-2 and EFBR-300	2013-2014	Flow and field parameters	Klepfer Mining Services 2015a
SPL-1 SPL-4 SPL-9 SPL-11	2012 (1x) 2013 (2x) 2013 (2x) 2013 (1x) 2013 (2x)	Flow and field parameters Flow and field parameters Isotopes (one time excluding SPL-9)	Kline Environmental Research and NewFields 2012 MMC 2014d
<i>Upper East Fork Rock Creek and Rock Lake Area</i>			
EFRC-50	2012 (2x) 2013 (1x)	Flow and field parameters Isotopes	NewFields 2013a; MMC 2014d
SP-1R	2012 (2x) 1999	Flow and field parameters Isotopes	NewFields 2013a; MMC 2014d
EFRC-100 and EFRC-200 (Rock Lake inlet and outlet)	2010-2012 (2x/year) 2009-2014 (4x/year) 2013	Flow and field parameters Water quality parameters Isotope	Geomatrix 2009a, 2010b, 2011d; NewFields 2013a; MMC 2014d; Klepfer Mining Services 2015a

GDE-3	2013 2013 (1x)	Partial GDE Level 2 inventory Isotope	MMC 2014d
Rock Lake	2009-2014 (continuous)	Lake level	Geomatrix 2009a, 2010b, 2011d; NewFields 2013a; MMC 2014d; Klepfer Mining Services 2015a
<i>Benchmark Sites</i>			
BC-50 (Bear Creek)	2013-2014 (6x) 2013 (4x) 2013-2014 (continuous)	Flow and field parameters Water quality parameters Stage	Klepfer Mining Services 2015a
Wanless Lake	2013-2014 (continuous)	Lake level	Klepfer Mining Services 2015a
WL-2 (Wanless Lake)	2013 (3x)	Water quality parameters	Klepfer Mining Services 2015a
SC-1 (Swamp Creek)	2013 (4x) 2013 (1x)	Flow and field parameters Water quality parameters	Klepfer Mining Services 2015a

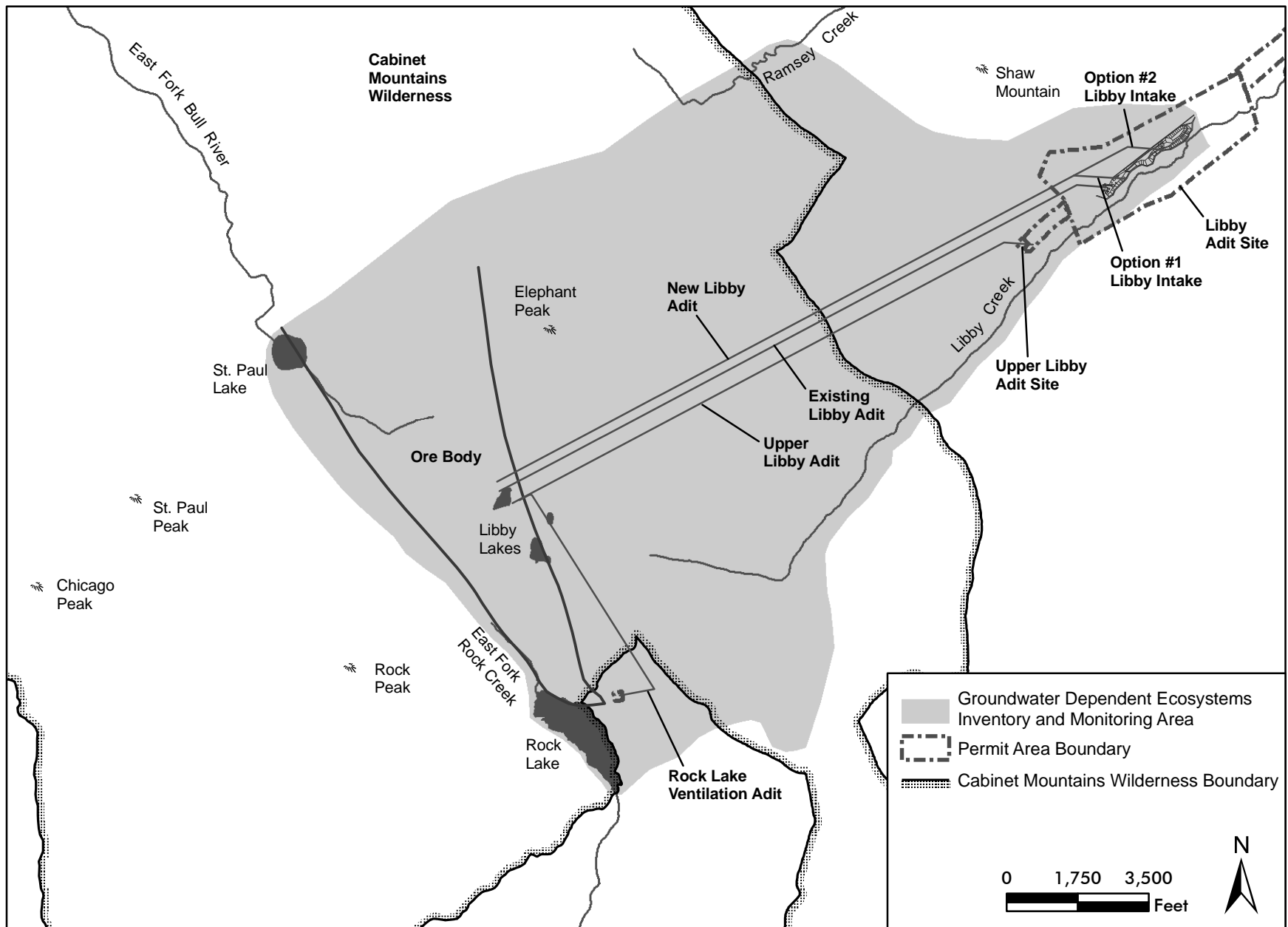
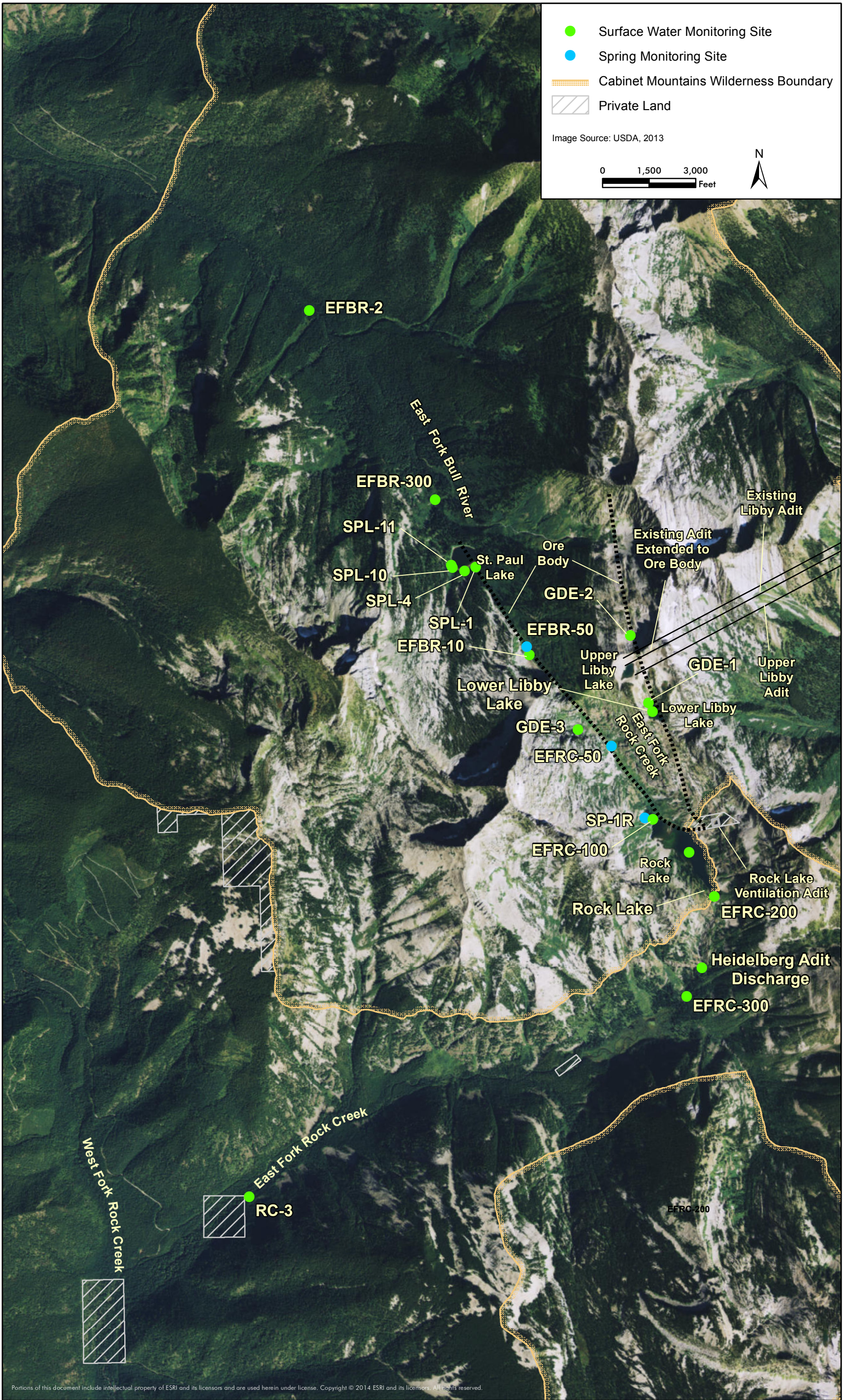


Figure C-3. Groundwater Dependent Ecosystems Inventory and Monitoring Area



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Figure C-4. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Mine Area

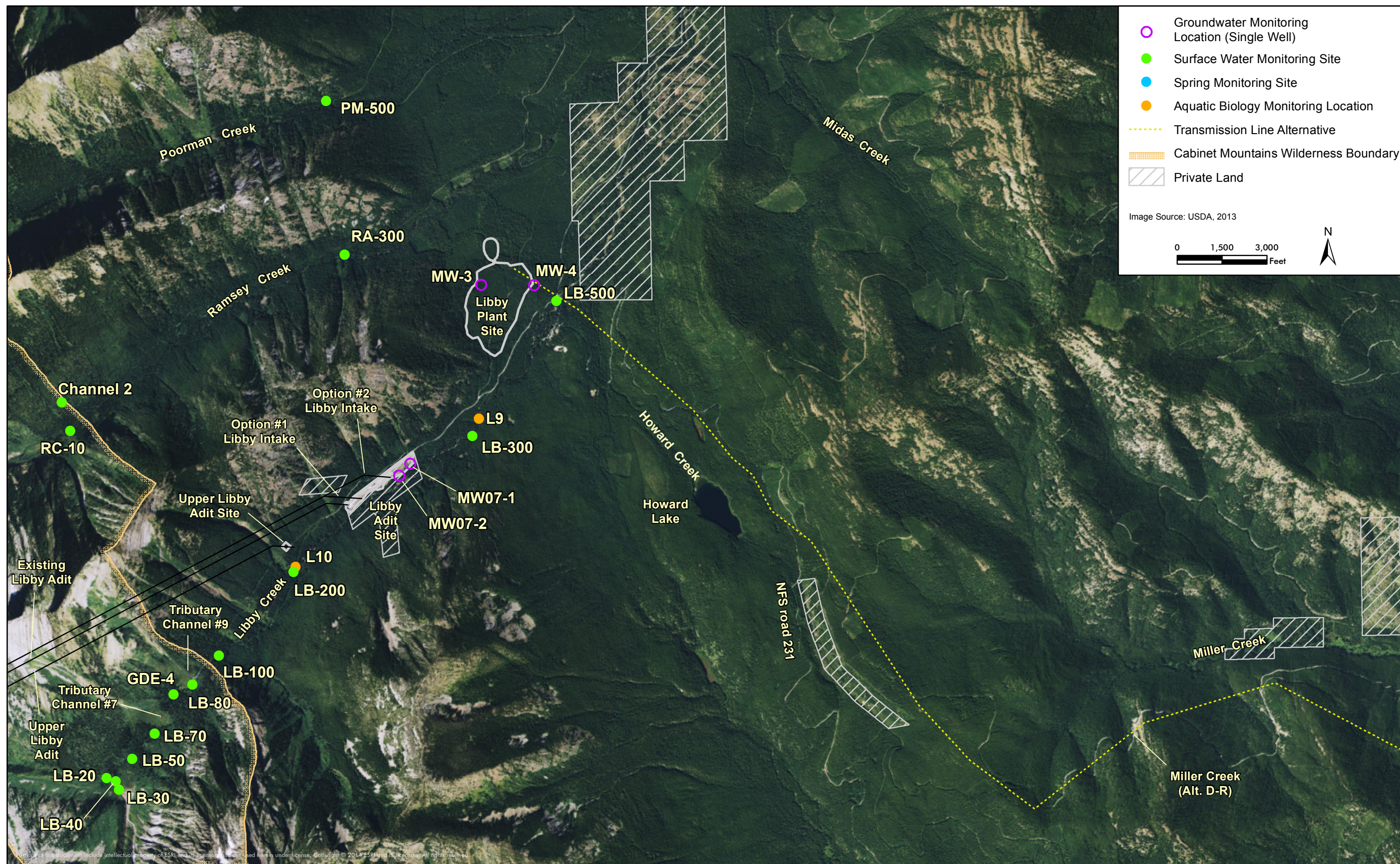


Figure C-5. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Upper Libby Creek

C.10.3.2.2 Continued GDE Monitoring

GDE monitoring currently being conducted would continue. Additional GDE monitoring would have locations and frequency specified based on inventory data and on the local hydrogeology and proximity to the mine or adit void. MMC would submit to the agencies for approval a GDE Monitoring Plan for important GDEs found during the inventory. The plan would be incorporated into an overall Water Resources Monitoring Plan. The plan's objective is to effectively detect stress to flora and fauna from effects on surface water or groundwater due to mine dewatering so that mitigation could be implemented to minimize such stress. The plan would be submitted to the agencies for approval after the GDE inventory was completed and early enough for at least 1 year of data to be collected before additional dewatering and extension of the Libby Adit started. The plan would include piezometers in critical locations. The plan would include a monitoring schedule, potential mitigation measures, and identification of possible mitigation implementation triggers if stress to flora and fauna is detected and determined to be a result of mine dewatering. The results of the initial inventory, subsequent inventories, and monitoring would be reported in annual reports to the agencies.

Springs

The most accurate site-specific method for measuring spring flow would be used. Any spring with a measurable flow would be assessed for its connection to a regional groundwater system, based on flow characteristics (*e.g.* possible short-term sources of water supply, such as nearby late-season snowfields or recent precipitation), water chemistry, and the hydrogeologic setting (associated geology such as the occurrence or absence of colluvium or alluvium).

In addition to identifying springs in the GDE inventory area, MMC would locate and monitor springs outside of the area potentially affected by mine dewatering or other activities for use as benchmark springs. The number of springs to be monitored would be determined following completion of the initial GDE inventory. Springs would be categorized and benchmark springs chosen based on location (west side of the Cabinets and east side of Cabinets), altitude, and hydrogeologic setting. The flow of each spring would be measured between mid-August and mid-September during a time of little or no precipitation. The springs would be used for evaluating compliance with action levels.

Wetland and Riparian Vegetation

At each critical GDE wetland, fen and riparian area habitat identified from the inventory, a vegetation survey using the Forest Service Level 2 Sampling Protocol for GDEs (USDA Forest Service 2012b) would be completed. Initial survey data would include site photos and points, GPS site locations, basic site descriptors, and plant species composition, focusing on hydrophytes (plants that are able to live either in water itself or in moist soils).

Streamflow

The most accurate site-specific method for measuring stream flow would be used. Measurements would be taken so that gaining stream reaches could be mapped, and then monitoring locations would be refined to focus on gaining reach lengths and flow. An example of how to determine if stream segments are gaining water from the regional groundwater system is to collect synoptic flow measurements within as short a time period as possible at short intervals along the stream segments within the inventory area. Streams would be assessed for their connection to a regional groundwater system based on flow measurements, water chemistry, the associated hydrogeology,

such as faults or the occurrence or absence of colluvium and/or alluvium, and possible short-term sources of water supply, such as nearby late-season snowfields or recent precipitation.

C.10.3.3 Surface Water Monitoring

C.10.3.3.1 On-going Discharge Monitoring

MMC is currently pumping water from the Libby Adit to the surface, treating it at the Water Treatment Plant, and then discharging it at a MPDES-permitted outfall at the site. MMC is collecting monthly or quarterly samples from Outfall 001 and LB-300 for flow rate, temperature, nutrients, metals, and other parameters. The on-going monitoring would continue during subsequent phases as long as there was a discharge of any mine drainage or process water to any MPDES-permitted outfall. Monitoring requirements described in any permit revision would be incorporated into the monitoring.

C.10.3.3.2 Benchmark Stream, Lake, and Spring Sites

It may be difficult to separate the effects of mine dewatering and other activities that could affect streamflow, spring flow, or the volume and water level of Rock Lake from natural variability and the effects of climate change. For this reason, benchmark sites located outside of the area potentially affected by the Montanore mine (Figure C-2) would also be monitored beginning during the Pre-Evaluation Phase and continuing through all phases or until agreed upon by the agencies that it was no longer necessary. Monitoring would begin at least 1 year before extending the Libby Adit to beneath the ore zone. MMC would locate and monitor springs outside of the area potentially affected by mine dewatering or other activities during the GDE inventory. Springs would be categorized and benchmark springs chosen based on location, elevation, and hydrogeologic setting.

Benchmark springs would be chosen based on location, elevation, water quality, and hydrogeologic setting. Benchmark streams would be chosen based on physiography (size, shape, slope, and aspect), gradient, stream type, climate, vegetation, geology, water quality, and land use. Benchmark sites would be monitored for flow and water quality as soon as they are chosen to determine if they are comparable to surface water sites affected by the mine, and then for at least 1 year prior to expansion of the Libby Adit. The agencies chose two streams for monitoring as benchmark streams, one in the Libby Creek watershed (Bear Creek), and one on the west side of the mountain divide (Swamp Creek), as examples of possible benchmark streams. Different sites and additional sites near the project area may be chosen for monitoring that would be benchmark locations for other stream types and hydrologic regimes. Benchmark sites would represent different stream types within the project area. The Bear Creek location, BC-50, is in upper Bear Creek at an elevation similar to LB-200 on Libby Creek and RA-200 on Ramsey Creek. The Bear Creek watershed above BC-50 is similar to the nearby watersheds of Poorman, Ramsey, and Libby creeks in physiography (size, shape, slope, and aspect), gradient, stream type, climate, vegetation, geology, and land use. The Swamp Creek location, SC-1, located in upper Swamp Creek below Wanless Lake, is near the East Fork Rock Creek, and is at an elevation similar to EFRC-300 below Rock Lake. The Swamp Creek watershed above SC-1 is similar to the nearby East Fork Rock Creek watershed above EFRC-300 in physiography (except for aspect), gradient, stream type, climate, vegetation, geology, and land use, and both have lakes (Rock Lake and Wanless Lake) above them. Swamp Creek drains Wanless Lake, which would be used as a benchmark lake for Rock Lake. Wanless Lake is slightly larger and has a slightly larger watershed than Rock Lake, but it is at a similar elevation, has similar topography, is located within the Revett formation, is bisected by the Rock Lake fault, and is within the 3D groundwater model

domain. Monitoring at the benchmark sites would be the same and would occur at the same time and frequency as monitoring at the comparable sites with the area influenced by the mine. Bear Creek, Swamp Creek, and Wanless Lake would also be used for evaluating compliance with action levels.

C.10.3.3.3 Other Surface Water Monitoring

Past Monitoring

MMC completed a synoptic flow event along upper Libby Creek in September 2010. MMC also completed synoptic flow measurements in this same area on September 13, 2012. In 2010, streamflow was measured at LB-50, LB-100, and LB-200), as well as immediately upstream and downstream of the tributary channels entering Libby Creek. Flow also was measured in the tributary channels, if present. Additional measurements of Libby Creek also were completed between LB-50 and LB-100, and upstream of LB-50. Field parameters of pH, specific conductance, dissolved oxygen, and temperature were measured at selected sites. MMC also surveyed tributary channels #7 and #9 up to about 5,600 feet to determine if any springs were in the upper channel areas (Figure C-5).

Future Monitoring

In addition to monitoring required by the MPDES permit, MMC is conducting the following monitoring (Figure C-5). This monitoring would continue during the Pre-Evaluation Phase or would begin at that time:

- In the Pre-Evaluation Phase and all subsequent phases, collecting flow measurements using the most accurate site-specific method available at EFRC-50, EFRC-100, EFRC-200, RC-3, EFBR-300, EFBR-2 and the Swamp Creek site at the same time every year for the purpose of establishing long-term trends (on or about July 10, August 10, September 10 and October 10)
- In the Pre-Evaluation Phase and all subsequent phases, collecting water quality samples at EFRC-100 and EFRC-200 at the same time every year for the purpose of establishing long-term trends (on or about July 10, August 10, September 10 and October 10) of parameters listed in Table C-10 and Table C-11; complete the same sampling at the inlet and outlet of Wanless Lake
- Sampling Rock Lake and Wanless Lake as described in the following paragraph
- Measuring flow at spring SP-1R site in early summer and late fall
- Measuring streamflow synoptically and analyzing field parameters (Table C-10) at LB-20, LB-30, LB-40, LB-50, LB-70, LB-80, LB-100, LB-200, LB-300, LB-500 on Libby Creek and at frequent intervals on the East Fork Rock Creek from the headwaters to the confluence with the West Fork Rock Creek, and at frequent intervals on the East Fork Bull River from the headwaters to just below the confluence with the North Fork of the East Fork Bull River every two weeks from July 1 to October 15
- Measuring water stage in Libby Creek at LB-200 and continuous flow using a pressure transducer datalogger (minimum of one data point every hour) and downloading data twice per year (early summer and early fall)

- Collecting samples from LB-100, LB-200, LB-300, and LB-500 for field parameters (Table C-10) and analysis of major cations, nutrients, and metals (Table C-11), on a routine basis; complete the same sampling in the Pre-Evaluation Phase and all subsequent phases at the benchmark stream sites.

During the Pre-Evaluation Phase and during all subsequent phases, MMC would sample Rock Lake water quality monthly during July through October by vertical profile sampling, with an optimum of three sampling periods per season. A temperature/dissolved oxygen profile would be collected before any water quality samples were collected. Samples would be collected at the center of the lake from the epilimnion (upper, warmest layer of a stratified lake) and the hypolimnion (cooler, bottom layer of a lake). Samples would be analyzed for all parameters in Table C-11 except metals. A sample from a 5-foot depth would be analyzed for chlorophyll-a, or if bottom of the epilimnion was less than 5 feet based on the temperature/dissolved oxygen profile, would be collected at a shallower depth within the epilimnion. A secchi disk would be used to measure water clarity. USDA Forest Service field sampling and data analysis protocols would be followed (USDA Forest Service 2012c). Wanless Lake, the possible benchmark lake for Rock Lake, or any other possible benchmark lakes would be sampled in the same way during the same sample event. MMC would install pressure transducer dataloggers at the inlet to Wanless Lake and in Wanless Lake or any other possible benchmark lakes during the Pre-Evaluation Phase to monitor inflow and lake levels continuously (minimum of one data point every hour), and would measure outflows from Wanless Lake or any other possible benchmark lakes during the same period such measurements were collected at Rock Lake.

During the Pre-evaluation Phase, MMC would collect sufficient streamflow measures at LB-200 and benchmark site BC-50 on Bear Creek or other corresponding benchmark site (a minimum of 8 times per year during the increasing, peak and decreasing limb of the hydrograph and during low flows) to establish a stage/discharge relationship. After sufficient streamflow measures had been obtained, MMC would continuously record stage.

C.10.3.4 Groundwater Monitoring

MMC collected 1 year of monitoring data beginning in September 2010 and initiated monitoring in 2013 with significantly reduced monitoring frequency to limit the amount of redundant data collected and managed. In 2010, MMC collected representative samples from inside the Libby Adit (*e.g.* at 5,200-foot level) and from the spring at site 8 along upper Libby Creek and analyzed them for oxygen-18, deuterium, and tritium.

For water quality, samples are collected monthly at the raw water holding tank (sample ID: RAW-1) at the Libby Water Treatment Plant and at wells MW07-1 and MW07-2, and analyzed for the parameters shown in Table C-12. Monitoring at wells MW07-1 and MW07-2 would continue during subsequent phases whenever discharges from the Water Treatment Plant occurred. Water quality monitoring associated with the Libby Adit discharge would continue during the Pre-Evaluation Phase.

C.10.4 Evaluation Phase

C.10.4.1 Objectives

During the Evaluation Phase, MMC would dewater the existing Libby Adit to its full length and extend it to beneath the ore body. MMC would collect additional information about the deposit,

as well as geotechnical, geochemical, and hydrological data to support a bankable feasibility study. Building on the inventory and monitoring completed during the Pre-Evaluation Phase, the objectives of monitoring during the Evaluation Phase are to:

- Monitor and characterize groundwater overlying the Libby Adit between the current dewatered location and the ore body
- Monitor and characterize the quality of groundwater entering the Libby Adit
- Characterize groundwater adjacent to the Rock Lake and Snowshoe faults
- Establish a relationship between streamflow and wetted perimeter at one site each in the East Fork Rock Creek and East Fork Bull River drainages
- Assess potential effects on surface resources of additional dewatering of the Libby Adit
- Assess potential effects on GDEs in the upper Libby Creek, East Fork Rock Creek, and East Fork Bull River drainages
- Assess potential effects on Rock Lake, and upper East Fork Rock Creek, and East Fork Bull River drainages
- Assess potential effects of treated water discharge on surface water and groundwater adjacent to the effluent discharge points
- Characterize groundwater quality at the Libby Plant Site, Poorman Impoundment Site, and the Libby Loadout

C.10.4.2 Groundwater Dependent Ecosystem Monitoring

GDE monitoring currently being conducted and any additional GDE monitoring implemented during the Pre-Evaluation Phase would continue. The monitoring required as a result of the Pre-Evaluation Phase GDE inventory would be implemented. Criteria required to decide which characteristics to monitor are traits that: 1) *have a defined relationship with groundwater levels*: there needs to be confidence that a measured response within a parameter reflects altered groundwater levels rather than other abiotic/biotic factors; 2) *are logistically practical*: parameters should be practical to measure within the constraints of a wilderness setting; parameters that reflect landscape responses by GDEs of wide distribution, such as remote sensing of hydrophytic vegetation health, could be considered; and 3) *have early warning capabilities*: it is important to consider the lagtime between changed groundwater levels and environmental condition or health. The response of vegetation parameters influenced by changed groundwater levels can take a long time to become manifested and further reductions may occur before impacts of previous changes are realized; consequently, parameters with rapid responses are favored (*e.g.* groundwater levels in piezometers), as they provide advanced warning of significant stress or degradation on the system, as well as providing the opportunity to determine whether intervention or further investigation is required. Nevertheless, some GDE values may have to be measured through parameters with a greater lag time (*e.g.* hydrophytic vegetation community composition).

Table C-8 identifies the specific monitoring options for GDEs in the inventoried area. After the initial survey, this table would help to establish the methods that would be used to monitor GDEs. Additional monitoring of GDEs may be required, depending on the outcome of the GDE inventory.

Table C-8. Groundwater Dependent Ecosystem Monitoring Options.

Surface Resource Component	Look For:	Using:
Springs, Lakes, and Streams	Flow changes	Flow monitoring – continuous stage recording station and/or stream flow measurements
	Wetted perimeter/stage changes	Channel cross-section measurements
	Lake level changes	Continuous level recorder
	Groundwater level changes	Piezometers
Wetland and Riparian Vegetation	Groundwater level changes	Piezometers
	Dieback, early desiccation, habitat decline	Photo points, field surveys, remote sensing
	Soil moisture stress	Tensiometers
	Plant water potential/ turgor pressure changes	Pressure bomb technique
Amphibians, Mollusks, Macroinvertebrates, Fish	Population decline, community composition change	Field surveys
Terrestrial animals	Population/usage decline	Field surveys

Springs

In addition to the spring at site 8 along upper Libby Creek, the flow in any spring within the GDE monitoring area (Figure C-3) determined by the agencies to be supported by the regional groundwater system or whose connection to the deep bedrock groundwater might be uncertain would be measured annually between mid-August and mid-September during a period of little or no precipitation. Parameters shown in Table C-10 would be collected. During flow measurements, observations regarding possible short-term sources of water supply, such as nearby late-season snowfields, would be made. A spring that was determined by the agencies, after repeated flow measurements, not to be connected to the deep bedrock groundwater may be eliminated from additional monitoring.

Wetland or Riparian Areas

Monitoring of wetland and riparian areas would depend on the nature and location of the wetland or riparian area, and generally would include vegetation cover (woody, herbaceous, and bryophytes), and groundwater level measurements. Level 2 GDE vegetation protocols would be used at GDEs.

Streamflow

Streamflow measurements are discussed in the following section on Surface Water Monitoring. For streams within the GDE monitoring areas determined to be supported by the regional groundwater system or whose connection to the regional groundwater system might be uncertain, such stream segments would be measured every two weeks between July 10 and October 10 each year using the most accurate site-specific method available. If the agencies determine, after repeated flow measurements, that a stream segment is not connected to the regional groundwater

system, such locations may be given a reduced measurement cycle or eliminated from additional monitoring.

At EFBR-2 and RC-3, which are important aquatic life sites, MMC would collect streamflow and cross-section measurements during low flow periods to calculate wetted perimeters at these sites and establish a relationship between streamflow and wetted perimeter. At least 4 sets of measurements one or more weeks apart would be collected for 2 years during low flows (mid-August to mid-October). The data would be submitted for agency approval prior to the agencies approving the Construction Phase. The method for the field measurements and establishing this relationship used by the Forest Service is provided by Montana FWP (Nelson 1989). If the channels at either location were altered by large flow events after the initial relationship was established, MMC would collect new data to re-establish the wetted perimeter-discharge relationships at the affected location.

C.10.4.3 Surface Water Monitoring

Surface water monitoring would be required for the purpose of detecting water quality impacts from mine facilities and detecting flow changes due to mine dewatering. Locations, frequency, and the purpose of surface water monitoring locations are listed in Table C-9. New monitoring locations would be developed in collaboration with the agencies. Flow and field parameters shown in Table C-10 would be measured at monitoring locations in the upper part of various drainages. For locations where water stage would be measured with continuous electronic recording, the measuring device would also measure temperature continuously, and be capable of measuring low stages, and remain in place during high stage events. For continuously recorded sites, MMC would collect sufficient streamflow measurements (a minimum of 8 times per year during the increasing, peak and decreasing limb of the hydrograph and during low flows) to establish a stage/discharge relationship. It is from the established stage/discharge relationship that the 10% accuracy for flow measurements would be determined. Continuous temperature recording would follow DEQ's temperature data logger protocols (DEQ 2005b).

Parameters to be sampled for and analyzed at each surface monitoring location where quality was the focus are provided in Table C-11. Dissolved metal analyses (except for aluminum) are not needed because sufficient dissolved metals data have been collected at monitoring sites in Libby Creek during baseline monitoring. Laboratory analytical methods would conform to those listed in 40 CFR 136. Laboratory reporting limits would comply with the Required Reporting Values found in the most current Montana water quality standards (Circular DEQ-7; DEQ 2012a). The Required Reporting Value is DEQ's selection of a laboratory reporting limit that is sufficiently sensitive to meet the most stringent numeric water quality standard (DEQ 2012a). For parameters without a Circular DEQ-7 required reporting value, the achievable reporting limits from USDA Forest Service, 2012c, Table 3-1 would be used. If data collected under this plan were to be used for compliance purposes for the MPDES permit, minimum limits specified in the MPDES permit must be achieved. Flow measurements would be made using the most accurate site-specific method available and appropriate for the site.

Table C-9. Surface Water Monitoring Locations—Evaluation Phase.

Station	Location	Parameters	Frequency	Purpose
East Fork Rock Creek Drainage				
EFRC-50	Just below SP-41	Stage/flow; field parameters (Table C-10)	Continuous electronic recording for stage/flow; field parameters on or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFRC-100	Inflow to Rock Lake	Stage/flow (Table C-10)	Continuous electronic recording	Monitor mine dewatering
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
Rock Lake	Near south end of lake Vertical profile sampling at center of lake	Lake stage	Continuous electronic recording	Monitor mine dewatering
		Quality (Table C-11 except metals)	On or about 7/10, 8/10, 9/10, 10/10	
EFRC-200	Below Rock Lake where measurable, such as at exposed bedrock slightly downstream from lake	Flow (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
EFRC-300	Upstream of Rock Creek Meadows	Flow, field parameters (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
RC-3	Upstream of confluence with West Fork Rock Creek	Flow (Table C-10), channel cross-section measurements	Flow on or about 7/10, 8/10, 9/10, 10/10, and flow/cross-section measurements at least 4 times/yr during mid-August to mid-October	Monitor mine dewatering
Heidelberg Adit	Below Rock Lake	Flow (Table C-10)	On or about 7/10, 9/10	Monitor mine dewatering
	Additional GDE sites	To be determined	To be determined	Monitor mine dewatering
East Fork Bull River Drainage				
EFBR-50	Just below SP-42	Stage/flow; field parameters (Table C-10)	Continuous electronic recording for stage/flow; field parameters on or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFBR-300	At base of steep slope below St. Paul Lake where measurable	Flow, field parameters (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFBR-2	Just downstream Isabella Creek confluence	Flow (Table C-10), channel cross-section measurements	Flow on or about 7/10, 8/10, 9/10, 10/10, and flow/cross-section measurements at least 4 times/yr during mid-August to mid-October	Monitor mine dewatering
		Quality (Table C-11)	On or about 9/10	
	Additional GDE sites	To be determined	To be determined	Monitor mine dewatering

Station	Location	Parameters	Frequency	Purpose
Libby Creek Drainage				
Lower Libby Lake	Near outlet	Lake stage	Continuous electronic recording	Monitor mine dewatering
LB-20, LB-30, LB-40, LB-50, LB-70, LB-80, LB-100	Upstream of Wilderness boundary	Flow (Table C-10)	Every two weeks 7/1-10/15	Monitor mine dewatering
GDE 4	Upstream of Wilderness boundary	Level 2 GDE vegetation protocol	Annual	Monitor mine dewatering
		Water levels	Monthly 7/15-10/15	
LB-200	Upstream of Libby Adit	Stage/flow/temperature	Continuous electronic recording	Monitor mine dewatering
		Quality (Table C-11) or as specified by MPDES permit	On or about 7/10, 8/10, 9/10, 10/10 or as specified by MPDES permit	
LB-300	Upstream of Howard Creek confluence	Stage/flow/temperature	Continuous electronic recording	Monitor Libby Adit Site and Water Treatment Plant discharges
		Quality (Table C-11) or as specified by MPDES permit	On or about 7/10, 8/10, 9/10, 10/10, or as specified by MPDES permit	
LB-500	Near Libby Plant Site	Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Monitor Libby Adit Site and Libby Plant Site
Possible Benchmark Sites (Outside of Mining Influence)				
SC-1	Swamp Creek downstream of Wanless Lake	Flow (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor natural variability and climate change
		Quality (Table C-11)	On or about 9/10	
BC-50	Bear Creek downstream of Wilderness boundary	Stage/flow Quality (Table C-11)	Continuous electronic recording On or about 7/10, 8/10, 9/10, 10/10	Monitor natural variability and climate change
Wanless Lake	To be determined Vertical profile sampling at center of lake	Lake stage	Continuous electronic recording	Monitor natural variability and climate change effects
		Quality (Table C-11 except metals)	On or about 7/10, 8/10, 9/10, 10/10	
WL-1	Inlet to Wanless Lake	Stage/flow	Continuous electronic recording	Comparison to EFRC-100
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
WL-2	Outlet from Wanless Lake	Stage/flow	Continuous electronic recording	Comparison to EFRC-200
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	

Whole Effluent Toxicity (WET) testing would also be required quarterly for Outfalls 001 to 003. In the draft renewal MPDES permit, the DEQ preliminarily determined that the discharge from the Water Treatment Plant has a reasonable potential to violate numeric or narrative criteria prohibiting toxicity to humans or aquatic life. The WET test uses the most sensitive local or economically important species to implement aquatic life prohibition of toxicity in state waters. In the draft renewal MPDES permit, the effluent limitations for chronic toxicity were for *Ceriodaphnia dubia* and *Pimephales promelas*. If toxicity occurred in a routine WET test, an additional test would be conducted within 14 days of the first test, and if toxicity again occurred, WET testing would increase to monthly and additional testing would be required to determine the cause of the toxicity of the tested organisms. The final MPDES permit will contain final WET testing requirements.

Table C-10. Flow and Field Parameters for Surface Water Samples and Required Reporting Values.

Parameter	Current Required Reporting Value
Flow (cfs or gpm)	Within 10% accuracy
pH (s.u.)	0.1
Dissolved Oxygen (mg/L)	0.3
Specific Conductivity ($\mu\text{S}/\text{cm}$)	1.0
Turbidity (NTU)	1.0
Temperature ($^{\circ}\text{F}$)	0.1

See note to Table C-11.

Table C-11. Monitoring Parameters and Required Reporting Values for Surface Water Samples.

Parameter	Current Required Reporting Value (mg/L unless otherwise specified)	Parameter	Current Required Reporting Value (mg/L)
Physical Parameters			
Flow (cfs or gpm)	Within 10% accuracy	Temperature	0.1
pH (s.u.)	0.1	Total alkalinity (as CaCO ₃)	0.26
Dissolved oxygen	0.3	Total hardness (as CaCO ₃)	1.0
Specific conductivity (μS/cm)	1.0	Turbidity (NTU)	1.0
Oil and grease	1.0		
Inorganic Parameters			
Total dissolved solids	1.0	Total Kjeldahl nitrogen	0.15
Total suspended solids	0.4	Nitrate, as N	0.02
Sodium	0.03	Nitrite, as N	0.01
Calcium	0.08	Nitrate+nitrite, as N	0.02
Magnesium	0.02	Ammonia, as N	0.07
Potassium	0.05	Total inorganic nitrogen	0.01
Bicarbonate	1.0	Total nitrogen	0.15
Chloride	0.1	Total phosphorus, as P	0.004
Sulfate	0.2	Ortho-phosphate	0.001
Silica	0.4		
Metals			
Aluminum, dissolved (0.45 μm filter)	0.009	Lead	0.0003
Antimony	0.0005	Manganese	0.005
Arsenic	0.001	Mercury	0.000005
Beryllium	0.0001	Nickel	0.001
Cadmium	0.00003	Silver	0.0002
Chromium	0.01	Thallium	0.0002
Copper	0.002	Zinc	0.008
Iron	0.02		

Note: Metals are total recoverable unless otherwise specified. For parameters without a Circular DEQ-7 (DEQ 2012a) required reporting value, the achievable reporting limits shown are from USDA Forest Service (2012c, Table 3-1). Required reporting values may differ from MPDES permit reporting levels. Any reporting values in Table C-10 or Table C-11 lower than MPDES permit Reporting Levels would meet USDA Forest Service requirements.

C.10.4.4 Groundwater

Groundwater monitoring would be required for the purpose of detecting potential water quality impacts from mine facilities and for detecting potential groundwater level changes from the underground mine and adits. A summary of all groundwater monitoring requirements are shown on Table C-12.

C.10.4.4.1 Mine Area Locations and Frequency

Piezometers

Because the mine workings (mine void and adits) would be located over a large area mostly beneath the CMW, the most efficient means for obtaining groundwater level data would be from within the mine voids. Numerous piezometers would be required. MMC would submit a plan for the installation of piezometers to be approved by the agencies.

During the dewatering of the Libby Adit, an array of small diameter boreholes would be installed from within the Libby Adit, and instrumented with continuous recording pressure transducers. In general, the boreholes would be drilled in a radial or fan pattern from the mine workings so that the degree of heterogeneity could be assessed as heads change in the fractures surrounding the mine. Each drill station would consist of two boreholes, drilled about 30 degrees from the horizontal from drift, 180 degrees apart, and a third borehole drilled vertically upward from the drift (Figure C-6). Boreholes to be drilled vertically upward from the drift are indicated in Figure C-6 with a “v” symbol. Because the intent of the underground piezometers is to obtain pre-mining pressure data and to track drawdown as MMC dewatered the mine void, the piezometers would be drilled out in front of the existing working face. At each station, the two inclined piezometers would be drilled from a cutout as close to the working face as possible without causing risk to the piezometers during subsequent blasting. The piezometers would be equipped with pressure recording devices before the drift or adit would be advanced. The locations shown on Figure C-6 or a similar approved pattern would be required to assess the variability in fracture spacing; additional piezometers would be installed when fractures transmitting higher flow rates are encountered (>25 gpm).

The first station would be located at the current terminus of the partially dewatered Libby Adit (about 14,000 feet from the portal). The purpose of these piezometers is to start recording water levels as soon as possible after dewatering the existing adit. Water levels in the fractures in the surrounding rock would begin responding as soon as dewatering began, and would be monitored at that time, rather than waiting until the extension of the adit. These piezometers would record hydraulic response as the adit was extended with the associated dewatering. A second station in the Libby Adit would be about 1,500 feet from the current terminus. All subsequent monitoring stations, as shown in Figure C-6, could use planned exploration boreholes so no additional boreholes would be required for piezometer installation.

The groundwater pressure would be continuously recorded using either a transducer with a built in datalogger or with separate transducers and dataloggers. The data would be recorded at least hourly and would be downloaded at least quarterly to ensure proper operation of the equipment, status of battery power for the dataloggers, and to establish groundwater pressure trends.

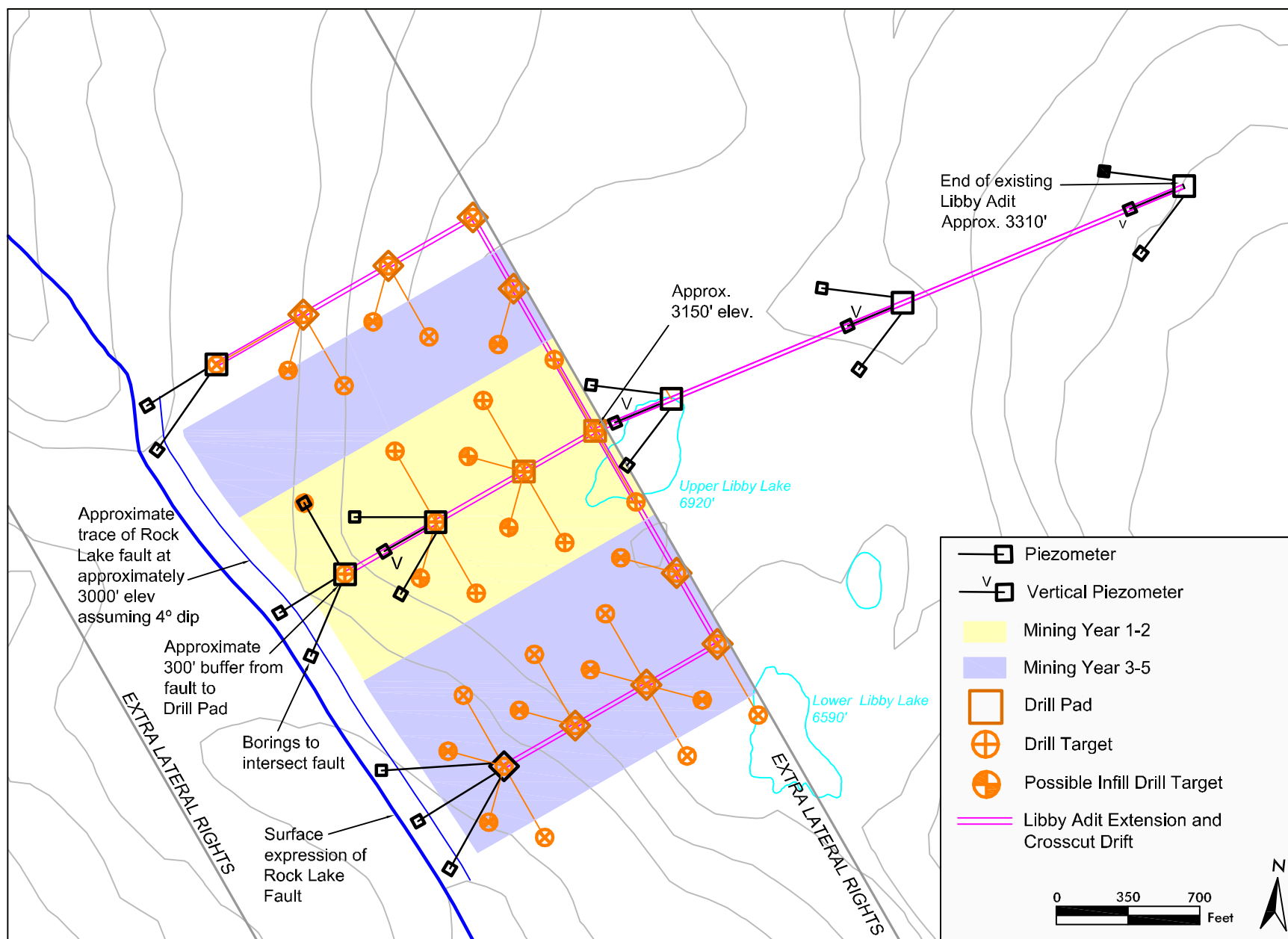


Figure C-6. Proposed Underground Piezometers

The location and number of sites would be determined after reviewing water level data collected during the first 2 years to evaluate any response of the groundwater system to dewatering and to determine whether the existing monitoring network density was sufficient. A plan would be developed for the additional piezometers to be installed in the remainder of the underground mine production area based on information gathered from the Evaluation Phase. This plan would be approved by the agencies.

Groundwater Isotope Analysis

During the late-summer/early-fall baseflow period, MMC would use stable isotope chemistry to compare seepages into Libby Adit or mine void to samples from GDEs and stream baseflow. Sample sites and frequency would be determined after the GDE inventory was completed. Isotopes analyzed would include oxygen-18 and deuterium. In addition, analytes such as tritium or chlorofluorocarbons would be used to establish approximate age of the water. Seepages into the Libby Adit or mine void would be used as benchmark chemistry for the deep aquifer. Major constituents (major anions and cations) would be used to determine relative residence time and travel distance in the aquifer when compared with other groundwater discharges from the same aquifer. The evolution of water chemistry would be graphically determined on trilinear plots. MMC would use age dating of groundwater to separate older groundwater from younger groundwater. Springs discharging older water would be assumed to be supplied by a deeper regional source.

C.10.4.4.2 Libby Adit Site, Libby Plant Site, Poorman Impoundment Site, and Libby Loadout

Location, Frequency, and Parameters

The monitoring of the two wells at the Libby Adit Site, MW07-01 and MW07-02, currently being conducted would continue during subsequent phases as long as there was a discharge to the MPDES-permitted outfalls to groundwater. MMC would submit a plan for the installation of new monitoring wells to be approved by the agencies. Two new wells would be established at the Libby Plant Site, one upgradient of the site and one downgradient (Figure C-5). Four new wells would be established at the Libby Loadout (see Figure 12 in the Final EIS). The monitoring wells at the plant site and Libby Loadout would be installed and sampled quarterly for parameters listed in Table C-12 for 1 year before the Construction Phase began in order to establish pre-operation conditions. Table C-13 lists monitoring requirements after initial characterization was completed.

Table C-12. Monitoring Parameters and Required Reporting Values for Groundwater and Mine and Tailings Water.

Parameter	Current Required Reporting Value (mg/L unless otherwise designated)	Parameter (Dissolved Metals)	Current Required Reporting Value (mg/L)
pH (s.u.)	0.1	Aluminum	0.03
Dissolved Oxygen	0.3	Antimony	0.0005
Specific Conductivity (μS/cm)	1.0	Arsenic	0.001
Total dissolved solids	1.0	Cadmium	0.00003
Sodium	0.03	Chromium	0.01
Calcium	0.08	Copper	0.002
Magnesium	0.02	Iron	0.02
Potassium	0.05	Lead	0.0003
Bicarbonate	1.0	Manganese	0.005
Chloride	0.1	Mercury	0.000005
Sulfate	0.2	Silver	0.0002
Nitrate+Nitrite, as N	0.02	Thallium	0.0002
Ammonia, as N	0.07	Zinc	0.008
Total Kjeldahl Nitrogen	0.15		
Total Phosphorus as P	0.004		
Ortho-phosphate	0.001		
Field Temperature	—		
Total Alkalinity (as CaCO ₃)	0.026		
Total Hardness (as CaCO ₃)	1.0		
Acrylamide [†]	0.01 or lowest possible		

[†]In tailings impoundment water and groundwater downgradient of the tailings impoundment during operations.

For parameters without a Circular DEQ-7 (DEQ 2012a) required reporting value, the achievable reporting limits shown are from USDA Forest Service (2012c, Table 3-1.)

Table C-13. Groundwater Monitoring Requirements.

Well Number	Location	Depth/Screen Interval	Required Data	Monitoring Frequency and Phase	Purpose
Libby Creek Drainage					
MW07-1 and MW07-2	Downgradient of adit facilities	Existing wells at Libby Adit	Water Levels, Water Quality	Quarterly during discharges	Assess potential impacts from Water Treatment Plant discharge
3	Upgradient Plant Site	Water table plus 20 feet or to bedrock, whichever is shallower	Water Levels, Water Quality	Quarterly Construction through Closure	Background data
4	Downgradient Plant Site	Water table plus 20 feet or to bedrock, whichever is shallower	Water Levels, Water Quality	Quarterly Construction through Closure	Assess potential impacts from Plant Site
Poorman Impoundment Site					
5	Upgradient of tailings impoundment	Water table plus 50 feet	Water Levels, Water Quality	Monthly Construction through Closure	Background data
6 – 12	Downgradient of tailings impoundment	Nested pairs – screened in surficial (if saturated) material and bedrock	Water Levels, Water Quality	Monthly Construction through Closure	Assess potential impacts from impoundment seepage and effectiveness of pumpback well system
Wetlands LCC-29, LCC-35A, LCC-36, and LCC-39A	Between Little Cherry Creek and Poorman Impoundment	Nested pairs – screened adequately to assess gradient	Water Levels	Monthly April through September Construction through Closure	Assess potential impacts from pumpback well system
Libby Loadout					
13 – 16	Around loadout facility	Water table plus 20 feet or bedrock, whichever is shallower	Water Levels, Water Quality	Quarterly Construction through Closure	Assess potential impacts from loadout activities
Mine and Adits					
Numerous (see Figure C-6)	From within adit(s) and mine void; drilled radially in all major directions	100's to 1,000 feet from the adit/mine	Water pressure above transducer	Continuously (at least one measurement per hour)	Monitor changes in groundwater pressure as adits/mine advance

A seepage collection system beneath the tailings impoundment and dam would be built to minimize seepage to groundwater from the tailings impoundment. Pumpback wells would be installed to capture seepage not collected by the seepage collection system. During the Evaluation Phase, MMC would complete aquifer testing at the Poorman Impoundment Site and finalize the design of the pumpback well system. After the system was designed, at least seven groundwater monitoring wells would be installed downgradient of the pumpback wells before construction of any of the impoundment facilities (Figure C-7). At least four of these wells would be constructed as nested pairs to monitor both shallow and deeper flow paths from the impoundment. The wells would be located so that the cross-sectional area below the impoundment was adequately covered by the monitoring wells. If any preferential flow paths were encountered during the construction of the impoundment or installation of monitoring wells, they would be monitored independently. The installation of pairs of nested wells is intended to monitor a reasonable vertical thickness of the saturated zone. To obtain a statistically valid set of existing water quality data, the monitoring wells at the impoundment site would be installed and sampled monthly for parameters listed in Table C-12 for 1 year before the initiation of the Construction Phase in order to establish pre-operation conditions. MMC may choose to sample quarterly for 3 years instead. Table C-13 lists monitoring requirements after initial characterization was completed.

Laboratory analytical methods would conform to those listed 40 CFR 136. Laboratory reporting limits would comply with the Required Reporting Values found in the most current Montana's water quality standards (Circular DEQ-7). For parameters without a Circular DEQ-7 required reporting value, the achievable reporting limits from USDA Forest Service, 2012c, Table 3-1 would be used. If data collected under this plan were to be used for compliance purposes for the MPDES permit, minimum limits specified in the MPDES permit must be achieved.

C.10.4.5 3D Groundwater Models Update

MMC developed separate 3D groundwater models for the mine area and the Poorman Impoundment Site. Before the Construction Phase started, MMC would update both models, incorporating the hydrologic and geologic information collected during the Evaluation Phase. MMC anticipates the mine area model's uncertainty for predicting inflows and water resource impacts would be reduced based on the empirical data obtained from underground testing. Effects on surface resources would be re-evaluated based on the revised modeling. The agencies would modify the monitoring requirements described in the following section for the Construction and Operations phases if necessary to incorporate the revised model results.

C.10.5 Construction and Operations Phases

C.10.5.1 Objectives

During the Construction and Operations phases, MMC would build and operate two new adits, an underground mine, the Libby Plant, the Poorman Impoundment, the Miller Creek transmission line alignment, access roads, and the Libby Loadout. Monitoring during the Construction and Operations phases would be the same as during the Evaluation Phase; suspended sediment monitoring (see section C.10.5.4, Stormwater, Suspended Sediment, and Best Management Practices Monitoring) would also be required. The objectives of monitoring during the Construction and Operations phases are to:

- Assess potential effects of continued dewatering of the Libby Adit and the dewatering of the mine void

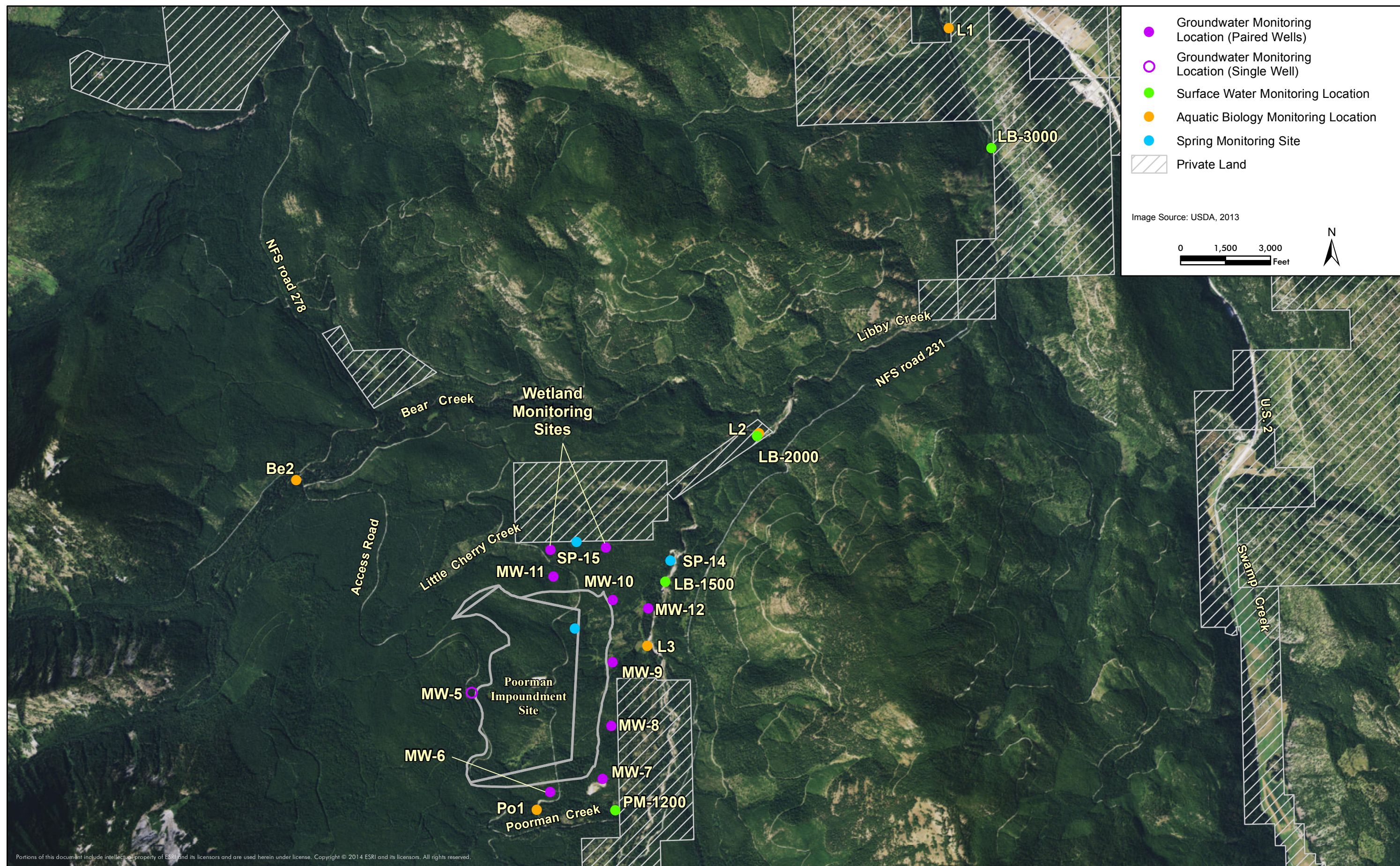
- Assess potential effects on GDEs in the upper Libby Creek, East Fork Rock Creek, and East Fork Bull River drainages
- Assess potential effects on wilderness lakes, and upper East Fork Rock Creek, East Fork Bull River, Libby Creek, and Poorman Creek drainages
- Assess potential effects of discharge of treated water on surface water and groundwater adjacent to the Libby Adit
- Assess the effectiveness of the pumpback well system at the tailings impoundment
- Assess effects on groundwater quality at the Plant Site, Impoundment Site, and the Libby Loadout
- Assess compliance with the MPDES permit requirements.

C.10.5.2 Groundwater Dependent Ecosystem Monitoring

GDE monitoring would continue during the Construction and Operations phases. Any additional GDE monitoring implemented during the Evaluation Phase would continue.

C.10.5.3 Surface Water Monitoring

The monitoring of sites established during the Pre-Evaluation and Evaluation phases would continue, and additional sites on Poorman and Libby creeks would be monitored (Table C-15).



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Figure C-7. Current and Proposed Hydrology and Aquatic Biology Monitoring Locations in Impoundment Area

Table C-14. Surface Water Monitoring Locations (Excluding Stormwater Monitoring)—Construction and Operations Phases.

Station	Location	Parameters	Frequency	Purpose
East Fork Rock Creek Drainage				
EFRC-50	Just below SP-41	Stage/flow; field parameters (Table C-10)	Continuous electronic recording for stage/flow; field parameters on or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFRC-100	Inflow to Rock Lake	Stage/flow (Table C-10) Quality (Table C-11)	Continuous electronic recording On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
Rock Lake	Near south end of lake Vertical profile sampling at center of lake	Lake stage Quality (Table C-11)	Continuous electronic recording On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFRC-200	Downstream of Rock Lake where measurable, such as at exposed bedrock slightly downstream from lake	Flow (Table C-10) Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10 On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFRC-300	Upstream of Rock Creek Meadows	Flow, field parameters (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
RC-3	Upstream of confluence with West Fork Rock Creek	Flow (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
Heidelberg Adit	Downstream of Rock Lake	Flow (Table C-10)	On or about 7/10, 9/10	Monitor mine dewatering
	Additional GDE sites	To be determined	To be determined	Monitor mine dewatering
East Fork Bull River Drainage				
EFBR-50	Just downstream of SP-42	Stage/flow; field parameters (Table C-10)	Continuous electronic recording for stage/flow; field parameters on or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFBR-300	At base of steep slope below St. Paul Lake where measurable	Flow, field parameters (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
EFBR-2	Just downstream of Isabella Creek confluence	Flow (Table C-10) Quality (Table C-11)	On or about 7/10, 9/10 On or about 9/10	Monitor mine dewatering
	Additional GDE sites	To be determined	To be determined	Monitor mine dewatering

Attachment 1—Conceptual Monitoring Plans

Station	Location	Parameters	Frequency	Purpose
Libby Creek Drainage				
Lower Libby Lake	Near outlet	Lake stage	Continuous electronic recording	Monitor mine dewatering
LB-20, LB-30, LB-40, LB-50, LB-70 LB-80, LB-100	Upstream of Wilderness boundary	Flow (Table C-10)	Every two weeks 7/10-10/10	Monitor mine dewatering
GDE 4	Upstream of Wilderness boundary	Level 2 GDE vegetation protocol	Annual	Monitor mine dewatering
		Water levels	Monthly 7/10-10/10	
LB-200	Upstream of Libby Adit	Stage/flow/temperature Quality (Table C-11) or as specified by MPDES permit	Continuous electronic recording	Monitor mine dewatering
			On or about 7/10, 8/10, 9/10, 10/10 or as specified by MPDES permit	
LB-300	Upstream of Howard Creek confluence	Stage/flow/temperature Quality (Table C-11) or as specified by MPDES permit	Continuous electronic recording	Monitor Libby Adit Site and Water Treatment Plant discharges
			On or about 7/10, 8/10, 9/10, 10/10 or as specified by MPDES permit	
LB-500	Near Libby Plant Site	Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Monitor Libby Plant Site
LB-1500	Downstream of Poorman Creek	Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Monitor Poorman Impoundment Site and pumpback well system
LB-2000	Downstream of Little Cherry Creek confluence	Stage/flow (Table C-10)	Continuous electronic recording	Monitor below Poorman Impoundment Site and pumpback well system
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
LB-3000	Upstream of Crazyman Creek confluence	Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Integrated effect site
Ramsey Creek Drainage				
RA-200	Upstream on Ramsey Creek	Flow (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor mine dewatering
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
RA-300	Mid-Ramsey Creek upstream of an existing point-of-diversion	Stage/flow ((Table C-10)	Continuous electronic recording	Monitor mine dewatering

Station	Location	Parameters	Frequency	Purpose
Poorman Creek Drainage				
PM-500	Upstream on Poorman Creek	Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Benchmark site; ambient quality
PM-1200	Upstream of Libby Creek confluence	Flow (Table C-10)	Every two weeks 7/1-10/15	Monitor mine dewatering
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	Monitor Poorman Impoundment Site and pumpback well system
Possible Benchmark Sites (Outside of Mining Influence)				
SC-1	Swamp Creek downstream of Wanless Lake	Flow (Table C-10)	On or about 7/10, 8/10, 9/10, 10/10	Monitor natural variability and climate change
		Quality ((Table C-11)	On or about 9/10	
BC-50	Bear Creek downstream of Wilderness boundary	Stage/flow Quality (Table C-11)	Continuous electronic recording On or about 7/10, 8/10, 9/10, 10/10	Monitor natural variability and climate change
Wanless Lake	To be determined Vertical profile sampling at center of lake	Lake stage	Continuous electronic recording	Monitor natural variability and climate change effects
		Quality (Table C-11 except metals)	On or about 7/10, 8/10, 9/10, 10/10	
WL-1	Inlet to Wanless Lake	Stage/flow	Continuous electronic recording	Comparison to EFRC-100
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	
WL-2	Outlet from Wanless Lake	Stage/flow	Continuous electronic recording	Comparison to EFRC-200
		Quality (Table C-11)	On or about 7/10, 8/10, 9/10, 10/10	

C.10.5.4 Stormwater, Suspended Sediment, and Best Management Practices Monitoring

The KNF conducts continuous suspended sediment monitoring during the ice-free period with an automated sampler near LB-3000 on Libby Creek (Figure C-2). The continuous suspended sediment monitoring would continue during construction and post-construction of the mine and transmission line facilities. MMC would either fund the existing KNF monitoring or they would implement their own monitoring efforts in Libby Creek. In lieu of collecting water samples for analysis of total suspended sediments (TSS), MMC may use a turbidity meter in concert with the TSS sampling to establish a relationship between turbidity and TSS. Once a statistically valid relationship between the turbidity meter results and the TSS results was established and approved by the agencies, MMC may use a turbidity meter.

This paragraph describes stormwater monitoring of Outfalls 004 through 008 required in the draft renewal MPDES permit. MMC would seek authorization to discharge stormwater from other disturbances associated with construction activity. Stormwater monitoring requirements for any new outfalls may differ from that described for Outfalls 004 through 008. Stormwater monitoring would be required at all stormwater outfalls whenever a measurable discharge occurred. Both grab and flow-weighted composite samples would be collected. Grab samples would be collected within the first 30 minutes of the stormwater discharge. Unless a grab sample was specified, a flow weighted composite sample would be taken for either the entire discharge or for the first 3 hours of the discharge. The flow-weighted composite sample for a stormwater discharge may be taken with a continuous sampler or as a combination of a minimum of three aliquots (with each aliquot separated by a minimum period of 15 minutes) taken in each hour of the discharge over the course of either the entire discharge or over the first 3 hours of the discharge. Aliquots may be collected manually or automatically. For a flow weighted composite sample, only one analysis of the composite of the aliquots is required. Flow weighted composite samples would not be allowed for pH, total phenols, and oil and grease. MMC may substitute a grab sample for a flow weighted composite sample provided that the grab sample is collected within the first 30 minutes of the discharge. Sample type and parameters to be analyzed for each stormwater outfall are provided in Table C-15.

Table C-15. Monitoring Parameters and Required Reporting Values for Stormwater Samples from Outfalls 004 through 008.

Parameter	Current Required Reporting Value (mg/L unless otherwise specified)	Parameter	Current Required Reporting Value (mg/L)
Physical and Biological Parameters			
Precipitation (storm event (inches) and duration)	0.01	Oil and grease	1.0
Maximum flow (gpm) and total volume (gals) of storm event	Within 10% accuracy	Chemical Oxygen Demand	1
pH (s.u.)	0.1		
Inorganic Parameters			
Total dissolved solids	1.0	Total Kjeldahl nitrogen	0.15
Total suspended solids	0.4	Total inorganic nitrogen	0.01
Ammonia, as N	0.07	Total nitrogen	0.01
Nitrate+nitrite, as N	0.02	Total phosphorus, as P	0.001
Metals			
Aluminum, dissolved (0.45 µm filter)	0.009	Lead	0.0003
Antimony	0.0005	Manganese	0.005
Arsenic	0.001	Mercury	0.000005
Beryllium	0.0001	Nickel	0.001
Cadmium	0.00003	Silver	0.0002
Chromium	0.01	Thallium	0.0002
Copper	0.002	Zinc	0.008
Iron	0.02		

Note: Metals are total recoverable unless otherwise specified.

For parameters without a Circular DEQ-7 (DEQ 2012a) required reporting value, the achievable reporting limits shown are from USDA Forest Service (2012c, Table 3-1). Required reporting values may be different from project MPDES permit reporting levels. Any reporting values in Table C-15 lower than MPDES permit Reporting Levels meet USDA Forest Service requirements.

In addition to the collection and analysis of a stormwater sample for an event, MMC would provide flow information for the storm event sampled and precipitation data for the event that generated the discharge. MMC would collect and report the total volume of the discharge and maximum flow rate (in gallons per minute) for the discharge event sampled. These parameters may be measured or estimated. If these values are estimated, the estimated values must follow those methods given in *Guidance Manual for the Preparation of NPDES Permit Application for Storm Water Discharges Associated with Industrial Activity* (EPA 1991) unless otherwise specified.

MMC would record the data and duration (in hours) of the storm event sampled, rainfall measurements or estimates, and the duration between the storm event sampled and the previous measurable storm event. A measurable storm event is any rainfall event that is greater than 0.1 inch. This information would not be required to be reported monthly but would subject to the record keeping and retention requirements of the MPDES permit.

MMC would maintain the BMPs so they remained effective. Drainage and conveyance systems would be inspected periodically for blockages and erosion. Fueling areas would be inspected to prevent problems before they occurred. MMC would conduct a facility inspection once every 14 days and within 24 hours of a significant precipitation event of 0.5 inches or greater. At a minimum, the documentation of each routine facility inspection would include: the inspection date and time; the name(s) and signature(s) of the inspector(s); weather information; a description of any discharges occurring at the time of the inspection; any previously unidentified discharges of pollutants from the site; any observations of obvious indicators of stormwater pollution; any control measures needing maintenance or repairs; any failed control measures that need replacement; any incidents of noncompliance observed; and any additional control measures needed to comply with MPDES permit requirements. An inspection for a significant storm event may also be used and credited toward one of the monthly inspections. If an inspection or other observation identified stormwater pollution or control measures needing repair or replacement, then MMC would document these conditions within 24 hours of making such discovery. Subsequently, within 14 days of such discovery, MMC would document any corrective action(s) taken or needed, any further investigation of the deficiency, or the basis for determining that no further action is needed. If it was determined that changes were necessary following the review, MMC would make any modifications to the control measures before the next storm event if possible, or as soon as practicable following that storm event. The final MPDES permit will contain final stormwater monitoring and BMP inspection requirements.

Disturbed areas such as access and haul roads, sedimentation ponds and other BMPs would be recontoured and revegetation would be performed to stabilize soils and prevent erosion. Inspection and monitoring of stormwater BMPs would continue until disturbed areas achieved final stabilization. Final stabilization is defined as when a vegetation cover has been established with a density of at least 70 percent of the pre-disturbance levels, or equivalent permanent, physical erosion control reduction methods have been employed. Final stabilization using vegetation would be accomplished using the seed mixture approved by the agencies for Alternative 3. The agencies expect that final stabilization would occur within 2 years of the completed activities.

C.10.5.5 Groundwater Monitoring

C.10.5.5.1 All Facilities

Groundwater monitoring conducted during the Evaluation Phase would continue through the Construction and Operations phases (Table C-13). At the Poorman Impoundment Site, flow measurement weirs would be installed downstream of the Seepage Collection Dam and, during operations, in any areas of observed flows. Any groundwater seeps adjacent to the impoundment would be sampled quarterly for parameters listed in Table C-12. Reclaim water in the tailings impoundment would be sampled monthly at the reclaim pond within the impoundment and analyzed for the parameters shown in Table C-12.

C.10.5.5.2 Pumpback Well System Monitoring

The intent of a pumpback well monitoring system would be to confirm that complete groundwater capture downgradient of the tailings impoundment had been established and that capture was maintained for as long as necessary to meet BHES Order limits or applicable nondegradation criteria of all receiving waters. The water level data from pumpback monitoring wells would be used to adjust pumping rates of the pumpback wells and/or add additional pumping capacity. Selected monitoring wells would be equipped with continuous water level

measuring/recording devices to provide at least four measurements per day. The water levels in wells not equipped with recording devices would be measured by hand at least once per month. The measured water level data would be compared with predicted drawdown at these locations to determine whether full capture had been established. The pumpback well system would be modified, as necessary, to maintain capture, based on the water level data.

In 2012, MMC installed shallow piezometers in each of four wetlands (LLC-29, LCC-35A, LCC-36, and LCC-39) south of Little Cherry Creek. One piezometer was installed in wetlands LLC-29 and LLC-36, two piezometers were installed in wetland LLC-35A, and three piezometers were installed in wetland LLC-39. Wetland LLC-39 was divided in the delineation into three wetlands and labeled LLC-39A, LLC-39B, and LLC-39C. One year before mill operation started, MMC would measure water levels in the piezometers in wetlands LCC-29, LCC-35A, LCC-36, and LCC-39 (Figure C-7) four times over the annual hydrograph. The purpose of the monitoring would be to assess the potential effects of the pumpback well system. Vegetation in these two wetlands also would be monitored, following the methods used for the GDE monitoring (section C.10.4.2, Groundwater Dependent Ecosystem Monitoring). The monitoring would continue through the Closure Phase as long as the pumpback well system operated or until agreed upon by the agencies that it was no longer necessary.

Springs SP-14 and SP-15 adjacent to the impoundment site would be monitored for flow (Figure C-7). The flow of each spring would be measured twice, once in early June or when the area was initially accessible, and once between mid-August and mid-September during a time of little or no precipitation. The purpose of the monitoring would be to assess the potential effects of the pumpback well system. The monitoring would begin at least 1 year before construction and continue through the Closure Phase as long as the pumpback well system operated or until agreed upon by the agencies that it was no longer necessary. The most accurate site-specific method for measuring spring flow would be used.

C.10.6 Closure and Post-Closure Phases

Surface water and groundwater monitoring conducted during the Construction and Operational phases would continue into the Closure Phase or until agreed upon by the agencies that it was no longer necessary. Stormwater BMPs still in use would continue to be inspected and maintained. MMC would update the closure plan, including the long-term monitoring plan, during the Construction Phase in sufficient detail to allow development of a reclamation bond. A final closure and post-closure plan, including long-term monitoring plan, would be submitted 3 to 4 years before mine closure. The plan would incorporate monitoring information obtained during the mining period in the design of monitoring locations and sampling frequency. The objectives of monitoring during the Closure and Post-Closure are to:

- Assess potential effects of refilling of the mine void and adits on surface water and groundwater resources in upper Libby Creek, East Fork Rock Creek, and East Fork Bull River drainages
- Assess potential effects of discharge of treated water on surface water and groundwater adjacent to the Libby Adit until all direct discharges ceased
- Assess potential effects of stormwater discharges at outfalls 004 to 008 until DEQ issued a stormwater Notice of Termination.

- Assess potential effects on groundwater quality at the Plant Site, Impoundment Site, and the Libby Loadout until these facilities were reclaimed.

The plan would include measuring water levels in the mine void through the Rock Lake Ventilation Adit. Mine water quality and geochemical analysis of rock surrounding the mine void would be made during the Operations Phase. Hydrologic data would be collected in all phases through the Operations Phase, and would be integrated into the groundwater model. The need for continued monitoring beyond the Closure Phase would be based on these data. The Financial Assurance section of Chapter 1 describes the mechanisms available to the agencies for ensuring funds would be available should continued monitoring beyond the Closure Phase be required.

C.10.7 Water Balance

MMC would maintain an operational water balance throughout all phases of the project, including the Evaluation Phase. The detailed water balance would include inflows and outflows to the project facilities. The monitoring information would be used to modify, as necessary, operational water handling and to develop a post-mining water management plan. As part of this monitoring, MMC would measure and report the items listed in Table C-16.

MMC would install a DNRC-approved water use measuring device at one or more point of diversion locations approved by the DNRC. Water must not be diverted until the required measuring device is in place and operation. On a form provided by the DNRC, MMC would keep a written monthly record of the flow rate and volume of all water diverted including the period of time. Records would be submitted to the KNF, DEQ, and DNRC by January 31 of each year and upon request at other times during the year. MMC would maintain the measuring device so it always operated properly and measured flow rate and volume accurately.

During operations, annual surveys of the impoundment, including water stored in the pond, would be carried out to assist in the reconciliation of mass balance. The water balance would be reconciled on an annual basis, in conjunction with the mass balance. Records of all flows would be reconciled and the water balance also would use the measured precipitation and evaporation rates on site and observations of areas of beaches and water ponds. These measurements would be provided as monthly (or more frequently if requested by the agencies) and annual averages and totals in a quarterly hydrology report.

C.10.8 Action Levels

This section discusses the agencies' preliminary action levels, or some measurable change in a monitoring parameter that would require MMC action. Final action levels would be described in the final monitoring plan.

Table C-16. Water Balance Monitoring Requirements.

Item	Monitoring Parameters	Frequency	Comments
Thickener underflow feed line to tailings impoundment	Tons and Gallons	Daily	Compiled monthly and reconciled on an annual basis with the water balance; Reconcile mass balance with density of tailings (dam and impoundment)
Secondary cyclone feed line to dam.	Tons and Gallons	Daily	
Secondary cyclone - underflow and overflow	Tons and Gallons	Daily	
Approximate water storage in impoundment	Gallons	Semi-annually	
Precipitation and evaporation at impoundment site	Inches	Daily	Compiled monthly and reconciled on an annual basis
Treated sanitary waste discharged at impoundment	Gallons	Daily	
Approximate pond areas	Acres	Monthly	
Approximate wet and dry beach and dam areas	Acres	Monthly	
Mine and adit inflows	Gallons	Daily	
Libby Creek groundwater diversion	Gallons	Daily	
Potable water use	Gallons	Daily	
Dust suppression at the impoundment	Gallons	Daily	
Dust suppression at other facilities	Gallons	Daily	
Pumpback well groundwater/seepage collection	Gallons	Daily	
Seepage collection pond pumping rate	Gallons/day	Daily	
Seepage collection from any waste rock stockpile	Gallons	Daily	
Reclaim pumping rate	Gallons/day	Daily	
Discharge at any MPDES-permitted outfall	Gallons	Daily	

C.10.8.1 Surface Water Quality and Quantity

MMC would monitor discharges permitted under the MPDES permit and report any incidents of noncompliance in accordance with the permit. MMC would report any incidents of noncompliance as soon as possible, but no later than 24 hours from the time MMC first became aware of the circumstances. This would include any noncompliance which may endanger health or the environment, any unanticipated bypass which exceeds any effluent limitation in the permit, or any upset which exceeds any effluent limitation in the permit. MMC would provide a written report with 5 days of the time that MMC became aware of the circumstances. The written submission would contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, the estimated time noncompliance is expected to continue if it has not been corrected, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The MPDES permit also contains action levels for reporting of the discharge of toxic substances for which effluent limits were not established in the permit.

MMC would monitor flows and water quality in benchmark springs and streams outside of the area potentially affected by mine dewatering, as well as changes in the level and water quality of the benchmark lake. Based on the monitoring, MMC would establish a relationship between flows and/or water quality in benchmark springs and streams (described in the previous section on lakes and streams) and flows in any monitored spring or stream, as well as changes in the lake level and water quality of Rock Lake. Flows, lake level changes, and water quality in all monitored springs, lakes, and streams would also be evaluated using simple linear regression or other appropriate statistical analyses. MMC would provide the analysis in the annual report. The trend analysis would follow Forest Service protocols (USDA Forest Service 2012c), regarding trend analysis or another method approved by the agencies. If the relationship in quantity and quality between benchmark and monitored springs, lakes and streams after adit dewatering began was statistically significantly different compared to pre-mining or if the concentration of monitored parameters showed an increasing significantly trend, MMC would flag the flow change, lake level change or water quality parameter for agency review. If the agencies decided that some action were necessary, it would provide written notification to MMC, requesting submittal of a work plan within 30 days. The work plan would contain a detailed assessment of the changes, recommendations for additional monitoring (spatial and/or temporal), development of conceptual mitigation, or other actions to address the situation. The work plan would contain a schedule for implementing the proposed measures. Within 30 days, the agencies would: (i) approve, in whole or part, the plan; (ii) approve the plan with conditions; (iii) request clarifying information for the plan or additional review time or, (iv) disapprove, in whole or in part, directing that a revised work plan be submitted. If the agencies were to disapprove the plan, an explanation would accompany the disapproval.

C.10.8.2 Groundwater Quality

Action levels for groundwater compliance wells downgradient of the tailings impoundment pumpback well system are listed in Table C-17. Action levels for selected parameters are included to provide an early detection of adverse groundwater conditions and to verify the effectiveness of the tailings impoundment pumpback well system. Parameters selected for development of action levels are based on their presence at low concentrations in the downgradient aquifers, but at elevated concentrations in process water. Exceedance of these levels would require additional action by MMC, but would not be considered a violation of the MPDES permit, Hard Rock Operating Permit, or Montana groundwater standards. The action level would be increased accordingly if the pre-mining baseline concentration in any individual monitoring well

consistently exceeded 50 percent of an action level. Action levels for the tailings impoundment monitoring wells would not be changed after construction of the tailings impoundment began.

In addition to assessing relationship of detected concentrations to action levels, MMC would present a trend analysis of all data for the parameters listed in Table C-17 in its annual report. A statistically significant increasing trend in concentration of any parameter would be discussed. Because arsenic is a carcinogen and changes in ambient concentrations are not allowed under Montana's nondegradation rules, MMC would assess if the arsenic concentration of each well was statistically significantly greater than the well's ambient concentration using an appropriate statistical test. For manganese, where ambient concentrations already sometimes exceed the BHES Order limit, if concentrations measured during mining exceeded the BHES Order limit and showed an increasing trend using an appropriate statistical test, this would be considered an exceedance of the action level.

If monitoring indicated that these action levels had been exceeded in any compliance well, MMC would notify the agencies of the exceedance within 5 working days. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

Table C-17. Action Levels for Groundwater Compliance Wells downgradient of the Tailings Impoundment Pumpback Well System.

Parameter	BHES Order Limit (mg/L)	Groundwater Standard (mg/L)	Ambient Concentration (mg/L) [†]	Action Level (mg/L) [§]
Nitrate + nitrite, as N	10	10	0.07	5
Total dissolved solids	200	—	60	150
Sulfate	—	—	<4.5	20
Potassium	—	—	<0.78	10
Antimony	—	0.0056	<0.003	0.0025
Arsenic	—	0.01	<0.003	See text
Chromium	0.02	0.1	<0.00074	0.01
Copper	0.1	1.3	<0.0012	0.05
Iron	0.2	—	<0.01	0.1
Manganese	0.05	—	<0.077	trend analysis showed increasing concentration trend exceeding 0.05 mg/L
Zinc	0.1	2	<0.0064	0.05

“—” = No applicable concentration.

mg/L = milligrams per liter.

[†]Ambient concentrations are from data collected in LCTM-8 through 2012 (Appendix K). Concentrations presented with a < symbol had at least one sample with a reported concentration less than the detection limit used in calculating representative values; detection limit used in calculating representative value when reported concentration was below the detection limit. For dissolved antimony, all sample results were below detection limits; detection limit for antimony is now lower (0.0005 mg/L).

[§]If the pre-mining baseline concentration in any individual monitoring well consistently exceeded 50 percent of an action level, the action level would be increased accordingly. Action levels in the tailings impoundment monitoring wells would not be changed after construction of the tailings impoundment began.

C.10.8.3 Groundwater Flow

C.10.8.3.1 Mine Area

MMC would monitor flows from the mine and adits, as well as from individual fractures in the vicinity of the Rock Lake Fault and Rock Lake. If mine and adit inflows greater than 500 gpm occurred for 10 days, MMC would notify the agencies on the 11th day. MMC would then implement excess water contingency plans described in Chapter 2, such as grouting or treatment and discharge at the Water Treatment Plant.

If the mine void encountered substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake, MMC would notify the agencies within 5 business days. “Substantial groundwater inflows in the vicinity of the Rock Lake Fault or Rock Lake” means a flow from any individual fracture within 1,000 feet of either the Rock Lake Fault or Rock Lake with total flow greater than an average of 50 gpm over a 24-hour period. The agencies would evaluate the inflow data and direct MMC to take appropriate actions. MMC would then evaluate the possible effect to Rock Creek and Rock Lake and provide an evaluation report to the agencies within 30 days after initial agency notification.

MMC would monitor the flow in benchmark springs outside of the area potentially affected by mine dewatering, and establish a relationship between flows in benchmark springs (described in the previous section on springs) and flows in any monitored springs. Flow in all monitored springs would also be evaluated using simple linear regression or other appropriate statistical analyses. If the relationship in flow between benchmark springs and monitored springs after adit dewatering began was statistically significantly less than pre-mining, MMC would provide the analysis in the annual report. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

C.10.8.3.2 Tailings Impoundment Area

MMC would establish a pumpback well monitoring system adjacent to the pumpback wells in the impoundment area (see section C.10.5.5.2, Pumpback Well System Monitoring). Water levels would be measured continuously in some wells using electronic data recorders and monthly by hand in other wells. Within 30 days of the end of each month, MMC would analyze the performance of the pumpback well system and assess the extent of capture of any seepage entering the groundwater beneath the tailings impoundment. If monitoring indicated that full capture of the seepage was not being achieved, MMC would notify the agencies within 5 working days. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

C.10.8.4 Wetland or Riparian Areas

The initial GDE inventory information (see section C.10.3.2, Groundwater Dependent Ecosystem Inventory and Monitoring) would be used to develop a prevalence index (Corps 2008b) for monitored wetlands overlying the mine. Monitored wetlands north of the impoundment area also would use a prevalence index to assess effects. Many plant species have been given wetland indicator status of obligate wetlands, facultative wetlands, facultative, facultative upland, or upland based on probabilities of occurring in wetlands. The USDI Fish and Wildlife Service compiled a list of plants and their wetland indicator status (USDI Fish Wildlife Service 1993). If a drying trend were to occur at a wetland and riparian site, the composition of plants would be expected to shift from a dominance of obligate wetland and facultative wetlands species to a

higher percentage of facultative wetland and facultative upland species. For example, sphagnum moss, an obligate wetlands species found at site 8, would be an indicator of slight shifts in hydrological conditions because this plant does not have roots and is dependent on water saturating the soil for all or most of the growing season. A prevalence index of 3.0 or less indicates that hydrophytic vegetation is present (Corps 2008b). A prevalence index would be identified for each wetland and riparian site monitored.

If the prevalence index of any monitored wetlands is 50 percent greater than its baseline index (such as 1.5 to 2.3) or is above 3 for 2 consecutive years, MMC would provide the analysis in the annual report. If the agencies decided that additional actions were necessary, the procedures regarding a work plan described for surface water quality would be implemented.

Other monitoring options such as piezometers would be used to facilitate or strengthen monitoring effectiveness. If a change in seep or spring flow, water level, or water quality were noted outside the baseline data for an individual site or set of sites, or a trend was observed that was not observed during pre-mining monitoring, then a re-evaluation of those potentially affected habitats would be conducted and documented for comparison against initial survey information. Depending on a combination of biological or physical variables or the severity of plant indicator decline, the agencies may require more rigorous monitoring.

C.10.9 Plan Management

C.10.9.1 Quality Assurance/Quality Control

As part of each plan for environmental monitoring, MMC would develop Sampling and Analysis Plan (SAP) and a Quality Assurance Project Plan (QAPP) and submit them to the agencies for approval. Collectively, these procedures would compose a plan that ensures the reliability and accuracy of monitoring information as it was acquired. QA/QC procedures would include both internal and external elements. Internal elements may include procedures for redundant sampling such as random blind splits or other replication schemes, chain of custody documentation, data logging, and error checking.

Written reports to document the implementation of the plan would be an integral part of monitoring reports. Any variances or exceptions to established sampling or data acquisition methods during monitoring would be documented. Documentation would include a discussion of the significance of data omissions or errors, and measures taken to prevent any occurrences. Reports would be submitted to the appropriate agencies with the annual report, unless otherwise requested.

C.10.9.2 Sample Collection and Data Handling

Field procedures would follow DEQ procedures (DEQ 2012b) and collection, storage, and preservation of water samples would follow EPA procedures (EPA 1982). Grab samples would be collected from streams and springs, and groundwater samples would be obtained using low flow sampling techniques. Samples would be cooled immediately after collection. Metals in water samples would be preserved by adding nitric acid in the field to lower the pH to less than 2.0 or as appropriate to meet standard industry sampling protocols.

Groundwater samples for metal analyses would be field filtered through a 0.45 micron filter to allow measurement of the dissolved constituents. Chemical analysis of water samples would be

by procedures described in 40 CFR 136, EPA-600/4-79-020, or methods shown to be equivalent. All field procedures would follow standard sampling protocols as demonstrated through the quality assurance and quality control documentation.

MMC would use a sample control plan, which includes sample identification protocol, the use of standardized field forms to record all field data and activities, protocol for collecting field water quality parameters, and the use of chain-of-custody, sample tracking, and analysis request forms. MMC would develop a master file of all field forms and laboratory correspondence. MMC would meet the laboratory method-required holding time for each constituent being analyzed.

MMC would ensure representativeness of samples collected by locating sampling stations in representative areas and by providing quality control samples and analyses. Quality control samples would include blind field standards, field cross-contamination blanks, and replicate samples. Quality control samples would be at a minimum frequency of 1 in 10. In addition, MMC would use EPA-approved laboratories. If revised sampling methods or QA/QC protocols change, MMC would incorporate those as directed by the agencies.

C.10.9.3 Data Reporting

Any reporting required in the MPDES permit would continue as long as there was discharge of any mine drainage or process water to a MPDES-permitted outfall. MMC would submit water quality and flow measurement data to the KNF and DEQ in an electronic format acceptable to the agencies within 10 working days after receipt of final laboratory results. All submitted analytical data would comply with DEQ's minimum reporting requirements for analytical data (DEQ 2009). MMC would develop and maintain an agency-accessible, password-protected website that hosted electronic data. MMC would prepare a report briefly summarizing hydrologic information, sample analysis, and quality assurance/quality control procedures following each sample interval. The report would be posted on MMC's website within 4 weeks after receipt of final laboratory results.

The annual report, summarizing data over the year, would include data tabulations, maps, cross-sections, and diagrams needed to describe hydrological conditions. Raw lab reports and field and lab quality results also would be reported. In the annual report, MMC would present a detailed evaluation of the data. Data would be analyzed using routine statistical analysis, such as analysis of variance, to determine if differences exist:

- Between sampling stations
- Between an upstream benchmark station and the corresponding downstream station
- Between sampling time (monthly, growing season/non-growing season)
- Between stream flow at the time of sampling (for example, low flow during the fall compared to low flow during the winter)
- Between sampling years
- Trend analyses would be included where applicable and/or quantifiable

The annual report would be posted on MMC's website within 90 days after receipt of the final laboratory results for the final quarter of the year. A formal review meeting would be arranged within 2 weeks of MMC submitting the monitoring report to the agencies. The formal review

meeting would involve representatives from the reviewing agencies and MMC. The review could result in various outcomes:

- Determine that no change in the monitoring programs or mine operation plans was needed
- Require modifications to the monitoring programs
- Require new treatment or mitigation measures to be implemented as part of the mine project
- Require MMC to implement necessary measures to ensure compliance with applicable laws and regulations

At the end of the first monitoring year and following submittal of the annual report, MMC would meet with the agencies to discuss the monitoring results. Following the annual review, the agencies would decide whether a change in monitoring or operations would be required.

C.11 Aquatic Biology

C.11.1 General Requirements

MMC would conduct aquatic biological monitoring before, during, and after project construction and operation at stream stations that are within and downstream of project disturbance boundaries and at benchmark stations that are upstream of potential influence from the project. At replicate sample locations within each station, multiple parameters that are likely to display small-scale variability and likely to be correlated would be assessed. Replicated sample locations would be selected to be as similar as possible across stations. This sampling design would allow analysis of data using a before-after/control-impact approach, and would allow use of univariate and multivariate statistical methods. This sampling design is intended to identify natural variability and isolate the influence of water quality and fine sediment deposition on stream biota and habitat.

MMC would collect surface water quality samples at each aquatic biological monitoring station during each monitoring period to assist in interpretation of the data. MMC would also conduct salmonid population surveys and salmonid tissue chemistry surveys to provide additional information to assess the influence of the project on stream biota.

C.11.2 Bull Trout Mitigation Monitoring

MMC would develop Bull Trout Core Area Mitigation Plans in accordance with the USFWS' Biological Opinion for aquatic species. MMC would develop the plans and submit them to the KNF and USFWS within six months of the KNF's approval to start the Evaluation Phase. Mitigation monitoring would include assessment of fish populations and stream habitat in mitigation streams. The Mitigation Plans would describe the monitoring locations, frequency, parameters, and reporting consistent with the requirements of the Biological Opinion.

C.11.3 Monitoring Locations and Times

MMC would conduct aquatic biological monitoring at seven stations (Table C-18 at the end of this section); Figure C-2; Figure C-4 through Figure C-7). Five stations are within or downstream of the proposed disturbance boundaries. Two stations are upstream of potential project impacts

and would serve as benchmark stations. Stream reach length would vary depending on the monitoring task and station.

Monitoring frequency would vary, depending on the monitoring task and station (Table C-19). Some tasks would be conducted three times annually: prior to runoff from the higher elevations in the spring (typically April or May), during summer (typically early August to September), and prior to ice formation (typically October). Other tasks would be conducted annually during the summer period, or less frequently as described below.

C.11.4 Substrate and Fine Sediments

During the summer monitoring period, percent surface fines would be quantified using a grid sampling device as described in the R1/R4 methodology (Overton et al. 1997) at each quantitative macroinvertebrate sample (Surber sample) location. Embeddedness would be also quantified at each Surber sample location by tallying each stone within the Surber sampler frame that is <50% embedded. Substrate size would be quantified by measuring the narrow dimension of these same stones. By conducting these tasks at the Surber sample locations, the data would provide quantitative measures of substrate at all stations in similar habitat and under similar depth and flow conditions, and would improve the ability to isolate the influence of water quality and fine sediments on benthic macroinvertebrates (see below). Samples would be collected within the shortest reach available that meets the macroinvertebrate sample location criteria (see below).

Also during the summer period, in the fish monitoring reaches (L1, L3, L9, and Be2 see below), the substrate monitoring methods described above would be supplemented with the McNeil Core substrate sampling method. Ten representative core samples would be collected from potential spawning locations in scour pool tail crests and low-gradient riffles within the salmonid population survey reach at each of the four stations. Fewer core samples would be collected if 10 suitable locations are not located within the survey reach.

During all three monitoring periods, DEQ methods for assessing sediment impairment (DEQ 2013b) would be followed at all monitoring stations. These methods would include Wolman pebble counts, grid tosses, measurement of residual pool depth, and pool counts (Wolman 1954, DEQ 2013b). Reach lengths for this monitoring component would be 20 times the bankfull width in the sampling area.

C.11.5 Habitat

Habitat surveys would be conducted annually in the summer in the fish monitoring reaches (L1, L3, L9, and Be2 see below). Fish structures developed as mitigation also would be monitored. Instream habitat data collection would generally follow the R1/R4 methods developed by the FS (Overton et al. 1997). Habitat types within the stream reaches would be identified and measured individually. Measurements at recognized units within each habitat type would include length, wetted width, bank width, average depth, maximum depth, substrate type, type of bank vegetation, percent undercut bank, and percent eroded bank. These habitat measurements are consistent with the Inland Native Fish Strategy (INFS) goals. Additionally, other measurements, such as pool frequency, number of pieces of large woody debris, and lower bank angle, would be recorded to document further attainment of the riparian management objectives set by INFS (USDA Forest Service 1995).

C.11.6 Routine Physical/Chemical Features

MMC would measure the following routine physical and chemical parameters at all aquatic biological monitoring stations during all monitoring periods: stream discharge, air and water temperature, pH, total alkalinity, specific conductance, sulfate, and the metals listed in Table C-11. EPA approved methods or other acceptable methods specified in the monitoring plan would be used.

C.11.7 Benthic Macroinvertebrates

MMC would collect five quantitative samples and one qualitative sample of benthic macroinvertebrates from all aquatic biological monitoring stations during the summer period. Methods used would generally follow the guidelines described in the DEQ's macroinvertebrate sampling protocol (2012c) for the collection of quantitative Hess samples and semi-quantitative jab samples. Quantitative samples would be collected using a 500-micrometer mesh Surber sampler rather than a Hess net because Surber samplers have been used by the FWP in Libby Creek beginning in 2000 (Dunnigan et al. 2004). The continued use of the Surber sampler thus would allow for better comparisons with past data. Quantitative samples would be collected from the riffle/run habitats in the stream. Specific sampling locations at each station would be standardized, to the extent possible, for depths between 0.5 and 1.0 feet and flow velocities of less than 1.5 feet per second. MMC would collect the qualitative jab sample with a 500-micrometer mesh net in all micro-habitats not sampled during the collection of the quantitative samples, such as aquatic vegetation, snags, and bank margins. Benthic macroinvertebrates collected with the net would be used to provide supplemental information on species composition at the sites and to determine the relative abundance of the taxa inhabiting aquatic habitats at the sampling station.

Parameters analyzed would include density, number of taxa, number of *Ephemeroptera*, *Plecoptera*, and *Trichoptera* (EPT) taxa, number of Ephemeroptera taxa, number of Plecoptera taxa, percent non-insects, percent predators, percent burrower taxa, the EPT index, percent EPT individuals, Shannon-Weaver diversity index, Simpson diversity index, the Hilsenhoff Biotic Index (HBI) and the biotic condition index (BCI). Several of these parameters are among the metrics calculated by the DEQ as part of its data analysis (DEQ 2012c) and also allow for the calculation of the Montana multi-metric index for mountain stream (Jessup et al. 2006). The use of other metrics such as evenness, Simpson's diversity index, and the BCI have been recommended by FS personnel to allow for comparisons with previously collected data within this region (Steve Wegner, personal communication, 2006). Additionally, these data would be analyzed using the Observed/Expected (O/E) Model developed for Montana (Jessup et al. 2006). To summarize these data, four common statistical measures would be used (mean, standard deviation, coefficient of variation, and standard error of the mean), plus other appropriate measures (EPA 1990).

Quality assurance for macroinvertebrate data would follow DEQ guidelines (DEQ 2005a; 2012c) and would be conducted randomly on 10 percent of the samples, with 95 percent agreement for taxonomic and count precision required. MMC also would maintain a permanent taxonomic reference collection that contains all benthic species collected from project area streams. Taxa identification in this collection would be documented and confirmed by a qualified, independent macroinvertebrate taxonomist (DEQ 2012c). This reference collection would be maintained by MMC through the period of post-operational monitoring. Following this period, the collection would be transferred to a depository selected by the agencies for permanent scientific reference.

C.11.8 Periphyton and Benthic Chlorophyll-a

MMC would sample periphyton and benthic chlorophyll-a at all aquatic biological monitoring stations concurrent with the proposed benthic macroinvertebrate population sampling during the summer period. Qualitative periphyton would be collected following DEQ's standard operation procedure using the appropriate method for the stream type to be sampled (2011a). At stream locations with flowing water present at the time of sampling, the modified PERI-1 method would be used, which designates a specific longitudinal length of stream to be sampled at each site. The sampled stream length would be either 40 times the average wetted width at the mid-point of the stream reach or a minimum of 150 meters, whichever was greater. Eleven transects would be established throughout each site reach, and would be located equidistant from one another (shown on Figure 1.0 in DEQ 2011b). Algal material would be collected from each of the eleven transect locations, with all material composited into a single sample per site (DEQ 2011a). Collection methods would include using a toothbrush or knife to collect material from hard substrates and a turkey baster or spoon for soft substrates.

Quantitative benthic chlorophyll-a samples would be collected from each site sampled for periphyton following DEQ's standard operation procedure (2011b). Eleven transects would be established throughout the site reach as with the modified PERI-1 method. The samples collected at each transect would be kept separate rather than combining them into one composite sample as was recommended for the periphyton samples. The collection method used at each transect would be based on the substrate and conditions at each location. For example, the hoop method would be used for transects dominated by the presence of filamentous algae, regardless of stream substrate. If heavy filamentous algal growth was not observed, the template sampling method would be used at transects dominated by small boulders, cobble, and gravel, while the core method would be used at those transects dominated by silt-clay substrate. The collection tools used for each method differ, but they all result in a quantifiable area of the stream substrate being sampled at each transect (DEQ 2011b). If field personnel visually assessed the site and decided that benthic algal chlorophyll-a was low ($<50 \text{ mg/m}^2$) at all transects of a stream site, photographs of the stream substrate at all 11 transects would be taken in accordance with Section 7 of DEQ's standard operation procedure (2011b) rather than taking chlorophyll-a samples.

Based on these methods, one composite periphyton sample and eleven chlorophyll-a samples would be collected at each site from the reach that included the Surber sample locations prior to collecting macroinvertebrates (see section C.11.7; Table C-19). In addition, L9 (LB-300) and L3 (LB-1000) would be sampled 3 times per year in the summer period to assess if nuisance algal was present. These sampling events would be scheduled approximately a month apart and within the first two weeks of July, August, and September. The summer sampling of all sites may suffice for one of the three sampling events at L9 and L3. As stated in the DEQ's procedures (2011b), the sampling method could be modified to scrub additional delimited areas from the same location for the chlorophyll-a samples if very little material on the filter was observed after filtration or if previous sampling efforts had a high percentage of below detection limit results, provided the use of appropriate methods and detection limits. The number of additional delimited areas scrubbed at each transect would be recorded.

C.11.9 Salmonid Populations

To determine possible changes in salmonid populations associated with development of the Montanore Project, MMC would monitor salmonid populations in Libby Creek and Bear Creek

annually during the summer period. The FWP would complete the monitoring if they were conducting surveys at the approximate locations described below during summer. MMC would conduct the monitoring if the FWP was not already doing so and if the required permits were granted to MMC. If the required permits were not granted for some or all of the salmonid population monitoring, relative fish abundance by species and size class would be determined using the direct enumeration snorkeling technique (Thurow 1994 cited in Overton et al. 1997). Day and night snorkel surveys would be conducted in an upstream direction, using a dive light at night. Fish species and lengths would be documented to the extent practical without capturing fish. Fish counts, species identifications, and length determinations would be tallied for each macrohabitat type in each reach. If portions of reaches were too shallow for snorkeling, they would be surveyed from the banks. Bank surveys would also be conducted to tally young of the year fish.

MMC would monitor salmonid populations in Libby Creek in three stream reaches (L1, L3, L9), and in Bear Creek (Be2) using the following procedures. The stream reach would be blocked by netting at its upstream and downstream limits to prevent fish movement into or out of the sample reach during the sampling. Sampling procedures would include multiple-pass depletion electroshocking to collect salmonids from a 300-yard (or 300-meter) reach of stream. All salmonids would be identified, measured for length, and released. Population densities of each salmonid species captured during the study would be estimated, where adequate sample sizes permit, using a maximum-likelihood model (*e.g.*, Seber and Le Cren 1967, MicroFish 3.0). The condition of all captured salmonids would be recorded following an examination for overt signs of disease, parasites, or other indications of surface damage. Length-frequency data would be analyzed to determine whether species were naturally reproducing in or near the stream reaches. These methods may be modified if FWP conducted the monitoring. A monitoring report would be submitted annually to the KNF, the FWP, and the DEQ.

The same salmonid monitoring procedures would be used to monitor salmonid response to fish mitigation projects implemented by MMC. Beginning in the year prior to a fish mitigation project, salmonids would be monitored using the approved methods. In subsequent years (yearly), the mitigation monitoring at each site would be repeated. The salmonid population data from stations L1 and Be2 would be used as controls to assess if observed changes were a natural event.

C.11.10 Bioaccumulation of Metals in Fish Tissue

MMC would conduct monitoring studies that measure background concentrations of copper, cadmium, mercury, lead, and zinc in the fish in Libby Creek to provide a basis for comparison in order to document any potential changes in the concentrations of these metals due to construction and operation of the Montanore mine. Fish tissue monitoring would be conducted if the required permits were granted to MMC. If the required permits were not granted for some or all of the fish tissue monitoring, MMC would report the most relevant data that are available for the project area.

Prior to construction and once construction has begun, the FWP or MMC would collect five rainbow trout or rainbow trout hybrids (*Oncorhynchus* sp.) annually from Sites L1, L3, and Be2 for a period of 5 years, with each trout collected being greater than 4 inches in size. Collections would be completed during the summer period, concurrent with the fish population surveys.

Homogenized whole-fish tissue samples would be analyzed to determine copper, cadmium, mercury, zinc and lead concentrations. Thereafter, if no increasing trends in metal concentrations have been identified after the initial 5-year period, MMC would resample each site at a 3-year interval to document any trends in bioaccumulation of these metals. Test procedures would be the same as those used for baseline testing, unless changed by the agencies.

C.11.11 Sampling Trip and Annual Reporting

Within one week of completing biological sampling, MMC would submit a brief report to appropriate review personnel in the DEQ, the KNF, and the FWP. This report would include brief statements about stream conditions observed at each monitoring station and would alert the review personnel to any marked changes in monitoring data relative to the cumulative monitoring record.

On or before March 1 of each year, MMC would submit an annual aquatic monitoring report that contains summaries of all aquatic monitoring data collected during the previous year. Each report also would discuss trends in population patterns and evaluate changes in stream habitat quality, based on all data collected to date for the project. Reference to appropriate scientific literature would be included. Recommendations in these reports can include modifications to increase monitoring efficiency or to provide additional data needs.

C.11.12 Annual Review and Possible Revision of the Monitoring Plan

Within one month after MMC submits the annual report, an annual meeting would be held to review the aquatics monitoring plan and results, and to evaluate possible modifications to the plan. This meeting would include personnel from the DEQ, KNF, FWP, MMC, and other interested parties.

Table C-18. Aquatic Biology Monitoring Stations.

Reach	Nearest Upstream Activities	Station ID (surface water ID)	Station Comments	All Non-fish Monitoring	Fish Population and Habitat	Fish Tissue Metals
<i>Bear Creek</i>						
1	none	Be2 (BC-500)	Upstream benchmark	X	X	X
<i>Poorman Creek</i>						
2	Impoundment	Po1 (PM-1000)	Impact assessment	X		
<i>Libby Creek</i>						
1	Mine dewatering	L10 (LB-200)	Upstream of Upper Libby Adit	X		
2	Libby Adit	L9 (LB-300)	Impact assessment	X	X	
4	Impoundment	L3 (LB-1000)	Integrated impact assessment	X	X	X
5	Impoundment	L2 (LB-2000)	Integrated impact assessment	X		
6	All	L1 (LB-3000)	Integrated impact assessment	X	X	X

Additional monitoring stations would be developed in other streams, such as the East Fork Bull River and East Fork Rock Creek, in accordance with the Bull Trout Core Area Mitigation Plans discussed in section C.11.2, *Bull Trout Mitigation Monitoring*.

Table C-19. Aquatic Biology Monitoring.

Task category	Task	Timing			Number of Stations	Method	Replication per Station and Within-Station Locations
		Spring	Summer	Fall			
Benthic Biota	Macroinvertebrates, quantitative		X		all	Surber samples for lab taxonomy	5 sites with most similar microhabitat near station
	Macroinvertebrates, qualitative		X		all	kicknet sample for lab taxonomy	1 sample from all habitats in 100 ft reach that includes Surber sample locations
	Periphyton, quantitative		3X/season		L9 and L3	samples from rock surface for chlorophyll-a determination (DEQ SOP 2011b)	11 samples from each transect location within stream reach that includes Surber sample locations
	Periphyton, qualitative		3X/season		L9 and L3	picking and scraping all varieties for lab taxonomy (DEQ SOP 2011a)	1 sample comprised of a composite of 11 transect samples from each site within stream reach that includes Surber sample locations
Habitat	Canopy cover		X		all	densiometer	at each of the 5 Surber sites
	Water velocity		X		all	flow meter at 0.6 m depth	at each of the 5 Surber sites
	Stream discharge	X	X	X	all	velocity-area principle / 0.6 m depth	1 transect at station
	Fish habitat survey		X		4	R1/R4	same 100 yd reach as salmonid survey
Substrate	Embeddedness		X		all	Tally <50% embedded stones	at each of the 5 Surber sites
	Substrate size distribution		X		all	Measure <50% embedded stones	at each of the 5 Surber sites
	Surface fines		X		all	49 point grid	at each of the 5 Surber sites
	Spawning gravel		X		4	McNeil cores for lab analysis and field settling cone	maximum obtainable up to 10 samples within 100 yd salmonid survey reach
	Sediment impairment	X	X	X	all	DEQ 2010 SOP	20 bankfull widths
Water Quality	Conductivity	X	X	X	all	meter	1 measurement at station
	pH	X	X	X	all	meter	1 measurement at station
	Water temperature	X	X	X	all	meter	1 measurement at station
	Water chemistry sample	X	X	X	all	grab sample for comprehensive lab analysis	1 sample at station
Fish	Salmonid population survey		X		4	multiple-pass electrofishing or snorkel	extending from station to 100 yd upstream
	Salmonid tissue metals samples		X		3	<i>Oncorhynchus</i> sp. whole-fish Cu, Cd, Hg, Pb, Zn	5 fish per survey reach

C.12 Wilderness

All surface disturbances for the Montanore Project would be outside of the CMW boundary; some activities such as monitoring would occur within the CMW boundary. A summary of the types of monitoring activities that would occur in the wilderness is located in section 3.24.1.4.3 of the Final EIS. A description of monitoring of wilderness character is below.

C.12.1 Objective

The objective of monitoring for Wilderness is to determine if activities approved within the CMW boundary, such as the agencies' required monitoring described in this appendix (see sections C.5 *Wildlife*, C.7 *Rock Mechanics*, and C.10 *Water Resources*), are in conformance with mitigation and special provisions and if management is minimizing impacts to wilderness values.

C.12.2 Locations, Parameters, and Frequency

C.12.2.1 MRDG Process and Approval of Final Monitoring Plans

A Minimum Requirements Analysis (MRA) is required when prohibited use(s) are being considered in an administrative action (Wilderness Act, section 4.c). Prohibited uses in the CWM include motorized equipment and motorized or mechanized transportation. Motorized equipment is defined as any machine activated by a nonliving power source except small battery-powered hand carried devices such as flashlights, GPS, cameras, or cell phones (36 CFR 261.2). Small battery-powered equipment left on site for a period of time would be considered motorized equipment.

The Minimum Requirements Decision Guide (MRDG) is a tool to complete a minimum requirement analysis (Arthur Carhart National Wilderness Training Center 2014). The MDRG has two parts: 1) determine if administrative action is necessary, and if necessary, 2) determine the minimum activity necessary. As part of the project record, a 2015 Montanore Project MRDG has been completed for the conceptual monitoring plan through Step 1 (determination of an administrative action is necessary in the CMW). The determination made was that administrative action is necessary in the CWM due to existing rights, special provisions, and as a requirement of other statutes or regulations. Step 2, which is the determination of the minimum activity necessary, would be used to evaluate Final Plans as they are submitted to the agencies by MMC.

MMC would clearly identify any activities (monitoring, equipment, transport) that would occur within the CMW boundary in submitted plans (maps, tables, monitoring locations) as described under Section C.12.3). The KNF would complete MRDG Step 2, determination of the minimum tool necessary, prior to approving any monitoring activities. The MRDG would be completed for final plans and updated as the project progresses.

C.12.2.2 Wilderness Stewardship Performance

The Forest Service issued the National Wilderness Stewardship Performance Guidebook in 2015. (USDA Forest Service 2015). Two elements that apply to the Montanore Project are described below.

Other Special Provisions—includes management plan and monitoring of the special provisions for the protection of wilderness values for the project. Special Provisions of The Wilderness Act

Sec. 4(d)(3) allow for ‘*Mineral leases, permits, and licenses covering lands within national forest wilderness areas designated by this Act shall contain such reasonable stipulations as may be prescribed by the Secretary of Agriculture for the protection of the wilderness character of the land consistent with the use of the land for the purposes for which they are leased, permitted, or licensed.*’

The KNF would develop a Special Provision Monitoring plan, covering both management and monitoring within the CMW boundary. The Montanore Final Monitoring Plan would be used as a basis for the KNF Special Provision Monitoring Plan. The Special Provisions Monitoring Plan would be interactive and collaborative with MCC in determining priority management issues. If monitoring of the Special Provisions indicates resources are not in conformance with the plan, corrective actions would be taken.

Wilderness Character Baseline—establish a baseline and provide foundation for evaluating trends in wilderness character. These trends indicate the outcome of our stewardship actions and success at ‘preserving wilderness character’, as directed by the Wilderness Act. National protocol for monitoring wilderness character is currently under development. The KNF would develop a wilderness character narrative, select measures for each indicator, and gather data to establish a baseline. Once a baseline was established, Wilderness character monitoring would be conducted on a 5-year cycle.

The Forest Service has developed a National Minimum Protocol for Monitoring Outstanding Opportunities for Solitude (USDA 2014). The KNF would implement solitude monitoring in 2016 to establish pre-operation baseline information for the Montanore Project. The 2016 monitoring would focus on areas identified with possible ‘*increased visibility of mine disturbances as well as increased noise from mining facilities*’ from specific locations including the following: viewpoint at Elephant Peak; between Elephant Peak and Bald Eagle Peak; CMW locations west of the facilities; and Rock Lake Ventilation Adit.

C.12.3 Reporting Requirements

MMC would submit the Final Monitoring Plan with activities (monitoring, equipment, transport) within the CMW boundary clearly identified. The KNF would complete Step 2 of the MRDG, and determination of minimal activity.

MCC would submit all activities (monitoring, equipment, transport) occurring within the CWM annually to the KNF using the Administrative and Special Provisions Authorization form by October 1 of every year. This form tracks motorized equipment/mechanical transport use authorizations to facilitate post-season data entry into Infra-WILD, which is part of the Natural Resource Manager (NRM), a system of database tools used by the Forest Service for managing agency data.

The KNF would complete a Special Provisions Monitoring Plan report annually (starting year Final Monitoring Plan was approved) by October 1 of every year.

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**Attachment 2 – Major Facility Siting Act
Certificate**

DEPARTMENT OF ENVIRONMENTAL QUALITY

In the Matter of the Application of
Mines Management, Inc. for
Certificate of Compliance under the
Major Facility Siting Act

Findings Necessary for
Certification and Determination

On June 15, 2005, Mines Management, Inc. (MMI) submitted an application to the Department of Environmental Quality (DEQ) under the Major Facility Siting Act (MFSA). In the application, MMI requested issuance of a Certificate of Compliance for a 230-kilovolt (kV) alternating current transmission line to serve its Montanore Mine, located 18 miles south of Libby, Montana. The proposed transmission line would originate from a new substation (Sedlak Park Substation) adjacent to Bonneville Power Administration's (BPA) Noxon-Libby 230-kV Transmission Line and would connect to the Montanore Mine project site. Montanore Mineral Corporation (MMC), a subsidiary of MMI, will own and operate the new 230-kV transmission line.

DEQ issued an operating permit (Operating Permit No. 00150) for the Montanore Mine in 1993. The federal approval for the Montanore Mine, which was issued at approximately the same time, was allowed to lapse. Consequently, MMI submitted an application to the U.S. Department of Agriculture, Kootenai National Forest (KNF) for approval of a new Plan of Operations for the Montanore Project, including the mine and proposed transmission line. MMC has requested DEQ to amend Operating Permit No. 00150 to conform it with the anticipated KNF record of decision.

Pursuant to the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA), DEQ and the KNF prepared a Draft EIS for the Montanore Project (mine and transmission line). The Draft EIS was issued for public comment on February 27, 2009, and a 90-day comment period (February 27 to May 28), which was subsequently extended by 60 days (until July 27), followed. In response to public comment, the agencies revised the agencies' mine alternatives (Alternatives 3 and 4) and transmission line alignments (Alternatives C, D, and E) and issued a Supplemental Draft EIS on October 7, 2011. This was followed by a 45-day comment period (October 7 to November 21), which was subsequently extended by 30 days (until December 21).

To comply with federal requirements, the KNF issued a preliminary Final EIS and a Draft Record of Decision in March 2015 for an objection period. Following the federal objection process, DEQ and the KNF released a Joint Final EIS on December 23, 2015.

The KNF has issued a ROD approving a Plan of Operations consistent with Mine Alternative 3 - Agency Mitigated Poorman Impoundment Alternative and Transmission Line Alternative D-R - Miller Creek Transmission Line Alternative. DEQ has issued a ROD approving amendments to Operating Permit No. 00150 for the Evaluation Phase of the Montanore Project to make it consistent with the federal approval. Due to nondegradation concerns, however, DEQ is holding its decision on the Construction, Operation, and Closure Phases of the Montanore Project in abeyance to allow collection and analysis of additional information collected during the Evaluation Phase to

demonstrate compliance with nondegradation standards pertaining to stream flow. MMI may not proceed beyond the Evaluation Phase until DEQ approves amendments to Operating Permit No. 00150 regarding the Construction, Operation and Closure Phases to make the Operating Permit No. 00150 consistent with the KNF's approval of Mine Alternative 3 – Agency Mitigated Poorman Impoundment Alternative.

The transmission line alternatives that DEQ and the KNF analyzed in the environmental review culminating in the issuance of the Joint Final EIS are depicted on Attachment 1. Chapter 2 of the Joint Final EIS provides a description of the proposed project and the alternatives considered by DEQ.

DECISION AND RATIONALE

DEQ is required to approve a facility as proposed or as modified or an alternative to a proposed facility if DEQ makes the findings required under Section 75-20-301, MCA. DEQ approves Alternative D-R – Miller Creek Transmission Line Alternative. However, DEQ's finding of need for the facility under Section 75-20-301, MCA, is conditioned on MMC obtaining approval of amendments to Operating Permit No. 00150 pertaining to the Construction, Operation and Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the federal approval of the Montanore Project. Therefore, DEQ's approval of Alternative D-R Miller Creek Transmission Line Alternative is conditioned on MMC obtaining DEQ approval of said amendments.

The findings required under Section 75-20-301, MCA, are discussed below.

A. Section 75-20-301(1)(a), MCA - The Basis of the Need for the Facility

The primary purpose and need for the new transmission line is to provide electrical power to construct, operate, and reclaim the Montanore Mine. No electrical distribution system is near the project area. The nearest electrical distribution line parallels U.S. Highway 2 (US 2) and is not adequate to carry the required electrical power. Thus, the transmission line will be needed if MMC obtains approval for the Construction, Operation, and Closure Phases of the Montanore Project.

B. Section 75-20-301(1)(b), MCA, - Nature of the Probable Environmental Impacts

The Joint Final EIS (Chapter 3) for the Montanore Project describes the nature of the probable impacts, including cumulative effects, that will result from construction, operation, and decommissioning of the transmission line. The following sections summarize the effects of Alternative D-R—Miller Creek Transmission Line Alternative.

1. Air Quality

Construction of the transmission line will result in short-term increases in gaseous and particulate emissions. Similar, but lower, emissions will occur at the end of operations when the transmission line is decommissioned. Please see the Joint Final EIS (Section 3.4) for a detailed discussion on air quality.

2. Aquatic Life and Fisheries

The transmission line corridor area is drained by the Fisher River and its tributaries: Hunter Creek, Sedlak Creek, Miller and North Fork Miller creeks, Standard Creek, and West Fisher Creek; and by Libby Creek and its tributaries: Howard Creek, Midas Creek, and Ramsey Creek, all perennial streams. Numerous unnamed ephemeral streams also drain the area. Short segments of the transmission line will be within the Standard Creek watershed, but the line and any associated access roads will be located more than one mile from the creek and not within any riparian habitat conservation areas (RHCAs). No effects on Standard Creek are expected. The transmission line will cross four perennial streams and 18 other streams. The transmission line construction and operation will not have any impact on lakes.

The transmission line will be decommissioned and removed following mine closure and reclamation, and roads and disturbed areas will be contoured and revegetated. Based on road sedimentation analysis, no long-term effect from these activities on the aquatic habitat and populations should occur. Please see the Joint Final EIS (Section 3.6) for a detailed discussion on aquatic life and fisheries.

3. Road Construction

Construction of the transmission line will require 5.1 miles of new roads. The alignment will minimize crossings of areas with soils that are highly erosive and subject to high sediment delivery. New access roads and closed roads with high upgrade requirements will disturb 2.6 acres of soils having severe erosion risk, and 0.5 acre of soils with high sediment delivery potential. Most of the soils having severe erosion risk that will be crossed by access roads occur along West Fisher Creek and the Fisher River. The majority of soils with high sediment delivery potential along access roads occur along Libby Creek and the Fisher River. No perennial streams and smaller streams will be crossed by new roads. Please see the Joint Final EIS (Section 3.21) for a detailed discussion on road impacts.

4. Riparian Areas

Disturbance within riparian areas will be 35 acres of RHCAs on National Forest System (NFS) land and 13 acres of other riparian areas on private land. Based on a preliminary design, six structures will be in a RHCA on NFS land and three structures will be in a riparian area on private or state land. During final design, MMC will locate these structures outside of riparian areas if alternative locations are technically and economically feasible. Minimizing structure locations in riparian areas and using a helicopter for line stringing and site clearing will minimize contributions of sediment to area streams. Please see the Joint Final EIS (Section 3.13) for a detailed discussion on riparian areas.

5. Threatened, Endangered, or Sensitive Species

The transmission line may affect bull trout and hybrid redband trout and their habitat in area drainages. The transmission line may affect pure westslope cutthroat trout individuals or habitat in Miller Creek, but would not likely contribute to a trend toward federal listing or cause a loss of viability to the population or species. The mitigation measures discussed in Joint Final EIS Section 3.6.4.7.1, *Sediment*, will minimize impacts on these populations. The transmission line may affect designated bull trout critical habitat in Libby Creek and essential excluded habitat in West Fisher Creek where the line will cross such habitat. Fisheries mitigation, including mitigation specific for bull trout, is anticipated to offset these effects. Please see the Joint Final EIS (Section 3.25.5) for a detailed discussion on threatened, endangered, or sensitive species.

6. Cultural Resources

Based on sites recorded in the region, and a synthesis of expected cultural resources provided in the KNF Heritage Guidelines, the following cultural resource types are considered most likely to occur in the area: prehistoric campsites, scarred trees, historic cabins, trading posts, mining and logging sites, homesteads, bridges, and trash dumps. Cultural resources in upland areas are expected to be fewer than in lower elevation areas

and along major watercourses. Upland areas were used seasonally by hunter-gatherer groups for specific economic procurement tasks.

Known cultural resources located within the transmission line corridor are listed in Table 84 of the Joint Final EIS. A summary of the cultural history of the area can be found in Section 3.7.3.1, *Cultural Resource Overview*, of the Joint Final EIS. Please see the Joint Final EIS (Section 3.7) for a detailed discussion of potential impacts to cultural resources.

In 2010, the KNF and Montana SHPO entered into a Programmatic Agreement that described certain requirements of the parties to mitigate the unavoidable adverse effects on historic properties and to manage inadvertent discovery of historic properties. Before any ground-disturbing activities, MMC will complete an intensive cultural resources survey on all areas proposed for disturbance for any areas where such surveys have not been completed and that will be disturbed by the transmission line. Monitoring will be required during any land disturbing activity that has potential to adversely affect unidentified sites. A complete list of monitoring requirements for cultural resources is in Appendix C, subsection C.3 of the Joint Final EIS.

7. Surface Water Hydrology

Construction Phase

Four perennial streams will be crossed by the transmission line: Fisher River, West Fisher Creek, Howard Creek, and Libby Creek. The transmission line will cross an estimated 0.3 mile of floodplains and require 0.2 acre of new roads within a floodplain. Two structures will be located in a floodplain. Construction of the transmission line will require no new road crossings over any stream. During final design, MMC will avoid or minimize, to the extent practicable, locating facilities, such as structures and access roads in floodplains. If at final design, transmission line facilities will be in a floodplain, an application for a flood plain permit would be submitted to the Montana Department of Natural Resources and Conservation (DNRC) that provided details on the obstruction or use of a floodway/floodplain, and a permit received before construction.

Installation of culverts, bridges, or other structures at perennial stream crossings will be specified by the agencies following on-site inspections with DEQ, KNF, Montana Fish, Wildlife and Parks (FWP), landowners, and local conservation districts. Installation of culverts or other structures in a water of the United States will be in accordance with U.S. Army Corps of Engineers (Corps) 404 and DEQ 318 permit conditions. New culverts will be installed so water velocities or positioning of the culverts will not impair fish passage. Stream crossing structures will be constructed to pass the 100-year flow event without impedance.

Timber clearing for access roads and the transmission line is not predicted to measurably increase the peak flow of any streams.

Operations Phase

The transmission line and associated road crossing culverts will not affect streamflow during mine operations. After line installation is complete, access roads will be changed to intermittent stored service. Culverts will be removed by MMC if the KNF determines them to be high risk for blockage or failure. Stream banks will be laid back to allow

streamflow to pass without scouring or ponding. Newly constructed roads on Plum Creek lands will be gated after construction. Road management will depend on the easement agreement between the landowner and MMC. Newly constructed roads on State land will be gated after construction and managed in accordance with an easement agreement between the DNRC and MMC.

Decommissioning Phase

Transmission line roads will be reclaimed after mine closure and decommissioning of the transmission line. Culverts will be removed and fill areas sloped back and stabilized during road decommissioning.

8. Water Quality

MMC will minimize transmission line construction in areas with soils that are highly erosive and subject to high sediment delivery and slope failure, reducing the potential for increased sediments in nearby streams. H-frame structures, which generally allow for longer spans, fewer structures and access roads, will be used for the line to reduce clearing associated with new access roads and potential erosion.

The sediment analysis results for the existing and new transmission line roads are provided in Table 136 (Alternative D-R) of the Joint Final EIS. The new transmission line roads will be graveled and have 40- to 50-foot buffers to eliminate sediment from entering RHCAs and streams. Reducing the contributing road length and adding gravel to roads that currently do not have a gravel surface will also reduce sediment leaving the roads and buffers. When not in use, the roads will be changed to intermittent stored service roads, and will be treated to minimize erosion and sediment movement from the roads. The roads will be monitored throughout the project to ensure that BMPs implemented to minimize sediment from moving from roads to streams were effective.

Clearing for the transmission line will disturb 21 acres in the Fisher River watershed and 13 acres in the Libby Creek watershed. Tree clearing across Libby Creek will be about 200 feet wide. New or upgraded roads will disturb less than one acre in both watersheds. The agencies' access changes will reduce the contribution of additional sediment to below existing levels in the Libby Creek watershed.

The installation of culverts, bridges, or other structures at perennial stream crossings will be specified by the agencies following on-site inspections with the DEQ, KNF, FWP, landowners, and local conservation districts. Installation of culverts or other structures in a water of the United States will be in accordance with Corps 404 and DEQ 318 permit conditions. MMC may request, and the DEQ may authorize, a short-term exemption from surface water quality standards for total suspended sediments and turbidity for construction of the transmission line, access roads, and other stream crossings.

9. Land Use

The KNF manages most lands within the transmission line corridor. The 2015 Kootenai Forest Plan (KFP) guides all natural resource management activities and establishes management standards for the KNF. The KNF identified the need to amend the 2015 KFP to provide project-specific variances for the Montanore Project (mine and transmission line). These variances are discussed below.

Most private land within the transmission line corridor is owned by Plum Creek Timberlands LP (Plum Creek). FWP holds a conservation easement on all of the Plum Creek land where the transmission line will be located. Under the terms of the Thompson/Fisher conservation easement, FWP has reserved the right to prevent any inconsistent activity on or use of the land by Plum Creek or other owners and to require the restoration of any areas or features of the land damaged by such activity or use. Activities and uses prohibited or restricted include installing any natural gas or other pipelines or power transmission lines greater than 25-kV unless prior written approval is given by FWP.

The transmission line will cross Plum Creek land, all of which is covered by the conservation easement with FWP. The Sedlak Park Substation and loop line will affect 4.4 acres of Plum Creek land, all of which are covered by the Thompson/Fisher conservation easement. Up to 105 acres of Plum Creek land and 6 acres of state land will require clearing for the transmission line. MMC will convey a conservation easement to FWP on up to 91 acres of private land adjacent to the Thompson/Fisher conservation easement with similar conservation values that will be added to the existing conservation easement. Six residences are within 0.5 mile of the proposed transmission line, but they all are more than 450 feet from the centerline.

10. Recreation

NFS lands make up a large percentage of the Lincoln County land base and offer public access for a variety of motorized and non-motorized recreational activities including: hunting for big game and upland game birds, fishing, hiking, wildlife observation, photography, backpacking, horseback riding, snowmobiling, cross-country skiing, mountain biking, picnicking, sightseeing, off-highway vehicle use, rock hounding, and camping. Recreational use in the area occurs largely within the 350,000-acre Libby Ranger District of the KNF. Recreational use of the Libby Ranger District is highest in the summer with camping, hiking, and fishing on the weekends being the major activities. These activities are concentrated at Howard Lake and along popular hiking trails. Recreational activities continue to take place during fall, although use declines. Fall use of the area is mainly dispersed hunting and berry picking season.

Construction and maintenance of the transmission line will require new access roads. These roads will be closed to motorized vehicles, but will benefit non-motorized recreation access (e.g., walk-in hunting and fishing access, hiking, and berry picking) on both NFS lands and on private lands where public access is permitted.

The transmission line will cross recreation trails and the Libby Creek Recreational Gold Panning Area. Transmission line construction will adversely affect the short-term use and enjoyment of these areas due to increased noise, traffic, and construction activity. During mine operation, the transmission line will alter the scenic integrity and landscape character of trail corridors and the gold panning area. The alteration of scenic integrity in these localized areas will have minor adverse effects on enjoyment of recreational amenities that will be crossed by the transmission line.

The transmission line corridor will be visible from Howard Lake. Such visual effects may diminish the quality of the recreational experience for some visitors.

Recreation Opportunity Spectrum (ROS) characteristics (a KNF inventory tool for defining classes of outdoor recreation opportunity environments) of the transmission line corridor will change from Semi-Primitive Non-Motorized to Semi-Primitive Motorized in some areas. These changes from less developed to more developed recreation settings will likely displace some recreationists seeking a more remote and dispersed recreational experience. Over the long term, these changes to ROS characteristics will extend about 20 years beyond the time when the transmission line is decommissioned. As vegetation cover increases in the reclaimed transmission line corridor, the ROS characteristics will revert to existing conditions.

11. Scenery

The transmission line will be located in montane forest and valley characteristic landscapes within the KNF and a 6-mile portion of US 2 east of the Cabinet Mountains. This area is characterized visually by the summit peaks of the Cabinet Mountains surrounded by the adjacent densely forested mountains and valleys, with some flat, open creek or stream valleys of dense low-growing herbaceous vegetation interspersed with the forest.

Generally, changes to characteristic landscapes will include loss of vegetation and landform modifications at and near the proposed transmission line corridor. Sensitivity levels of several key observation points (KOPs), such as Howard Lake, will be lowered by the presence of transmission line facilities not already existing within a given view.

Visibility of the transmission line, structures, and tree clearing area will be very low and partially obscured from US 2 and some permanent residences (KOPs 9 and 10) due to the screening effects of topographic changes and trees. Effects on Howard Lake (KOP 5) will be high visibility, high contrast, and a noticeable change to the existing line, color, and texture of the forest. Most visitors to Howard Lake will have unobstructed views of a portion of the transmission line.

12. Social/Economics

The estimated total employment (mine and transmission line) during the construction phase of the Montanore Project will be 623 jobs at Year 3 (see Table 162 in the Final EIS). About 21 percent of the direct employment will be construction related and the remainder attributable to production. It is estimated that a 23-person crew will be required for construction of the transmission line. Construction-related annual labor income for the project (mine and transmission line) is estimated to be \$8.9 million during the peak construction phase. There will be an estimated 312 secondary jobs associated with the estimated 311 direct jobs related to construction and operations of the mine and transmission line. Please see the Joint Final EIS (Section 3.18) for a detailed discussion on Social and Economic impacts.

13. Soils and Reclamation

Based on preliminary design, the transmission line will be 13.7 miles long, require 92 structures, and end at the substation at the Libby Plant Site. The alignment will minimize disruption of soil having severe erosion risk (1.3 miles). Some areas will be logged using a helicopter, minimizing disturbances and erosion.

New access roads and closed roads with high upgrade requirements will create 15.5 acres of disturbance and disturb 7.9 acres of slopes that exceed 30 percent, 0.6 acre of soils with high sediment delivery potential to waterways, and 6.4 acres of soil that have potential for slope failure. Access roads will cross 1.8 acres of soil having severe erosion risk. Most soils having severe erosion risks along access roads will occur along Libby Creek in the extreme western portion of the transmission line, along West Fisher Creek and Fisher River. The majority of soils with high sediment delivery potential along access roads will occur only along Libby Creek and at the northeast end along the Fisher River. Most soils having potential for slope failure along access roads will occur southeast of Libby Creek near Howard Lake, portions between Miller and West Fisher creeks, and east of Fisher River. Please see the Joint Final EIS (Section 3.19) for a detailed discussion on sediment controls and Best Management Practices (BMP's) for the project.

14. Sound, Electrical and Magnetic Fields (EMF), Radio, and TV Effects

Line Construction, Operations, and Decommissioning Noise

Noise from helicopters, heavy equipment, and chain saws between the work location and staging area should be expected during construction of the transmission line. Similar noise levels will occur during annual inspections and final line decommissioning. The increased noise levels will be short-term, and will return to ambient levels when the noise-generating activity is completed. Helicopters will be used for five activities: logging, structure placement, line stringing, annual inspection and maintenance, and decommissioning. Logging may take 1 to 2 months and structure placement and line stringing will take a week or two each. Annual inspections may take about a week. Increased noise levels will occur at private residences along US 2 where the alignment crosses the Fisher River, and at private residences near Howard Lake. Recreation users at the Libby Creek Recreation Gold Panning Area and on trails along the alignment will experience higher noise levels during construction, annual inspections, and decommissioning. Recreation users at the campground and Howard Lake will also experience higher noise levels during construction, annual inspections, and decommissioning.

Transmission Line Noise

All residences are more than 450 feet from the centerline of the transmission line. The centerline will be no closer than 200 feet from any residence during final design because the final alignment could vary by up to 250 feet from the centerline analyzed in the EIS (ARM 17.20.301(21)). Expected noise levels at a residence 200 feet from the centerline during a light rain will be about 42 decibels (dBA) and less than 40 dBA at 300 feet and probably will not be noticeable over existing noise levels.

Electrical and Magnetic Fields

All residences are more than 450 feet from the transmission line centerline. The centerline will be no closer than 200 feet from any residence during final design. For residences 200 feet or more from the centerline, the electric field strength will be about 0.05 kilovolts per meter (kV/m) (or 50 V/m) and the magnetic field strength will be less than 1 mG (milligauss). The maximum electric field strength at 50 feet would be below the level set by Montana regulation for subdivided and residential areas for electric field strength. (see Section 3.20.4 in the Joint Final EIS).

Radio and TV Effects

All residences are greater than 450 feet from the centerline so the transmission line will not affect radio or television reception.

15. Transportation

The traffic generated by the initial construction, continued operations and maintenance, and final decommissioning of the transmission line will have no significant effect on the traffic congestion of the affected roads and intersections due to the low volumes of traffic generated. Short intermittent delays on US 2 will occur during transmission line stringing operations. Guard structures will be placed on either side of US 2 to prevent the line from falling across the highway. Similar delays will occur and similar procedures will be used on currently open NFS roads, such as NFS road #231 or #385, in construction of the transmission line. Similar short intermittent delays on U.S.2 will occur during the initial months of construction of the Sedlak Park Substation. These delays will not adversely affect traffic congestion on US 2.

There will be no adverse impacts on the safety of the transportation network due to the minimal volume of traffic that will be generated by the transmission line construction, continued operations and maintenance, and final decommissioning. The approach to the Sedlak Park Substation will be designed not to affect the transportation system level of service or safety in the analysis area. If construction access roads onto US 2 are necessary, an encroachment permit will be required before entering MDT right-of-way.

16. Vegetation

Construction of the transmission line, with a clearing width of 200 feet, will affect up to about 182 acres of mature coniferous forest, and 131 acres of previously harvested coniferous forest, and about 18 acres of wetland/riparian areas. Road construction will affect about three acres of mature coniferous forest, about one acre of previously harvested coniferous forest, and less than one acre of wetlands and riparian areas. MMC will convey a conservation easement to FWP on up to 91 acres of private land adjacent to the Thompson/Fisher conservation easement with similar conservation values that will be added to the existing conservation easement.

After transmission line construction is complete, new roads on NFS lands will be placed into intermittent stored service using a variety of treatment methods. Trees will be planted in all areas where trees were removed for construction of the transmission line including access roads and other disturbances such as line stringing and tensioning sites, slash burn piles, and construction pads. Trees will be planted at a density such that at the end of five years, the approximate stand density of the adjacent forest will be attained at maturity. This standard will not apply to roads placed in intermittent stored service, but will apply when the roads are decommissioned after the transmission line is restored.

Effects will include loss of biodiversity, an increase in introduced species, a change in species composition, and timber production on disturbed lands. These are unavoidable impacts of transmission line construction.

17. Old Growth

In the Crazy Planning Sub-Unit (PSU), construction of the transmission line will increase edge effects on four acres of effective old growth and decrease interior habitat by four acres (see Table 184 in the Joint Final EIS). In the Silverfish PSU, construction of the transmission line will affect eight acres of effective old growth, will decrease edge effects on four acres of effective old growth and decrease interior habitat by five acres (see Table 184 in the Joint Final EIS). Recruitment old growth will not be affected. The transmission line will not affect old growth on private land. The substation and loop line will not affect old growth. Construction will require an estimated 92 feet of new roads through effective old growth, affecting less than 0.1 acre of effective old growth on National Forest System lands.

Impacts on old growth on all lands will be minimized through implementation of the Environmental Specifications (Attachment 2) and the Vegetation Removal and Disposition Plan that will be developed by MMC. Also, the use of monopoles in old growth, if incorporated into the Vegetation Removal and Disposition Plan, will require less clearing. Loss of old growth and edge effect may be offset by private land acquisition associated with grizzly bear habitat mitigation, if old growth characteristics are present on the acquired parcels.

18. Threatened, Endangered, and Sensitive Plant Species

No KNF sensitive or state-listed plant species of concern were identified along the transmission line corridor. Although suitable habitat is likely present, surveys for KNF sensitive and state-listed plant species of concern have not been conducted for some segments of the alignment and the southern spur to Sedlak Park Substation. Before any ground-disturbing activities occur, MMC will update surveys for plant species of concern, including newly listed species. If a species of concern is identified and adverse effects cannot be avoided, MMC will develop appropriate mitigation plans for the agencies' approval. The mitigation will be implemented before any ground-disturbing activities occur. To the extent feasible, MMC will make adjustments to structure and road locations, and other ground-disturbing activities to reduce impacts.

19. Noxious Weeds

A helicopter will be used to construct between some structures, which will minimize new road construction or reconstruction. A helicopter will also be used to clear timber in areas adjacent to core grizzly bear habitat. Roads decommissioned or placed in intermittent stored service will not be used for routine maintenance of the transmission line, but could be used for emergency repairs, such as a damaged insulator. These actions will reduce the risk of noxious weed spread. MMC's weed control program will minimize weed infestations on lands disturbed by the transmission line facilities. MMC will coordinate with the KNF weed specialist for use of biocontrol agents as they become available. MMC will not be required to control other introduced species.

20. Wetlands and Other Waters of the U.S.

A total of 2.0 acres of wetlands and 2,935 linear feet of waters of the U.S. will be within the clearing area of the transmission line. No wetlands or waters of the U.S. will be

affected by new or upgraded road construction. Indirect effects will be minimized through BMPs and appropriate stream crossings.

21. Wilderness, Roadless Areas, and Wild and Scenic Rivers

Cabinet Mountains Wilderness

The transmission line will not encroach on the Cabinet Mountains Wilderness (CMW). Views, however, from within the CMW will be affected by the transmission line, particularly from high, open vistas such as Elephant Peak within the CMW. The transmission line will not affect wilderness character.

Roadless Areas

The transmission line will avoid physical disturbance in the Cabinet Face East Inventoried Roadless Area (IRA). No road construction or timber harvest will occur in the IRA. Transmission line construction at the Libby Plant Site will be audible in the IRA between Libby and Ramsey creeks. Views from the IRA will be affected by new H-frame transmission lines, particularly from high, open vistas. IRA attributes will return to pre-transmission line conditions after transmission line decommissioning.

Wild and Scenic Rivers

The transmission line will not affect the free-flowing characteristics, water quality, or the outstandingly remarkable values of any designated or eligible river segments.

22. Wildlife Resources

The transmission line will disturb 198 acres on National Forest System lands, including 73 and 125 acres in the Crazy and Silverfish PSUs, respectively (Table 193), and 113 acres on State and private lands. Disturbances would be due to road construction and transmission line clearing. Vegetation will be cleared from access roads, pulling and tensioning sites, and within the transmission line clearing area.

The transmission line will impact four acres of old growth within the Silverfish PSU and 63 acres of untreated stands split between the two PSUs. The effects to riparian habitats would be negligible as well: 26 acres and 9 acres of riparian habitat in the Crazy and Silverfish PSUs, respectively, will be cleared and 13 acres of riparian habitat on private and state lands will be cleared. There will be site-specific loss of snags (cavity habitat), but there will be no effect to the cavity habitat percent potential population levels and adequate snag habitat will remain within the PSUs. The transmission line will also impact the amount of down wood habitat

Impacts on key habitats (old growth, riparian, snag, and down wood habitat) on National Forest System lands and private land will be minimized through implementation of the Wetland Mitigation Plan, the Vegetation Removal and Disposition Plan, and the Environmental Specifications (See Attachment 2).

Noise from helicopters during line stringing may temporarily deter some wildlife from using nearby snags and down wood. Similar effects will occur from other transmission line construction activities where helicopters are not used. Disturbance impacts will be short-term and, with the exception of line inspection and maintenance activities, will cease after transmission line construction until decommissioning. Helicopter use and

other construction activities will cause similar disturbances with similar durations during line decommissioning. Please see the Joint Final EIS (Section 3.25) for a detailed discussion on potential impacts to specific species and species habitat.

C. Section 75-20-301(1)(c), MCA, - Minimization of Adverse Environmental Impacts

Construction and operation of the transmission line under Alternative D-R Miller Creek Transmission Line Alternative minimizes adverse environmental impacts considering the state of available technology and the nature and economics of the various alternatives. Environmental specifications developed by DEQ and KNF to minimize adverse impacts in construction, operation, maintenance and decommissioning of the transmission line are set forth in Attachment 2 – Environmental Specifications.

The specifications include sensitive areas where special measures will be taken to reduce impacts during construction and reclamation activities. Sensitive areas include wetlands; riparian areas; bull trout critical habitat; old growth habitat; core grizzly bear habitat; bald eagle primary use areas; areas with high risk of bird collisions; big game winter range; visually sensitive and high visibility areas; and cultural and paleontological resources. Additional areas for monitoring may be identified following the preconstruction monitoring trip by the agencies or preconstruction surveys by MMC.

These specifications are incorporated by reference as enforceable provisions of this Certificate of Compliance.

1. The expected net present value of costs, including monetary costs of construction to MMI, external monetary costs, and the value of reasonably quantifiable environmental impacts is lower for the proposed facility than for any other available alternative that will meet the project's purpose and need.

2. Environmental impacts that could not be quantified in monetary terms were considered (see Section B. Section 75-20-301(1)(b), MCA, - Nature of the Probable Environmental Impacts above). The impacts were not adverse enough to alter DEQ's determination that the selected location and design for the transmission line minimizes the net present value of costs among alternatives.

3. The costs associated with the mitigation measures included in the Environmental Specifications (Attachment 2) and the Joint Final EIS were considered in DEQ's determination that the selected location and design for the transmission line minimize the net present value of costs among alternatives.

4. The selected location (Attachment 3) represents the best balance among the preferred location criteria listed in DEQ Circular MFSA-2, Section 3.1. Alternative D-R was developed out of public and agency comments to use more public land. Thus, DEQ believes that there is greater general local acceptance of Alternative D-R than the other alternatives. Alternative D-R, along with Alternatives C-R and E-R, limits impacts to residential areas by keeping structures a safe distance from residences and areas of human concentrations; Alternative B has more residences in impact zones. Alternative D-R has the shortest length of line in areas of severe erosion risk. Alternatives C-R, D-R and E-R have comparable low visual impacts; Alternative B is the most visible.

Alternative C-R, D-R and E-R have the same number of structures in flood plains; Alternative B has more structures in flood plains than the other alternatives. The 2015 Kootenai Forest Plan was amended to provide project specific variances for Alternative D-R. All other alternatives are not in compliance with federal management plans. Unincorporated Lincoln County has no comprehensive or general plan, zoning regulations, or growth policies.

Considering several variable impacts including but not limited to structure placement, road construction and potential erosion risk, Alternative D-R has the fewest impacts to critical bull trout habitat. Alternative E-R is in the vicinity of critical habitat and essential excluded habitat in West Fisher Creek and has the most structures within one mile of bull trout critical habitat. Alternative B disturbs the most acreage within one mile of bull trout habitat due to road construction and upgrades. Alternative C-R disturbs slightly more acreage in the vicinity of critical bull trout habitat than Alternative D-R.

Alternative C-R crosses three miles of grizzly core habitat and has greater potential for displacement of grizzly bears than Alternatives B, D-R, and E-R. Alternative C-R also requires the clearing of revegetation in core grizzly habitat during the life of the transmission line. The right-of-way clearing required under Alternative C-R provides easier recreational and hunter access, potentially resulting in a higher risk of grizzly bear mortality or displacement within core grizzly bear habitat.

Alternative D-R uses or parallels the least amount of existing corridors; Alternative E-R makes use of the most existing corridors. Alternative D-R crosses the least logged areas and most undisturbed areas; Alternative E-R crosses the most logged areas and the least undisturbed areas.

DEQ believes that Alternative D-R represents the best balance among the preferred location criteria listed in DEQ Circular MFSA-2, Section 3.1. DEQ is giving particular weight to the minimization of impacts to bull trout and grizzly bears under Alternative D-R. The DEQ Circular MFSA-2 criteria are discussed in greater detail below. Table 1 summarizes the preferred location criteria findings for Alternative D-R – Miller Creek Transmission Line Alternative.

a. General local acceptance

Issues and concerns about the proposed transmission line were identified during the public involvement process. A public meeting on the proposed 230-kV transmission line was held in May 2005 to identify resources potentially affected by the proposed transmission line, suggested locations for the proposed line, alternatives to the proposed line, and mitigation measures for the proposed line. At the meeting, MMI presented information on the need for the proposed facility. The agencies issued a Draft EIS for public comment in February 2009 and a Supplemental Draft EIS in September 2011. Based on public and agency comments, the transmission line alignment was revised to reduce effects on private lands.

b. Existing utility and/or transportation corridors

Existing transportation corridors consist of US 2 and roads on NFS lands, such as NFS road #231 or #278, and roads on Plum Creek lands. Alternatives B through E-R would use or parallel existing road corridors, including open, gated, barriered, or impassable roads. Alternative B would have 5 miles of centerline within 100 feet of an existing open road. Alternative E-R would make greater use of existing corridors, with 5.5 miles of centerline within 100 feet of these roads. Alternative D-R will make the least use of existing corridors. Most of the transmission line corridor is on NFS lands or private lands owned by Plum Creek Timberlands LP. Residential areas are not found on either type of land.

c. Nonresidential areas

Twenty residences are within one mile of one of the four transmission line alternatives. Most of these properties are within 0.5 mile of US 2. Alternative B would be closer to more residences than the other three alternatives. Fourteen residences are within 0.5 mile of Alternative B, of which 11 are greater than 450 feet from the centerline of the right-of-way, and the remaining three are within 450 feet of the centerline. All residences in Alternatives C-R, D-R, and E-R would be more than 450 feet from the centerline. Montana regulations allow the final centerline to vary up to 250 feet from the centerline analyzed in this EIS (ARM 17.20.301 (21)), unless there is a compelling reason to increase or decrease this distance. The centerline during the final design for Alternative D-R will be no closer than 200 feet from the centerline.

d. Logged areas rather than undisturbed forest

Alternatives B through E-R would cross logged areas, as well as undisturbed forest, riparian, and other areas. Slightly less than half of the area crossed by Alternatives B and C-R has been logged. Alternative E-R would cross the most logged areas (241 acres) and least undisturbed areas (124 acres). Alternative D-R will cross the least logged areas (136 acres) and most undisturbed areas (202 acres).

e. Geologically stable areas with nonerosive soils

The terrain in the transmission line corridor consists of flat alluvial valleys along major creeks and rivers, such as the Fisher River, Miller Creek, and West Fisher Creek; or steep hillsides (slopes greater than 30 percent). Soils subject to slope failure are found throughout the corridor area, primarily on lower hillslopes. Erosive soils are found along the Fisher River, Miller Creek, and West Fisher Creek. Table 1 below compares the physical characteristics and erosion risks of the transmission line alternatives.

Of the four alternatives, the centerline of the transmission line of Alternative B would cross more steep areas (7.4 miles) and more soils with a severe erosion hazard (6.7 miles) than the other three action alternatives (See Table 1). Alternative B also would have more access roads than the other alternatives. In Alternatives C-R through E-R, the need for access roads would be reduced by using a helicopter to set structures in areas of poor accessibility. The access roads in Alternative B would disturb 16.5 acres of slopes greater than 30 percent, 13.3 acres of soil having potential for slope failure, and 8.9 acres of soil having severe erosion risk. Because of the fewer roads in the other alternatives, roads would disturb between 2 and 8 acres of soils with these constraints in Alternatives C-R, D-R, and E-R.

Within the transmission line corridor, a segment of Libby Creek and the Fisher River are on Montana's 303(d)-list of impaired streams. Alternative B would have 4.7 miles of line paralleling the Fisher River, where soils with severe erosion risk and high sediment delivery are found. Clearing for the transmission line and new or upgraded roads would disturb 84 acres in the watershed. Alternative B also would disturb 17 acres in the Libby Creek drainage. The soils at the Libby Creek crossing have severe erosion risk and high sediment delivery. Alternatives C-R, D-R, and E-R would have fewer disturbances in the watersheds of impaired streams, disturbing 21 acres in the Fisher River watershed and 13 acres in the Libby Creek watershed.

Through the use of Best Management Practices, Environmental Specifications, and other design criteria, these potential sediment sources will have minimal effects on analysis area streams under most conditions. The new transmission line roads will be graveled, and have 40- to 60-foot buffers to eliminate any sediment from entering RHCAs. The sediment runoff analysis results for the existing and proposed transmission line roads for Alternative D-R showed that for both high and low road use, reducing the contributing road lengths and adding a gravel surface to roads that currently do not have a gravel surface will reduce the amount of sediment leaving the roads and buffers. When not in use, the roads will be changed to intermittent stored service roads, and will be treated to minimize erosion and sediment movement from the roads. The roads will be monitored throughout the project to ensure that Best Management Practices implemented to minimize sediment from moving from roads to streams are effective.

f. Roaded areas where existing roads can be used for access

Existing roads are found throughout the transmission line analysis area. Most of the roads on the KNF were used for timber harvest and are currently closed. Roads on Plum Creek land would be used for all alignments. Four open roads would be used as primary access by one or more of the transmission line alternatives: US 2, NFS road #231 (Libby Creek Road), NFS road #385 (Miller Creek Road), and NFS road #4724 (South Fork Miller Creek Road). Alternative B would require about 10 miles of new roads or roads with extensive upgrade requirements. In Alternatives C-R through E-R, the need for access roads would be reduced by using a helicopter to set structures in areas of poor accessibility. Alternatives C-R and E-R would require about 3 miles of new or extensively upgraded roads and Alternative D-R will need 5 miles. Alternatives B and E-R would also require extensive upgrading of less than a mile of existing road.

g. Where structures in floodplains are avoided

One hundred-year floodplains have been designated along the Fisher River, Miller Creek, an unnamed tributary to Miller Creek, Ramsey Creek, and Libby Creek. Eight structures in Alternative B would be located in a designated 100-year floodplain, primarily along the Fisher River. Two structures would be located in a designated 100-year floodplain in the other three alternatives, including the Selected Transmission Line Alternative D-R. MMC will attempt to avoid locating these facilities in a floodplain during final design and will locate facilities in a floodplain if no practicable alternative exists to avoid doing so.

h. Where the structures will create the least visual impact

The transmission line analysis area is characterized visually by the summit peaks of the Cabinet Mountains surrounded by the adjacent densely forested mountains and valleys, with some flat, open stream valleys of dense low-growing herbaceous vegetation interspersed with the forest. The four action transmission line alternatives would be located in montane forest and valley characteristic landscapes within the KNF.

All alternatives would be visible from Key Observation Points (KOPs), high use roads, and the CMW. Alternative B would be visible from five KOPs, with the other alternatives visible from three KOPs. Alternative C-R would be visible from 10 miles of high use roads, with the other three action alternatives visible from 11 miles of high use roads. The effects of views from the CMW would be the greatest in Alternative B, with 1,600 acres in the CMW having views of the corridor, and the least in Alternative E-R. A short segment of Alternative E-R would be visible from Howard Lake, a popular recreation area. The Selected Transmission Line Alternative D-R will be similarly visible from Howard Lake.

About 3.8 miles of Alternative B would have high visibility and 8 miles would be moderately visible. Alternatives C-R, D-R, and E-R would have similar lengths of high visibility (about 2 to 3 miles). Alternatives C-R and E-R would have increasing lengths of moderate visibility, with 5.8 and 8.1 miles, respectively. Alternative D-R will have 6.6 miles of moderate visibility. Alternative C-R would have the greatest length of transmission line without any visibility at 2.5 miles. Visually sensitive and high visibility areas are considered sensitive areas. Under the Environmental Specifications (see Attachment 2) MMC will take all necessary actions to avoid adverse impacts on them.

i. Safe distance from residences and other areas of human concentration

Fourteen residences would be within 0.5 mile of Alternative B, of which 11 would be greater than 450 feet from the centerline and the remaining three would be within 450 feet of the centerline. Because the final alignment could vary by up to 250 feet from the centerline analyzed in this EIS (ARM 17.20.301 (21)), three residences may be within 200 feet of the centerline, depending on the final transmission line alignment. At lateral distances from the edge of the right-of-way (50 feet from the centerline) to 200 feet away, the electric field strength would range from about 0.75 kV/m (kilovolt/meter) at 50 feet to about 0.05 kV/m (or 50 V/m) at 200 feet. The magnetic field strength would be about 4 milligauss (mG) at 50 feet and less than 1 mG at 200 feet. This maximum electric field strength at 50 feet would be below the level set by Montana regulation for subdivided and residential areas for electric field strength, and both the electric and magnetic field strengths at 50 feet would be below the exposure levels for the public recommended as reference levels or maximum permissible levels. All four residences in Alternative C-R and all six residences within 0.5 mile of Alternative E-R would be more than 450 feet from the centerline.

Similarly, for the Selected Transmission Line Alternative, all six residences within 0.5 mile of the transmission line are more than 450 feet from the centerline. The centerline will be no closer than 200 feet from any residence during final design. The electric field strength will be less than 0.05 kV/m (or 50 V/m), and the magnetic field strength will be less than 1.0 mG at 200 feet from the centerline. Based on the electric and magnetic field

strengths recommended in guidelines as reference levels or maximum permissible levels for the public, and the current state of scientific research on electric and magnetic fields, the transmission line will be a safe distance from residences and other areas of human concentration.

j. In accordance with local, state, or federal management plans

Unincorporated Lincoln County has no comprehensive or general plan, zoning regulations, or growth policies.

FWP holds a conservation easement on lands owned by Plum Creek where the transmission line will be located. Under the terms of the conservation easement, FWP has reserved the right to prevent any inconsistent activity on or use of the land by Plum Creek or other owners, and to require the restoration of any areas or features of the land damaged by such activity or use. Activities and uses prohibited or restricted include installing any natural gas or other pipelines or power transmission lines greater than 25-kV unless prior written approval is given by FWP. Construction of the transmission line must comply with the FWP-Plum Creek conservation easement.

There are two State parcels (Sections 36, T27N, R30 and Section 16, T28N, R30W) located within the Montanore Project analysis area (comprised of the Crazy and Silverfish PSUs) that are covered by a voluntary multi-species Habitat Conservation Plan (State HCP) developed by the DNRC with technical assistance from the U.S. Fish and Wildlife Service. The State HCP identified species specific goals for the grizzly bear and lynx in the HCP project area and covered forest management activities include timber harvest and associated activities, road construction and maintenance, and grazing. Construction, operations, and decommissioning of the proposed transmission line action alternatives are not covered activities under the State HCP.

The 2015 KFP describes desired conditions, objectives, standards, guidelines, and land suitability for project and activity decision making on the KNF, guiding all resource management activity (USDA Forest Service 2015c). This direction applies either forestwide or specific to management or geographic area allocations. For the Montanore Project (mine and transmission line), the KNF identified the need to amend the 2015 KFP to provide several project-specific variances. Below are those KFP standards and guidelines that require a variance for the transmission line:

FW-GDL-AR-01: Management activities should be consistent with the mapped scenic integrity objective, see Plan set of documents. The scenic integrity objective is High to Very High for scenic travel routes, including Pacific Northwest National Scenic Trail, designated Scenic Byways, and National Recreation Trails. (2015 KFP, page 35)

MA6-GDL-AR-05. Management activities should be consistent with the Scenic Integrity Objective of Low to High. (2015 KFP, page 66)

FW-STD-RIP-01: When RHCAs are intact and functioning at desired condition, then management activities shall maintain or improve that condition. Short-term effects from activities in the RHCAs may be acceptable when those activities

support long-term benefits to the RHCAs and aquatic resources. (2015 KFP, page 25)

FW-STD-RIP-02: When RHCAs are not intact and not functioning at desired condition, management activities shall include restoration components that compensate for project effects to promote a trend toward desired conditions. Large-scale restoration plans or projects that address other cumulative effects within the same watershed may be considered as compensatory components and shall be described during site-specific project analyses. (2015 KFP, page 25).

FW-GDL-VEG-02: Road construction (permanent or temporary) or other developments should generally be avoided in old growth stands unless access is needed to implement vegetation management activities for the purpose of increasing the resistance and resilience of the stands to disturbances. (2015 KFP, page 19).

Table 1. Preferred Location Criteria for Selected Transmission Line Alternative.

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
Circular MFSA-2, section 3.2(d)(1)(d)(i) through (xi)						
i. National wilderness areas	N/A	N/A	No direct effects. See compatibility with visual management plans for indirect visual effects.	No direct effects	none	No direct effect on wilderness attributes
ii. National primitive areas	N/A	N/A	No effect	No effect	N/A	No effect
iii. National wildlife refuges and ranges	N/A	N/A	No effect	No effect	N/A	No effect
iv. State wildlife management areas and wildlife habitat protection areas	N/A	N/A	No effect	No effect	N/A	No effect
v. National parks and monuments	N/A	N/A	No effect	No effect	N/A	No effect
vi. State parks	N/A	N/A	No effect	No effect	N/A	No effect
vii. National recreation areas	N/A	N/A	No effect	No effect	N/A	No effect
viii. Designated or eligible national wild and scenic rivers system	N/A	N/A	No effect	No effect	N/A	No effect
ix. Roadless areas over 5,000 acres	Acres in clearing width/ low, moderate, high effect	Miles of new and high-upgrade roads	No effect	No effect	Avoidance of inventoried roadless areas	No effect
x. Rugged topography (areas with slopes >30%)	Miles of centerline/ low, moderate, high effect	Acres/ low, moderate, high effect	6.4	7.9	Helicopter use for vegetation clearing and structure construction adjacent to grizzly bear core habitat to decrease number of access roads	Minor effect
xi. Specially managed buffer areas	N/A	N/A	No effect	No effect	N/A	No effect
Circular MFSA-2, section 3.4(1)(b) through (w)						
b. state or federal water-fowl production areas	N/A	N/A	No effect	No effect	N/A	No effect
c. Designated natural areas	N/A	N/A	No effect	No effect	N/A	No effect
d. Critical habitat for federal T&E species						

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
Bull trout	# structures within 1 mile of bull trout critical habitat	Acres new and high-upgrade road disturbance within 1 mile of bull trout critical habitat	25	4	Implementation of Storm Water Pollution Prevention Plan and structural and nonstructural BMPs; construction of stream crossings per KNF and DEQ requirements; minimization of disturbance on active floodplains; curtailment of construction activities during heavy rains; re-routing to avoid highly erosive soils; use of H-frame poles, allowing longer spans and fewer structures and access roads; helicopter construction in grizzly bear core habitat to decrease number of access roads; placement of NFS road #4725 into long-term intermittent stored status; where feasible, location of structures outside of riparian areas; new culverts to allow fish passage; stream-crossing structures designed to withstand a 100-year flow event; completion of habitat inventory and development of instream structures in Libby Creek. Additional measures described under "severe erosion risk" below.	May affect, and likely to adversely affect bull trout critical habitat.
e. Seasonally occupied habitat for federal and state T&E species						
grizzly bear habitat physically removed on all lands	N/A	Acres of new and high-upgrade roads	N/A	20	Protection of grizzly bear habitat through acquisition of or conservation easements on 28 to 40 acres of habitat on non-Forest System lands. Creation of grizzly bear core habitat through yearlong access changes through the installation of barriers or gates in several roads.	Combined mine-transmission line may affect, are likely to adversely affect grizzly bear.
Acres of core lost for life of transmission line	Acres	Acres	0	0	No core lost for life of transmission line	Effects determination same as above.

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
Acres of core temporarily removed during construction phase and decommissioning	N/A	NA	0	18	18 acres of core temporarily lost due to access road during construction. Mitigated for at 2:1 ratio prior to activity	Effects determination same as above. Short term displacement effects mitigated by core creation prior to activity. Affected core block increases to 2,763 acres, providing for ample adjacent secure habitat during construction.
Miles of transmission line located in existing core	Miles	N/A	NA	N/A	None specified for transmission line	Effects determination same as above. Location would not be within core habitat
Miles of transmission line in core during operations	Miles	Included in clearing width impacts	0	0	None specified for transmission line	Effects determination same as above.
Core creation deferred to post construction phase due to transmission line construction	N/A	N/A	0	0	None specified for transmission line	Effects determination same as above. Road access changes associated with the mine alternatives would not be delayed and would achieve 57% core prior to construction in BMU 6

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
Miles existing; closed, opened & new roads in grizzly habitat	N/A	Total Miles	N/A	15.6	None specified for transmission line	Effects determination same as above. Effects of Increased open or total roads resulting from construction would be offset by road access changes associated with the mine.
Additional temporary displacement effects on grizzly bears due to helicopter use in currently affected habitat	Acres in areas where influence zones of existing disturbance and new disturbance overlap	N/A - all roads included in helicopter. construction influence zone	5,180	N/A	Transmission line construction on National Forest System and State lands limited to between June 16 and October 14, minimizing disturbance on grizzly bear spring use (April 1-June 15) and denning (December 1-March 31) seasons	Effects determination same as above. See displacement and effects to seasonal habitat discussion in grizzly bear section
New temporary displacement effects on grizzly bears due to helicopter use in currently undisturbed habitat	Acres in influence zone of new disturbance only	N/A - all roads included in helicopter. construction influence zone	5,171	N/A	Transmission line construction on National Forest System and State lands limited to between June 16 and October 14	Effects determination same as above. See displacement and effects to seasonal habitat discussion in grizzly bear section

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
Clearing of lynx overall habitat	Acres in clearing width and width of new and high-upgrade roads	Included in clearing width impacts	107	N/A	Fund habitat enhancement on lynx stem exclusion habitat at 2:1 ratio. Potential benefits to lynx from other mitigation, including Vegetation Removal and Disposition plan to minimize vegetation removal within corridor, land acquisitions for grizzly bear and other grizzly bear and big game timing mitigation.	Combined mine-transmission line may affect but not likely to adversely affect Canada lynx. Lynx habitat would be improved with habitat enhancement in stem exclusion habitat and vegetation retained in the transmission line corridor would provide hiding cover allowing for lynx movement
Occupied bull trout habitat	Acres in clearing width and width of new and high-upgrade roads in watersheds with occupied bull trout habitat	Included in clearing width impacts	70	N/A	Same as bull trout critical habitat above.	May affect, and likely to adversely affect bull trout
f. National historic landmarks, districts, or sites	# of sites	Included in transmission line analysis buffer	0	N/A	N/A	No effect
g. Eligible or recommended eligible historic landmarks, districts, or sites	# of sites	Included in transmission line analysis buffer	11	N/A	Review and consultation with the SHPO to receive consensus determinations and to develop a plan of action for site 24LN1818. Additional fieldwork may be necessary prior to SHPO consultation.	Because there would be no direct effects, a determination of no adverse effect may be achieved through SHPO consultation.
h. Municipal watersheds	N/A	N/A	No effect	No effect	N/A	No effect
i. FWP Class I or II streams or rivers	Acres in clearing width within watershed of affected streams	Acres of roads within watershed of affected streams	47	<1	Same as described above for "occupied bull trout habitat" and below for "severe erosion risk".	Minor short-term increases and long-term decreases in sediment

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
j. 303(d) listed impaired streams	Acres in clearing width within watershed of affected streams	Acres of roads within watershed of affected streams	34	<1	Same as described above for "occupied bull trout habitat" and below for "severe erosion risk".	Minor short-term increases and long-term decreases in sediment
k. Highly erodible soils/reclamation constraints						
Severe erosion risk	Miles of centerline	Acres of roads	1.3	1.8	Erosion and sediment control BMPs; interim reclamation (replacing soil where it was removed and reseeding) of access roads ; immediate stabilization of cut-and-fill slopes; seeding, application of fertilizer, and stabilization of road cut-and-fill slopes and other disturbances along roads as soon as final grades post-construction grades are achieved; at the end of operations, decommissioning of new roads and reclamation of most other currently existing roads to pre-operational conditions; ripping of compacted soils prior to soil placement, and disking and harrowing of seedbeds; development and implementation of a Road Management Plan; where feasible, soil salvage in 2 lifts; after removal of transmission line, soil salvage before reclamation of decommissioned roads. Additional measures described above for "bull trout occupied habitat."	Minor losses of soil until re-establishment of vegetation.
High sediment delivery	Miles of centerline	Acres of roads	0.5	0.6	Same as for erosion risk above	Minor contributions of sediment until re-establishment of vegetation
l. Compatibility with visual management plans/regulations						
Compatibility with visual management plans	Yes/No	Yes/No	Yes	Yes	Forest Plan amendment	In compliance
Indirect visual impacts to the CMW	Acres within CWA from which transmission line can be seen	N/A	1,360	N/A	none	No effect on wilderness attributes
m. Winter habitat for elk, deer, moose, pronghorn, mountain goat or bighorn sheep						

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
elk	Acres in clearing width and width of new and high-upgrade roads	Included in clearing width impacts	128	N/A	Potential benefits to elk from land acquisitions and road access changes for grizzly bear and big game mitigation. No transmission line construction between December 1 to April 30. Exemptions to these timing restrictions may be granted by DEQ and FS in writing if MMC can clearly demonstrate that no significant environmental impacts would occur.	Minor effects
white-tailed deer	Acres in clearing width and width of new and high-upgrade roads	Included in clearing width impacts	144	N/A	Same as described above for elk	Minor effects
moose	Acres in clearing width and width of new and high-upgrade roads	Included in clearing width impacts	266	N/A	Same as described above for elk	Minor effects
goat	Acres in clearing width and width of new and high-upgrade roads	Included in clearing width impacts	0	N/A	Same as described above for elk	
n. Elk security areas clearing in elk security	Acres of security habitat in clearing width	Included in clearing width impacts	11	N/A	Security habitat may be created through road access changes that may occur on land acquired as part of the grizzly bear mitigation..	Minor effects
o. Occupied mountain goat habitat physically impacted	Acres in clearing width	Included in clearing width impacts	0	N/A	Potential benefits to mountain goat from land acquisitions and road access changes for grizzly bear and big game mitigation.	Minor effects
construction displacement effects	Acres in 1-mile helicopter influence zone	N/A - all roads included in heli. const. influence zone	766	N/A	Potential benefits to mountain goat from land acquisitions and road access changes for grizzly bear and big game mitigation.	Minor effects
p. Sage and sharp-tailed grouse breeding areas and winter range	N/A	N/A	No effect	No effect	N/A	No effect
q. High waterfowl population areas	N/A	N/A	No effect	No effect	N/A	No effect
r. Areas of unusual scientific, educational, or recreational significance	N/A	N/A	No effect	No effect	N/A	No effect

Criteria	Transmission Line Unit of Measure	Access Road Unit of Measure	Transmission Line	Access Roads	Mitigation	Effect After Mitigation
s. Areas with high probability of including significant paleontological resources	N/A	N/A	No effect	No effect	N/A	No effect
t. Sites with religious or heritage significance/ value to Indians	# sites	#sites	No sites identified	No sites identified	Ongoing tribal consultation	To be determined during consultation
u. Water bodies	N/A	N/A	No effect	No effect	N/A	No effect
v. Potable surface water supplies	N/A	N/A	No effect	No effect	N/A	No effect
w. Active faults (for substation)	N/A	N/A	No effect	No effect	N/A	No effect

5. The location of the transmission line selected by DEQ does not cross any of the following areas: national primitive areas; national wildlife refuges and ranges; state wildlife management areas and wildlife habitat protection areas; national parks and monuments; state parks; national recreation areas; designated or eligible wild and scenic river systems; roadless areas greater than 5,000 acres; specifically managed buffer areas; state or federal waterfowl production areas; designated natural areas; municipal watersheds; sage and sharp-tailed grouse breeding areas and winter range; high waterfowl population areas; areas of unusual scientific, educational, or recreational significance; areas of high probability of including significant paleontological resources; water bodies; potable surface water supplies, or active faults.

6. While the transmission line as located by DEQ will not directly affect the wilderness attributes of the CMW, it will have indirect affects as discussed below under Scenic Quality.

7. The transmission line as located by DEQ will have an effect on critical habitat for federally threatened and endangered (T&E) species. The Fisher River, West Fisher Creek, Libby Creek, and Ramsey Creek in the transmission line analysis area provide habitat for bull trout, which is listed as threatened under the ESA. Bull trout could be affected by increased sedimentation caused by clearing, road construction, and other disturbance associated with the transmission line.

The transmission line may affect bull trout and designated critical habitat. The line will cross designated bull trout critical habitat in West Fisher Creek and Libby Creek, and 25 structures will be within one mile of bull trout critical habitat. Road construction and upgrades will disturb four acres within one mile of bull trout critical habitat.

Three Montana fish species of concern are found in the transmission line analysis area streams: interior redband trout, torrent sculpin, and westslope cutthroat trout. Pure populations of interior redband trout are found in the Fisher River, West Fisher Creek, Ramsey Creek, a short segment of Libby Creek below Ramsey Creek, and Midas Creek. Torrent sculpin are found in Libby Creek and Miller Creek. Both torrent and slimy sculpin are found in analysis area streams and cannot be readily identified based on external morphology. Westslope cutthroat trout are found in Howard Creek and Miller Creek. Fish species of concern also are found in Midas Creek and Standard Creek. The transmission line will have only minor disturbance in these watersheds, which is unlikely to affect aquatic life. The transmission line will not likely contribute to a trend toward federal listing of interior redband trout or westslope cutthroat trout.

In addition to mitigation measures described above to minimize erosion and sediment delivery, MMC will implement a Storm Water Pollution Prevention Plan and structural and nonstructural BMPs, construct stream crossings per KNF and DEQ requirements, minimize disturbance on active floodplains, and curtail construction activities during heavy rains. Also, where feasible, structures will be located outside of riparian areas, new culverts will be installed to allow fish passage, stream crossing structures will be designed to withstand a 100-year flow event, and in Libby Creek, a habitat inventory will be completed and instream structures will be developed. Based on the use of BMPs, Environmental Specifications, and other design criteria, sediment increases will have minimal effects on analysis area streams under most conditions.

8. The transmission line as located by DEQ will have an effect on seasonally occupied habitat for state and federal T&E species.

Grizzly Bear

The physical loss of grizzly bear habitat due to the transmission line will be low, primarily from construction of roads and the Sedlak Park Substation. Most impacts on grizzly bear habitat in the clearing area will be temporary because disturbed habitat will be reclaimed and revegetated after the transmission line is built. Some of the coniferous forest in the clearing area will be converted to grassland or shrubland in the long term.

The transmission line will temporarily increase displacement effects on bears both inside and outside the Grizzly Bear Recovery Zone. Some areas in the zone of influence of transmission line activities are currently being affected by other activities, such as road use or activities on private land. Within the Grizzly Bear Recovery Zone, potential short-term, new displacement effects will occur on 4,377 acres of grizzly bear habitat, and short-term, additional displacement effects will occur on 4,604 acres in the recovery zone. Outside of the Grizzly Bear Recovery Zone, potential short-term, new displacement effects will occur on 794 acres of grizzly bear habitat, and short-term, additional displacement effects will occur on 588 acres in the recovery zone. Increased displacement will be primarily due to helicopter activity. Helicopters will be used for line stringing, which will last about 10 days, and for vegetation clearing and structure construction in some segments, prolonging disturbance for up to 2 months. Disturbance also will occur for about 2 months during other transmission line construction activities in areas where helicopters are not used. Except for annual inspection and infrequent maintenance operations, helicopter use and other transmission line construction activities will cease after the transmission line is built until decommissioning. Helicopter use and other transmission line construction activities will cause similar disturbances with similar durations during line decommissioning. Transmission line displacement effects will be minimized through implementation of helicopter construction timing restrictions: all transmission line construction, reclamation, and removal in the Cabinet-Yaak Recovery Zone and Cabinet Face BORZ must occur between June 16 and October 14. The effects on the grizzly bear also will be mitigated through habitat acquisition, access changes, and habitat enhancement.

The transmission line will require an access change in NFS road #4725 that will enlarge a block of core habitat in the northeast portion of BMU 6. The access change will be in the entire length of NFS road #4725 and will be implemented before transmission line construction starts.

Canada Lynx

Construction of the transmission line may affect the Canada lynx, but will comply with Northern Rockies Lynx Management Direction objectives, standards, and guidelines. Overall lynx habitat disturbed in the transmission line clearing area or for road construction or improvement will be 107 acres. Impacts on currently suitable lynx habitat will be offset through enhancement of 214 acres of lynx stem exclusion habitat. Land acquired for grizzly bear mitigation for the transmission line will likely improve habitat conditions for lynx and their prey.

Bull Trout

The transmission line will disturb 70 acres in watersheds of occupied bull trout streams. Effects on bull trout will be mitigated through implementation of the USFWS' terms and conditions in their Biological Opinion.

9. The transmission line corridor will cross cultural sites eligible or recommended eligible for the NRHP (see *Cultural Resources* section above). All historic properties will either be avoided or mitigated in consultation with the SHPO. One site is a portion of US 2 that crosses the transmission line corridor; this segment has not been evaluated for the NRHP. Consultation with the SHPO will be conducted to receive consensus determinations and to develop a plan of action for this portion of US 2. Sites identified on state land will be coordinated with the Montana Department of Natural Resources and Conservation (DNRC). Additional fieldwork will be necessary before SHPO consultation takes place.

10. Libby Creek and Howard Creek will be crossed by the transmission line. FWP rates both Libby Creek and Howard Creek as outstanding streams (Class 1 streams). Construction and decommissioning of the transmission line in the vicinity of these streams may result in increased sediment. MMC is required to follow the following measures to minimize impacts to these two Class I streams:

1. Implementation of a Storm Water Pollution Protection Plan (SWPPP) best management practices (BMPs);
2. Minimization of disturbance in active floodplains;
3. Curtailment of construction activities during heavy precipitation events;
4. Avoidance of highly erosive soils;
5. Location of structures outside of riparian areas if feasible; and
6. Helicopter construction in grizzly bear habitat to decrease the number of access roads in the watershed.

No Class II streams are found in the area. Road construction and improvement will disturb less than 1 acre. The transmission line will have only minor disturbance in these watersheds, which is unlikely to affect aquatic life.

11. Two segments of Libby Creek and one segment of the Fisher River are on Montana's 2014 list of impaired streams. Vegetation clearing and road construction for the transmission line will impact 34 acres within the watersheds of these streams (21 acres in the Fisher River watershed and 13 acres in the Libby Creek watershed). Road construction and improvement will disturb less than 1 acre. Libby Creek will be crossed by the transmission line. Construction and decommissioning of the transmission line in the vicinity of Libby Creek may result in increased sediment. The following measures would be applied to minimize impacts to this stream: implementation of a Storm Water Pollution Plan, BMPs; minimization of disturbance on active floodplains; curtailment of construction activities during heavy precipitation events; avoidance of highly erosive

soils; the location of structures outside of riparian areas if feasible; and helicopter construction in grizzly bear habitat to decrease the number of access roads in the watershed. The transmission line will have only minor disturbance in these watersheds, which is unlikely to affect aquatic life.

12. The transmission line will not be designed and implemented in accordance with 2015 KFP guidelines FW-GDL-AR-01 and MA6-GDL-AR-05 (see Preferred Location Criteria, subsection j.) The KNF will adopt a project-specific amendment for the transmission line, allowing segments of the transmission line to vary from the mapped scenic integrity objective for the life of the project. Design features cannot be applied to the project to achieve the mapped scenic integrity objective. The amendment would apply to National Forest System lands affected by the Montanore Project facilities, and would not apply to State or private lands. No visual regulatory requirements apply to BPA's Sedlak Park Substation and loop line, which would be on private land.

13. The transmission line will disturb winter habitat for moose, elk, and white-tailed deer; and security habitat for elk. Impacts on big game winter habitat will be mitigated through winter construction timing restrictions in elk, white-tailed deer, or moose winter range. Land acquisition programs, especially where roads could be closed, also will mitigate impacts on big game. Additional mitigation measures include creating security habitat through road access changes and monitoring road-killed animals to determine if improved access results in increased wildlife mortality.

14. Helicopter use and other transmission line construction activities associated with the transmission line alternatives (described above for the *Grizzly Bear*) could temporarily displace goats from suitable habitat or reduce their ability to effectively use the available habitat in the short term. Individual goats could suffer increased stress levels from helicopter and construction disturbance. Impacts on mountain goats will be reduced through land acquisition programs, if the acquired land provides suitable goat habitat and can be managed to benefit mountain goats.

15. The transmission line will cross 6.4 miles with slopes greater than 30 percent and will cross 0.5 mile of soils with potential high sediment delivery. New access roads for the transmission line will cross 7.9 miles with slopes greater than 30 percent.

To minimize erosion risk and sediment delivery, the following mitigations were proposed by MMC and will be required by DEQ: erosion and sediment control BMPs; interim reclamation (replacing soil where it is removed and reseeding) of access roads; immediately stabilizing cut-and-fill slopes; seeding, applying fertilizer and stabilizing road cut-and-fill slopes and other disturbances along roads as soon as final post-construction grades were achieved; at the end of operations, decommissioning new roads and reclaiming most other currently existing roads to pre-operational conditions; ripping compacted soils before soil placement; and disking and harrowing seedbeds.

In addition, DEQ and KNF require the following mitigations: rerouting to avoid highly erosive soils; using H-frame poles, allowing longer spans, and fewer structures and

access roads; using helicopter construction in grizzly bear core habitat to decrease the number of access roads; and implementing a Road Management Plan.

With implementation of mitigation measures, there will be no significant adverse impacts on the soil resources, and the soil losses along access roads will likely be minor until vegetation is reestablished in most areas after 3 to 5 years. Vegetation reestablishment on steep areas, particularly on south- and west-facing slopes, could take longer.

16. No sites with religious or heritage significance have been identified in the transmission line corridor, and tribal consultation is ongoing.

D. Location of Transmission Line Underground

DEQ considered locating the transmission line underground. Underground transmission lines typically have less clearing and do not have the visual impact of the transmission lines and structures. Underground transmission lines typically have significantly fewer faults, fewer voltage sags, and fewer short- and long-duration interruptions. Traditional overhead circuits typically fault about 90 times per 100 miles per year; underground circuits fail less than 10 or 20 times per 100 miles per year. Because overhead circuits have more faults, they cause more voltage sags, more momentary interruptions, and more long-duration interruptions.

Locating the line underground would require proximity to an access road for the entire length of the line. Consequently, the option chosen for analysis was generally the alignment of Alternative E-R, West Fisher Creek. The line would not follow the overhead line alignment exactly, but would be adjacent to US 2 and NFS road #231. This alignment would allow easy access for construction and maintenance. The line would start at the Sedlak Park Substation. Two voltages would be feasible for an underground line, 230 kV and 115 kV. Both voltages would be solid dielectric, cross-linked polyethylene, insulated cable in duct banks encased in concrete. Multiple underground cable splicing vaults with access manholes would be required along the route. Generally, the vaults would be required every 1,000 feet. Aboveground to overhead line termination points would be necessary at the Sedlak Park Substation and at the Libby Plant Site. The duct bank would have four 5-inch to 8-inch conduits with a cable in each conduit. One conduit would be a spare conduit and cable for reliability of service in case of a cable failure.

Considerable disturbance would be necessary for construction due to the size of the cable trench and the cable splicing vaults. Trenches are 5 feet deep and vaults are 8 feet high, 10 feet wide, and 20 to 30 feet long. The line would be about 20 miles long.

For the 230-kV option, the proposed Sedlak Park Substation would stay essentially the same except for the addition of a cable termination system. This could increase the substation cost by 15 percent. The construction cost for the installation would be \$3 million per mile or \$60 million total. For the 115-kV option, the proposed Sedlak Park Substation would require a voltage step-down transformer, which would increase the substation construction area, require additional facilities and equipment, and require a termination system. The substation costs would increase by about 60 percent for the 115-kV cable option. The construction cost for the cable installation would be \$2 million per mile or \$40 million total. The agencies eliminated underground installation as an alternative because of the cost.

E. Consistency with Regional Plans for Expansion

The transmission line will allow the mine to connect to the regional electrical transmission grid. While there is no single formal published plan for expansion of the regional grid, the line will be consistent with plans for expansion of the BPA grid in the area. The line will not significantly add to the ability of the grid as a whole to deliver electricity because the purpose of the line is to serve only the mine loads. The BPA completed the studies necessary to interconnect the proposed line to BPA's Libby-Noxon 230-kV line. BPA's study indicated the proposed line will not have a significant effect on the interconnected system.

F. Utility System Economy and Reliability

BPA completed a study indicating the proposed interconnection will not adversely affect BPA's system. Operating the proposed line at 230 kV will help ensure low line losses.

G. Conformance with Applicable State and Local Laws

The location of the facility will conform to applicable state and local laws and regulations either as a permitting or certification condition, or in compliance with project-specific Environmental Specifications.

H. Public Interest, Convenience, and Necessity

The proposed transmission line will be built to meet the need for additional transfer capacity to the mine. Benefits to MMI will be the monetary profit from operating the mine and transmission line. Benefits to the state include local tax revenues to counties in which the line and mine are located, state tax revenues from the line and mine, a short-term beneficial effect on local economies from construction of the line and mine, and a long-term beneficial effect on local economies from maintenance of the line.

Economic impacts due to the proposed transmission line will be minimal at a state level. Construction benefits due to the line will be short-term. Line maintenance employment benefits and tax benefits will be long-term but small at both a county and state level. The total costs include mine and transmission line construction, and operation costs and other costs due to environmental impacts are described in Chapter 3 of the Joint Final EIS. The costs of these environmental impacts cannot be reasonably quantified in monetary terms.

The proposed transmission line is unlikely to have adverse effects on public health, welfare, and safety because the line will conform to the requirements of the National Electrical Safety Code and DEQ standards for electric field strength in residential or subdivided areas and at road crossings. Sensitive receptors such as residences will be located at distances sufficient that even the most restrictive suggested standards for magnetic fields will be met under normal operating conditions. The transmission line will be constructed in a manner that minimizes adverse impacts on soil, water, and aquatic resources.

I. Air and Water Quality Decisions, Opinions, Orders, and Certifications

As appropriate, the DEQ will issue all necessary environmental permits (except for the 401 water quality certification) for the transmission line at the time the decision is made on whether to grant a certificate for the facility. The 401 water quality certification will be issued just prior to the U.S. Army Corps of Engineers' issuance of a 404 permit for the project. If the DEQ issues a 401 certification on the 404 permit, DEQ may add conditions to the Section 404 permit, if necessary, to ensure that state water quality standards are met.

J. Public and Private Lands

The use of public lands for location of the facility was evaluated, and public lands were incorporated into alternatives whenever their use was as economically practicable as the use of private lands (75-20-301(1)(h), MCA). The transmission line will be primarily on NFS lands and private land owned by Plum Creek.

Conditional Approval

DEQ's finding of need for the transmission line is conditioned on MMC obtaining approval of amendments to Operating Permit No. 00150 pertaining to the Construction, Operation and Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the federal approval of the Montanore Project. Therefore, DEQ's approval of Alternative D-R Miller Creek Transmission Line Alternative is conditioned on MMC obtaining DEQ approval of said amendments.

Conditions

A. Time Limits

Unless extended pursuant to Section 75-20-303, MCA, construction of the transmission line must be completed within five years of the date MMC obtains DEQ's approval of amendments to Operating Permit NO. 00150 pertaining to the Construction, Operation, and Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the federal approval of the Montanore Project.

B. Monitoring Expenses

Pursuant to Section 75-20-402, MCA, MMI shall pay all expenses related to the monitoring plan contained in the environmental specifications.

Certificate of Compliance

Pursuant to Section 75-20-301, MCA, DEQ certifies that the design, location, construction, operation, maintenance, and decommissioning of the Montanore Project transmission line, in conformance with the provisions set forth herein, complies with the requirements of the Major Facility Siting Act. All terms, conditions, and modifications set forth above are enforceable provisions of the certificate.

Dated this 12th day of February, 2016.



Tom Livers
Director
Montana Department of Environmental Quality




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Spokane, WA 99201
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AGREEMENT TO COMPLY

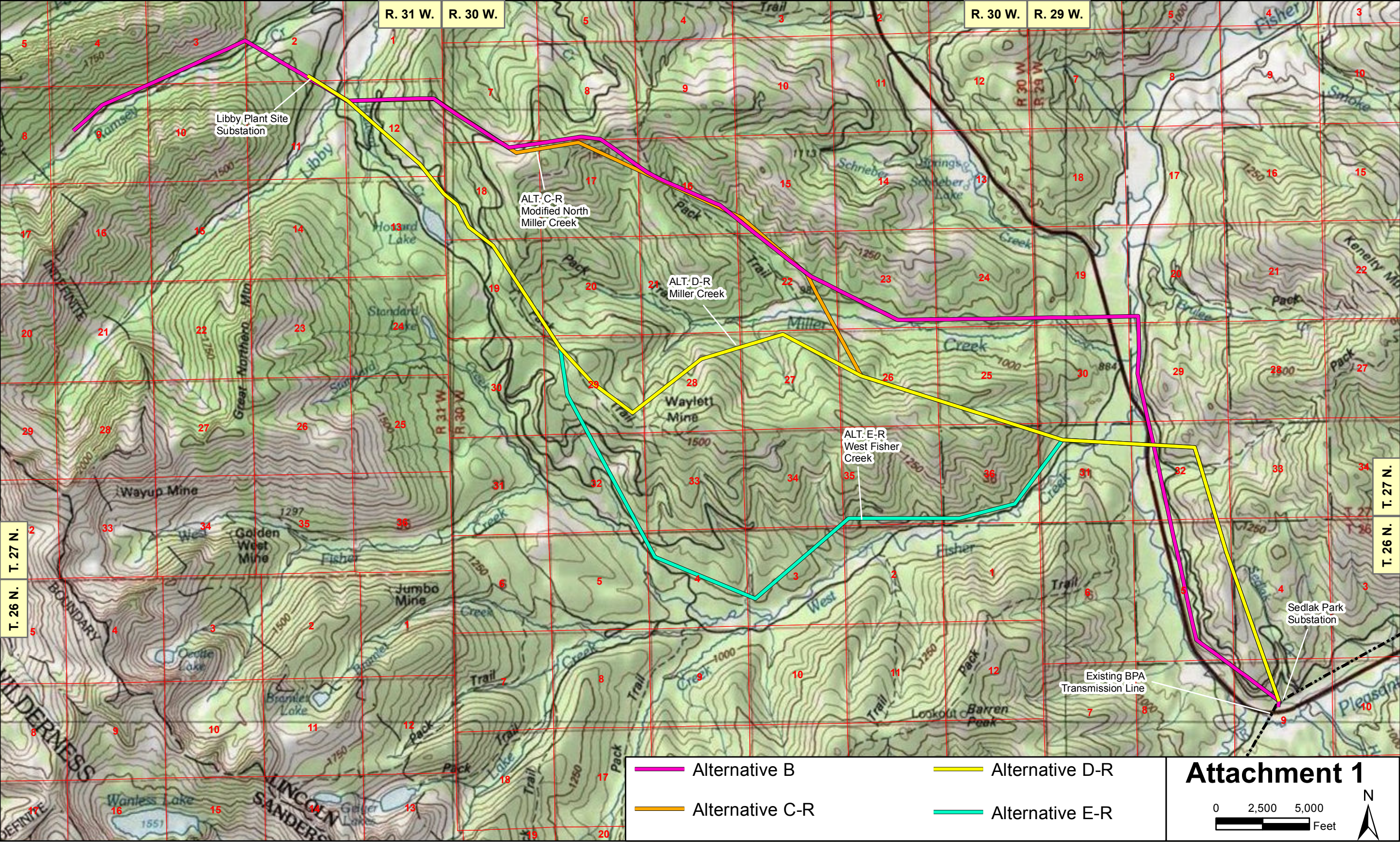
We, the undersigned Applicants for a Certificate of Compliance for the proposed Mines Management, Inc. 230-kV Transmission Line agree, as a condition subsequent to the issuance of the Certificate, to comply fully and completely with the requirements of the Major Facility Siting Act set forth in Section 75-20-101, *et. seq.*, M.C.A., and the conditions of the Certificate of Compliance.

MINES MANAGEMENT, INC.

BY 
Glenn M. Dobbs
Chief Executive Officer

DATED 4/4/18

Attachment 1 – Transmission Line Alternatives



Attachment 2 – Environmental Specifications

STATE OF MONTANA/USDA FOREST SERVICE
ENVIRONMENTAL SPECIFICATIONS FOR
MONTANORE 230-KV TRANSMISSION LINE

Contents

INTRODUCTION	5
0.0. GENERAL SPECIFICATIONS	6
0.1. SCOPE	6
0.2. ENVIRONMENTAL PROTECTION	6
0.3. CONTRACT DOCUMENTS	6
0.4. BRIEFING OF EMPLOYEES.....	6
0.5. COMPLIANCE WITH REGULATIONS	7
0.6. LIMITS OF LIABILITY	7
0.7. DESIGNATION OF SENSITIVE AREAS	7
0.8. PERFORMANCE BONDS.....	7
0.9. DESIGNATION OF STRUCTURES.....	8
0.10. ACCESS	8
0.11. DESIGNATION OF STATE INSPECTOR AND KNF INSPECTOR.....	8
1.0. PRECONSTRUCTION PLANNING AND COORDINATION.....	8
1.1. PLANNING	8
1.2. PRECONSTRUCTION CONFERENCE	9
1.3. PUBLIC CONTACT	10
1.4. PRECONSTRUCTION SURVEYS	10
2.0. CONSTRUCTION.....	11
2.1. GENERAL	11
2.2. CONSTRUCTION MONITORING	12
2.3. TIMING OF CONSTRUCTION	13
2.4. PUBLIC SAFETY	13
2.5. PROTECTION OF PROPERTY	14
2.6. TRAFFIC CONTROL	15
2.7. ACCESS ROADS AND VEHICLE MOVEMENT	16
2.8. EQUIPMENT OPERATION.....	17
2.9. RIGHT-OF-WAY CLEARING AND SITE PREPARATION	18
2.10. GROUNDING	20
2.11. EROSION AND SEDIMENT CONTROL.....	20

2.12. CULTURAL AND PALEONTOLOGIC RESOURCES	22
2.13. PREVENTION AND CONTROL OF FIRES	22
2.14. WASTE DISPOSAL.....	23
2.15. SPECIAL MEASURES	24
3.0. POST-CONSTRUCTION CLEANUP AND RECLAMATION	24
3.1. CLEANUP	24
3.2. RECLAMATION	25
3.3. MONITORING CONSTRUCTION AND RECLAMATION ACTIVITIES	26
4.0. OPERATION AND MAINTENANCE.....	27
4.1. RIGHT-OF-WAY MANAGEMENT	27
4.2. MAINTENANCE INSPECTIONS.....	27
4.3. CORRECTION OF LANDOWNER PROBLEMS	27
4.4. HERBICIDES AND WEED CONTROL	28
4.5. CONTINUED MONITORING.....	28
5.0. ABANDONMENT, DECOMMISSIONING AND RECLAMATION FOLLOWING DECOMMISSIONING.....	29
APPENDICES	30
Appendix A: Sensitive Areas for the Montanore Project.	30
Appendix B: Performance Bond Specifications.....	32
Appendix C: Name and Address of Inspectors and Owner's Liaison.....	32
Appendix D: Road Management Plan	32
Appendix E: Cultural Resources Protection and Mitigation Plan.....	34
Appendix F: Vegetation Removal and Disposition Plan	34
Appendix G: Variations in Right-of-Way Width	34
Appendix H: Monitoring Plan	34
Appendix I: Areas Where Construction Timing Restrictions Apply	35
Appendix J: Aeronautical Hazard Markings	36
Appendix K: Weed Control Plan.....	37
Appendix L: Fire Prevention Plan.....	37
Appendix M: Reclamation and Revegetation Plan	37
Appendix N: Abandoning and Decommissioning Plan.....	37

DEFINITIONS

ACCESS EASEMENT:	Any land area over which the OWNER has received an easement from a LANDOWNER allowing travel to and from the project. Access easements may or may not include access roads.
ACCESS ROAD:	Any travel course which is constructed by substantial recontouring of land and which is intended to permit passage by most four-wheeled vehicles.
ARM:	Administrative Rules of Montana
BEGINNING OF CONSTRUCTION:	Any project-related earthmoving or removal of vegetation (except for clearing of survey lines).
BOARD:	Montana Board of Environmental Review
CERTIFICATE:	Certificate of Compliance
CFR:	Code of Federal Regulations
CONTRACTOR:	Constructors of the Facility (agent of owner)
DAY:	Monday through Friday, excluding all state or federal holidays
DEQ:	Montana Department of Environmental Quality
DNRC:	Montana Department of Natural Resources and Conservation
FWP:	Montana Fish, Wildlife, and Parks
FS:	United States Department of Agriculture, Forest Service
INSPECTORS:	DEQ or KNF employee or their designee charged with inspecting the transmission line for compliance with the Environmental Specifications.
KNF:	Kootenai National Forest
KNF INSPECTOR:	KNF employee or designee charged with inspecting the transmission line for compliance with the KNF requirements.
LANDOWNER:	The owner of private property
MCA:	Montana Code Annotated

MDT:	Montana Department of Transportation
NFSL:	National Forest System Lands
OWNER:	The owner(s) of the facility, or the owner's agent.
ROD:	Record of Decision
SENSITIVE AREA:	Area which exhibits environmental characteristics that may make them susceptible to impact from construction of a transmission facility. The extent of these areas is defined for each project and may include any of the areas listed in Circular MFSA-2 (2004 Edition), Sections 3.2(1)(d) and 3.4(1).
SHPO:	State Historic Preservation Office
STATE SPECIAL: USE SITES	All locations other than structure locations and roads needed for the construction, operation, and decommissioning of the transmission line, and shall include, staging areas, helicopter landing and fueling sites, pulling and tensioning sites, stockpile sites, splicing sites, borrow pits, and storage or other building sites.
STATE INSPECTOR:	DEQ employee or DEQ's designee with the responsibility for monitoring the OWNER's contractor compliance with terms and conditions of the CERTIFICATE issued for the Project.

INTRODUCTION

The purpose of these specifications is to ensure the prevention or mitigation of potential environmental impacts during the construction and interim reclamation of the 230-kV transmission facility associated with the proposed Montanore Project. These specifications do not apply to the Sedlak Park substation, loop line, buried 34.5-kV powerline associated with the Montanore Mine, or to the mine itself. All other mine-related disturbances are covered by a Montana Department of Environmental Quality (DEQ) hard rock operating permit and Forest Service (FS) Plan of Operations. These specifications vary from those typically prepared by DEQ for other transmission line facilities because the specifications also incorporate FS requirements. These specifications are intended to be incorporated into the texts of contracts, plans, Plan of Operations, and specifications.

Decommissioning of the transmission line will be covered by the final reclamation and closure plan described in Appendix N at the end of this document.

Authority to determine compliance of the proposal facility with state and federal requirements for air and water quality standards, lies with the respective agencies. State laws for the protection of employees engaged in the construction, operation on maintenance of the proposal facility also remain in effect (Section 75-20-401, MCA).

Appendices at the end of these specifications refer to individual topics of concern and to site-specific concerns. Certain of these Appendices, shall be prepared by the OWNER working in consultation with DEQ and FS prior to the start of construction and submitted for approval by the DEQ and FS.

0.0. GENERAL SPECIFICATIONS

0.1. SCOPE

These specifications apply to all lands affected by the 230-kV transmission line, excluding the Sedlak Substation and loop line and the 34.5-kV power line. As provided in ARM 17.20.1902 (10), the certificate holder may contract with the LANDOWNER for revegetation or reclamation if the LANDOWNER wants different reclamation standards from (10)(a) applied on the property and that not reclaiming to the standards specified in (10)(a) and (b) would not have adverse impacts on the public and other LANDOWNERS. Where the LANDOWNER requests practices other than those listed in these specifications, DEQ may authorize such a change provided that the STATE INSPECTOR is notified in writing of the change and that the change will not be in violation of: (1) the Certificate; (2) any conditions imposed by the DEQ; (3) the DEQ's finding of minimum adverse impact or (4) the regulations in ARM 17.20.1701 through 17.20.1706, 17.20.1901, and 17.20.1902.

On private land, these specifications shall be enforced by the STATE INSPECTOR. On NFSL, enforcement shall be the joint responsibility of the STATE INSPECTOR and the KNF INSPECTOR.

0.2. ENVIRONMENTAL PROTECTION

The OWNER shall conduct all operations in a manner to protect the quality of the environment.

0.3. CONTRACT DOCUMENTS

It is the OWNER'S responsibility to ensure compliance with these specifications. If appropriate, these specifications can be part of or incorporated into contract documents to ensure compliance; in any case, the OWNER is responsible for its agent's adherence to these specifications in performing the work.

0.4. BRIEFING OF EMPLOYEES

The OWNER shall ensure that the CONTRACTOR and all field supervisors are provided with a copy of these specifications and informed of the applicability of individual sections to specific procedures. It is the responsibility of the OWNER to ensure its CONTRACTOR and CONTRACTOR's Construction Supervisors comply with these measures. The OWNER'S Project Supervisor shall ensure all employees are informed of the applicable environmental specifications discussed herein prior to and during construction. Site-specific measures provided in the appendices attached hereto shall be incorporated into the design and construction specifications or other appropriate contract document. The OWNER shall have regular contact and site supervision to ensure compliance is maintained.

0.5. COMPLIANCE WITH REGULATIONS

All project-related activities of the OWNER shall comply with all applicable local, state, and federal laws, regulations, and requirements that are not superseded by the Major Facility Siting Act.

0.6. LIMITS OF LIABILITY

The OWNER is not responsible for correction of environmental damage or destruction of property caused by negligent acts of DEQ or FS employees during construction, operation maintenance, decommissioning, and reclamation of the proposal project.

0.7. DESIGNATION OF SENSITIVE AREAS

DEQ and FS, in their evaluation of the transmission line, have designated certain areas along the right-of-way or access roads as SENSITIVE AREAS as indicated in Appendix A. The OWNER shall take all necessary actions including the measures listed in Appendix A to avoid adverse impacts in these SENSITIVE AREAS.

0.8. PERFORMANCE BONDS

To ensure compliance with these specifications, prior to any ground disturbing activity, the OWNER shall submit a joint transmission line construction and reclamation bond to DEQ and FS pertaining specifically to the reclamation of designated access roads, special use areas, and adjacent land disturbed during construction (Appendix B). The transmission line construction and reclamation bond shall be held to ensure cleanup and construction reclamation are complete and revegetation is proceeding satisfactory. At the time cleanup and construction reclamation are complete and revegetation is proceeding satisfactory, the OWNER shall be released from its obligation for transmission line construction reclamation and the transmission line construction and reclamation bond shall be released.

Concurrently, the OWNER shall submit a separate joint transmission line decommissioning bond to the DEQ and FS pertaining specifically to monitoring, decommissioning of the transmission line and reclamation following decommissioning. The joint decommissioning bond shall be subject to the FS and DEQ bond release provisions as outlined in the Reclamation Plan approved by the FS and DEQ. The approved Reclamation Plan shall contain reclamation standards as stringent as those found in ARM 17.20.1902(10).

DEQ's issuance of the Certificate of Compliance for the transmission line is conditioned upon the OWNER obtaining DEQ's approval of amendments for the Construction, Operation, Closure and Post-Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the FS's approval of Alternative 3- Agency Mitigated Poorman Impoundment

Alternative. DEQ and the FS will calculate the amount of the joint transmission line construction and reclamation bond and the joint decommissioning bond within 45 days after DEQ's approval of amendments to Operating Permit No. 00150 for the Construction, Operation, Closure and Post Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the FS's approval of Alternative 3- Agency Mitigated Poorman Impoundment Alternative.

0.9. DESIGNATION OF STRUCTURES

Each structure for the transmission line shall be designated by a unique number on plan and profile maps and referenced consistently. Any reference to specific poles or structures in the Appendices shall use these numbers. If this information is not available because the survey is not complete, station numbers or mileposts shall indicate locations along the centerline. Station numbers or mileposts of all angle points shall be designated on plan and profile maps.

0.10. ACCESS

When easements for construction access are obtained for construction personnel, provision shall be made by the OWNER to ensure that DEQ will be allowed access to the special use areas, right-of-way, and to any off-right-of-way access roads. Where such easements are obtained on private land to provide access to NFSL, such provisions shall also be made for the KNF INSPECTOR. Liability for damage caused by providing such access for the STATE INSPECTOR or KNF INSPECTOR shall be limited by section 0.6 LIMITS OF LIABILITY.

0.11. DESIGNATION OF STATE INSPECTOR AND KNF INSPECTOR

DEQ shall designate a STATE INSPECTOR(S) to monitor the OWNER'S compliance with these specifications and any other project-specific mitigation measures adopted by DEQ as provided in ARM 17.20.1901 through 17.20.1902. The FS shall designate a KNF INSPECTOR(S) to monitor the OWNER'S compliance with the Plan of Operations for activities on NFSL. The STATE INSPECTOR shall be the OWNER's liaison with the State of Montana on construction, post-construction, and construction reclamation activities for the certified transmission line on all lands. The KNF INSPECTOR and the STATE INSPECTOR shall coordinate lead roles for construction, post-construction, and reclamation activities for the certified transmission line on NFSL. All communications regarding the project shall be directed to the STATE INSPECTOR and on NFSL, to the KNF INSPECTOR and STATE INSPECTOR. The names of the INSPECTORS are in Appendix C.

1.0. PRECONSTRUCTION PLANNING AND COORDINATION

1.1. PLANNING

1.1.1. Planning of all stages of construction and maintenance activities is essential to ensure that construction-related impacts shall be kept to a minimum. The CONTRACTOR and OWNER shall, to the extent possible, plan the timing of construction, construction and maintenance access

requirements, location of special use areas, and other details before the commencement of construction.

1.1.2. At least 45 days before the start of construction, the OWNER shall submit plan and profile map(s), both on paper and an electronic equivalent agreed to by the DEQ and FS, to DEQ and the FS depicting the location of the centerline and of all construction access roads, maintenance access roads, structures, clearing back lines, operational right-of-way width, vehicle wash or cleaning stations specified by county Weed Control Plan, and, to the extent known, STATE SPECIAL USE SITES. The scale of the map shall be 1:24,000 or larger. Specifications and typical sections for construction and maintenance access roads shall be submitted with the plan and profile maps(s) and an electronic equivalent agreed to by the DEQ and FS. When these materials are submitted, access road locations shall have been flagged on the ground for review by the KNF and STATE INSPECTORS.

1.1.3. At least 45 days before the BEGINNING OF CONSTRUCTION, the OWNER shall submit a Road Management Plan to the FS and DEQ. This plan shall detail the specific location of all roads that need to be opened, constructed, or reconstructed. The OWNER must receive written approval of the plan from the FS and DEQ prior to gaining access on any closed road or beginning any surface disturbing activity. This plan, once approved, shall be incorporated into Appendix D.

1.1.4. If special use areas are not known at the time of submission of the plan and profile, the following information shall be submitted no later than 5 days prior to the BEGINNING OF CONSTRUCTION. The location of special use areas shall be plotted on one of the following and submitted to the KNF and STATE INSPECTORS: aerial imagery of a scale 1:24,000 or larger, or available USGS 7.5' plan and profile maps of a scale 1:24,000 or larger, and an electronic equivalent agreed to by the DEQ and FS.

1.1.5. Changes or updates to the information submitted in 1.1.2 through 1.1.4 shall be submitted within 10 days to the DEQ and FS for approval. In no case shall a change be submitted less than 5 days prior to its anticipated date of construction. Where changes affect designated SENSITIVE AREAS, these changes must be submitted to DEQ and FS 15 days before construction and approved by the STATE INSPECTOR on all lands and the KNF on FS lands prior to construction.

1.2. PRECONSTRUCTION CONFERENCE

1.2.1. At least one week before the BEGINNING OF CONSTRUCTION, the OWNER shall schedule a preconstruction conference with DEQ and the FS. The KNF and STATE INSPECTORS shall be notified of the date and location for this meeting.

1.2.2. The OWNER's representative, the CONTRACTOR's representative, the designated INSPECTORS, and representatives of affected state and federal agencies who have land management or permit and easement responsibilities shall be invited to attend the preconstruction conference.

1.3. PUBLIC CONTACT

1.3.1. Written notification by the OWNER's field representative or the CONTRACTOR shall be given to local public officials in each affected community prior to the BEGINNING OF CONSTRUCTION to provide information on the temporary increase in population, when the increase is expected, and where the workers will be stationed. If local officials require further information, the OWNER shall hold meetings to discuss potential temporary changes. Officials contacted shall include the county commissioners, city administrators, and law enforcement officials. It is also suggested that local fire departments, emergency service providers, and a representative of the Chamber of Commerce be contacted.

1.3.2. The OWNER shall negotiate with the LANDOWNER in determining the best location for access easements and the need for gates.

1.3.3. The OWNER shall contact local government officials, MDT, or the managing agency, as appropriate, regarding implementation of required traffic safety measures.

1.4. PRECONSTRUCTION SURVEYS

1.4.1. The Construction Phase will begin after OWNER submits final design plans to the agencies described in Section 1.1, and received agency approval to implement the Construction Phase. Before OWNER receives agency approval to implement the Construction Phase and any ground-disturbing activities occurs, Owner shall complete the surveys described below on all areas where such surveys have not been completed and that will be disturbed by the transmission line.

1.4.2. OWNER shall complete an intensive cultural resource inventory of the Area of Potential Effect that will meet the requirements of the 36 CFR 800, the guidelines in the 2009 FS and DEQ Site Inventory Strategy, and Montana SHPO. An intensive cultural resource inventory is a pedestrian survey with transects no more than 100 feet apart that covers the entire Area of Potential Effect. The adequacy of past intensive cultural resource inventories shall be decided by the FS and DEQ in consultation with the Montana SHPO. OWNER shall submit to the FS and DEQ an inventory report meeting Montana SHPO requirements. The report shall include eligibility for listing on the National Register of Historic Places recommendations for all identified historic properties. When an adverse effect to an eligible historic property is anticipated, OWNER may choose to redesign the project to avoid the property. If avoidance is not feasible, OWNER shall undertake actions to mitigate any adverse effect following the requirements of 36 CFR 800.6. A mitigation plan shall be developed by OWNER, reviewed by the FS and DEQ, reviewed by culturally affiliated tribes, and submitted to the SHPO and the Advisory Council on Historic Preservation for approval. OWNER will implement the approved mitigation plan and receive FS and DEQ concurrence of mitigation implementation before any ground-disturbing activities. In addition, the OWNER shall adhere to all provisions outlined in the Programmatic Agreement, and Tribal Monitoring Plan (Appendix E), if developed.

1.4.3. The OWNER shall complete a survey for threatened, endangered, or Forest sensitive plant species on NFSL for any areas where such surveys have not been completed and that will be disturbed by transmission line construction. Similarly, the OWNER, in coordination with the DNRC and LANDOWNER, shall conduct surveys in habitat suitable for threatened, endangered, and state-listed plant species potentially occurring on non-NFSL lands. The surveys shall be submitted to the DEQ and FS for approval. If adverse effects could not be avoided, OWNER shall develop appropriate mitigation plans for agency approval. OWNER shall implement the approved mitigation plan and receive FS and DEQ concurrence of mitigation implementation before any ground-disturbing activities.

1.4.4. The OWNER shall complete a jurisdictional wetland delineation of all areas proposed for ground disturbance associated with the transmission line, including all crossings of waters of the U.S. by roads. The delineation shall be submitted to the U.S. Army Corps of Engineers for a jurisdictional determination. If discharge of dredge or fill material into waters of the U.S. cannot be avoided, OWNER shall develop appropriate mitigation plans for Corps, FS, and DEQ approval. OWNER shall implement the approved mitigation plan and receive FS and DEQ concurrence of mitigation implementation before any ground-disturbing activities. All conditions associated with a 404 permit shall be incorporated into these specifications.

1.4.4. The OWNER shall either fund or conduct field and/or aerial reconnaissance surveys to locate any new bald eagle or osprey nests along specific segments of the transmission line corridor or implement timing restrictions listed in Appendix I. Surveys shall be conducted between March 15 and April 30, one nesting season immediately prior to transmission line construction.

2.0. CONSTRUCTION

2.1. GENERAL

2.1.1. The preservation of the natural landscape contours and environmental features shall be an important consideration in the location of all construction facilities, including roads and special use areas. Construction of these facilities shall be planned and conducted so as to minimize destruction, scarring, or defacing of the natural vegetation and landscape. Any necessary earthmoving shall be planned and designed to be as compatible as possible with natural landforms.

2.1.2. Temporary special use areas shall be the minimum size necessary to perform the work. Such areas shall be located where most environmentally compatible, considering slope, fragile soils or vegetation, and risk of erosion. After construction, these areas shall be reclaimed as specified in Section 3.0 of these specifications unless a specific exemption is authorized in writing by the STATE INSPECTOR. On NFSL, these areas shall be reclaimed as specified in Section 3.0 of these specifications unless a specific exemption is authorized in writing by the KNF and STATE INSPECTOR.

2.1.3. All work areas shall be maintained in a neat, clean, and sanitary condition at all times. Trash or construction debris (in addition to solid wastes described in section 2.14) shall be regularly removed during the construction and reclamation periods.

2.1.4. If mixing of soil horizons will lead to a significant reduction in soil productivity, difficulty in establishing permanent vegetation, or an increase in weeds, mixing of soil horizons shall be avoided insofar as possible. This may be done by removing and stockpiling topsoil, where practical, so that it may be spread over subsoil during site reclamation.

2.1.5. Vegetation such as trees, plants, shrubs, and grass on or adjacent to the right-of-way that does not interfere with the performance of construction work or operation of the line itself shall be preserved. The Vegetation Removal and Disposition Plan (Appendix F) shall identify the specific areas where vegetation will be removed or retained to minimize impacts from the construction and operation of the transmission line. This plan must be approved by the inspectors in their areas of jurisdiction prior to construction.

2.1.6. The OWNER shall take all necessary actions to avoid adverse impacts to SENSITIVE AREAS listed in Appendix A and implement the measures listed in Appendix A in these areas. The STATE INSPECTOR shall be notified 5 days in advance of initial clearing or construction activity in these areas. In addition the KNF INSPECTOR shall be notified 5 days in advance of initial clearing or construction activity on NFSL in these areas. The OWNER shall mark or flag the clearing backlines and limits of disturbance in certain SENSITIVE AREAS as designated in Appendix A. All construction activities must be conducted within this marked area.

2.1.7. The OWNER shall either acquire appropriate land rights or provide compensation for damage for the land area disturbed by construction. The width of the area disturbed by construction shall not exceed a reasonable distance from the centerline as necessary to perform the work. For this project, construction activities except access road construction and use of special use areas shall be contained within the area specified in Appendix G.

2.1.8. Flow in a stream course may not be permanently diverted. If temporary diversion is necessary for culvert installation, flow shall be restored immediately after culvert installation, as determined by the STATE INSPECTOR on all lands, and KNF INSPECTOR on NFSL.

2.2. CONSTRUCTION MONITORING

2.2.1. The STATE INSPECTOR is responsible for implementing the compliance monitoring required by ARM 17.20.1902. The STATE and KNF INSPECTORS are responsible for implementing the compliance monitoring on NFSL. The plan specifies the type of monitoring data and activities required and terms and schedules of monitoring data collection, and assigns responsibilities for data collection, inspection reporting, and other monitoring activities. It is attached as Appendix H.

2.2.2. The INSPECTORS, the OWNER, and the OWNER'S agents shall attempt to rely upon a cooperative working relationship to reconcile potential problems relating to construction in

SENSITIVE AREAS and compliance with these specifications. When construction activities cause excessive environmental impacts due to seasonal field conditions or damage to sensitive features, the designated INSPECTORS shall talk with the OWNER about possible mitigating measures or minor construction rescheduling to avoid these impacts and may impose additional mitigating measures. The INSPECTORS shall be prepared to provide the OWNER with written documentation of the reasons for the additional mitigating measures within 24 hours of their imposition. All parties shall attempt to adequately identify and address these areas and planned mitigation, to the extent practicable, during final design to minimize conflicts and delays during construction activities.

2.2.3. The INSPECTORS may require mitigating measures or procedures at some sites beyond those listed in Appendix A in order to minimize environmental damage due to unique circumstances that arise during construction, such as unanticipated discovery of a cultural site. The KNF INSPECTOR may require additional mitigating measures on NFSL. The INSPECTORS shall follow procedures described in the monitoring plan when such situations arise.

2.2.4. In the event that the STATE INSPECTOR shows reasonable cause that compliance with these specifications is not being achieved, and the OWNER has not taken reasonable efforts to remediate the situation, DEQ shall take corrective action as described in 75-20-408, MCA. In the event that the KNF INSPECTOR shows reasonable cause that compliance with these specifications is not being achieved, FS shall implement measures described in 36 CFR 228.7(b).

2.3. TIMING OF CONSTRUCTION

2.3.1. Construction and motorized travel may be restricted or prohibited at certain times of the year in certain areas. Exemptions to these timing restrictions may be granted by DEQ and FS in writing if the OWNER can clearly demonstrate that no significant environmental impacts will occur as a result. No waiver of winter range timing restrictions shall be approved on National Forest System or state trust lands where the grizzly bear mitigations apply. These areas are listed in Appendix I.

2.3.2. In order to prevent rutting and excessive damage to vegetation, construction shall not take place during periods of high soil moisture when construction vehicles will cause severe rutting deeper than four inches requiring extensive reclamation.

2.4. PUBLIC SAFETY

2.4.1. All construction activities shall be done in compliance with existing health and safety laws.

2.4.2. Requirements for aeronautical hazard marking shall be determined by the OWNER in consultation with the Montana Aeronautical Division, the Federal Aviation Administration the DEQ, and FS. These requirements are listed in Appendix J. Where required, aeronautical hazard

markings shall be installed at the time the wires are strung, according to the specifications listed in Appendix J.

2.4.3. Noise levels shall not exceed established DEQ standards as a result of operation of the facility and associated facilities. For electric transmission facilities, the average annual noise levels, as expressed by an A-weighted day-night scale (Ldn) shall not exceed 50 decibels at the edge of the right-of-way in residential and subdivided areas unless the affected LANDOWNER waives this condition.

2.4.4. The facility shall be designed, constructed, and operated to adhere to the National Electrical Safety Code regarding transmission lines.

2.4.5. The electric field at the edge of the right-of-way shall not exceed 1 kilovolt per meter measured 1 meter above the ground in residential or subdivided areas unless the affected LANDOWNER waives this condition, and that the electric field at road crossings under the facility shall not exceed 7 kilovolts per meter measured 1 meter above the ground.

2.5. PROTECTION OF PROPERTY

2.5.1. Construction operations shall not take place over or upon the right-of-way of any railroad, public road, public trail, or other public property until negotiations and/or necessary approvals have been completed with the LANDOWNER or FS, and on lands subject to a conservation easement, FWP. Designated roads and trails as listed in Appendix A and Appendix D shall be protected and kept open for public use. Where it is necessary to cross a trail with access roads, the trail corridor shall be restored. Adequate signing and/or blazes shall be established so the user can find the route. All roads and trails designated by any government agency as needed for fire protection or other purposes shall be kept free of logs, brush, and debris resulting from operations under this agreement. Any such road or trail damaged by project construction or maintenance shall be promptly restored to its original condition.

2.5.2. Reasonable precautions shall be taken to protect, in place, all public land monuments and private property corners or boundary markers. If any such land markers or monuments are destroyed, the marker shall be reestablished and referenced in accordance with the procedures outlined in the "Manual of Instruction for the Survey of the Public Land of the United States" or, in the case of private property, the specifications of the county engineer. Reestablishment of survey markers shall be at the expense of the OWNER.

2.5.3. Construction shall be conducted so as to prevent any damage to existing real property including transmission lines, distribution lines, telephone lines, railroads, ditches, and public roads crossed. If such property is damaged during construction, operation, or decommissioning, the OWNER shall repair such damage immediately to a reasonably satisfactory condition in consultation with the LANDOWNER, the LANDOWNER shall be compensated for any losses to personal property due to construction, operation, or decommissioning activities.

2.5.4. In areas with livestock, the OWNER shall make a concerted effort to comply with the reasonable requests of LANDOWNERS regarding measures to control livestock. Unless requested by a LANDOWNER, care shall be taken to ensure that all gates are closed after entry or exit. Gates shall be inspected and repaired when necessary during construction and missing padlocks shall be replaced. The OWNER shall ensure that gates are not left open at night or during periods of no construction activity unless other requests are made by the LANDOWNER. Any fencing or gates cut, removed, damaged, or destroyed by the OWNER shall immediately be replaced with new materials. Fences installed shall be of the same height and general type as the fence replaced or nearby fence on the same property, and shall be stretched tight with a fence stretcher before stapling or securing to the fence post. Temporary gates shall be of sufficiently high quality to withstand repeated opening and closing during construction, to the satisfaction of the LANDOWNER.

2.5.5. The OWNER must notify the STATE INSPECTOR, KNF INSPECTOR and, if possible, the affected LANDOWNER within 2 days of damage to land, crops, property, or irrigation facilities, contamination or degradation of water, or livestock injury caused by the CONTRACTOR and/or the OWNER's activities, and the OWNER shall reasonably restore any damaged resource and/or replace where applicable damaged property. The OWNER shall provide reasonable compensation for damages to the affected LANDOWNER.

2.5.6. Pole holes and anchor holes must be covered or fenced in all locations if left open longer than eight hours or where a LANDOWNER's requests can be reasonably accommodated.

2.5.7. When requested by the LANDOWNER, all fences crossed by permanent access roads shall be provided with a gate. All fences to be crossed by access roads shall be braced before the fence is cut. Fences not to be gated should be restrung temporarily during construction and restrung permanently within 30 days following construction, subject to the reasonable desires of the LANDOWNER.

2.5.8. Where new access roads cross fence lines, the OWNER shall make reasonable effort to accommodate the LANDOWNER's wishes on gate location and width.

2.5.9. Any breaching of natural barriers to livestock movement by construction activities shall require fencing sufficient to control livestock.

2.6. TRAFFIC CONTROL

2.6.1. At least 30 days before any construction within or over any state or federal highway right-of-way or paved secondary highway for which MDT has maintenance, the OWNER shall notify the appropriate MDT field office to review the proposed occupancy and to obtain appropriate permits and authorizations. The OWNER must supply DEQ and FS with documentation that this consultation has occurred. This documentation shall include any measures recommended by MDT that apply to state highways and to what extent the OWNER has agreed to comply with these measures. In the event that recommendations or regulations will not be followed, DEQ shall resolve any disputes regarding state highways.

2.6.2. In areas where the construction creates a hazard, traffic shall be controlled according to the applicable MDT regulations. Safety signs advising motorists of construction equipment shall be placed on major state highways, as recommended by MDT. The installation of proper road signing shall be the responsibility of the OWNER.

2.6.3. The managing agency shall be notified, as soon practicable, when it is necessary to close public roads to public travel for short periods to provide safety during construction.

2.6.4. Construction vehicles and equipment shall be operated at speeds safe for existing road and traffic conditions.

2.6.5. Traffic delays shall be restricted on primary access routes, as determined by MDT on state or federal highways or FS on its roads.

2.6.6. Access for fire and emergency vehicles shall be provided for at all times.

2.6.7. Public travel through and use of active construction areas shall be limited at the discretion of the managing agency.

2.7. ACCESS ROADS AND VEHICLE MOVEMENT

2.7.1. Construction of new roads shall be the minimum reasonably required to construct and maintain the facility in accordance with the Road Management Plan in Appendix D. National Forest System, State, county, and other existing roads shall be used for construction access wherever possible. The location of access roads and structures shall be established in consultation with affected LANDOWNERS and LANDOWNER concerns shall be accommodated where reasonably possible and not in contradiction to these specifications or other appropriate FS and DEQ conditions.

2.7.2. All new roads, both temporary and permanent, shall be constructed with the minimum possible clearing and soil disturbance to minimize erosion, as specified in Section 2.11 of these specifications.

2.7.3. Where practical, all roads shall be initially designed to accommodate one-way travel of the largest piece of equipment required to use them; road width shall be no wider than necessary.

2.7.4. Roads shall be located as approved in the Road Management Plan (Appendix D). Travel outside the right-of-way to enable traffic to avoid cables and conductors during conductor stringing shall be kept to the minimum possible. Road crossings of the right-of-way shall be near support structures to the extent feasible.

2.7.5. Helicopter construction techniques shall be used as specified on Figure D-1 of this Appendix. Helicopter stringing shall also be used on the line. Where overland travel routes are used, they shall not be graded or bladed unless necessary and shall be flagged or otherwise

marked to show their location and to prevent travel off the overland travel route. Where temporary roads are required, they shall be constructed on the most level land available.

2.7.6. In order to minimize soil disturbance and erosion potential, cutting and filling for access road construction shall be kept to a minimum to the extent practicable, in areas of up to 5 percent side slope. In areas of over 5 percent side slope, roads shall be constructed to prevent channeling of runoff.

2.7.7. The OWNER shall complete the measures necessary so the KNF could place all new roads constructed for the transmission line on NFSL into intermittent stored service. Such requirements are described in Appendix D. The OWNER shall restrict access to closed roads during construction. Closure devices shall be reinstalled following construction on existing closed roads. The OWNER shall cooperate with the LANDOWNER regarding private lands and the DNRC on State lands to develop a similar approach to meet the LANDOWNER's land use requirements while minimizing environmental impacts.

2.7.8. Any damage to existing private roads, including rutting, resulting from project construction, operation, or decommissioning shall be repaired and restored to a condition as good or better than original as soon as possible. Repair and restoration of roads shall be accomplished during and following construction as necessary to reduce erosion.

2.7.9. Any necessary snow removal shall be done in a manner to preserve and protect roads, signs, and culverts, to ensure safe and efficient transportation, and to prevent excessive erosion damage to roads, streams, and adjacent land. All snow removal shall be done in compliance with INFS standards.

2.7.10. At least 30 days prior to construction of a new access road approach intersecting a state or federal highway, or of any structure encroaching upon a highway right-of-way, the OWNER shall submit to MDT a plan and profile map showing the location of the proposed construction. At least five days prior to construction, the OWNER shall provide the designated INSPECTORS written documentation of this consultation and actions to be taken by the OWNER as provided in 2.6.1.

2.8. EQUIPMENT OPERATION

2.8.1. During construction, unauthorized cross-country travel and the development of roads other than those approved shall be prohibited. The OWNER shall be liable for any damage, destruction, or disruption of private property and land caused by his construction personnel and equipment as a result of unauthorized cross-country travel and/or road development.

2.8.2. To prevent excessive soil damage in areas where a graded roadway has not been constructed, the limits and locations of access for construction equipment and vehicles shall be clearly marked or specified at each new site before any equipment is moved to the site. CONTRACTOR personnel shall be well versed in recognizing these markers and shall understand the restriction on equipment movement that is involved.

2.8.3. Dust control measures on all roads used for construction shall be implemented in accordance with DEQ's air quality permit and the KNF's Plan of Operations. Where requested by residents living within 500 feet of the line, the OWNER shall control dust created by transmission line construction activities. Oil or similar petroleum-derivatives shall not be used to control dust.

2.8.4. Work crew foremen shall be qualified and experienced in the type of work being accomplished by the crew they are supervising. Earthmoving equipment shall be operated only by qualified, experienced personnel. Correction of environmental damage resulting from operation of equipment by inexperienced personnel shall be the responsibility of the OWNER. Repair of damage to a condition reasonably satisfactory to the LANDOWNER, FS, or if necessary, DEQ, shall be required.

2.8.5. Sock lines or pulling lines shall be strung using a helicopter to minimize disturbance of soils and vegetation.

2.8.6. Following construction in areas designated by the local weed control board, DEQ, or FS on NFSL as a noxious weed areas, the CONTRACTOR shall thoroughly clean all vehicles and equipment to remove weed parts and seeds immediately prior to leaving the area. Such areas are shown in Appendix K.

2.9. RIGHT-OF-WAY CLEARING AND SITE PREPARATION

2.9.1. The STATE INSPECTOR shall be notified at least 10 days prior to any vegetation clearing; the STATE INSPECTOR and KNF shall be notified at least 10 days prior to any vegetation clearing on NFSL. The STATE INSPECTOR shall be responsible for notifying the DNRC Forestry Division. All vegetation clearing shall be conducted in accordance with the Vegetation Removal and Disposition Plan (Appendix F).

2.9.2. Right-of-way clearing shall be kept to the minimum necessary to meet the requirements of the National Electrical Safety Code. Clearing shall produce a "feathered edge" right-of-way configuration, where only specified hazard trees and those that interfere with construction or conductor clearance are removed. Trees to be saved within the clearing back lines and danger trees located outside the clearing back lines shall be marked. Clearing back lines in SENSITIVE AREAS shall be indicated on plan and profile maps. All snags and old growth trees that do not endanger the line or maintenance equipment shall be preserved. In designated SENSITIVE AREAS, the INSPECTORS may approve clearing measures and boundaries that vary from the design plan prior to clearing.

2.9.3. During clearing of survey lines or the right-of-way, small trees and shrubs shall be preserved to the greatest extent possible in accordance with the Vegetation Removal and Disposition Plan and in compliance with the National Electrical Safety Code. Shrub removal shall be limited to crushing where necessary. Plants may be cut off at ground level, leaving roots undisturbed so that they may re-sprout.

2.9.4. In no case shall the cleared width be greater than that described in the Vegetation Removal and Disposition Plan and the National Electrical Safety Code, unless approved by the INSPECTORS on NFSL and the STATE INSPECTOR and LANDOWNER on State and private land.

2.9.5. Soil disturbance and earth moving shall be kept to a minimum.

2.9.6. The OWNER shall be held liable for any unauthorized cutting, injury or destruction to timber whether such timber is on or off the right-of-way.

2.9.7. Unless otherwise requested by the LANDOWNER or FS, felling shall be directional in order to minimize damage to remaining trees. Maximum stump height shall be no more than 8 inches or less above the existing grade. Trees shall not be pushed or pulled over. Stumps shall not be removed unless they conflict with a structure, anchor, or roadway.

2.9.8. Crane landings shall be constructed on level ground unless extreme conditions (such as soft or marshy ground) make other construction necessary. In areas where more than one crane landing per structure site is built, the STATE INSPECTOR shall be notified at least 5 days prior to the beginning of construction at those sites. Topsoil will be salvaged at crane landings and used in reclamation of these disturbed areas.

2.9.9. No motorized travel on, scarification of, or displacement of talus slopes shall be allowed except where approved by the STATE INSPECTOR on all lands, the KNF INSPECTOR on NFSL, and LANDOWNER.

2.9.10. To avoid unnecessary ground disturbance, counterpoise should be placed or buried in disturbed areas whenever possible. If ground conditions do not allow for the drilling of counterpoises and excavations are required, topsoil must be salvaged. The topsoil will be used in reclamation of these disturbed areas.

2.9.11. Slash resulting from project clearing that may be washed out by high water the following spring shall be removed and piled outside the floodplain before runoff. Any instream slash resulting from project clearing to be removed shall be removed within 24 hours. OWNER shall leave large woody material for small mammals and other wildlife species within the cleared area on NFSL.

2.9.12. Use of heavy equipment to clear and remove vegetation in riparian areas shall be minimized.

2.9.13. Topsoil shall be salvaged from excavated structure holes and reapplied to the base of the structures.

2.9.14. If material drilled out for structures is not used to backfill the structure holes, the material must first be offered to the landowner. If the landowner does not want the material, the OWNER shall dispose of the material in consultation with the STATE INSPECTOR.

2.10. GROUNDING

2.10.1 Grounding of fences, buildings, and other structures on and adjacent to the right-of-way shall be done according to the specifications of the National Electrical Safety Code.

2.11. EROSION AND SEDIMENT CONTROL

2.11.1. Clearing and grubbing for roads and rights-of-way and excavations for stream crossings shall be carefully controlled to minimize silt or other water pollution downstream from the rights-of-way. At a minimum, erosion control measures described in the OWNER's Storm Water Pollution Prevention Plan and INFS standards shall be implemented as appropriate following the review of the plan and profile map(s) required under Section 0.9 and 1.1.2.

2.11.2. Roads shall cross drainage bottoms at sharp or nearly right angles and level with the stream bed whenever possible. Temporary bridges, fords, culverts, or other structures to avoid stream bank damage shall be installed.

2.11.3. Under no circumstances shall stream bed materials be removed for use as backfill, embankments, road surfacing, or for other construction purposes.

2.11.4. No excavations shall be allowed on any river or perennial stream channels or floodways at locations likely to cause detrimental erosion or offer a new channel to the river or stream at times of flooding.

2.11.5. Installation of culverts, bridges, fords, or other structures at perennial stream crossings shall be done as specified by the INSPECTORS following on-site inspections conducted by the STATE INSPECTOR. The STATE INSPECTOR shall invite the OWNER, landowner, FWP, and local conservation districts to participate in these inspections. Installation of culverts or other structures in a water of the United States shall be in accordance with the U.S. Army Corps of Engineers 404. Activities affecting water of the State of Montana shall be in accordance with DEQ 318 permit conditions. All culverts shall be sized according to current KNF stream crossing flow calculations and the Revised Hydraulic Guide Kootenai National Forest (1990) and amendments. Where new culverts are installed, they shall be installed with the culvert inlet and outlet at natural stream grade or ground level. Water velocities or positioning of culverts shall not impair fish passage. Stream crossing structures need to be able to pass the 100 year flow event.

2.11.6. Following submittal of a plan and profile maps, but prior to construction of access roads, bridges, fill slopes, culverts, impoundments, or channel changes within the high-water mark of any perennial stream, lake, or pond, the OWNER shall discuss proposed activities with the STATE INSPECTOR, FWP, local conservation district, and KNF personnel. This site review shall determine the specific mitigation measures to minimize impacts appropriate to the conditions present. These measures shall be added to Appendix A by the STATE INSPECTOR and as appropriate by the KNF INSPECTOR.

2.11.7. No blasting shall be allowed in streams. Blasting may be allowed near streams if precautions are taken to protect the stream from debris and from entry of nitrates or other contaminants into the stream. No blasting debris shall be placed into a water of the United States without a U.S. Army Corps of Engineers 404 and DEQ 318 permit.

2.11.8. The OWNER shall maintain roads on private lands while using them. All ruts made by machinery shall be filled or graded to prevent channeling. In addition, the OWNER must take measures to prevent the occurrence of erosion caused by wind or water during and after use of these roads. Some erosion-preventive measures include but are not limited to, installing or using cross-logs, drain ditches, water bars, and wind erosion inhibitors such as water, straw, gravel, or combinations of these. Erosion control shall be accomplished as described in the OWNER's General Stormwater Permit (or MPDES Permit) and the Storm Water Pollution Prevention Plan.

2.11.9. The OWNER shall prevent material from being deposited in any watercourse or stream channel. Where necessary, measures such as hauling of fill material, construction of temporary barriers, or other approved methods shall be used to keep excavated materials and other extraneous materials out of watercourses. Any such materials entering watercourses shall be removed immediately.

2.11.10. The OWNER shall be responsible for the stability of all embankments created during construction. Embankments and backfills shall contain no stream sediments, frozen material, large roots, sod, or other materials that may reduce their stability.

2.11.11. No fill material other than that necessary for road construction shall be piled within the high water zone of streams where floods can transport it directly into the stream. Excess floatable debris shall be removed from areas immediately above crossings to prevent obstruction of culverts or bridges during periods of high water.

2.11.12. No skidding of logs or driving of vehicles across a perennial watercourse shall be allowed, except via authorized construction roads.

2.11.13. Skidding with tractors shall not be permitted within 100 feet of streams containing flowing water except in places designated in advance, and in no event shall skid roads be located on these stream courses. Skid trails shall be located high enough out of draws, swales, and valley bottoms to permit diversion of runoff water to natural undisturbed forest ground cover.

2.11.14. Construction methods shall prevent accidental spillage of solid matter, contaminants, debris, petroleum products, and other objectionable pollutants and wastes into watercourses, lakes, and underground water sources. Secondary containment catchment basins capable of containing the maximum accidental spill shall be installed at areas where fuel, chemicals or oil are stored. Any accidental spills of such materials shall be cleaned up immediately.

2.11.15. To reduce the amount of sediment entering streams, vegetation clearing in Riparian Habitat Conservation Areas on NFSL and other riparian areas on private lands shall be conducted in accordance with the Vegetation Removal and Disposition Plan and the Storm Water Pollution Prevention Plan, to be submitted for approval by the DEQ and the FS.

2.11.16. Damage resulting from erosion or other causes from construction activities and disturbance areas shall be repaired after completion of grading and before revegetation is begun.

2.11.17. Stormwater discharge of water shall be dispersed in a manner to avoid erosion or sedimentation of streams as required in DEQ permits.

2.11.18. Riprap or other erosion control activities shall be planned based on possible downstream consequences of activity, and installed during the low flow season if possible. Timing restrictions are presented in Appendix I.

2.11.19. Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete lift cleanup, and other wastewater processes shall not be discharged into surface waters without a valid discharge permit from DEQ.

2.12. CULTURAL AND PALEONTOLOGIC RESOURCES

2.12.1. All construction activities shall be conducted so as to prevent damage to significant archaeological, historical, or paleontological resources, in accordance with the requirements of 1.4.1 and the PA (Appendix E). Any Mitigation or Treatment plans involving privately owned property will be submitted to DEQ. DEQ will review submitted plans and then forward them to SHPO for approval. Both DEQ and SHPO require 30 days to review and approve any submitted plans.

2.12.2. In the event of any unanticipated discoveries, procedures outlined in the PA (Appendix E) will be followed. For notification purposes, the FS maintains jurisdiction on NFSL lands, DEQ maintains jurisdiction on private lands.

2.12.3. The OWNER shall conform to treatments recommended for cultural or paleontological resources by SHPO and DEQ on private land, with concurrence by the LANDOWNER, and the FS if on NFSL.

2.13. PREVENTION AND CONTROL OF FIRES

2.13.1. Burning, fire prevention, and fire control shall meet the requirements of the managing agency and/or the fire control agencies having jurisdiction. The STATE and KNF INSPECTORS shall be invited to attend all meetings with these agencies to discuss or prepare these plans. A copy of agreed upon plans shall be included in Appendix L

2.13.2. The OWNER shall direct the CONTRACTOR to comply with regulations of any county, town, state or governing municipality having jurisdiction regarding fire laws and regulations.

2.13.3. Blasting caps and powder shall be stored only in approved areas and containers and always separate from each other.

2.13.4. The OWNER shall direct the CONTRACTOR to properly store and handle combustible material that could create objectionable smoke, odors, or fumes. The OWNER shall direct the CONTRACTOR not to burn refuse such as trash, rags, tires, plastics, or other debris, except as permitted by the county, town, state, or governing municipality having jurisdiction.

2.14. WASTE DISPOSAL

2.14.1. The OWNER shall direct the CONTRACTOR to use licensed solid waste disposal sites. Inert materials (Group III wastes) may be disposed of at licensed Class III landfill sites; mixed refuse (Group II wastes) must be disposed of at licensed Class II landfill sites.

2.14.2. Emptied pesticide containers or other chemical containers must be triple rinsed to render them acceptable for disposal in Class II landfills or for scrap recycling pursuant to ARM 44.10.803 for treatment or disposal. Pesticide residue and pesticide containers shall be disposed of in accordance with ARM 4.10.805 and 806.

2.14.3. All waste materials constituting a hazardous waste defined in Section 75-10-403, MCA, and wastes containing any concentration of polychlorinated biphenyls must be transported to an approved designated hazardous waste management facility (as defined in ARM 17.50.504) for treatment or disposal.

2.14.4. All used oil shall be hauled away and recycled or disposed of in a licensed Class II landfill authorized to accept liquid wastes or in accordance with 2.14.2 and 2.14.3 above. There shall be no intentional release of oil or other toxic substances into streams or soil. In the event of an accidental spill into a waterway, the INSPECTORS shall be contacted immediately. Any spill of refined petroleum products greater than 25 gallons must be reported to the State at the Department of Military Affairs, Disaster and Emergency Services Division at 406-841-3911. All spills shall be cleaned up in accordance with the OWNER's Emergency Spill Response Plan.

2.14.5. Sewage shall not be discharged into streams or streambeds. The OWNER shall direct the CONTRACTOR to provide refuse containers and sanitary chemical toilets, convenient to all principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations. A septic tank pump licensed by the State shall service these facilities.

2.14.6. Slash from vegetation clearing along the transmission line shall be managed in accordance with the Vegetation Removal and Disposition Plan, Montana law regarding reduction of slash (76-13-407, MCA) and, on NFSL, KNF objectives regarding fuels reduction.

2.14.7 On NFSL, merchantable timber shall be transported to designated landings or staging areas, and branches and tops shall be removed and piled. The FS shall be responsible for disposing of the piles on NFSL and the OWNER shall be responsible for disposal of the piles on other lands. All merchantable timber shall be removed from the transmission line clearing area on NFSL unless authorized in writing by an authorized FS representative. Non-merchantable

trees and coniferous forest debris shall be removed using a brush blade or excavator to minimize soil accumulation. Excess slash shall be removed or burned in all timber harvest areas and within ½ mile of any residence. The FS shall be responsible for disposing of the piles on FS land and the OWNER shall be responsible for disposal of the piles on other lands. Non-merchantable material left within the transmission line clearing area shall be lopped and scattered unless otherwise requested by the KNF.

2.14.8. On private land, management of merchantable and non-merchantable trees as well as slash shall be negotiated between LANDOWNER and OWNER. On State land, management of merchantable and non-merchantable trees as well as slash shall be negotiated between DNRC and OWNER.

2.14.9. Refuse burning shall require the prior approval of the LANDOWNER and a Montana Open Burning Permit must be obtained from the DEQ. Any burning of wastes shall comply with section 2.13 of these specifications.

2.14.10. Burning of vegetation shall be in accordance with the Vegetation Removal and Disposition Plan. Piling and windrowing of material for burning shall use methods that shall prevent significant amounts of soil from being included in the material to be burned and minimize destruction of ground cover. Piles shall be located so as to minimize danger to timber and damage to ground cover when burned.

2.15. SPECIAL MEASURES

2.15.1 Structures with low reflectivity and non-specular conductors shall be used to reduce potential for visual contrast.

2.15.2 Crossings of rivers should be at approximately right angles. Strategic placement of structures should be done both as a means to screen views of the transmission line and right-of-way and to minimize the need for vegetative clearing.

2.15.3 Based on the analysis contained in the EIS and findings made by the DEQ, general mitigations also may apply to construction and operation of the project. These measures are found in Appendix A.

3.0. POST-CONSTRUCTION CLEANUP AND RECLAMATION

3.1. CLEANUP

3.1.1. All litter resulting from construction is to be removed, to the satisfaction of the LANDOWNER on private lands, the DNRC on State lands, and the FS on NFSL, from the right-of-way and along access roads leading to the right-of-way. Such litter shall be legally disposed of as soon as possible, but in no case later than 60 days following completion of wire clipping.

3.1.2. Insofar as practical, all signs of temporary construction facilities such as haul roads, work areas, buildings, foundations or temporary structures, soil stockpiles, excess or waste materials, or any other vestiges of construction shall be removed and the areas restored to as natural a condition as is practical, in consultation with the LANDOWNER and the FS on NFSL.

3.2. RECLAMATION

3.2.1 Revegetation of the right-of-way, access roads, all special use area, or any other disturbance shall be consistent with the reclamation and revegetation standards and provisions contained in ARM 17.20.1902 and the approved Plan of Operations on NFSL. This plan and any conditions to the certificate approved by DEQ shall be attached as Appendix M.

3.2.2 Scarring or damage to any landscape feature listed in Appendix A shall be reclaimed as nearly as practical to its original condition. Bare areas created by construction activities shall be reseeded in compliance with Appendix M to prevent soil erosion.

3.2.3 After construction is complete, NFSL roads shall be reclaimed as described in Appendix D. Roads on private lands shall be managed in accordance with the agreement between LANDOWNER and OWNER and between DNRC and OWNER on State land.

3.2.4. Fill slopes associated with access roads adjacent to stream crossing shall be regraded at slopes less than the normal angle of repose for the soil type involved.

3.2.5. All drainage channels, where construction activities occurred, shall be restored to a gradient and width that shall prevent accelerated gully erosion (see Section 2.11.11).

3.2.6. Drive-through dips, open-top box culverts, waterbars, or cross drains shall be added to roads at the proper spacing and angle as necessary to prevent erosion. The suggested spacing of drive thru dips and relief culverts is discussed in the KNF Revised Hydraulic Guide (1990) and Parrett and Johnson (2004) unless superseded by the Corps' 404 and DEQ 318 permit conditions and shall be used to establish the locations of these items.

3.2.7. Interrupted drainage systems shall be restored.

3.2.8. Sidecasting of waste materials may be allowed on slopes over 40 percent after approval by the LANDOWNER, DNRC, or FS, however, this will not be allowed within the buffer strip established for stream courses, in areas of high or extreme soil instability, or in other SENSITIVE AREAS identified in Appendix A. Surplus materials shall be hauled to sites approved by LANDOWNER, DNRC, or FS in such areas.

3.2.9. Seeding prescriptions to be used in revegetation, requirements for hydroseeding, fertilizing, and mulching, as jointly determined by representatives of the OWNER, DEQ, DNRC, FS, and other involved state and federal agencies, are specified in Appendix M.

3.2.10. During the initial reclamation of construction disturbance in areas where topsoil has been stockpiled, the surface shall be graded to a stable configuration and the topsoil shall be replaced on the disturbed area. The STATE INSPECTOR may waive the requirement for topsoil replacement on private lands on a site-specific basis where additional disturbance at a site increases erosion, sedimentation, or reclamation problems. Similarly, the KNF INSPECTOR may waive such requirements on NFSL.

3.2.11. Excavated material not suitable or required for backfill shall be evenly spread onto the cleared area prior to spreading any stockpiled soil. Large rocks and boulders uncovered during excavation and not buried in the backfill shall be disposed of as approved by the STATE and KNF INSPECTORS and/or LANDOWNER.

3.2.12. Application rates, timing of seeds and fertilizer, and purity and germination rates of seed mixtures shall be as determined in consultation with DEQ and FS. Reseeding shall be done at the first appropriate opportunity after construction ends.

3.2.13. Where appropriate, hydro seeding, drilling, or other appropriate methods shall be used to aid revegetation. Mulching with straw, wood chips, or other means shall be used where necessary. Areas requiring such treatment are listed in Appendix M.

3.3. MONITORING CONSTRUCTION AND RECLAMATION ACTIVITIES

3.3.1. Upon notice by the OWNER, the INSPECTORS shall schedule initial post-construction field inspections following clean up and road closure. Follow-up visits shall be scheduled as required to monitor the effectiveness of erosion controls, reseeding measures, and the Reclamation and Revegetation Plan (Appendix M). The OWNER shall contact the LANDOWNER for post-construction access and to determine LANDOWNER satisfaction with the OWNER'S reclamation measures.

3.3.2. The STATE INSPECTOR shall document observations on all lands for inclusion in monitoring reports regarding bond release required by DEQ. Such observations shall be coordinated with the KNF INSPECTOR on NFSL and the OWNER.

3.3.3. Release of the Transmission Line Construction and Reclamation Bond shall be based on completing the activities specified in the Reclamation and Revegetation Plan (Appendix M). Failure of the OWNER to complete the activities on disturbed areas in accordance with Appendix M and successfully revegetate disturbed areas shall be cause for forfeiture for the BOND or penalties described in Section 0.3. Failure of the OWNER to adequately reclaim all disturbed areas in accordance with section 3.2 and Appendix M of these specifications shall be cause for forfeiture of the BOND or penalties described in Section 0.9. Reclamation shall be in accordance with the standards established in ARM 17.20.1902 and in forested areas the right of way and unneeded roads shall be stocked naturally or planted with trees so that upon maturity, the canopy cover approximates that of adjacent undisturbed areas. Noxious weeds shall be controlled on disturbed areas.

4.0. OPERATION AND MAINTENANCE

4.1. RIGHT-OF-WAY MANAGEMENT

4.1.1. Maintenance of the right-of-way shall be as specified in the Weed Control Plan (Appendix K) and other monitoring and mitigation plans described in the KNF's Plan of Operations. This plan shall provide for the protection of SENSITIVE AREAS identified prior to and during construction. OWNER and CONTRACTOR activities off the right-of-way such as along access roads shall be consistent with best management practices and environmental protection measures contained in these specifications.

4.1.2. Vegetation that has been saved through the construction process and which does not pose a hazard or potential hazard to the transmission line, particularly that of value to fish and wildlife as specified in Appendix A, shall be allowed to grow on the right-of-way. Vegetation management shall be in accordance with the Vegetation Removal and Disposition Plan (Appendix F).

4.1.3. Vegetative cover along the transmission line and roads shall be maintained in cooperation with the LANDOWNER on private lands, DNRC on State lands, and the FS on NFSL.

4.1.4. Grass cover, water bars, cross drains, the proper slope, and other agreed to measures shall be maintained on permanent access roads on private lands and service roads in order to prevent soil erosion.

4.2. MAINTENANCE INSPECTIONS

4.2.1. The OWNER shall have responsibility to correct soil erosion or revegetation problems on the right-of-way or access roads as they become known. Maintenance of roads on NFSL shall be in accordance with the Road Management Plan. Appropriate corrective action shall be taken where necessary. The OWNER, through agreement with the LANDOWNER, DNRC, or FS, may provide a mechanism to identify and correct such problems.

4.2.2. Operation and maintenance inspections using ground vehicles shall be timed so that routine maintenance shall be done when access roads are firm, dry, or frozen, wherever possible. New roads, and existing barriered or impassable roads used for transmission line construction on NFSL shall not be used for routine maintenance; use of such roads shall be for emergency maintenance only. Maintenance vegetative clearing shall be done according to criteria described in Appendix F.

4.3. CORRECTION OF LANDOWNER PROBLEMS

4.3.1. When the facility causes interference with radio, TV, or other stationary communication systems, the OWNER shall correct the interference with mechanical corrections to facility

hardware, or antennas, or shall install remote antennas or repeater stations, or shall use other reasonable means to correct the problem.

4.3.2. The OWNER shall respond to complaints of interference by investigating complaints to determine the origin of the interference. If the interference is not caused by the facility, the OWNER shall so inform the person bringing the complaint. The OWNER shall provide the STATE INSPECTOR with documentation of the evidence regarding the source of the interference if the person brings the complaint to the STATE INSPECTOR or DEQ.

4.4. HERBICIDES AND WEED CONTROL

4.4.1. To minimize spreading weeds during construction, a joint weed inspection of the transmission line corridor and/or construction areas may be completed prior to construction areas. The joint inspection is intended to identify areas with existing high weed concentration. This joint review may include the OWNER, affected weed control boards, FS, DNRC and LANDOWNERS.

4.4.2. Weed control, including any application of herbicides in the right-of-way, shall be done by applicators licensed in Montana and in accordance with recommendations of the Montana Department of Agriculture, FS on NFSL, and in accordance with the Weed Control Plan in Appendix K.

4.4.3. Herbicides shall not be used in certain areas identified by DEQ, FS, and FWP, as listed in Appendix K.

4.4.4. Proper herbicide application methods shall be used to keep drift and nontarget damage to a minimum.

4.4.5. The OWNER shall notify the STATE and KNF INSPECTORS (if involving NFSL) in writing 30 days prior to any broadcast or aerial spraying of herbicides. The notice shall provide details as to the time, place, and justification for such spraying. DEQ, FWP, the Montana Department of Agriculture, and FS, if involving NFSL, shall have the opportunity to inspect the portion of the right-of-way or access roads schedule for such treatment before, during, and after spraying.

4.5. CONTINUED MONITORING

4.5.1. The KNF and DEQ may continue to monitor operation and maintenance activities for the life of the transmission line in order to ensure compliance with the KNF's Plan of Operations and the Certificate of Compliance.

5.0. ABANDONMENT, DECOMMISSIONING AND RECLAMATION FOLLOWING DECOMMISSIONING

When the transmission line is no longer used or useful, structures, conductors, and ground wires shall be removed, roads recontoured and disturbed areas reclaimed using methods outlined in Appendix N.

APPENDICES

Appendix A: Sensitive Areas for the Montanore Project.

The following sensitive areas have been identified on Figure D-1 of this Appendix where special measures will be taken to reduce impacts during construction and reclamation activities:

- Wetlands
- Riparian areas
- Bull trout critical habitat
- Old growth
- Core grizzly bear habitat
- Bald eagle primary use areas
- Areas with high risk of bird collisions
- Big game winter range
- Visually sensitive and high visibility areas
- Cultural and paleontological resources (not shown on Figure D-1)
- Additional areas for monitoring may be identified following the preconstruction monitoring trip by the INSPECTORS or preconstruction surveys by the OWNER (see Appendix I)

The following special measures will be incorporated into final design for these sensitive areas.

Wetlands and Riparian Areas

- Complete a jurisdictional delineation of waters of the U.S. in accordance with Section 1.4.3; avoid discharge of dredge or fill material into waters of the U.S. where practicable; develop and implement mitigation for all unavoidable impacts in accordance with Section 1.4.3.
- Construct all stream crossings in accordance with Section 2.11.5 and 2.11.6
- Locate structures outside of riparian areas if alternative locations are technically and economically feasible
- Minimize vegetation clearing and heavy equipment use in riparian areas in accordance with Sections 2.9.12 and 2.11.1

Bull Trout Critical Habitat

- Implement the timing restrictions described in Appendix I
- Implement measures for wetlands and riparian areas designed to minimize clearing adjacent to critical habitat

Old Growth

- Implement the vegetation removal procedures described in Appendix F designed to minimize clearing of old growth

Core Grizzly Bear Habitat

The OWNER shall not construct any road or trail that reduces core grizzly bear habitat.

Bald Eagle Primary Use Areas

- Implement the timing restrictions described in Appendix I

Areas with High Risk of Bird Collisions

To prevent avian collisions with the transmission lines, the visibility of conductors or shield wires shall be increased where necessary. This may include installation of marker balls, bird diverters, or other line visibility devices placed in varying configurations, depending on line design and location. Areas of high risk for bird collisions where such devices may be needed, such as major drainage crossings, and recommendations for type of marking device, shall be identified through a study conducted by a qualified biologist and funded by the OWNER.

Big Game Winter Range

- Implement the timing restrictions described in Appendix I

Cultural Resources

- Complete pre-construction surveys accordance with Section 1.4.1
- Conduct activities to prevent damage to significant archaeological, historical, or paleontological resources, in accordance with the requirements of 1.4.1, 2.12, and Appendix E.
- No roads, trails or overland travel is permitted within the boundaries of NRHP eligible or potentially eligible cultural sites unless appropriate mitigation has been applied.

Visually Sensitive and High Visibility Areas

- After completing a more detailed topographic survey, complete a detailed visual assessment of the alignment at three locations near residential properties: near the Fisher River and U.S. 2 crossing north of Hunter Creek (Section 32, T. 27 N., R. 29 W.), along West Fisher Creek (Section 2, T. 26 N., R. 30 W.), and between NFS roads 231 and 4725 southeast of Howard Lake (Section 19, T. 27 N., R. 30 W.)
- Keep the centerline at least 200 feet from private property at these locations, unless it is not technically feasible to do so.
- Based on the assessment, incorporate into the Vegetation Removal and Disposition Plan (Appendix F) measures to minimize vegetation clearing and visibility from residences and Howard Lake through modification of pole height, span length, and vegetation growth factor

- Based on the assessment, modify the quantity and location of poles to be installed by helicopter to minimize visible access roads
- Do not remove any shrub species 10 feet in height or less in the clearing corridor (see Section 2.1.5)

Appendix B: Performance Bond Specifications

The JOINT Transmission Line Construction and Reclamation Bond and the Joint Decommissioning Bond shall be used to ensure compliance with these specifications. DEQ and the FS will calculate the amount of the joint transmission line construction and reclamation bond and the joint transmission line decommissioning bond within 45 days after DEQ approving amendments to Operating Permit No. 00150 for the Construction, Operation, Closure and Post Closure Phases of the Montanore Project to make Operating Permit No. 00150 consistent with the FSs approval of Alternative 3- Agency Mitigated Poorman Impoundment Alternative. These bonds must be submitted prior to the start of construction of the transmission line. The amount of the bonds will be reviewed and updated every 5 years by DEQ and FS. The FS may review bonds at any time.

Appendix C: Name and Address of Inspectors and Owner's Liaison

STATE INSPECTOR
Environmental Science Specialist
Montana Department of Environmental Quality
P.O. Box 200901, 1520 East Sixth Avenue
Helena, Montana 59620-0901
(406) 444-_____

OWNER'S LIAISON
Environmental Specialist
Montanore Minerals Corp.
34524 U.S. Highway 2 West
Libby Montana 59923
(406) 293-_____

KNF INSPECTOR
Kootenai National Forest
31374 U.S. Highway 2 West
Libby Montana 59923
(406) 293-_____

Appendix D: Road Management Plan

OWNER shall develop for the lead agencies' review and approval, and implement a final Road Management Plan that describes for all new and reconstructed roads used for the transmission line the following:

- Criteria that govern road operation, maintenance, and management
- Requirements for pre-, during-, and post-storm inspections and maintenance

- Regulation of traffic during wet periods to minimize erosion and sediment delivery and accomplish other objectives
- Implementation and effectiveness monitoring plans for road stability, drainage, and erosion control
- Mitigation plans for road failures

OWNER shall be responsible for implementing one or more of the following measures on newly constructed roads and reconstructed roads on NFSL so they cause little resource risk if maintenance is not performed on them during the operation period and prior to their future need:

- Conducting noxious weed surveys and performing necessary weed treatments prior to storage activities
- Blocking entrance to road prism
- Removing culverts determined by the KNF to be high-risk for blockage or failure; laying back stream banks at a width and angle to allow flows to pass without scouring or ponding so that revegetation has a strong chance of success
- Installing cross drains so the road surface and inside ditch will not route any intercepted flow to ditch-relief or stream-crossing culverts
- Removing and placing unstable material at a stable location where stored material will not present a future risk to watershed function
- Replacing salvaged soil and revegetating with grasses in treated areas and unstable roadway segments to stabilize reduce erosion potential

The OWNER shall decommission new transmission line roads on NFSL after removal of transmission line. OWNER shall be responsible for implementing one or more of the following measures on new roads on NFSL to minimize the effects on other resources:

- Conducting noxious weed surveys and performing necessary weed treatments prior to decommissioning
- Removing any remaining culverts and removing or bypassing relief pipes as necessary
- Stabilizing fill slopes
- Fully obliterating road prism by restoring natural slope and contour; restoring all watercourses to natural channels and floodplains
- Revegetating road prism
- Installing water bars or outsloping the road prism
- Removing unstable fills

On private lands the same measures shall be applied unless the certificate holder contracts with the landowner for revegetation or reclamation as allowed under ARM 17.20.1902.

Appendix E: Cultural Resources Protection and Mitigation Plan

The final Programmatic Agreement (PA) will be incorporated into these specifications.

The FS will contact the Confederated Salish & Kootenai Tribes and the Kootenai Tribe of Idaho (collectively the Tribes) to determine if they are interested in monitoring transmission line construction on Federal, State and private lands. If either or both Tribes express an interest, OWNER shall develop a Tribal Monitoring Plan in cooperation with the FS, DEQ, and the Tribes with for inclusion into this Appendix. This plan will facilitate the presence of tribal monitors from the SCKT and/or KTOI during transmission line construction. The plan will outline the tribal monitor's qualifications, responsibilities and capabilities as well as establish funding, which will be the OWNER's responsibility. The plan will be submitted to FS and DEQ for review at least 90 days prior to the BEGINNING OF CONSTRUCTION. The FS and DEQ will have 30 days to review the plan. The FS and DEQ will invite SHPO and DNRC to comment on the draft plan. The approved plan will be incorporated into these specifications.

Appendix F: Vegetation Removal and Disposition Plan

As part of final design, OWNER shall prepare a Vegetation Removal and Disposition Plan for lead agency review and approval. One of the plan's goals will be to minimize vegetation clearing. The plan will identify areas where clearing will be avoided, such as deep valleys with high line clearance, and measures that will be implemented to minimize clearing. For example, the growth factor used to assess which trees will require clearing could be reduced in sensitive areas, such as Riparian Habitat Conservation Areas, from 15 years to 5 to 8 years. OWNER will evaluate the use of monopoles to reduce clearing in select areas, such as old growth. The plan also will evaluate the potential uses of vegetation removed from disturbed areas, and describe disposition and storage plans during life of the line. The Vegetation Removal and Disposition Plan will be part of and incorporate details of the final design for the transmission line.

Appendix G: Variations in Right-of-Way Width

DEQ does not recommend specific widths for construction easements. In accordance with the specifications, construction activities shall be contained in the minimum area necessary for safe and prudent construction and approved by the FS on NFSL.

DEQ does not recommend specific variations in right-of-way widths beyond those required to meet the National Electric Safety Code for electric transmission line operations and those necessary to meet standards established in ARM 17.20.1607 (2).

Appendix H: Monitoring Plan

The STATE INSPECTOR is responsible for implementing this monitoring plan required by 75-20-303(b) and (c), MCA, and for reporting whether terms of the Certificate and

Environmental Specifications (including but not limited to adequacy of erosion controls, successful seed germination, and areas where weed control is necessary) are being met, along with any conditions in the 404 permit and the MPDES General Permit for Storm Water Discharges Associated with Construction Activity and Authorization associated with the transmission line. Additional mitigating measures may be identified by the STATE INSPECTOR or by the KNF INSPECTOR on NFSL in order to minimize environmental damage due to unique circumstances that arise during construction.

In addition to participating in preconstruction conferences, the INSPECTORS shall conduct on-site inspections during the period of construction. At a minimum the INSPECTORS will be present at the start of construction and during the initiation of construction in sensitive areas. Subsequently INSPECTORS shall strive to conduct on-site reviews of construction activities on at least a weekly schedule. More frequent monitoring may be necessary.

INSPECTORS shall record the dates of inspection, areas inspected, and instances where construction activities are not in conformance with Environmental Specifications or terms and conditions of the Certificate of Compliance for the project. Inspection reports shall be submitted in a timely manner to the OWNER's Liaison who will see that corrections are made or that such measures are implemented in a timely manner.

When violations of the Certificate are identified, the STATE INSPECTOR shall report the violation in writing to the OWNER, who shall immediately take corrective action. If violations continue, civil penalties described in 75-20-408, MCA may be imposed. In the event that the KNF INSPECTOR shows reasonable cause that compliance with the Plan of Operations is not being achieved, FS will implement measures described in 36 CFR 228.7(b).

Upon the completion of construction in an area, the INSPECTORS will determine that Environmental Specifications have been followed, and that activities described in Appendix M have been completed and vegetation is progressing in a satisfactory manner.

In the event the DEQ or FS finds that the OWNER is not correcting damage created during construction in a satisfactory manner or that initial revegetation is not progressing satisfactorily, DEQ may determine the amount and disposition of all or a portion of the reclamation bond to correct any damage that has not been corrected by the certificate holder.

Appendix I: Areas Where Construction Timing Restrictions Apply

All activities on NFSL and state trust lands for both construction seasons of the transmission line shall occur between June 16 and October 14.

Restrictions in the timing of tree removal and other transmission line construction activities are required on all lands between February 1 and August 15 around bald eagle or osprey breeding sites to assure compliance with the Montana Bald Eagle Management Plan, Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act or FS requirements. Surveys for bald eagle or osprey nests shall be completed in appropriate habitat or timing restrictions shall be

implemented in all areas of potential habitat. Surveys shall be conducted between March 15 and April 30, one nesting season immediately prior to transmission line construction.

If surveys conducted one nesting season immediately prior to construction activities did not find nesting of these species, such restrictions shall be rescinded. If an active nest was found, guidelines from the Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group 1994) shall be followed to provide management guidance for the immediate nest site area (Zone 1), the primary use area (Zone 2), and the home range area (Zone 3). This includes delineating a ¼-mile buffer zone for the nest site area, along with a ½-mile buffer zone for the primary use area. High intensity activities, such as heavy equipment use, are not permitted during the nesting season (February 1 to August 15) within these two zones. The Montana Bald Eagle Working Group recommendations apply during the 5-year period following delisting of the bald eagle from the list of threatened and endangered species. If the Montana Bald Eagle Working Group recommendations lapse before the line was constructed, then the timing restrictions shall revert to the National Bald Eagle Management Guidelines issued by the US Fish and Wildlife Service in 2007.

Restrictions in the timing of transmission line construction activities in elk, white-tailed deer, or moose winter range are required between December 1 and April 30. These timing restrictions may be waived in mild winters if it can be demonstrated that snow conditions are not limiting the ability of these species to move freely throughout their range. Grizzly bear mitigations in the agency-mitigated alternatives include restrictions on the timing of transmission line construction and decommissioning. These restrictions shall apply to NFS and state trust lands. This grizzly bear mitigation requires that MMC be restricted to June 16 to October 14 for conducting these activities. No waiver of winter range timing restrictions shall be approved on NFS or state trust lands where the grizzly bear mitigations apply. The OWNER must receive a written waiver of these timing restrictions from the KNF, DEQ, and FWP, before conducting construction activities on elk, white-tailed deer, or moose winter range between December 1 and April 30 on private land. Timing restrictions shall not apply to substation construction.

Culvert or bridge installation is prohibited in areas of important fish spawning beds identified in Appendix A and during specified fish spawning seasons on less sensitive streams or rivers. Riprap or other erosion control activities on NFSL affecting bull trout spawning habitat can only occur during May 15 and September 1.

Other timing restrictions as negotiated by LANDOWNERS in individual easement agreements shall be incorporated into these specifications.

Appendix J: Aeronautical Hazard Markings

DEQ does not recommend aeronautical hazard markings at this time. If a potential hazard is identified during final design, DEQ will consult with the Federal Aviation Administration and Montana Aeronautics Division of MDT to determine appropriate action or aeronautical safety marking.

Appendix K: Weed Control Plan

The final Weed Control Plan will be incorporated into these specifications.

Appendix L: Fire Prevention Plan

The final Fire Prevention Plan will be incorporated into these specifications.

Appendix M: Reclamation and Revegetation Plan

An interim and final Reclamation and Revegetation Plan shall be developed and submitted to DEQ and FS for approval. This plan must, at a minimum, specify seeding mixtures and rates. It must satisfy LANDOWNER wishes, to the extent reasonable, requirements of the MPDES General Permit for Storm Water Discharges Associated with Construction Activity, and ARM 17.20.1902(10).

Because the reclamation of construction activities associated with the transmission line is considered interim and final reclamation will be required at mine closure, the primary objective of the interim reclamation plan is to provide long-term stability and control weed infestation during the operational phase of the project. The standards for interim reclamation used to determine construction bond release or to determine that expenditure of the reclamation bond is necessary to meet the requirements of the certificate for transmission lines will follow these primary objectives. The OWNER shall complete the following activities prior to release of the TRANSMISSION LINE CONSTRUCTION BOND:

- Implementation of the Weed Control Plan (Appendix K)
- Completion of all monitoring and mitigation described in the Cultural Resources Protection and Mitigation Plan and Tribal Monitoring Plan (Appendix E)
- Completion of all interim reclamation activities described in the Reclamation and Revegetation Plan (Appendix M)
- Completion of all activities associated with roads used for transmission line construction described in the Road Management Plan (Appendix D)
- Completion of all activities associated with vegetation removal and disposal for transmission line construction described in the Vegetation Removal and Disposition Plan (Appendix F)
- Revegetation is proceeding satisfactorily.

Appendix N: Abandoning and Decommissioning Plan

Prior to the start of construction, the OWNER shall submit to the lead agencies for their approval an abandonment and decommissioning plan. Based on this plan, the agencies shall then calculate the amount of the final reclamation bond.

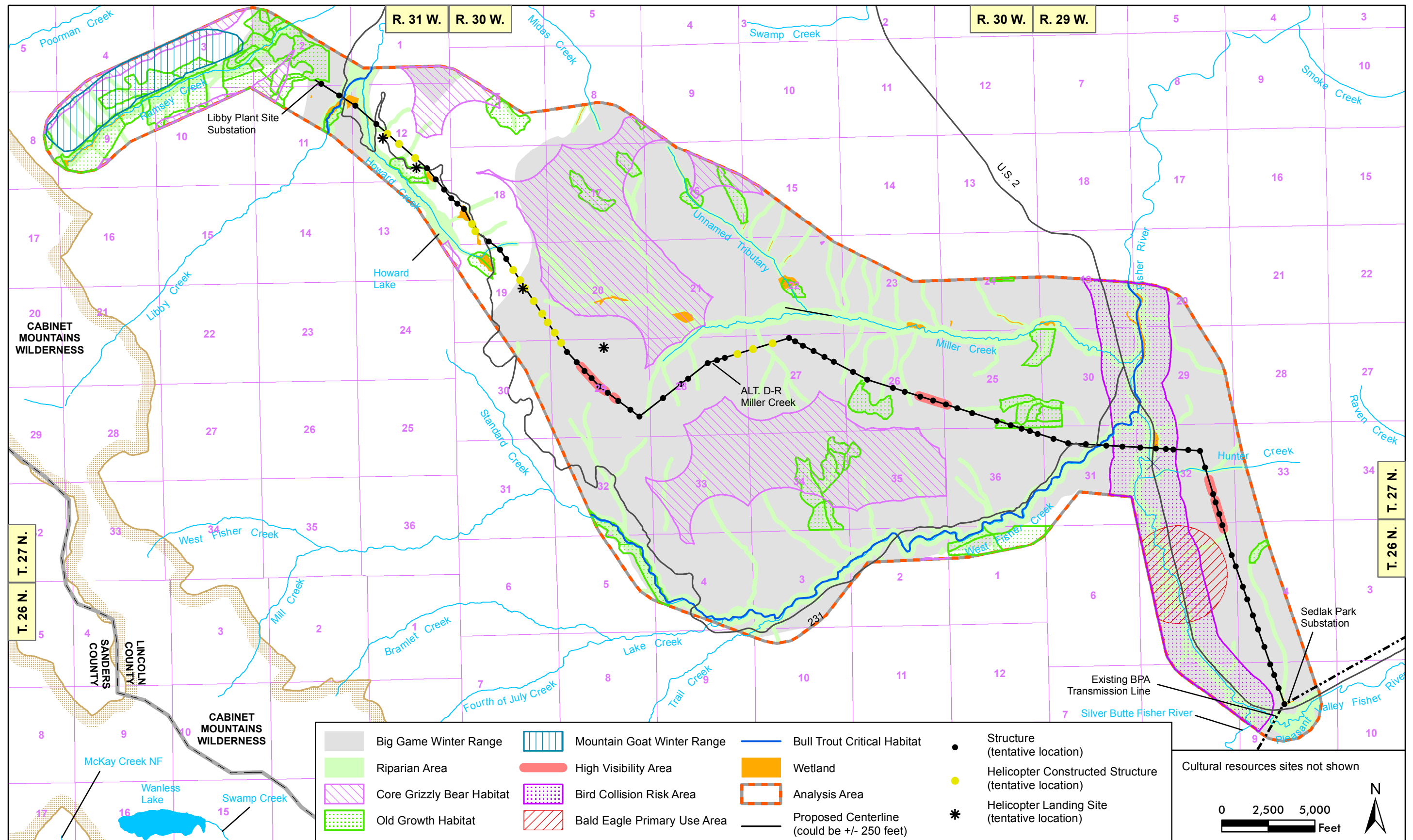
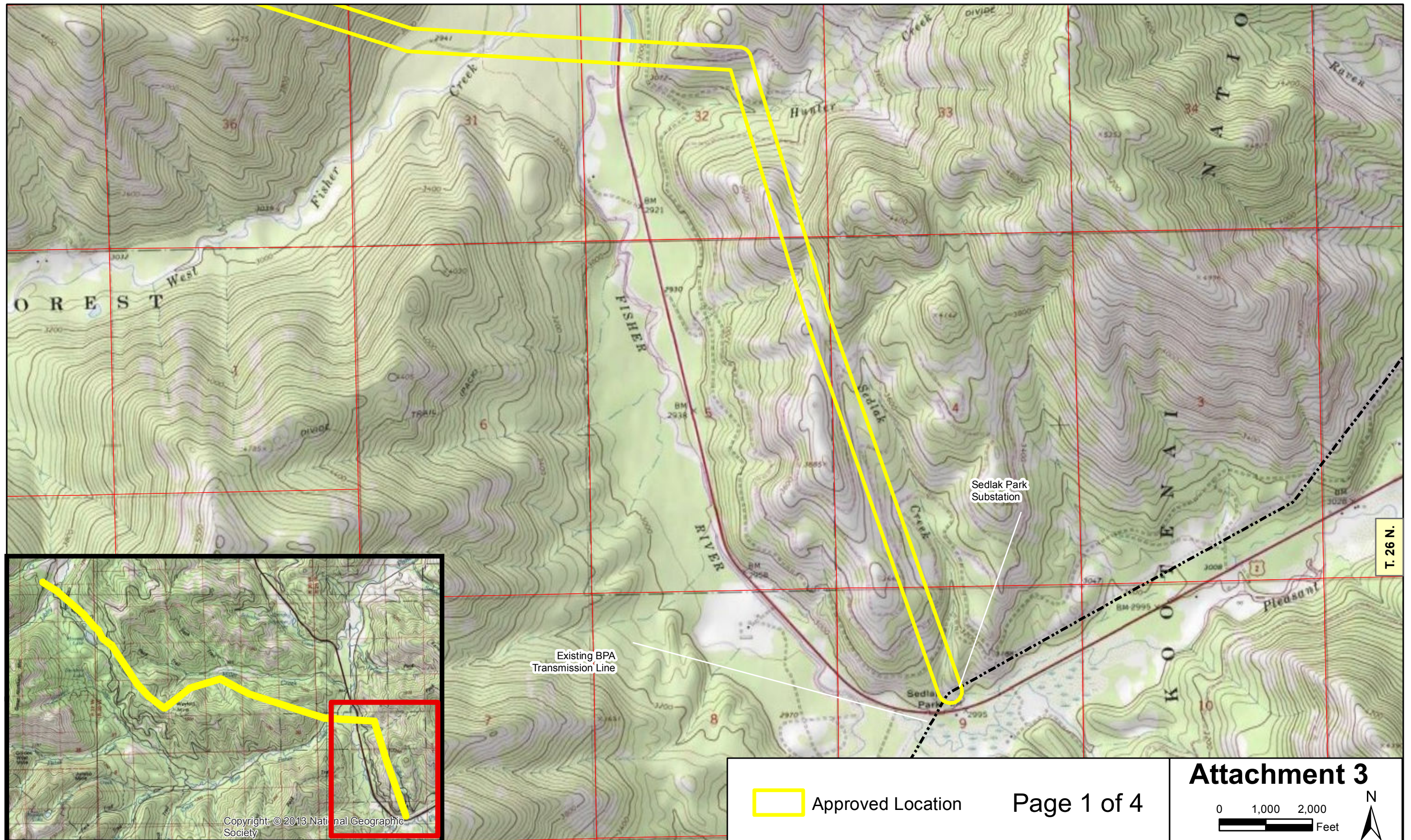


Figure D-1. Sensitive Areas Along Selected Transmission Line Corridor

Attachment 3 – Approved Location



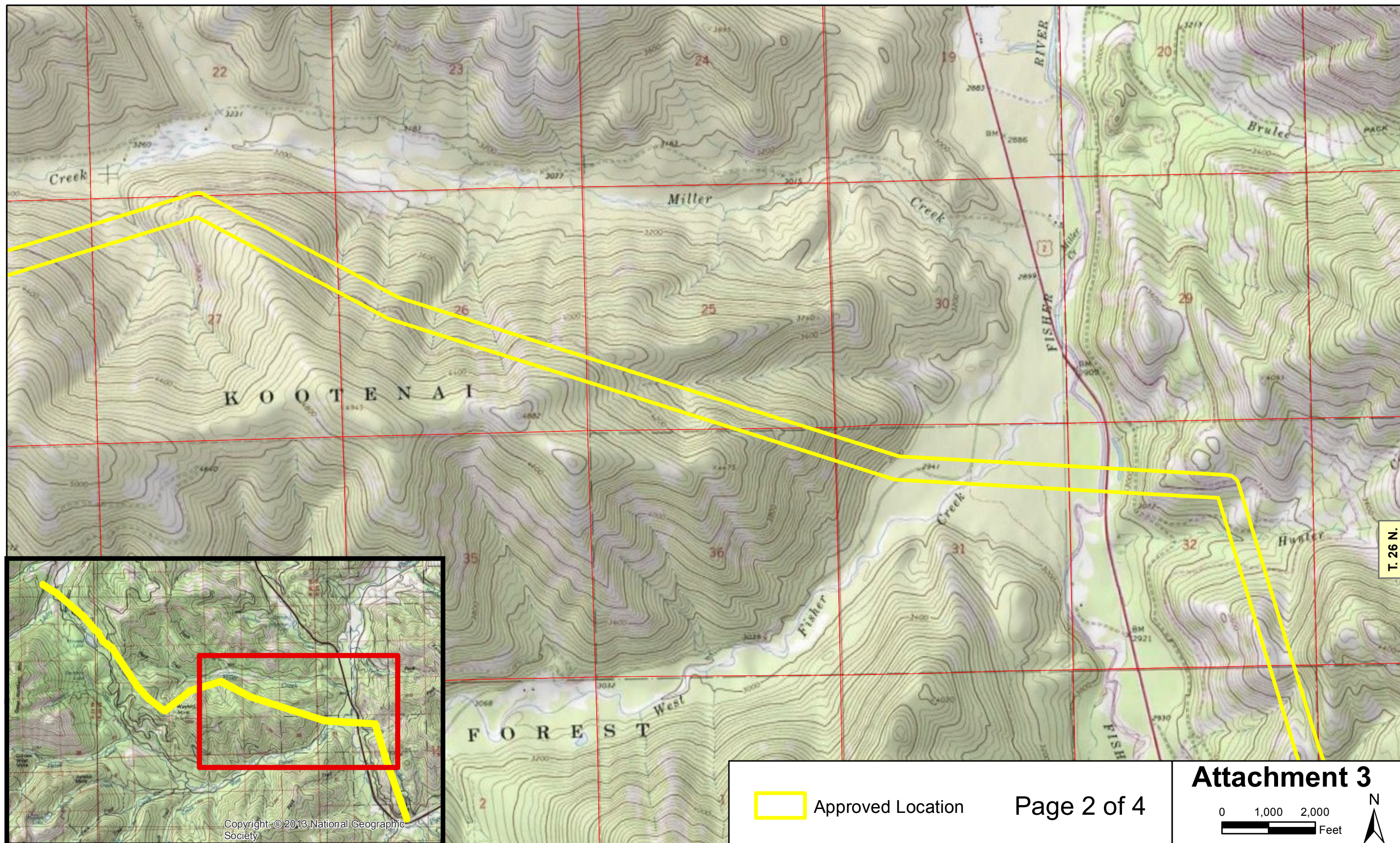
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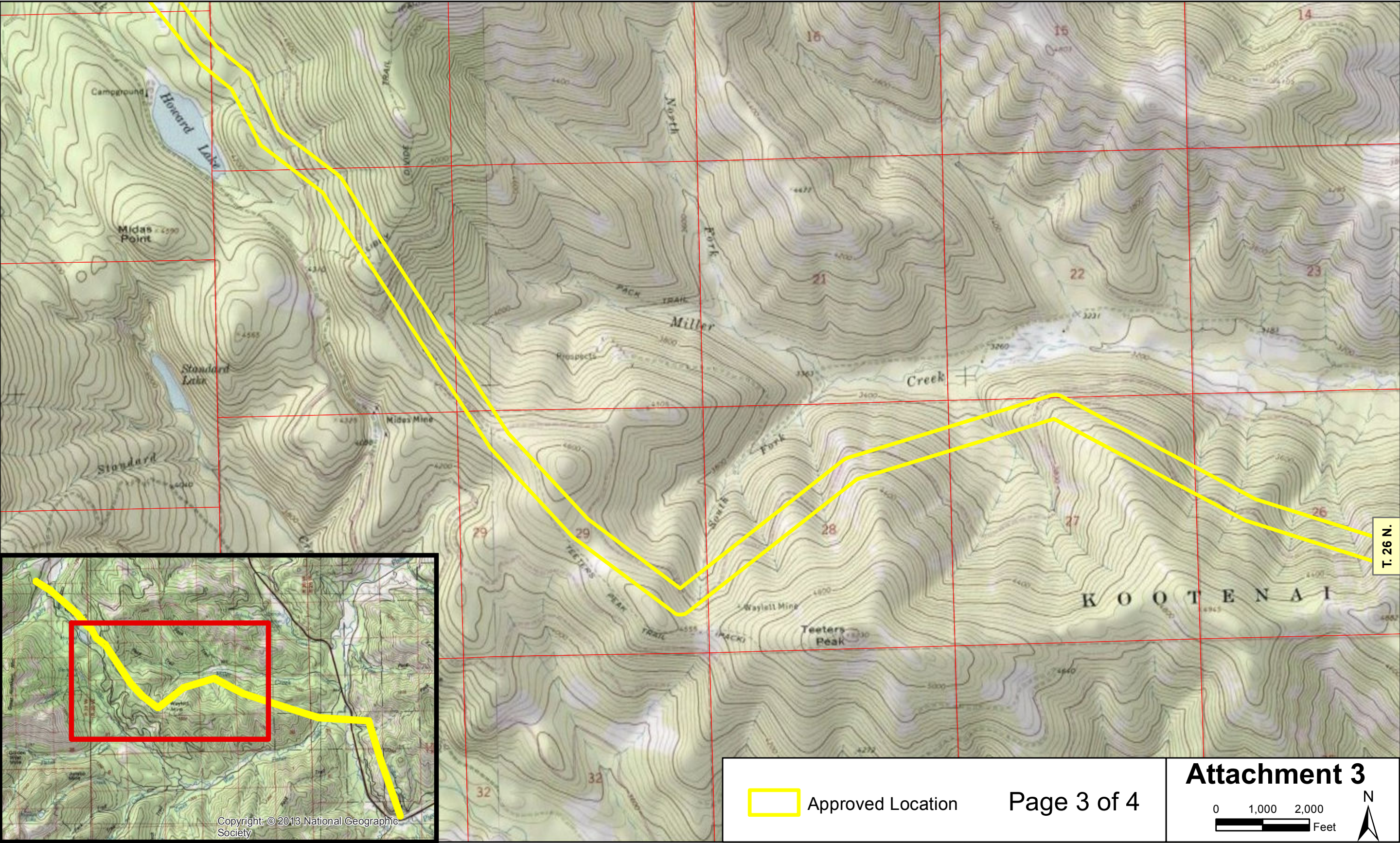
Page 1 of 4


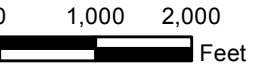

Attachment 3

0 1,000 2,000
Feet







 Approved Location	Page 3 of 4	Attachment 3  0 1,000 2,000 Feet 
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Attachment 3 – Air Quality Permit



February 12, 2016

Mines Management Inc.
905 W. Riverside Ave., Suite 311
Spokane, WA 99201

Dear Mr. Klepfer:

The Department of Environmental Quality (Department) has made its decision on the Montana Air Quality Permit application for Mines Management Inc. The application was given permit number 3788-00. The Department's decision may be appealed to the Board of Environmental Quality (Board). A request for hearing must be filed by February 29, 2016. This permit shall become final on March 1, 2016, unless the Board orders a stay on the permit.

Procedures for Appeal: Any person jointly or severally adversely affected by the final action may request a hearing before the Board. Any appeal must be filed by the date stated in the Department's Decision on this permit. The request for a hearing shall contain an affidavit setting forth the grounds for the request. Any hearing will be held under the provisions of the Montana Administrative Procedures Act. Submit requests for a hearing in triplicate to: Chairman, Board of Environmental Review, P.O. Box 200901, Helena, MT 59620.

For the Department,

A handwritten signature in black ink that reads "Julie A. Merkel".

Julie A. Merkel
Permitting Services Section Supervisor
Air Quality Bureau
(406) 444-3626

A handwritten signature in black ink that reads "Craig Henrikson".

Craig Henrikson, P.E.
Environmental Engineer
Air Quality Bureau
(406) 444-6711

JM:CH
Enclosures

MONTANA AIR QUALITY PERMIT

Issued to:	Mines Management Inc. Montanore Mine 905 W. Riverside Ave., Suite 311 Spokane, WA 99201	MAQP #3788-00 Application Complete: 05/18/2011 Initial Preliminary Determination (PD) Issued: 08/30/2006 Supplemental PD Issued: 09/07/2011 Supplemental PD (2) Issued: 8/28/2015 Department's Decision Issued: 2/12/2016 Permit Final: AFS#: 053-0016
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A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to Mines Management, Inc. (Mines Management), pursuant to Sections 75-2-204 and 211 of the Montana Code annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq.*, as amended, for the following:

Section I: Permitted Facilities

A. Permitted Equipment

Mines Management operates a 20,000 ton per day (tpd) (7,000,000 tons per year (tpy)) underground silver and copper mine and processing facility known as the Montanore Mine.

B. Source Description

The Montanore Mine is located 15 miles south-southwest of the city of Libby, Montana. The mine covers portions of Sections 23, 24, 25, 26, 35 and 36 in Township 28 North, Range 31 West, and Sections 1, 2, 11, 14, and 15 in Township 27 North, Range 31 West, in Lincoln County, Montana. The Libby Creek plant site is located in Sections 2 and 11 Township 27 North, Range 31 West.

Section II: Conditions and Limitations

A. Emission Limitations

1. The maximum ore production (measured as throughput at the primary crusher) shall be limited to 20,000 tons during any 24-hour rolling period (ARM 17.8.749).
2. The maximum ore production (measured as throughput at the primary crusher) shall be limited to 7,000,000 tons during any rolling 12-month time period (ARM 17.8.749).
3. The maximum diesel fuel consumption by underground equipment shall be limited to 3,576 gallons during any rolling 24-hour time period (ARM 17.8.749).

4. The maximum diesel fuel consumption by underground equipment shall be limited to 1,305,279 gallons during any rolling 12-month time period (ARM 17.8.749).
5. The maximum diesel fuel consumption by surface equipment shall be limited to 3,769 gallons during any rolling 24-hour time period (ARM 17.8.749).
6. The maximum diesel fuel consumption by surface equipment shall be limited to 1,375,712 gallons during any rolling 12-month time period (ARM 17.8.749).
7. The maximum propane consumption by the propane fired heaters shall be limited to 488,448 gallons during any rolling 12-month time period (ARM 17.8.749).
8. The maximum RU Emulsion explosive use shall be limited to 4,770.5 tons during any rolling 12-month time period (ARM 17.8.749).
9. The maximum High Explosive use shall be limited to 5.0 tons during any rolling 12-month time period (ARM 17.8.749).
10. Until the underground electric transmission line is operational at the mine site, Mines Management shall not operate more than two, EPA Tier 3, diesel engine(s)/generator(s) at any given time and the combined total maximum rated design capacity of the diesel engine/generators shall not exceed 1,500 brake horsepower (bhp) (ARM 17.8.749).
11. The stack height of the diesel engine/generator shall be a minimum of 10 feet above ground level (ARM 17.8.749).
12. Once the underground electric transmission line is operational at the mine site, the operation of the diesel engine(s)/generator(s) in section II.A.10 shall not exceed 16 hours during any rolling 12-month time period (ARM 17.8.749).
13. The emissions from the Libby #1 Exhaust Ventilation Adit shall be limited to (ARM 17.8.749):
 - 8.74 tpy of particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀);
 - 2.03 tpy of particulate matter with an aerodynamic diameter of 2.5 microns or less (PM_{2.5});
 - 23.22 tpy of oxides of nitrogen (NO_x); and
 - 1.91 tpy of oxides of sulfur (SO_x).
14. The Libby #1 and Libby #2 Exhaust Ventilation Adits shall not exhaust more than a total of 700,000 cubic feet per minute (cfm) of air (ARM 17.8.749).

15. Emissions from the baghouses used to control emissions from the surface ore handling activities at the SAG mill and at the Libby Load-Out facility shall be limited to 0.05 grams per dry standard cubic meter (g/dscm) or 0.020 grains/dscm (ARM 17.8.749 and 40 CFR 60, Subpart LL).
16. Emissions from the wet venturi scrubber used to control emissions from the coarse ore stockpile transfer to the apron feeders shall be limited to 0.05 g/dscm or 0.020 grains/dscm (ARM 17.8.749 and 40 CFR 60, Subpart LL).
17. Mines Management shall not cause or authorize to be discharged into the atmosphere stack emissions that exhibit 7% opacity or greater averaged over 6 consecutive minutes from the baghouse (ARM 17.8.340 and 40 CFR 60, Subpart LL).
18. Mines Management shall not cause or authorize to be discharged into the atmosphere any fugitive emissions from process equipment that exhibit 10% opacity or greater averaged over 6 consecutive minutes (ARM 17.8.340 and 40 CFR 60, Subpart LL).
19. Mines Management shall not cause or authorize emissions to be discharged into the outdoor atmosphere from any sources installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes (ARM 17.8.304).
20. Water shall be available and used, as necessary, to maintain compliance with the opacity limitations (ARM 17.8.752).
21. Detailed descriptions of the baghouses and wet Venturi scrubbers (make, model, flowrate, etc.) shall be submitted to the Department prior to the commencement of construction (ARM 17.8.749).
22. Mines Management shall install, calibrate, maintain, and operate monitoring devices for the continuous measurement of the following on the wet Venturi scrubber (ARM 17.8.340 and 40 CFR 60, Subpart LL):
 - a. Change in pressure of the gas stream through the scrubber. The monitoring device must be certified by the manufacturer to be accurate within ± 250 pascals (± 1 inch water) gauge pressure and must be calibrated on an annual basis in accordance with manufacturer's instructions.
 - b. Scrubbing liquid flow rate to the wet scrubber. The monitoring device must be certified by the manufacturer to be accurate within ± 5 percent of design scrubbing liquid flow rate and must be calibrated on at least an annual basis in accordance with manufacturer's instructions.

23. Mines Management shall comply with all applicable standards, limitations, and the reporting, recordkeeping, and notification requirements contained in 40 CFR 60, Subpart LL, for all affected facilities (ARM 17.8.340 and 40 CFR Part 60).
24. Mines Management shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).
25. Mines Management shall treat all unpaved portions of the haul roads, access roads, parking lots, or the general plant area with water and/or chemical dust suppressant, as necessary, to maintain compliance with the reasonable precautions limitation in Section II.A.24 (ARM 17.8.749).
26. Mines Management shall develop a general operating plan for the tailings impoundment site including a fugitive dust control plan to control wind erosion from the tailings impoundment site. Prior to the commencement of operation, Mines Management shall submit to the Department for review and approval a general operation plan for the tailings impoundment site including the fugitive dust control plan. The plan must include, at a minimum, the embankment and cell (if any) configurations, a general sprinkler arrangement, and a narrative description of the operation, including tonnage rates, initial area, and timing of future enlargement (ARM 17.8.749 and 17.8.752).
27. Tailings wind erosion control shall be maintained during the interim period after the end of active tailings deposition and prior to final reclamation of the site (ARM 17.8.749 and 17.8.752).
28. If constructed, Mines Management shall use the Rock Lake ventilation raise only as an air intake adit. Any pollutant emissions from the Rock Lake ventilation raise are prohibited (ARM 17.8.749).
29. Mines Management shall comply with all applicable standards and limitations, and the reporting, recordkeeping, and notification requirements contained in 40 CFR 60, Subpart IIII, *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* and 40 CFR 63, Subpart ZZZZ, *National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines*, for any applicable diesel engine (ARM 17.8.340; 40 CFR 60, Subpart IIII; ARM 17.8.342 and 40 CFR 63, Subpart ZZZZ).

B. Emission Control Requirements

Mines Management shall utilize the following emission control requirements:

1. Underground Primary Crusher – Water sprays shall be used at the primary crusher (ARM17.8.752).

2. Underground Coarse Ore Conveyor Transfers – Water sprays shall be used at the five underground coarse ore conveyor transfer points to be located along the conveyor route from the primary crusher to the Libby #1 portal (ARM 17.8.752).
3. Conveyor Transfer to Coarse Ore Stockpile – Water sprays shall be used at the transfer of ore from the underground conveyor system to the coarse ore stockpile (ARM 17.8.752).
4. Overland Conveyor – conveyor emissions from the Libby portal to Mill shall be controlled by a utilizing a fully enclosed conveyor. All three transfer points on this conveyor shall also be fully enclosed (ARM 17.8.752).
5. Coarse Ore Stockpile – The coarse ore stockpile shall be surrounded by a pole structure with an enclosure on the top and two sides (ARM 17.8.752).
6. Apron Feeders – A wet scrubber shall control particulate emissions from the coarse ore stockpile transfer to the apron feeders (ARM 17.8.752).
7. Conveyor Discharge to Semi-Autogenous Grinding (SAG) Mill – The conveyor discharge to the SAG Mill shall occur inside the Mill Building (ARM 17.8.752).
8. Concentrate Transfer and Loading - The concentrate transfer and loading of concentrate into highway trucks for shipment to the Libby Load-out facility shall be entirely enclosed within the Mill Building (ARM 17.8.752).
9. Oversize Transfer to Hopper and Reclaim Belt – The oversize material transferred to the oversize hopper and oversize reclaim belt originate from the SAG Mill, which shall be a wet process. The material passes through a sump and pump to the reclaim route and shall be wet material (ARM 17.8.752).
10. Oversize Screen and Crusher and SAG Mill Transfer – A baghouse shall control emissions from the oversize screen, crusher, and transfer to the SAG Mill (ARM 17.8.752).
11. Tailings Impoundment – The tailings from the mill shall be slurried through a pipeline to a tailings impoundment site. Excess water shall be returned to the mill for re-use. Spigots distributing wet tailings material and water shall cover about one-half of the total tailings at any time. The spigots shall be moved regularly and shall cause wetting of all non-submerged portions of the tailings impoundment to occur each day. This wetting shall be supplemented by sprinklers as necessary when weather conditions could exist to cause fugitive dust (ARM 17.8.752).
12. Libby Load-Out Facility – Concentrate shall be transported to the load-out facility from the mine by highway trucks and shall be transferred to the storage pile within the building. A truck ramp shall be constructed as part of the load-out building. A portion of the ramp shall be enclosed. The load-

out building's exhaust air outlet shall be controlled by a baghouse. Telescoping chutes shall be used while loading each rail car. Loaded rail cars waiting for consolidation into a unit train shall be covered (ARM 17.8.752).

13. Rock Lake Ventilation Raise – The Rock Lake ventilation raise, if constructed, will supplement air flow in the mine and shall function as air intake only. The Rock Lake ventilation raise shall be equipped with a ventilation fan to force air into the mine to supplement ventilation, and air doors shall be installed and closed when the intake ventilation fan is not operational, eliminating exhaust air from exiting at that location (ARM 17.8.752).
14. US Forest Service Road 231 – Concentrate shall be transported to the Libby Load-Out facility using US Forest Service Road 231 and Montana Highway 2. US Forest Service Road 231 shall be upgraded for year-round use by applying a chip-and-seal surface (Reference: Kootenai National Forest Record of Decision).

C. Testing Requirements

1. The affected facilities, under 40 CFR 60, Subpart LL, shall be tested and demonstrate compliance with the emission limitations contained in Section II.A. 15, Section II.A.16, Section II.A.17, and Section II.A.18 within 60 days after achieving the maximum production rate at which the affected facility will be operated, but not later than 180 days after initial start up of the system (ARM 17.8.105, ARM 17.8.340, and 40 CFR Part 60.8).
2. Mines Management shall perform particulate and NO_x emissions testing of the Libby #1 and Libby #2 Ventilation Adits to demonstrate compliance with the emission limitations contained in Section II.A.13. Concentrations should be measured near the point of generation inside the mine and at the point of exhaust to the atmosphere. The testing methodology must be approved in advance by the Department (ARM 17.8.749).
3. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).
4. The Department may require further testing (ARM 17.8.105).

D. Operational Reporting Requirements

1. Mines Management shall supply the Department with annual production information for all emission points, as required by the Department, in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions identified in the emission inventory contained in the permit analysis.

Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in the units required by the Department. This

information may be used to calculate operating fees, based on actual emissions from the facility, and/or to verify compliance with permit limitations (ARM 17.8.505). Mines Management shall submit the following information annually to the Department by March 1 of each year; the information may be submitted along with the annual emission inventory (ARM 17.8.505):

- a. Amount of ore and waste handled.
 - b. Amount of diesel fuel used (surface equipment and underground equipment separately).
 - c. Amount of propane used.
 - d. Amount of explosives used (RU Emulsion explosive and High Explosive separately).
 - e. Hours of operation of the diesel engine(s)/generators.
 - f. An estimate of vehicle miles traveled on on-site access roads.
 - g. Amount of disturbed acreage (including tailings impoundment area).
 - h. Other emission related information the Department may request (ARM 17.8.749).
2. Mines Management shall notify the Department of any construction or improvement project conducted, pursuant to ARM 17.8.745, that would include ***the addition of a new emissions unit***, change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location, or fuel specifications, or would result in an increase in source capacity above its permitted operation. The notice must be submitted to the Department, in writing, 10 days prior to startup or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(l)(d) (ARM 17.8.745).
 3. All records compiled in accordance with this permit must be maintained by Mines Management as a permanent business record for at least 5 years following the date of the measurement, must be available at the plant site for inspection by the Department, and must be submitted to the Department upon request (ARM 17.8.749).
 4. Mines Management shall record the measurements of both the pressure drop across the scrubber and the scrubbing liquid flow rate during the initial performance test of the scrubber and at least weekly thereafter. Mines Management shall submit semiannual reports to the Department of occurrences when the measurements of the scrubber pressure loss (or gain) and liquid flow rate differ by more than ± 30 percent from those measurements recorded during the most recent performance test. These reports must be submitted within 30 days following the end of the second and fourth calendar quarters (40 CFR 60, Subpart LL).

5. Mines Management shall document, by day, the ore production levels (measured as throughput at the primary crusher). Mines Management shall sum the total ore production during the previous 24 hours to verify compliance with the limitations in Section II.A.1. A written report of the compliance verification shall be submitted annually to the Department along with the annual emission inventory (ARM 17.8.749).
6. Mines Management shall document, by month, the ore production levels (measured as throughput at the primary crusher). By the 25th day of each month, Mines Management shall calculate the total ore production level from the facility for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.2. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).
7. Mines Management shall document, by day, the diesel fuel consumption by underground equipment. Mines Management shall sum the total diesel fuel consumption by underground equipment during the previous 24 hours to verify compliance with the limitations in Section II.A.3. A written report of the compliance verification shall be submitted annually to the Department along with the annual emission inventory (ARM 17.8.749).
8. Mines Management shall document, by month, the diesel fuel consumption by underground equipment. By the 25th day of each month, Mines Management shall calculate the total diesel fuel consumption by underground equipment for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.4. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).
9. Mines Management shall document, by day, the diesel fuel consumption by surface equipment. Mines Management shall sum the total diesel fuel consumption by surface equipment during the previous 24 hours to verify compliance with the limitations in Section II.A.5. A written report of the compliance verification shall be submitted annually to the Department along with the annual emission inventory (ARM 17.8.749).
10. Mines Management shall document, by month, the diesel fuel consumption by surface equipment. By the 25th day of each month, Mines Management shall calculate the total diesel fuel consumption by surface equipment for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.6. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).
11. Mines Management shall document, by month, the propane fuel consumption by the propane fired heaters. By the 25th day of each month, Mines Management shall calculate the total propane fuel consumption by the propane fired heaters for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.7. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

12. Mines Management shall document, by month, the amount of RU Emulsion explosive used at the mine. By the 25th day of each month, Mines Management shall calculate the total RU Emulsion explosive used for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.8. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).
13. Mines Management shall document, by month, the amount of High Explosive used at the mine. By the 25th day of each month, Mines Management shall calculate the total High Explosive used for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.9. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).
14. Mines Management shall document, by month, the hours of operation of the emergency diesel engine(s)/generator(s). By the 25th day of each month, Mines Management shall calculate the hours of operation of the diesel engine/generator for the previous month. The monthly information will be used to verify compliance with the rolling 12-month limitation in Section II.A.12. The information for each of the previous months shall be submitted along with the annual emission inventory (ARM 17.8.749).

E. Ambient Air Monitoring

Mines Management shall operate an ambient air monitoring network as described in Attachment 1 of this MAQP. The monitoring plan will be periodically reviewed by the Department and revised, if necessary (ARM 17.8.749).

F. Notification Requirements

1. Mines Management shall supply the Department the following notification (ARM 17.8.749):
 - a. Date when the underground electric transmission line is operational and postmarked within 15 days after such date.
 - b. Date when adit advancement or construction commenced, postmarked no later than 30 days after such date.
 - c. Anticipated date of initial start up of milling operations, postmarked not more than 60 days nor less than 30 days prior to such date.
 - d. Actual date of initial start up of milling operations postmarked within 15 days after such date (ARM 17.8.340, 40 CFR Part 60).

Section III: General Conditions

- A. Inspection – Mines Management shall allow the Department's representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment (Continuous Emissions Monitoring System (CEMS), Continuous Emissions Rate Monitoring System (CERMS) or observing any monitoring or testing, and otherwise conducting all necessary functions related to this permit.
- B. Waiver – The permit and all the terms, conditions, and matters stated herein shall be deemed accepted if Mines Management fails to appeal as indicated below.
- C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving Mines Management of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq.* (ARM 17.8.756).
- D. Enforcement – Violations of limitations, conditions, and requirements contained herein may constitute grounds for permit revocation, penalties, or other enforcement as specified in Section 75-2-401, *et seq.*, MCA.
- E. Appeals – Any person or persons jointly or severally adversely affected by the Department's decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefore, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department's decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department's decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the Board, the Department's decision on the application is final 16 days after the Department's decision is made.
- F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by Department personnel at the location of the permitted source.
- G. Permit Fee – Pursuant to Section 75-2-220, MCA, as amended by the 1991 Legislature, failure to pay the annual operation fee by Mines Management may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.
- H. Duration of Permit – Construction or installation must begin or contractual obligations entered into that would constitute substantial loss within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall expire (ARM 17.8.762).

Attachment 1

Mines Management, Inc. Ambient Air Monitoring Plan Montana Air Quality Permit (MAQP) #3788-00

1. This ambient air monitoring plan is required by MAQP #3788-00, which applies to Mines Management Inc. (Mines Management) underground silver and copper mine and processing facility known as the Montanore Mine Project. This monitoring plan may be changed by the Department of Environmental Quality (Department). All current requirements of this plan are considered conditions of MAQP #3788-00.
2. Mines Management shall install, operate, and maintain three air monitoring sites in the vicinity of the mine and facilities. The exact location of the monitoring sites must be approved by the Department and meet all siting requirements contained in the Montana Quality Assurance Manual, including revisions; the EPA Quality Assurance Manual, including revisions; and Parts 50, 53, and 58 of the Code of Federal Regulation; or any other requirements specified by the Department.
3. Mines Management shall commence air monitoring at the commencement of mill facilities or the tailings impoundment and continue air monitoring for at least one year after normal production is achieved. Mines Management will analyze for metals as described below on the PM₁₀ filters once the mill facilities and tailings impoundment are operational. At that time, the air monitoring data will be reviewed by the Department and the Department will determine if continued monitoring or additional monitoring is warranted. The Department may require continued air monitoring to track long-term impacts of emissions for the facility or require additional ambient air monitoring or analyses if any changes take place in regard to quality and/or quantity of emissions or the area of impact from the emissions.
4. Mines Management shall monitor the following parameters at the sites and frequencies described below:

Location	Site	Parameter	Frequency
Plant Area 30-053-0014	Site #1	PM-10 ¹ As, Cu,Cd,Pb,Zn ² PM-2.5 ³	Every 3 rd day according to EPA monitoring schedule
Tailings Area (Up-drainage) 30-053-0015	Site #2	PM-10 ¹ As, Cu,Cd,Pb,Zn ² PM-2.5 ³	Every 3 rd day according to EPA monitoring schedule
Tailings Area (Down-drainage) 30-053-0016	Site #3	PM-10 ¹ / PM-10 ¹ Collocated As, Cu,Cd,Pb,Zn ² PM-2.5 ³ / PM-2.5 ³ Collocated Windspeed: 61101 Wind Direction: 61102 Sigma theta ⁴ : 61106	Every 3 rd day according to EPA monitoring schedule (Collocated every 6 th day) Continuous
¹ PM-10 = particulate matter less than 10 microns. Local Conditions: 85101 Standard Conditions: 81102 ² As = Arsenic, Cu = Copper, Cd = Cadmium, Pb = Lead, Zn = Zinc			

³ PM-2.5 = particulate matter less than 2.5 microns.

Local Conditions: 68101

Sample Flow Rate CV: 68101

Sample Volume: 68102

Ambient Min. Temperature: 68103

Ambient Max. Temperature: 68104

Ambient Avg. Temperature: 68105

Sample Min. Baro. Pressure: 68106

Sample Max. Baro. Pressure: 68107

Sample Avg. Baro. Pressure: 68108

Elapsed Sample Time: 68109

⁴ Sigma Theta = Standard Deviation of Horizontal Wind Direction

5. Data recovery (DR) for all parameters shall be at least 80 percent, computed on a quarterly and annual basis. The Department may require continued monitoring if this condition is not met. The data recovery shall be calculated using the following equation(s), as applicable:

$$\text{Manual Methods \% DR} = \left[\frac{\text{total number of valid samples collected}}{\text{total number of samples scheduled}} \right] \times 100$$

or

$$\text{Automated Methods \% DR} = \left[\frac{\text{total number of hours possible} - \text{hours lost to QA / QC checks} - \text{hours lost to downtime}}{\text{total number of hours possible}} \right] \times 100$$

6. Any ambient air monitoring changes proposed by Mines Management must be approved in writing by the Department.
7. Mines Management shall utilize air monitoring and quality assurance procedures which are equal to or exceed the requirements described in the Montana Quality Assurance Manual, including revisions; the EPA Quality Assurance Manual, including revisions; 40 CFR Parts 53 and 58 of the Code of Federal Regulations; and any other requirements specified by the Department.
8. Mines Management shall submit quarterly data reports within 45 days after the end of the calendar quarter and an annual data report within 90 days after the end of the calendar year. The annual report may be substituted for the fourth quarterly report if all information in Item 9 below is included in the report.
9. The quarterly report shall consist of a narrative data summary and a data submittal of all data points in AIRS format. This data shall be submitted on a 3" diskette or a compact disc (CD). The narrative data summary shall include:
- a. A topographic map of appropriate scale with UTM coordinates and a true north arrow showing the air monitoring site locations in relation to the plant, any nearby residences and/or businesses, and the general area;
 - b. A hard copy of the individual data points;
 - c. The quarterly and monthly means for PM₁₀, PM_{2.5}, and wind speed;

- d. The first and second highest 24-hour PM₁₀, PM_{2.5} concentrations and dates;
 - e. A quarterly and monthly wind roses;
 - f. A summary of the data collection efficiency;
 - g. A summary of the reasons for missing data;
 - h. A precision and accuracy (audit) summary;
 - i. A summary of any ambient air standard exceedances;
 - j. Calibration information.
10. The annual data report shall consist of a narrative data summary containing:
- a. A topographic map of appropriate scale with universal transverse Mercator (UTM) coordinates and a true north arrow showing the air monitoring site locations in relation to the plant, any nearby residences and/or businesses, and the general area;
 - b. A pollution trend analysis;
 - c. The annual means for PM₁₀, PM_{2.5}, and wind speed;
 - d. The first and second highest 24-hour PM₁₀, PM_{2.5} concentrations and dates;
 - e. The annual wind rose;
 - f. An annual summary of data collection efficiency;
 - g. An annual summary of precision and accuracy (audit) data;
 - h. An annual summary of any ambient standard exceedance;
 - i. Recommendations for future monitoring.
11. The Department may audit, or may require Mines Management to contract with an independent firm to audit, the air-monitoring network, the laboratory performing associated analyses, and any data handling procedures at unspecified times. Based on the audits and subsequent reports, the Department may recommend or require changes in the air monitoring network and associated activities in order to improve precision, accuracy, and data completeness.

Permit Analysis
Mines Management, Inc.
Montana Air Quality Permit (MAQP) #3788-00

I. Introduction/Process Description

A. Permitted Equipment

Mines Management, Inc. (Mines Management) operates an underground silver and copper mine and ore processing facility known as the Montanore Mine. The Montanore Mine is located 15 miles south-southwest of the city of Libby, Montana. The mine covers portions of Sections 23, 24, 25, 26, 35 and 36 in Township 28 North, Range 31 West, and Sections 1, 2, 11, 14, and 15 in Township 27 North, Range 31 West, in Lincoln County, Montana. The Libby Creek plant site is located in Sections 2 and 11 Township 27 North, Range 31 West. A complete listing of equipment and activities is included in Section I.B. of this permit analysis.

B. Source Description

The Montanore Mine is designed to mine 20,000 tons per day (tpd) of copper and silver ore in an underground ore deposit underlying the Cabinet Mountains Wilderness. The ore deposit will be mined using room-and-pillar methods, with both diesel and diesel-electric underground equipment. Propane fired heaters will be operated, as necessary, in the mine. Mining would occur 24 hours per day, seven days per week, for 350 days per year to yield a maximum of 7 million tons of ore annually. Access to the mine site will be by US Forest Service Road 231.

Two mine portals, both adits will be located in Libby Creek drainage, Libby #1 and Libby #2. Both adits will exhaust ventilation air from the underground mine and provide mine access. A third portal (Libby #3) will be located north of the Libby Adit and will provide the primary intake air during construction and operations. Supplemental intake air may be provided from the Rock Lake Ventilation Raise. Ore will be crushed underground by a primary crusher and brought to the surface by conveyors through the Libby #1 portal. The ore will travel from the portal to the coarse ore stockpile via conveyor, then from the stockpile to a classifier/oversize crushing/screening train by underground apron feeders, and then transferred to a Semi-Autogenous Grinding (SAG) mill. Dust emissions from these ore handling activities will be controlled with water sprays, wet Venturi scrubbers, and enclosures.

The SAG mill will undergo commissioning by the vendor/contractor for 30 to 60 days after start-up, during which time the mine will not yet be at full production, and all emission controls at the mill will be operational. Mines Management will take possession of the mill following completion of the commissioning process. Like the mine, the mill will operate 24 hours per day, seven days per week, for 350 days per year. The mill will be powered by electricity supplied by a 230-kV electric transmission line and no continuous on-site power generation will be needed. Up to two (not to exceed 1500 hp), diesel electric generators will be located on-site for emergency backup use. Ore grinding operations at the SAG mill will be fully enclosed and wet, with water pumped into the SAG mill at a rate of 7,780 gallons per

minute (gpm). Copper and silver will be separated from the ore by flotation techniques. The resulting concentrate will be thickened and pressure filtered to remove excess water, and transported by truck using US Forest Service Road 231 and Montana Highway 2 to a rail siding in the city of Libby.

All underground emissions from the Montanore Mine will exit to the atmosphere through both the Libby portals, while Libby #3 portal will provide intake air. The mine will not be ventilated from only one portal. Even under a condition where the ventilation system would be interrupted (i.e., power outage) the volume of air that would naturally flow through the system would be reduced. Under this condition, natural air flow would still occur through both portals. Some variation could occur in the distribution between the two portals; however, the portion of total mine air volume that could be exhausted from the Libby#1 portal would be no greater than 350,000 cubic feet per minute (cfm) (50% of total volume flow) due to the physical restraints (flow turbidity, volume, etc.) of the portal dimensions and air control mechanisms.

Due to the large volume of air required to ventilate the mine, all emissions, regardless of release location underground, are assumed to be well mixed with the ventilation air. Total exhaust air from the mine will be 700,000 cfm based on ventilation design. 350,000 cfm will exhaust through the Libby#1 portal, while the remaining 350,000 cfm will exhaust through the Libby #2 portal. Therefore, with the assumption the emissions are well mixed with the air, about 50% of underground emissions will exhaust through the Libby #1 portal and 50% will exhaust through the Libby #2 portal.

Underground sources contributing to the portal exhaust emissions are blasting, propane heaters, primary crushers, coarse ore conveyor transfers, and underground mobile sources. The Libby #2 portal diameter is calculated to be equivalent to the 350,000 cfm volume exhaust rate from the portal exiting at 0.0328 feet per second (fps), for a portal diameter of 475.7 feet.

The tailings from the mill will be slurried through a pipeline to a tailings impoundment site located at the Poorman Impoundment Site, located between Little Cherry Creek and Poorman Creek. Excess water will be returned to the mill for re-use. Although the tailings will be wetted with a sprinkler system, some drying may occur in the summer months. Water utilized by the sprinklers will be obtained from the water reclaim system which returns water to the mill from the tailings impoundment. Although the tailings will be wetted with a sprinkler system, some drying may occur in the summer months. To control fugitive dust on the tailings impoundment, a fugitive dust control plan will be employed by Mines Management.

The decision to operate sprinklers at the tailings impoundment will be made based on regular inspection of the tailings impoundment during the day and on weather criteria to be established as part of the fugitive dust control plan. The presence of visible emissions, observed through shift inspection of the tailings impoundment on a regular basis during the day by environmental personnel trained in visual opacity monitoring and by shift operators staffing the tailings impoundment would prompt sprinkler operation. In addition, specific thresholds for weather conditions such as

wind speed, precipitation, humidity, etc. would be developed as part of the fugitive dust control plan to indicate the potential for fugitive dust emissions to occur, prompting sprinkler operation.

All transfer operations and storage areas at the Libby rail siding will be completely enclosed. Concentrate transported by the haul trucks to the Libby siding will be dumped to an enclosed storage bin which will transfer the concentrate to rail cars. Loaded rail cars waiting for consolidation into a unit train will be covered to prevent wind losses. When a sufficient number of railcars have been loaded, they will be coupled to a mainline engine for transport to an off-site smelter. The trucks would enter this area and dump the concentrate into the main area of the load-out facility. The transfer and loading of concentrate onto rail cars is conducted within the pressurized load-out building. The load-out building's exhaust air outlet will be controlled by a baghouse. The concentrate's high moisture content (16-20%) will assist in controlling particulate emissions. One rail car is routed through door flaps into the building on the rail siding that passes through the building. The rail car is loaded using telescoping chutes to reduce product loss and to assist in controlling airborne dust concentrations within the building. Upon completion of loading one rail car, the rail car is covered and awaits sufficient cars to connect to a train.

During mine development, some waste rock will be transported by truck from the portal to a temporary storage area east of the mill site. This waste rock will be used as a construction material for the tailings dam and mill site areas. Waste rock generated in the advancement of the mine will remain underground or used in dam construction.

Construction and Operation Schedule

The construction and operation schedule for the Montanore Mine will consist of several phases:

- The project is divided into two main phases. The first phase is the construction phase and the second phase is the operations phase. Within the construction phase, there is also an evaluation phase where two Tier II diesel generators will likely move to the site under an "intent to transfer" notification which are permitted as portable generators for temporary power. These generators are not specifically covered under the Montanore air quality permit. Three diesel generators have been permitted under this portable permit identified as Cummins USA MAQP #4063-00. As part of the Montanore modeling analysis, two of these generators along with adit emissions were modeled to demonstrate compliance with the 1-hour NO₂ standard. This period is expected to be about 12 months but may be longer or shorter depending upon the transmission line construction schedule or whether Tier III units permitted under the Montanore permit move to the site.
- The next part of the construction phase persists until the transmission line power is installed or until Tier III engines replace the temporary portable generators. The project may install a smaller underground power line from the City of Libby that could reduce engine/generator use until the main

transmission line is constructed. During this phase, access roads will be upgraded, the Libby adits will be advanced, and an underground electric transmission line from the city of Libby may be installed. No major surface construction will occur during this phase and the Libby portal air emissions would be less than during later phases of construction or during production. During this phase, the adits will continue to be advanced, roads to portals and tailings impoundment dam will be constructed, and the Libby Plant site preparation will begin

- In additional phases of construction, surface facilities such as the mill and support facilities will be constructed, the electric transmission line to the Libby Plant will be constructed, the tailings impoundment will be constructed, and advancement of all the Libby tunnels will continue. Initial mining and milling will take place during the first two years of mine life. During this time period, construction will continue as well as limited production with up to 15,700 tpd of ore being mined and milled. Once transmission line power to the Libby Plant site is complete, standby generators will provide backup power (up to 16 hours per 12-month time period). If the underground line is installed it could provide backup power to all facilities. In either case, the diesel generators will remain on-site at the Libby Plant area to provide emergency power in the event of primary and secondary line power failure.
- Full production of 20,000 tpd of ore removal and processing will take place at about year 15.
- Production mining will continue for about 8 years after full development at a rate of 7,000,000 tons per year (tpy).

C. Current Permit Action

On January 17, 2006, the Montana Department of Environmental Quality – Air Quality Bureau (Department) received a MAQP application from Mines Management for a proposed underground silver and copper mine with an associated mill facility. On March 17, 2006, the Department sent a letter to Mines Management requesting additional information. On May 12, 2006, the Department received a revised MAQP application from Mines Management. On June 7, 2006, the Department received information from Mines Management that additional emitting units (engines/generators) would be located at the mine site. These generators were not identified in the MAQP applications submitted to the Department on January 17, 2006, and May 12, 2006. On July 7, 2006, the Department sent Mines Management a letter requesting Mines Management to update the MAQP application to include information about the new generators. On July 21, 2006, the Department received additional information from Mines Management stating that Mines Management would not be operating the additional emitting units. On July 21, 2006, the MAQP application was considered complete. On August 30, 2006, the Department issued the preliminary determination. This remained as preliminary pending a final Environmental Impact Statement (EIS).

On June 29, 2009, the Department received comments from the Environmental Protection Agency (EPA) regarding the Draft EIS. On February 18, 2010, the Department, in conjunction with the Forest Service, sent a response to EPA. On May 10, 2010, EPA responded by expressing satisfaction with the Department/Forest Service submittal. However, at that time, EPA suggested that the Department require Mines Management to address the new National Ambient Air Quality Standards (NAAQS) for oxides of nitrogen (NO_x) and sulfur dioxide (SO₂).

The Department continued to work closely with Mines Management regarding the new NAAQS. On August 17, 2010, and November 23, 2010, Mines Management submitted information to demonstrate compliance the NAAQS. The Department requested additional information and on February 14, 2011, and March 14, 2011, the Department arranged for conference calls to go over remaining deficiencies with respect to the modeling demonstration. On April 5, 2011, Mines Management submitted additional information electronically and hard copies of this information were received on April 6, 2011. On April 6, 2011, the Department contacted Mines Management with questions regarding the latest submittal.

At the Department's request, on April 15, 2011, Mines Management sent potential changes of the initial MAQP including: plant location, number and size of diesel engines/generators, engine stack height, and replacement of the Ramsey Exhaust Ventilation Adit with Libby #1 Adit. Additionally, Mines Management submitted a change to the source description in the permit analysis. On April 20, 2011, at the Department's request, Mines Management sent the required AERSURFACE input and output files.

On April 25, 2011, the Department requested additional information via email and Mines Management provided the information the same day. At that time, the Department had enough information to complete review of the modeling demonstration with respect to the new NAAQS (NO_x and SO₂) and the potential permit changes.

In June 2015, additional modeling was conducted to include off-site emissions from both the Rock Creek Mine and Troy mine. The additional modeling demonstration results were added to the permit. Additional comments have also been added to address the earlier part of the construction phase where Tier II engines will be temporarily used at the site under an existing air quality permit but only after an "intent to transfer" process has been initiated to bring the engines onto the site. Finally, a review of the Best Achievable Control Technology was completed as the previous BACT analysis had expired since the previous draft permits had never become final.

D. Department Edits from Preliminary Determination

Upon review of supporting documentation, several minor corrections were made by the Department from the earlier issued Preliminary Determination. These include eight places where reference to US Forest Service Road 278 was changed to US Forest Service Road 231. Additionally, a minor correction was made to the description of the Township, Range, and Section to better align with the final EIS

and Record of Decision. Section 1 within Township 27 North, Range 31 West was added to the location description on page 1 of the permit and also in the permit analysis. Finally, the expected schedule to reach full production and the period of years operating at full production were changed to indicate full production would be reached in year 15 and operate at full production for 8 years.

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the operation. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available, upon request, from the Department. Upon request, the Department will provide references for locations of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Sub-Chapter 1, General Provisions, including, but not limited to:

1. ARM 17.8.101 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.
2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment, including instruments and sensing devices, and shall conduct tests, emission or ambient, for such periods of time as may be necessary, using methods approved by the Department.
3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source, or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Montana Clean Air Act, 75-2-101, *et seq.*, Montana Code Annotated (MCA).

Mines Management shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited to, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation, or to continue for a period greater than four hours.
5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means which, without resulting in reduction in the total amount of air contaminant emitted, conceals, or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner that a public nuisance is created.

B. ARM 17.8, Sub-Chapter 2, Ambient Air Quality, including, but not limited to:

1. ARM 17.8.204 Ambient Air Monitoring
2. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
3. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
4. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
5. ARM 17.8.213 Ambient Air Quality Standard for Ozone
6. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide
7. ARM 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
8. ARM 17.8.221 Ambient Air Quality Standard for Visibility
9. ARM 17.8.222 Ambient Air Quality Standard for Lead
10. ARM 17.8.223 Ambient Air Quality Standard for PM₁₀
11. ARM 17.8.230 Fluoride in Forage

Mines Management must maintain compliance with the applicable ambient air quality standards.

C. ARM 17.8, Sub-Chapter 3, Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged to an outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.
2. ARM 17.8.308 Particulate Matter, Airborne. (1) This rule requires an opacity limitation of 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter. (2) Under this rule, Mines Management shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter.
3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, suffer, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.
4. ARM 17.8.310 Particulate Matter, Industrial Processes. This rule requires that no person shall cause, allow, or permit to be discharged into the outdoor atmosphere particulate matter in excess of the amount set forth in this rule.
5. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.
6. ARM 17.8.340 Standard of Performance for New Stationary Sources. This section incorporates, by reference, 40 CFR Part 60, Standards of Performance for New Stationary Sources (NSPS). This facility is considered an NSPS affected facility under 40 CFR Part 60 and is subject to the requirements of the following subparts.

- a. 40 CFR 60, Subpart A – General Provisions apply to all equipment or facilities subject to an NSPS Subpart as listed below:
 - b. 40 CFR 60, Subpart IIII - Standards of Performance for Stationary Compression Ignition Internal Combustion Engines (CI ICE). Owners and operators of stationary CI ICE that commence construction after July 11, 2005, where the stationary CI ICE are manufactured after April 1, 2006, and are not fire pump engines, and owners and operators of stationary CI ICE that modify or reconstruct their stationary CI ICE after July 11, 2005, are subject to this subpart.
 - c. 40 CFR 60, Subpart LL – Metallic Mineral Processing Plants – Requires opacity limitations of 10% on process fugitive emissions and 7% on baghouse stack emissions and a stack particulate limitation of 0.05 grams per dry standard cubic meter.
7. ARM 17.8.342 Emission Standards for Hazardous Air Pollutants for Source Categories. This rule incorporates, by reference, 40 CFR Part 63, National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Source Categories. Matriarch is considered an NESHAP-affected facility under 40 CFR Part 63 and is subject to the requirements of the following subparts.
- a. 40 CFR 63, Subpart A – General Provisions apply to all equipment or facilities subject to a NESHAPs Subpart as listed below.
 - b. 40 CFR 63, Subpart ZZZZ - National Emissions Standards for Hazardous Air Pollutants (HAPs) for Stationary Reciprocating Internal Combustion Engines (RICE). An owner or operator of a stationary RICE at a major or area source of HAP emissions is subject to provisions of this subpart, except if the stationary RICE is being tested at a stationary RICE test cell/stand. As an area source, the diesel RICE will be subject to this rule.
- D. ARM 17.8, Sub-Chapter 5, Air Quality Permit Application, Operation and Open Burning Fees, including, but not limited to:
- 1. ARM 17.8.504 Air Quality Permit Application Fees. This section requires that an applicant submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. Mines Management submitted the appropriate permit application fee to the Department.
 - 2. ARM 17.8.505 Air Quality Operation Fees. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit, excluding an open burning permit, issued by the Department. The air quality

operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

An air quality operation fee is separate and distinct from an air quality permit application fee. The annual assessment and collection of the air quality operation fee, described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules, such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions that prorate the required fee amount.

- E. ARM 17.8, Sub-Chapter 7, Permit, Construction and Operation of Air Contaminant Sources, including, but not limited to:
1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.
 2. ARM 17.8.743 Montana Air Quality Permits – When Required. This rule requires a person to obtain an air quality permit or permit modification to construct, alter, or use any air contaminant sources that have the Potential to Emit (PTE) greater than 25 tpy of any pollutant. The Mines Management facility has a PTE greater than 25 tpy of particulate matter; therefore, an air quality permit is required.
 3. ARM 17.8.744 Montana Air Quality Permits – General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit Program.
 4. ARM 17.8.745 Montana Air Quality Permits – Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.
 5. ARM 17.8.748 New or Modified Emitting Units – Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, alteration, or use of a source. Mines Management submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. Mines Management submitted an affidavit of publication of public notice for the February 10, 2006, and February 15, 2006, issue of *The Western News*, a newspaper of general circulation in the city of Libby, Lincoln County, Montana, as proof of compliance with the public notice requirements.
 6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure

compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.

7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that BACT shall be used. The BACT analysis is discussed in Section III of this Permit Analysis.
8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.
9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving Mines Management of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq.*
10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement.
11. ARM 17.8.760 Additional Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those applications that require an environmental impact statement.
12. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or modified source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than one year after the permit is issued.
13. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).
14. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752,

ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.

15. ARM 17.8.765 Transfer of Permit. This rule states that an air quality permit may be transferred from one person to another if written notice of Intent to Transfer, including the names of the transferor and the transferee, is sent to the Department.

F. ARM 17.8, Subchapter 8 – Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.
2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications – Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source since this facility is not a listed source and the facility's potential to emit is less than 250 tons per year of any pollutant (excluding fugitive emissions).

G. ARM 17.8, Subchapter 12 – Operating Permit Program Applicability, including, but not limited to:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any source having:
 - a. PTE > 100 tpy of any pollutant;
 - b. PTE > 10 tpy of any one HAP, PTE > 25 tpy of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or
 - c. PTE > 70 tpy of PM₁₀ in a serious PM₁₀ nonattainment area.
2. ARM 17.8.1204 Air Quality Operating Permit Program. (1) Title V of the FCAA amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing MAQP #3788-00 for Mines Management, the following conclusions were made:
 - a. The facility's PTE is less than 100 tons/year for any pollutant (excluding fugitive emissions).
 - b. The facility's PTE is less than 10 tons/year for any one HAP and less than 25 tons/year of all HAPs.
 - c. This source is not located in a serious PM₁₀ nonattainment area.

- d. This facility is subject to 40 CFR 60, Subpart LL and 40 CFR 60, Subpart IIII.
- e. This facility is potentially subject to 40 CFR 63, Subpart ZZZZ.
- f. This source is not a Title IV affected source
- g. This source is not a solid waste combustion unit.
- h. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that Mines Management is a minor source of emissions as defined under Title V. Therefore, Mines Management is not required to obtain a Title V Operating Permit. However, if minor sources subject to NSPS are required to obtain a Title V Operating Permit in the future, Mines Management will be required to obtain a Title V Operating Permit.

III. Best Available Control Technology (BACT) Determination

A BACT determination is required for each new or modified source. Mines Management shall install on the new or modified source the maximum air pollution control capability which is technically practicable and economically feasible, except that BACT shall be utilized.

A BACT analysis was previously submitted by Mines Management addressing some available methods of controlling emissions from the sources used at the Montanore Mine. The Department previously reviewed these methods, as well as previous BACT determinations in order to make the following BACT determination.

Diesel Generator BACT Analysis

During the production phase of operation, operation of the emergency engines shall not exceed 16 hours during any rolling 12-month time period and the annual emissions of all criteria pollutants were projected to be less than 1 ton per year. During this type of operating scenario, Mines Management does not believe and the Department agrees, that applying any control technology would be economically infeasible.

During the construction phase of operation, which includes construction that occurs up until the underground electric transmission line is operational, Mines Management proposes to use the above mentioned engines as a power source. As currently proposed, Mines Management would use these engines for approximately one year.

The Department determined that additional controls for particulate matter (PM), particulate matter with an aerodynamic diameter less than or equal to 10 microns (PM₁₀), volatile organic compounds (VOC), carbon monoxide (CO), and oxides of sulfur (SO_x) would be technically or economically infeasible. Therefore, the Department determined that proper operation and maintenance with no additional controls for PM, PM₁₀, VOC, CO, and SO_x would constitute BACT for the diesel generators/engines.

Additionally, control options required for the diesel generators/engines are similar to other recently permitted similar sources and are capable of achieving the appropriate emission standards. The new diesel stationary engines would be required to meet EPA's Tier 3 NOx emission standards and comply with the federal engine emission limitations including, for example, 40 CFR 60, Subpart IIII and/or 40 CFR 63, Subpart ZZZZ.

Mines Management proposes BACT as proper operation and maintenance of up to two, diesel fired engines with a combined capacity not to exceed 1500 brake-horsepower (bhp).

Mill Building BACT Analysis

This section provides a BACT analysis for material transfer and processing activities from underground ore operations through the SAG Mill. Particulate control is the focus of this analysis because particulate and lead (as a fraction of particulate) are the only pollutants emitted from these activities. All underground and surface material transfers and material processing equipment/activities will be equipped with emission controls to limit particulate emissions.

For all material transfers and processing activities, high material moisture content will inherently control particulate emissions. High-moisture ore for metallic minerals processing is defined by EPA in AP-42, Chapter 11.24, Metallic Minerals Processing:

“Test data collected in the mineral processing industries indicate that the moisture content of ore can have a significant effect on emissions from several process operations. High moisture generally reduces the uncontrolled emission rates, and separate emission rates are provided for primary crushers, secondary crushers, tertiary crushers, and material handling and transfer operations that process high-moisture ore...

For most metallic minerals covered in this section, high-moisture ore is defined as ore whose moisture content, as measured at the primary crusher inlet or at the mine, is 4 weight percent or greater. Ore defined as high-moisture at the primary crusher is presumed to be high-moisture ore at any subsequent operation for which high-moisture factors are provided unless a drying operation precedes the operation under consideration...”

The inherent moisture in raw ore mined at the Montanore Mine will be 10-12% by weight. Water application will occur during loading operations at the face, primary crushing, conveyor transfers, and other appropriate places that will inherently increase this moisture content as the ore moves through the material handling system to the wet grinding circuit. This water application will assist in maintaining and increasing the moisture content of the ore.

An additional level of emission control for underground emission sources will occur following installation of an air re-circulation/water mister/de-mister system. The system will be installed at the mine upon full production (approximately year 4) and will re-circulate 350,000 cfm of air from the underground mine. Although an exact emission control efficiency is not known, as each system is custom built by mine site, the mister is estimated

to be able to remove nearly 100% of particulate greater than 5 microns in size as well as up to 90% of water soluble pollutants such as NO_x and SO_x. The demister system will remove the water along with the entrained and dissolved pollutants before the air is re-introduced to the mine. Because of the uncertainty in the control efficiency, no reduction in emissions due to this system was assumed. However, once the system is installed, emissions from the mine portals due to underground sources will be reduced significantly.

Particulate will be controlled from 90% to 99% at underground and surface sources, depending upon the technology utilized. The technology proposed to be utilized for each of these sources and a BACT discussion is provided in the sections that follow.

Primary Crusher

Water sprays are proposed at the primary crusher, and are estimated to reduce particulate emissions by 90%. Other control options include a wet scrubber, a baghouse, or enclosure of the primary crusher. Each of these three options is technically infeasible due to the mobility required of the primary crusher, which operates underground, and the limited spaces within which the crusher operates, a complete enclosure of the crusher which allows capture of air emissions and routing to a control device is not possible. Therefore, water sprays are considered BACT for the primary crusher.

Underground Coarse Ore Conveyor Transfers

Water sprays are proposed at the underground coarse ore conveyor transfer points, and are estimated to reduce particulate emissions by 90%. Another control option is the enclosure of each of the five transfer points to be located along the conveyor route from the primary crusher to the Libby portal. This control option is technically infeasible due to the low air velocities within the mine, an enclosure is not estimated to control emissions significantly enough to warrant full enclosure on these mobile transfer points. Therefore, water sprays are considered BACT for the underground coarse ore conveyor transfer points.

Conveyor Transfer to Coarse Ore Stockpile

Water sprays are proposed at the transfer of ore from the underground conveyor system to the coarse ore stockpile, and are estimated to reduce particulate emissions by 90%. Other control options include complete enclosure of the coarse ore stockpile and/or routing emissions to a baghouse. The coarse ore stockpile will be partially enclosed by a pole structure with a top and two sides enclosed to reduce material loss. Mines Management will use this cover structure to mitigate the majority of the emissions from the coarse ore stockpile. Access to a majority of the pile by heavy equipment is required periodically to manage the pile. In addition, waste rock will be discharged at this location and loaded into trucks requiring easy access for heavy equipment. These access requirements prohibit further enclosure of the structure. Without complete enclosure, a baghouse would be technically infeasible because emissions cannot be routed to a baghouse. Therefore, water sprays are considered BACT for material transfer to the coarse ore stockpile.

Overland Ore Conveyor

This conveyor was requested by Mines Management (on April 4, 2011) to replace the 40-ton haul trucks that were originally proposed to transport ore from the Libby Portal to the Mill.

Three material transfer points are proposed along the conveyor route. As such, several emission control options were evaluated by Mines Management to include: water fogging sprays at each transfer point; complete enclosure of each transfer point, partial enclosure of each transfer point and no control. Mines Management selected the top control option (complete enclosure of the conveyor and the transfer points) and no further analysis is required. Therefore, enclosed conveyors and conveyor transfer points are considered BACT for material transfer.

Coarse Ore Stockpile

The coarse ore stockpile will be surrounded by a pole structure with an enclosure on the top and two sides to reduce wind-blown dust. No control efficiency is assigned to this control for this source because emissions were found to be negligible without application of controls; however, a 50% control is typically applied for a partial enclosure such as a stilling shed at a surface coal mine. The inherent material moisture content of the ore (10-12%) will assist in controlling fugitive dust from the stockpile, and water sprays are proposed at the conveyor transfer to the coarse ore stockpile which will maintain or increase this moisture. Another control option is complete enclosure, which is prohibitive for the reasons described above in the Conveyor Transfer to Coarse Ore Stockpile BACT discussion. Therefore, a pole structure with an enclosure on the top and two sides is considered BACT for this source.

Apron Feeders

A wet scrubber is proposed to control particulate emissions from the coarse ore stockpile transfer to the apron feeders, and is estimated to control particulate emissions by 95%. This transfer occurs underground. A baghouse is technically infeasible because of operational considerations of the underground transfer. While the area is contained, the apron feeder's configuration is such that a baghouse would not be effective in this situation. Each end of the system is open (coarse ore stockpile and SAG Mill), and the baghouse system would have to be able to overcome these conditions which could not be accomplished without significant air control devices to minimize pressurization of the area. These devices would impact access to the apron feeder by maintenance equipment. Therefore, the wet scrubber is considered BACT for the apron feeders.

Conveyor Discharge to SAG Mill

The conveyor discharge to the SAG Mill occurs just inside the Mill Building. That enclosure is estimated to provide a 99% control efficiency. Adding to the controls on this source is the introduction of water into the SAG Mill at a pump rate of 7,780 gallons per minute which will further control any particulate generated from this transfer. This control method is considered BACT for this source.

Concentrate Transfer and Loading

Concentrate transfer and loading into highway trucks for shipment to the Libby Load-out facility are entirely enclosed within the Mill Building, effecting an estimated control efficiency of 99%. In addition, material moisture is expected to be 16-20%. This control method is considered BACT for this source.

Oversize Transfer to Hopper and Reclaim Belt

Oversize material transferred to the oversize hopper and oversize reclaim belt originate from the SAG Mill, which is a wet process. The material passes through a sump and pump to the reclaim route and is wet material, which is estimated to completely control particulate emissions from these two transfer points (100% control). No more effective control options are available; therefore, this control method is considered BACT for this source.

Oversize Screen and Crusher and SAG Mill Transfer

Wet oversize material from the SAG Mill passes from the reclaim hopper and along the reclaim belt to the oversize screen, to the oversize crusher, and back to the SAG Mill. The oversize screen, crusher, and transfer to the SAG Mill are controlled by a baghouse which is estimated to control particulate emissions by 99%. No more effective control options are available than the baghouse control proposed; therefore, this control method is considered BACT for these sources.

Libby Load-Out Facility BACT Analysis

Particulate emissions are the focus of this analysis because particulate is the only pollutant with a potential to be emitted by the transfer and loading operations proposed at the Libby rail siding.

Concentrate is transported to the load-out facility from the mine by highway trucks, and is transferred to the storage pile within the building. A truck ramp would be constructed as part of the loadout building. A portion of the ramp would be enclosed. The trucks would enter this area and dump the concentrate into the main area of the loadout facility. The transfer and loading of concentrate onto rail cars is conducted within the pressurized load-out building. The load-out building's exhaust air outlet will be equipped with a baghouse which is estimated to control particulate emissions by 99%. The concentrate possesses a high moisture content (16-20%) which will assist in controlling particulate emissions. Product loss must be minimal from an economic standpoint; however, any product loss from trucks outside the load-out facility will be swept promptly. One rail car is routed through door flaps into the building on the rail siding that passes through the building. The rail car is loaded using telescoping chutes to reduce product loss, which also serves to control airborne dust concentrations within the building. Upon completion of loading one rail car, the car is covered and awaits sufficient cars to connect to a train. The complete enclosure of the handling and transfer operations within the pressurized building, the operation of a baghouse on the building's exhaust air outlet, combined with the other product loss control methods described above, is considered BACT for controlling emissions from the transfer and loading operations.

Miscellaneous Source Controls

Underground Mobile Sources

Fugitive emissions from the movement of mobile sources in the underground mine will be negligible due to the high moisture content of the traveled surfaces underground.

US Forest Service Road 231

Concentrate shall be transported to the Libby Load-Out facility using US Forest Service Road 231 and Montana Highway 2. US Forest Service Road 231 shall be upgraded for year-round use by applying a chip-and-seal surface. It is anticipated that applying a chip-and-seal surface will reduce emissions to near the levels of paved roads. The Department would typically consider water and/or chemical dust suppressant to be BACT for haul roads; however, Mines Management proposed applying a chip-and-seal surface. Therefore, this is above and beyond BACT requirements for recently permitted similar sources.

Tailings Impoundment

The tailings from the mill will be slurried through a pipeline to a tailings impoundment site. Excess water will be returned to the mill for re-use. Spigots distributing wet tailings material and water will cover about one-half of the total tailings at any time. The spigots will be moved regularly and will cause wetting of all non-submerged portions of the tailings impoundment to occur each day. This wetting will be supplemented by sprinklers as necessary when weather conditions could exist to cause fugitive dust. Water utilized by the sprinklers will be obtained from the water reclaim system which returns water to the mill from the tailings impoundment. Although the tailings will be wetted with a sprinkler system, some drying may occur in the summer months. To control fugitive dust on the tailings impoundment, a fugitive dust control plan will be submitted by Mines Management for review and approval by the Department. Therefore, an approved fugitive dust control plan is considered BACT for this source.

Rock Lake Ventilation Raise

The Rock Lake ventilation raise, if constructed, will supplement air flow in the mine and would function as air intake only. The Rock Lake ventilation raise would be equipped with a ventilation fan to force air into the mine to supplement ventilation, and air doors would be installed and closed when the intake ventilation fan was not operational, eliminating exhaust air from exiting at that location. Operating the ventilation fan to force air into the mine and operating the air doors is considered BACT for controlling emissions from the Rock Lake ventilation raise.

2015 BACT Update

The previous BACT analysis was reviewed and determined to still represent BACT conditions for the proposed project.

IV. Emission Inventory and Control Technology Review

Table 1. Point Source Emissions Inventory.

Point Source Emissions (tpy)								
Mine Sources	TSP	PM ₁₀	PM _{2.5}	NO _x	CO	SO ₂	VOC	Lead
Space Heating Propane Combustion	0.10	0.10	0.10	3.42	0.46	0.004	0.12	-----
Primary Crushers	7.25	3.26	0.65	-----	-----	-----	-----	1.63E-04
Coarse Ore Conveyor Transfers	28	11.2	2.24	-----	-----	-----	-----	5.60E-04

Conveyor to Coarse Ore Stockpile	3.5	1.4	0.28	-----	-----	-----	-----	7.00E-05
Apron Feeders	1.75	0.7	0.14	-----	-----	-----	-----	3.50E-05
Conveyor Discharge to SAG Mill	0.35	0.14	0.03	-----	-----	-----	-----	7.00E-06
Concentrate Transfer	0.01	2.94E-03	5.88E-04	-----	-----	-----	-----	1.29E-05
Concentrate Loading	0.01	2.94E-03	5.88E-04	-----	-----	-----	-----	1.29E-05
Oversize Transfer to Hopper	0	0	0	-----	-----	-----	-----	0.00E+00
Oversize Reclaim Belt Transfer	0	0	0	-----	-----	-----	-----	0.00E+00
Oversize Crusher	0.11	0.04	0.01	-----	-----	-----	-----	1.75E-06
Oversize Screen	0.02	0.01	0	-----	-----	-----	-----	3.50E-07
Belt Transfer Back to SAG Mill	0.02	0.01	0	-----	-----	-----	-----	3.50E-07
Emergency Generator	0.00198	0.00198	0.000198	0.0741	0.0688	0.0320	0.00529	-----
Laboratory Crusher	0.49	0.03	0.01	-----	-----	-----	-----	-----
Total	41.59	16.88	3.46	3.49	0.53	0.036	0.125	0.00863

Table 2. Fugitive Source Emissions Inventory.

Fugitive Source Emissions (tpy)							
Mine Sources	TSP	PM₁₀	PM_{2.5}	NO_x	CO	SO₂	Lead
Blasting (particulate emissions)	0.78	0.40	0.02				0.000202
Topslice	0.59	0.31	0.02	-----	-----	-----	1.54E-05
Bench	0.11	0.06	3.33E-03	-----	-----	-----	2.88E-06
Development	0.07	0.04	2.16E-03	-----	-----	-----	1.87E-06
Blasting (gaseous emissions)	-----	-----	-----	-----	-----	-----	-----
RU Emulsion	-----	-----	-----	1.19	64.4	0.14	-----
High Explosive	-----	-----	-----	0.13	0.26	0.00	-----
Coarse Ore Stockpile Wind Erosion	1.06	0.53	0.08	neg	neg.	neg.	2.66E-05
Haul Truck Travel	703.2	137.15	20.53	-----	-----	-----	1.37E-03
Tailings Impoundment Wind Erosion*	23.3	11.65	3.49	neg	neg.	neg.	5.82E-04
Total	727.28	149.21	24.04	1.33	64.66	0.14	.00139

*Department Tailings Impoundment Wind Erosion Emissions from 2006 and carried over to 2011

V. Existing Air Quality

The following air quality analysis is broken into two sections, one that addresses the modeling demonstration that was completed in 2006, and the other modeling demonstration that was completed in 2011. For the most part, all of the emitting units and emissions presented in 2006 remained the same as that of 2011, and the Department determined that it was not necessary to complete a full remodel. However, Mines Management submitted information to demonstrate compliance with the new NO₂ and SO₂ NAAQS and the Department also completed additional modeling to demonstrate compliance with PM₁₀ and PM_{2.5} NAAQS. Because the EIS for the project is not finalized and it is unclear at this time where the mine would locate, both scenarios and modeling demonstrations are included in this analysis.

In the 2006 scenario, the Montanore Mine (Alternative 2 – Draft EIS) is situated 15 miles south-southwest of the city of Libby, Montana. The mine covers portions of Sections 13, 14, 15, 23, 24, 26, and 35 in Township 28 North, Range 31 West, and Sections 1, 2, 3, 6, 11, 14, and 15 in Township 27 North, Range 31 West, in Lincoln County, Montana. The Ramsey plant site is located in Section 9, Township 27 North, Range 31 West. This scenario includes two mine portals, one in the Ramsey Creek drainage (Ramsey portal) and one in the Libby Creek drainage (Libby portal) will exhaust ventilation air from the underground mine and provide mine access.

Under the current permit action, the Montanore Mine is located 15 miles south-southwest of the city of Libby, Montana. The mine covers portions of Sections 23, 24, 25, 26, 35 and 36 in Township 28 North, Range 31 West, and Sections 2, 11, 14, and 15 in Township 27 North, Range 31 West, in Lincoln County, Montana. The Libby plant site is located in Sections 2 and 11 Township 27 North, Range 31 West. The two mine portals are both located in the Libby Creek (Libby #1 and Libby #2) drainage and will exhaust ventilation air from the underground mine and provide mine access.

2006 Modeling Demonstration

Mines Management operated an air monitoring site from July 1, 1988, through June 30, 1989. The site was located at Ramsey Creek near the proposed mine/mill site. Monitoring at the Ramsey Creek site included PM₁₀, wind speed, wind direction, sigma theta, and temperature. From the Total Suspended Particulate (TSP) filters, the following trace metals were analyzed: antimony (Sb), arsenic (As), cadmium (Cd), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), and zinc (Zn).

The PM₁₀ data collected at the sites were fairly typical of remote background sites. At the Ramsey Creek site, the annual PM₁₀ average was 14 micrograms per cubic meter (µg/m³) and the maximum 24-hour concentration was 35 µg/m³. Anomalous data which was recorded during the forest fires in the fall of 1988 was not included in the development of this summary. The metal concentrations were all very low and below the Montana guideline values. The ambient background concentrations data is shown below in Table 3.

There would also be short-term emissions associated with the development of the evaluation adit (approximately 1 year). These would occur prior to the operational phase emissions listed above. The pollutant of most concern would be NO_x from diesel generator used to

supply power at the Ramsey portal. Total NO_x emissions from the generator were estimated at 100.24 tpy. At that time, the stack height of each generator was required to be a minimum of 9 feet. (CO, VOC, and SO_x emissions were estimated at 4.86, 2.98, and 2.55 tpy, respectively. In the 2006 scenario, the particulate emissions from the Ramsey portal development operations and material handling were 2.10 tpy.

A specific air quality concern is the potential for wind erosion from the tailings disposal area. When tailings are allowed to dry, there is a significant potential for wind erosion to occur. To control fugitive dust on the tailings impoundment, a fugitive dust control plan will be employed by Mines Management. The effectiveness of the fugitive dust control plan will be evaluated by the Department through ongoing air quality monitoring and visual observation.

Another specific concern is the potential air quality impact to the Cabinet Mountains Wilderness. This area is designated as Class I under the Prevention of Significant Deterioration (PSD) regulations. The review of PSD requirements is carried out primarily through the analysis of permit applications for “major stationary sources.” The Montanore Mine project is not classified as a major stationary source because estimated emissions by individual pollutant types are less than 250 tons per year. Although the PSD regulations do not apply directly to the Montanore Mine project, many of the specific PSD requirements have been analyzed. These include:

- Preconstruction and post-construction ambient air monitoring;
- Computer simulation modeling of emission impacts; and
- Visibility impacts.

The impact analyses in Section VI summarize the predicted air quality impact at the wilderness boundary. Compliance with the Class I and II increments has been demonstrated. (Note: The Department’s position is that increment consumption is not applicable to this project because it is a minor source in an area where the baseline has not been triggered. The Environmental Protection Agency’s (EPA) position is that the baseline is triggered for the entire state and all sources consume increment).

Previously, in the initial preliminary determination (2006) section II.A.7 (currently Section II.A.13) of the permit required emissions testing of the Ramsey portal for NO_x and particulate (currently Section II.A.13 pertains to the Libby portal). The purpose of this testing was to evaluate and verify the emission estimates used in the initial permit application. Of special concern were the estimates of deposition rates in the Ramsey portal prior to release to the atmosphere. By measuring the concentrations just downstream of the generation point and at the outlet, deposition and/or absorption rates as well as actual emissions can be determined.

Concentrations of potentially toxic trace metals in the particulate emissions were also analyzed in the initial permit application. Specific metals included were Sb, As, Cd, Cr, Cu, Fe, Pb, and Zn. This type of analysis is required for most large mining operations to identify whether any of these metals are present in sufficient quantities in the ore and/or tailings to create a hazardous condition from airborne particulate levels. The modeled TSP concentrations were multiplied by the mass fraction (percentage) of each metal in the ore and tailings. (Metals contents were based on data from the Troy Project.) The resulting metals concentrations were then added to the measured background levels in the area.

Predicted concentrations of lead were well below the state and federal ambient air quality standards. There are no standards for the other metals.

Concentrations for those metals are, therefore, compared against guideline values used by the Department. All concentrations were predicted to be below the guideline values.

Table 3. 2006 Ambient Background Concentrations.

Pollutant	Averaging Period	Background Concentration ($\mu\text{g}/\text{m}^3$)	Data Source
PM ₁₀	Annual	14	1988-1989 Montanore Mine
	24-Hour	35	1988-1989 Montanore Mine
PM _{2.5}	Annual	3.5	Cabinet Mtns Wilderness IMPROVE
	24-Hour	10.4	Cabinet Mtns Wilderness IMPROVE
NO ₂	Annual	6	Department
	1-Hour	75 ¹ /40 ²	Department
SO ₂	Annual	3	Department
	24-Hour	11	Department
	3-Hour	26	Department
	1-Hour	35	Department
Lead	Annual	0.006	1988-1989 Montanore Mine

Mines Management will be required to perform post-construction monitoring as a condition of MAQP #3788-00. Attachment 1 describes the current ambient air monitoring plan.

VI. Ambient Air Quality Impact Analysis

The Montanore Mine is classified as a minor source under the Title V and PSD regulations. Potential emissions of regulated pollutants from the project during peak operations (year 4) are listed in this section. Emissions include the criteria air pollutants, which are NO_x, SO₂, VOCs, CO, Pb, PM₁₀, and PM_{2.5}. Table 4 groups the emissions into point source emissions, fugitive emissions and mobile source emissions. Emissions are expressed in units of tpy.

Table 4. 2006 - Summary of Mines Management Operation Emissions.

Pollutant	Point Source Emissions (tpy)	Fugitive Emissions (tpy)	Mobile Source Emissions (tpy)
PM ₁₀	12.7	138	5.07
PM _{2.5}	2.62	20.6	5.07
NO _x	3.60	1.33	163
CO	0.47	64.7	56.6
SO ₂	0.01	0.14	6.32
VOC	0.13	0.00	9.01

Mines Management production and processing facilities and tailings area are located in an area designated as attainment for all regulated pollutants. The city of Libby and surrounding area has been designated as non-attainment area for both PM_{2.5} and PM₁₀. The closest boundary of the PM₁₀ non-attainment area is 8.9 miles north of the tailings impoundment, which is the northernmost mine activity. The closest boundary of the PM_{2.5} non-attainment

¹ 75 $\mu\text{g}/\text{m}^3$ applied to the 1-hour (MAAQS) (as modeled in 2006)

² 40 $\mu\text{g}/\text{m}^3$ applies to the 1-hour NAAQS (as modeled in 2011)

area is only 1.5 miles north of the tailings impoundment. The concentrate rail load-out facility is located within the Libby PM₁₀ and PM_{2.5} non-attainment area boundaries. All transfer operations and storage areas at the Libby rail siding will be enclosed.

MODELING SUMMARY

A number of modeling analyses were performed for the Montanore Mine, as summarized in Table 5. Some analyses are required by regulation while others were performed for informational purposes as requested by the Department. Visibility impact assessment, acid deposition impact assessment and comparison of modeled concentrations to PSD Class I Increments are not explicitly required for minor source (non-PSD) Montana Air Quality Permit applications. The Department has requested these analyses because the mine is within ¼ mile of the Cabinet Mountains Wilderness Area and Mines Management agreed.

Table 5. Summary of Mines Management Air Quality Impact Analyses.

Modeling Objective	Model Used	Comments
Demonstration of compliance with MAAQS and NAAQS during peak year of operation. <i>Required</i>	ISCST3 with onsite met data from the Ramsey site and Spokane upper air.	Compliance demonstrated for all pollutants and averaging times.
MAAQS/NAAQS compliance during construction with generator operating. <i>Required</i>	ISCST3 with onsite met data from the Ramsey site and Spokane upper air.	Compliance demonstrated for all pollutants and averaging times.
PM ₁₀ non-attainment area impact analysis. <i>Required</i>	CALPUFF with Ramsey met, modeling direct emissions and secondary particulate formation.	Impacts below significance levels.
PM _{2.5} non-attainment area impact analysis. <i>Required</i>		Impacts less than or equal to 5% of NAAQS.
Class I PSD Increment analysis, Cabinet Mountains. <i>Requested</i>	ISCST3, Class I Receptors	Impacts below Class I PSD increments (not required)
Nitrogen and sulfate deposition at sensitive lakes in Cabinet Mountains. <i>Requested</i>	CALPUFF with Ramsey met, deposition calculations with CALPOST.	Modeled deposition rates acceptable. Receptors too close to source for definitive analysis.
Terrain-induced downwash evaluation. <i>Requested</i>	ISC and BPIP test runs	No terrain-induced downwash predicted
HAP Impact Analysis. <i>Informational</i>	ISCST3	Negligible risk demonstrated.
Plume visual impacts in Class I area. <i>Requested</i>	PLUVUE II	Evaluated plume perceptibility and color difference

MODELING PARAMETERS

For the initial application, emissions of NO_x, SO₂, PM₁₀, PM_{2.5} and Pb were modeled to demonstrate compliance with the NAAQS and the Montana Ambient Air Quality Standards (MAAQS). CO was not modeled due to low emission rates as per the Department's guidance. The modeling was performed in accordance with the methodology outlined in the New Source Review Workshop Manual, EPA, October 1990, Draft and Appendix W of 40 CFR Part 51, Guideline on Air Quality Models (revised), April 15, 2003 and November 9, 2006.

Mines Management submitted an initial modeling protocol on September 27, 2005, and incorporated the Department's comments into the final modeling. The modeling included point sources and area sources using source parameters that are consistent with accepted

practice. The Department ran the modeling files obtained from Mines Management to verify the modeling results.

Modeled Emission Sources

Two mine portals, one in the Ramsey Creek drainage (Ramsey portal) and one in the Libby Creek drainage (Libby portal) will exhaust ventilation air from the underground mine and provide mine access. Portal emissions are modeled as point source emissions, regardless of the manner of generation underground. The mine portals and associated facilities will be constructed before line power is available to the site. Therefore the emissions inventory contains a construction phase emissions and operations phase emissions. Although the construction phase is a temporary operating scenario, modeling analyses have been completed to verify compliance while the diesel-fired electrical generator is operating during construction. Operations for year 4, the first year of maximum production, are modeled as the highest operations phase emissions scenario.

The permit application and modeling rely on the assumption that the backup generators will not operate more than 4 hours per day during mine operations. The modeling is based on operations of 8 hours per day to cover the case when the generators operate 4 hours at the end of one day and 4 hours at the beginning of the next.

Meteorological Data

Onsite meteorological data was collected at a site in the upper Ramsey Creek drainage at the Montanore Mine mill site from July 1, 1988, through June 30, 1989. A 10-meter tower collected wind speed, wind direction, sigma-theta and temperature in a forest clearing at this site. The Ramsey Creek surface data was combined with twice-daily upper air mixing height data from the Spokane airport and was processed using EPA's Meteorological Processor for Regulatory Models (MPRM). The processed met data file was provided to the Department by Mines Management.

2006 Receptor Set

Receptors for criteria pollutant compliance and HAP modeling were placed at 50-meter intervals along the public access boundaries surrounding the Ramsey portal and Mill facility, the Libby portal, the Land Application Development (LAD) areas, and the tailings area. A 100-meter Cartesian receptor grid extends to 1 km in each direction beyond the boundaries, and 250-meter Cartesian grid extends to 3 km in each direction, and a 500-meter Cartesian grid extends to 5 km in each directions. Receptors were placed at 100-meter intervals along the Cabinet Mountains Wilderness Area boundary. Receptors were placed at 100-meter intervals along the PM₁₀ and PM_{2.5} non-attainment area boundaries. Additional discrete receptors were placed at prominent terrain features located between 6-10 kilometers from the mine portals, outside of the grid. A receptor was also placed at the Libby Courthouse Annex PM_{2.5} monitoring site. Receptor elevations were determined digital elevation model (DEM) files using the using 7.5-minute United States Geological Survey (USGS) topographical maps.

The USDA Forest Service (USFS) requested that deposition modeling be performed for lake acidification analyses at three sensitive alpine lakes within the Cabinet Mountain Wilderness

Area where acid deposition is of concern. As requested, Mines Management placed discrete receptors at Upper Libby Lake, Lower Libby Lake and Rock Lake.

Emissions Inventory

The emission inventory used in the modeling is slightly different from the emissions inventory used for permitting purposes because Mines Management took emission reductions due to deposition within the mine.

The Department has revised emissions estimates for wind blown dust from the tailings area. Mines Management estimated wind erosion emissions from the tailings impoundment based on equations contained in AP-42 Section 13.2.5. Assumptions made in the wind erosion calculation resulted in an estimate of zero emissions from the tailings, although the permit application acknowledges that emissions do occur on a short-term basis.

Due to concerns about 24-hour $PM_{2.5}$ impacts on the Libby $PM_{2.5}$ non-attainment area, the Department has revised the estimates to provide a more conservative analysis. The Department estimated the worst-case $PM_{2.5}$ emissions from the tailings area on a 24-hour basis to be 486 pounds per day and used this emission rate in the CALPUFF model to re-evaluate the 24-hour $PM_{2.5}$ impacts on the Libby $PM_{2.5}$ non-attainment area.

The Department previously estimated annual emissions from tailings wind erosion based on the methodology used in the 1993 permit application for this mine (Noranda). The 1993 application stated that the tailings will be subject to some wind erosion, which could lead to dust becoming entrained into the air and contributing to particulate concentrations downwind of the tailings impoundment. Uncontrolled TSP emissions from the tailings area were estimated to be 46.6 tpy using the universal soil loss equation. The 1993 application assumed 50% control of TSP from watering and precipitation. The Department has determined that 50% control would also be appropriate for PM_{10} and 0% control would be appropriate for $PM_{2.5}$. Estimated annual wind erosion emissions from the tailings area are: 23.3 tpy TSP, 11.7 tpy PM_{10} and 3.5 tpy $PM_{2.5}$.

MODELING RESULTS

NAAQS/MAAQS Compliance Demonstration

NAAQS/MAAQS modeling was conducted for PM_{10} , $PM_{2.5}$, SO_2 , NO_2 and Pb emissions from Mines Management, based on the maximum estimated emissions. Model results are compared to the applicable NAAQS and MAAQS in Table 6. Modeled concentrations show the impacts from Mines Management sources and include the background values. As shown in Table 6, the modeled concentrations were below the NAAQS/MAAQS applicable in 2006.

Table 6. 2006 - NAAQS/MAAQS Compliance Demonstration update.

Pollutant	Avg. Period	Modeled Conc. ^a (µg/m ³)	Background Conc. (µg/m ³)	Ambient Conc. (µg/m ³)	NAAQS (µg/m ³)	% of NAAQS	MAAQS (µg/m ³)	% of MAAQS
PM ₁₀	24-hr	21.7	35 ^e	56.7	150	38	150	38
	Annual	4.09	14 ^e	18.1	Revoked	-----	50	36
PM _{2.5}	24-hr	14.0	10.4 ^f	24.4	35	70	-----	-----
	Annual	2.10	3.5 ^f	5.60	15	37	-----	-----
NO ₂	1-hr	364 ^b	75	439	-----	-----	564	78
	Annual	19.8 ^c	6	25.8	100	26	94	27
SO ₂	1-hr	51.4	35	86.4	-----	-----	1,300	6.65
	3-hr	42.2	26	68.2	1,300	5.24	-----	-----
	24-hr	12.2	11	23.2	365	6.39	262	8.88
	Annual	1.92	3	4.92	80	6.15	52	9.47
Pb	Quarterly ^d	0.00026	Not. Avail.	0.00026	1.5	0.017	-----	-----
	90-day ^d	0.00026	Not. Avail.	0.00026	-----	-----	1.5	0.017

^a Concentrations are high-second high values.

^b The ozone limiting method has been applied to this result.

^c The ambient ratio method has been applied to this result.

^d The 1-month average impact is used for compliance demonstration.

^e 1988-1989 Montanore Mine monitoring data.

^f PM_{2.5} data from the Cabinet Mountains Wilderness IMPROVE Site.

The annual modeled NO_x impact was 26.5 µg/m³, which converts to 19.8 µg/m³ of NO₂ using the ambient ratio method. The maximum modeled 1-hour NO_x impact was 1761 µg/m³ which converts to 364 µg/m³ of NO₂ using the ozone limiting method.

Construction Modeling Including Generators

Construction activities at the mine will be temporary and will precede full production in year 4. During the first phase of construction, underground construction activities will begin, no major surface construction activities will occur, and one 1,622 horsepower diesel electric generator (with one identical collocated unit on standby) will operate continuously at the Libby site for construction support during electric utility installation. The diesel generator will be moved to the Ramsey portal for standby use during operation of the mine and mill.

Mines Management modeled construction emissions from the generator and from the Libby portal emissions resulting from underground construction activities emitting from the Libby portal. Libby portal emissions relied on underground deposition to reduce emissions. The generator(s) emissions were modeled at full time operation, 24 hours per day, 8,760 hours per year, for the construction phase modeling. Generator emissions and other construction emissions were modeled to show NAAQS/MAAQS compliance. Modeling of generator emissions included downwash.

NO_x was analyzed because it is emitted in the largest quantity and because NO_x concentrations in the production compliance modeling were the closest to their respective standards. The maximum modeled 1-hour NO₂ concentration (adjusted using OLM) was

364 $\mu\text{g}/\text{m}^3$ and the maximum annual average NO_2 concentration was 19.8 $\mu\text{g}/\text{m}^3$. The results show that the construction phase emissions would not result in a violation of the NO_2 NAAQS or MAAQS. Impacts are highest at the property boundary and drop off considerably at the Class I area boundary. Based on the NO_2 modeling, compliance with the other standards is expected.

PM₁₀ and PM_{2.5} Non-attainment Area Modeling

The Department requested that Mines Management use the CALPUFF model for the PM_{2.5} non-attainment area impact modeling to evaluate the impacts of primary and secondary particulate. The results show that the PM_{2.5} impacts are actually higher than the PM₁₀ impacts, primarily because the PM_{2.5} non-attainment area boundary is only 1.5 miles north of the tailings area. Total PM_{2.5} emissions include primary PM_{2.5}, SO_4 and NO_3 (sulfates and nitrates); POSTUTIL is used to process the CALPUFF outputs to calculation total PM_{2.5}.

Mines Management set the receptor elevations and the source elevations to 0, causing the model to treat the site as simple terrain. The Department requested this modeling approach because the receptors are actually at lower elevation than the source. By modeling the receptors as simple terrain, the model accounts for the worst-case situation where the plume may follow the terrain downslope.

The Department has reviewed all the CALPUFF, POSTUTIL and CALPOST post-processor input and output files. Table 7 contains the results of the nonattainment area modeling. The PM₁₀ impacts were well below the significant impact levels for non-attainment areas contained in 50 CFR 51Appendix S. Significant impact levels have not been established for PM_{2.5} non-attainment areas. The modeled PM_{2.5} impacts, including wind erosion emissions from the tailings area, are 1.3% of the annual PM_{2.5} standard and 2.7% of the 24-hour PM_{2.5} standard.

Table 7. Modeled Nonattainment Area Impacts.

Non-attainment Area	Pollutant and Averaging Period	Maximum Modeled Concentration ($\mu\text{g}/\text{m}^3$)	Non-attainment Area Significance Level ($\mu\text{g}/\text{m}^3$)	% of NAAQS (Excluding Background)
Libby, MT PM ₁₀ (8.9 mi. from source)	PM ₁₀ Annual	0.042	1	0.07
	PM ₁₀ 24-hour	0.83	5	0.44
Libby, MT PM _{2.5} (1.5 mi. from source)	PM _{2.5} Annual	0.44	Not established	1.3
	PM _{2.5} 24-hour	1.75		2.7

The Department used Mines Management's CALPUFF model to determine the worst-case PM_{2.5} impacts, including the impacts from wind erosion of the tailings, as described above. The 24-hour PM₁₀ model only included impacts modeled on the same day worst-case emissions estimates were predicted. This approach accounts for the fact that high winds cause both high wind erosion and increased dispersion.

Class I Concentration Modeling

PM₁₀, SO_2 , and NO_x emissions were modeled using ISCST3 for the Class I area receptors (Cabinet Mountains). Class I increments do not apply to this minor source, but are a useful comparison point for examining impacts. ISCST3 was used rather than CALPUFF because of the close proximity of the project to the Class I area. The Class I area modeling results

are shown in Table 8. All of the modeled impacts from the mine were below the PSD increments.

Table 8. Cabinet Mountain Class I Area Modeling Results.

Pollutant	Avg. Period	Class I Increment ($\mu\text{g}/\text{m}^3$)	Class I Modeled Conc. ($\mu\text{g}/\text{m}^3$)	% of Increment	Peak Impact Location
PM ₁₀	24-hr	8	4.18	52	(603491, 5328713)
	Annual	4	0.25	6.4	(603573, 5328675)
SO ₂	3-hr	25	7.97	32	(603372, 5328874)
	24-hr	5	2.24	45	(603491, 5328713)
	Annual	2	0.10	5.0	(603573, 5328675)
NO ₂	Annual	2.5	1.62	65	(603573, 5328675)

Deposition at Sensitive Lakes

Maximum sulfur (S) and nitrogen (N) deposition impacts were modeled from Montanore Mine sources using CALPUFF. POSTUTIL was used to estimate total S and N fluxes from CALPUFF-predicted wet and dry fluxes of SO₂, SO₄, NO_x, NO₃ and HNO₃. Impacts were assessed at three sensitive lakes identified by the Department and the USDA Forest Service (USFS): Lower Libby Lake, Upper Libby Lake, and Rock Lake. Modeled deposition rates were compared to the NPS deposition analysis threshold (DAT) of 0.005 kilograms per hectare per year (kg/ha-yr) which was developed for S and adopted for N. Other values considered in the analysis were the USFS levels of concern for N of 3 kg/ha-yr, and deposition data the National Atmospheric Deposition Program (NADP) monitor near Priest River, Idaho.

The average annual measured deposition rates at the Priest River Experimental Station of 1.4 kg/ha/yr N and 0.48 kg/ha-yr S are considered representative of background conditions in the Montanore mine area. Modeled S deposition was 0.005 kg/ha-yr at Upper and Lower Libby Lakes and 0.004 kg/ha-yr at Rock Lake. Modeled N deposition was 0.05 kg/ha-yr at Upper and Lower Libby Lakes and 0.04 kg/ha-yr at Rock Lake. The modeled N and S deposition values are less than 5% of background levels and do not indicate a level of concern for this project.

The CALPUFF-predicted annual deposition fluxes of S and N were used to estimate the change in acid neutralizing capacity (ANC) at the sensitive lakes. The change in ANC was calculated following USFS guidance and using background ANC values for the individual lakes. The predicted change in ANC was below the USFS Level of Acceptable Change (LAC) thresholds for all three lakes.

Terrain-induced Downwash

At the Department's request, Mines Management analyzed the potential effects of terrain-induced downwash that could be caused by the hillside rising sharply near the Ramsey portal. Test model runs were completed using both elevated terrain and flat terrain receptors. The

study results showed that hillside downwash had no effect on the maximum concentrations predicted by the dispersion model.

HAP Impact Analysis

Mines Management submitted modeling of the impacts from trace metals released during ore, tailings and concentration mining handling and processing. Montana does not have air toxics impact regulations and Mines Management is not explicitly required to assess human health risks from health emissions. However Mines Management provided a screening-type human health risk assessment for trace metals classified as HAPs to provide a full disclosure of potential HAP impacts.

The analysis predicted concentrations of lead, arsenic, antimony, cadmium and chromium, which were compared to several risk assessment levels. Arsenic, cadmium, and chromium modeled concentrations were predicted to be above the Department's carcinogenic incinerator risk assessment levels, and these compounds were carried forward in the analysis. Total combined cancer risk from these three HAPs was determined by summing the cancer risk for all and was found to be 5 in 1,000,000 based on a 70-year lifetime of exposure. Because the Montanore Mine is proposed to operate only 15 years, cancer risk was assumed to be proportionally reduced, to a combined cancer risk of 1 in 1,000,000.

Plume Visual Impacts

Visibility impairment due to the pollutant loading from a discrete plume, within a section of the atmosphere that becomes visible due to the contrast or color difference between the plume and viewed background is referred to as plume impairment. The Montanore Mine is a minor source under PSD regulations and as such is not explicitly required to analyze visibility impacts. PLUVUE II analyses were performed for the Montanore Mine point sources, Libby portal, Ramsey portal and the emergency generator. The PLUVUE II model was run with model default switch settings, seasonal relative humidity data applicable to the Cabinet Mountains Wilderness Area and background concentrations of NO_x, SO₂ and ozone from the Glacier National Park monitoring site. Hourly emission rates for NO_x, SO₂ and PM₁₀ from the Ramsey and Libby portals and the emergency generator were used for all PLUVUE II analyses.

The PLUVUE II analyses predicted a few hours in which the impacts were above the FLAG threshold level of concern for plume impairment. Mines Management's visibility report evaluated contributing and mitigating factors related to the PLUVUE II modeling results. The Department has reviewed the analyses and concurs with the finding that visual plume impacts are not expected to interfere with visitor experience at the Cabinet Mountains Wilderness Area.

2011 Modeling Demonstration

In response to comments received during the Draft EIS, Mines Management submitted information to demonstrate compliance with the new NO₂ and SO₂ NAAQS. The Department also requested that in addition to updating the modeling that Mines Management review the current Montana Air Quality Permit #3788-00 for accuracy because the Department planned to issue a supplemental preliminary determination to coincide with the Supplemental EIS. Mines Management submitted additional information through May

25, 2011, to make the following changes: update the location (change to the EIS' Alternative 3), and update the proposed generator/engine size.

In 2006, the MDEQ reviewed and accepted the meteorology (met) data with the information pertaining to the surface characteristics surrounding the on-site met tower. Due to this fact, a current review was unnecessary. For the most part, the modeling demonstration completed in 2006 versus that in 2011 remained the same. However, Mines Management submitted information to demonstrate compliance based on locating in the preferred alternative location.

2011 Modeled Emission Sources

As mentioned previously, the mine activities will occur in two phases, construction and production. Two, 750 bhp engines/generators will be the only emission sources during the construction phase. In the production phase, above and below ground emissions will be produced. The engines/generators would be required to meet the non-road EPA Tier 3 emission standards for engines less than 750 bhp. These engines/generators will be limited to 16 hours during the production phase, and as such, were considered intermittent 1-hour NO₂ sources and were not modeled as emission sources. On-road mobile exhaust emissions are not evaluated in the Montana air quality permitting process, but since this mine will be located near a Class I area, all emissions were considered in order to be extremely conservative. All of the mobile exhaust emissions were based on engine horsepower ratings and these emissions will be distributed into three areas of the mine: Mill, tailings impoundment, and Libby portal. All underground emissions will be equally emitted from two exit adits, Libby Portals 1 and 2. In what MMI is calling the evaluation phase but also represents the early part of the construction phase, consideration was also given to three Tier II engines that will move onto the site under an "intent to transfer" notification. Of these Tier II engines, only two may operate continuously and these engines will be used only for temporary power until Tier III engines are put into service and/or until the transmission line is in place.

Emission Inventory

Table 9 lists the change in the hourly and annual emissions from the 2006 air quality permit application to the current one for the following air pollutants: CO, PM_{2.5}, PM₁₀, NO_x, SO₂, and VOCs. Lead emissions were not included in this table due to extremely low emission rates. The same emissions methodologies were used to calculate the emissions for both applications; to reiterate, the MDEQ accepted the submitted 2006 emissions inventory with the associated methodology. The daily diesel generator emissions were based on 16 hours per day whereas the annual emissions comprised a total of 16 hours per year.

Table 9. Daily and Annual 2006 and 2011 Emissions.

Source	CO (tpy) ²	PM _{2.5} (tpy)	PM ₁₀ (tpy)	NO _x (tpy)	SO ₂ (tpy)	VOCs (tpy)
2006						
Point	0.47	2.62	12.68	3.60	0.01	0.13
Mobile	56.57	5.07	5.07	162.77	6.32	9.01
Fugitive	64.66	20.55	137.56	1.33	0.14	0.00
TOTAL	121.71	28.24	155.31	167.70	6.47	9.14
2011						
Point	0.53	3.46	16.88	3.49	0.036	0.125
Mobile	49.99	1.49	1.49	64.74	5.48	4.21
Fugitive	64.66	20.55	137.56	1.33	0.14	0.00
TOTAL	115.18	25.5	155.93	69.56	5.656	4.335
DIFF. ³	-6.53	-2.74	0.62	-98.14	-0.814	-4.805

¹. lb/day = pounds per day.

². tpy = tons per year.

³. DIFF. = difference; 2011 – 2006 emissions.

Over 99% of the fugitive CO and particulate emissions were haul road activities that will occur outside the mine property as haul trucks travel to the Libby rail load-out area. Within the mine boundaries, these emissions were conservatively estimated as 10% of the haul road emissions.

Compared to the 2006 emissions, the 2011 NO_x emissions had the greatest increase due to the mobile emissions whereas the CO emissions daily emissions decreased significantly.

2011 Receptor Set

In this case, with respect to the NO₂ and SO₂ modeling demonstration, a Cartesian receptor grid was developed outside the fence line at 250 m spacing for a distance to 1 kilometer (km), 100 m spacing from 1 km to 3 km, and at 500 m spacing from 3 to 10 km. A total of 7,659 receptors were used. Receptors were placed along the facility fence line at 50 m.

MODELING RESULTS

2011 NAAQS/MAAQs Compliance Demonstration

For the 1-hour NO₂ analysis, the 8th (H8H) modeled highest daily maximum 1-hour concentration for each phase was compared to the 1-hour NO₂ NAAQS. These selected concentrations were equivalent to the 98th percentile of the annual distribution of the maximum daily 1-hour values. The modeled 1-hour NO₂ H8H concentrations were adjusted by a 0.80 factor, the default for an USEPA Tier 2 analysis³. The 4th (H4H)

3 USEPA. 2010. Guidance Concerning the Implementation of the 1-hour SO₂ NAAQS for the Prevention of Significant Deterioration Program. August 23, 2010.

modeled highest daily maximum 1-hour SO₂ concentration was selected for each phase for comparison to the corresponding NAAQS. These selected concentrations were equivalent to the 99th percentile of the annual distribution of the maximum daily 1-hour values. Tables 10 and 11 list the 1-hour NO₂ and SO₂ modeling results for both construction and production phases and comparisons to the relevant NAAQS.

Table 10. Montanore Mine 1-Hour NO₂ Modeling Results.

Phase	1-Hour NO ₂ Modeled Concentration (µg/m ³) ¹	1-Hour NO ₂ Background Concentration (µg/m ³)	Total 1-Hour NO ₂ Concentration (µg/m ³)	1-Hour NO ₂ NAAQS ² (µg/m ³)	Percent of NAAQS (%)
Construction	69.656 (87.07 * 0.8)	40	109.656	188.679	58.1
Production	58.664 (73.33 * 0.8)	40	98.664	188.679	52.3

¹. µg/m³ = micrograms per cubic meter.

². NAAQS = National Ambient Air National Standard.

Table 11. MDEQ Montanore Mine 1-Hour SO₂ Modeling Results.

Phase	1-Hour SO ₂ Modeled Concentration (µg/m ³) ¹	1-Hour SO ₂ Background Concentration (µg/m ³)	Total 1-Hour SO ₂ Concentration (µg/m ³)	1-Hour SO ₂ NAAQS ² (µg/m ³)	Percent of NAAQS (%)
Construction	0.0004	35	35.00	195.00	18.0
Production	17.82	35	52.82	195.00	27.1

¹. µg/m³ = micrograms per cubic meter.

². NAAQS = National Ambient Air National Standard.

Other Pollutant NAAQS Modeling Analyses

In order to ensure that the new 2011 emissions and preferred U.S. Forest Service location will not cause a NAAQS violation, the daily and annual PM_{2.5} and PM₁₀ emissions were modeled using the new production phase locations. These pollutants were selected since the 2006 modeling analyses showed these emissions had the greatest impacts on their respective NAAQS. In the 2006 analyses, the total ambient concentrations including background for the 24-hour and annual PM_{2.5} were 70 and 37% of their respective NAAQS, whereas for PM₁₀, the corresponding results were 38 and 36% of their respective NAAQS. The 2006 modeling results for the other criteria pollutants were less than 10% of their respective NAAQS, except for NO₂. In this case, the annual NO₂ total concentration was 26% of the corresponding NAAQS. Table 12 lists daily and annual modeled PM_{2.5} and PM₁₀ emissions.

Table 12. 2011 Daily and Annual Modeled Production Phase PM_{2.5} and PM₁₀ Emissions.

Source	PM _{2.5}		PM ₁₀	
	(lb/day)	(tpy)	(lb/day)	(tpy)
Point	24.39	3.46	101.12	16.88
Mobile	7.96	1.45	7.96	1.45
Fugitive	11.80	2.06	79.53	13.95
TOTAL	44.15	6.97	188.62	32.28

¹. lb/day = pounds per day.

². tpy = tons per year.

For modeling, the fugitive haul road and mobile highway truck emissions were both reduced by 90% to account for the emissions only within the mine boundaries, the remaining emissions will occur on highway roads.

The laboratory crusher and haul road activities particulate emissions were combined with the mill volume source emissions for modeling. The modeling results are listed in Table 13. In every case, the high second high (H2H) concentration was selected to be consistent with the 2006 modeling results; the background concentrations were also used for consistency. This table also compares the total modeled concentrations to the applicable NAAQS and MAAQS.

Table 13. Daily and Annual Modeled Production Phase PM_{2.5} and PM₁₀ Results.

Pollutant	Averaging Period	Modeled Conc. ¹ (µg/m ³) ²	Background Conc. (µg/m ³)	Total Conc. (µg/m ³)	NAAQS ³ (µg/m ³)	Percent of NAAQS (%)	MAAQS ⁴ (µg/m ³)	Percent of MAAQS (%)
PM _{2.5}	24-hour	9.7	10.4 ⁵	20.1	35	57.4	-----	-----
	Annual	1.2	3.5 ⁵	4.7	15	31.3	-----	-----
PM ₁₀	24-hour	45.3	35 ⁶	80.3	150	53.5	150	53.5
	Annual	6.4	14 ⁶	20.4	-----	-----	50	40.8

¹. Selected modeled concentrations are high second high (H2H) values.

². µg/m³ = micrograms per cubic meter.

³. NAAQS = National Ambient Air National Standard.

⁴. MAAQS = Montana Ambient Air National Standard.

⁵. PM_{2.5} data from the Cabinet Mountains Wilderness Interagency Monitoring of Protected Visual Environments (IMPROVE) Site.

⁶. PM₁₀ 1988-1989 Montanore Mine monitoring data.

The 24-hour and annual NAAQS/MAAQS were not exceeded using the corresponding PM_{2.5} and PM₁₀ emission rates. Based on these results that were lower than the corresponding 2006 results, through inference, no NAAQS or MAAQS violations will occur for the following ambient air criteria pollutants from the production phase emissions, regardless of the averaging period for CO, lead, NO_x, and SO₂.

Libby PM_{2.5} and PM₁₀ NAA Modeling Analyses: For completeness purposes, the annual PM_{2.5} and 24-hour PM₁₀ production phase AERMOD modeling was conducted to ensure that the proposed source will not cause or contribute to a NAAQS violation based on significance levels contained in 40 CFR Part 51, Appendix S. The receptor sets were obtained from the 2006 far-field (CALPUFF) modeling demonstration; the coordinates were in universal transverse Mercator (UTM), Zone 11,

North American Datum (NAD) 27. The Department developed corresponding receptor elevations and hill height elevations using AERMAP.

Table 14 lists the results of this modeling analysis with the high first high (H1H) concentration selected and background concentrations were not added in this type of analysis.

Table 14. 2011 Production Phase PM_{2.5} and PM₁₀ NAA Significance Level Results.

Pollutant	Averaging Period	Modeled Conc. ¹ (µg/m ³) ²	Significance Level (µg/m ³)	Percent of Level (%)
PM _{2.5}	Annual	0.02	0.3	6.7
PM ₁₀	24-hour	0.05	5	1.0

¹ Selected modeled concentrations are high first high (H1H) values.

² µg/m³ = micrograms per cubic meter.

As such, the production phase PM_{2.5} and PM₁₀ emissions will not cause or contribute to a PM_{2.5} or PM₁₀ NAAQs violation in the corresponding Libby NAAs.

PSD Cabinet Mountains Wilderness Area (WA) Class I Modeling Analysis: Although Montanore Mine will not be a PSD source, the Cabinet Mountains Wilderness Area is a Class I Area located nearby. The 2006 modeling showed no Class I, PSD increment was consumed. However, the greatest increase in the production emissions occurred in the NO_x emissions relative to the 2006 emissions and in order to ensure that the Class I area will not be compromised, a PSD Class I increment modeling analysis was conducted.

Representative Cabinet Mountains WA receptors were obtained from the US National Park Service website (<http://www.nature.nps.gov/air/maps/receptors/>). These receptors were in geographic coordinates, NAD83. The US Army Corps of Engineers Corpscon, 6.0.1 software was used to convert the coordinates into UTM Zone 11, NAD27. Since there is no short-term NO₂ PSD Class I increment, the annual NO_x Production emissions were modeled and compared to the correspond PSD Class I increment. The background concentrations are not added in this analysis.

Table 15. 2011- Production Phase NO_x PSD Class I Increment Results.

Pollutant	Averaging Period	Modeled Conc. ¹ (µg/m ³) ²	PSD Class I Increment (µg/m ³)	Percent of Increment (%)
NO ₂	Annual	0.12	2.5	4.8

¹ Selected modeled concentrations are high first high (H1H) values.

² µg/m³ = micrograms per cubic meter.

The PSD, Class I, annual NO₂ increment will not be consumed by the production phase NO_x emissions. Through inference, none of the applicable criteria pollutants, regardless of the averaging period, will consume any PSD Class I increment.

SUMMARY

In 2006, modeling demonstrated that the project would not be expected to cause or contribute to a violation of the NAAQS or MAAQS. Further analyses showed that the project would not have

impacts in the Class I area above accepted levels. PM₁₀ non-attainment area impacts are very low. The mine and processing facilities, including wind erosion from the tailings area, will have a moderate impact at the PM_{2.5} non-attainment area boundary. Because most of the PM_{2.5} emissions are fugitive, impacts decrease with distance from the facility and the project is not expected to impact PM_{2.5} concentrations at areas of most concern in and around the city of Libby.

Further, the Montanore 1-hour NO_x and SO₂ construction and production phase emissions will not violate the corresponding NAAQS. The daily and annual PM_{2.5} and PM₁₀ production phase emission will not violate the corresponding NAAQS/MAAQs. The annual PM_{2.5} and 24-hour PM₁₀ production phase emissions will not cause or contribute to a violation in the Libby PM_{2.5} and PM₁₀ NAAs. Finally, the annual NO₂ PSD Class I increment will not be consumed. Through inference with comparing these results with the 2006 modeling demonstration, no ambient air criteria pollutant will violate an applicable NAAQS or MAAQS or cause/contribute to a violation in the Libby particulate NAAs. Finally, no PSD Class I increment will be consumed.

Both the 2006 and the 2011 modeling demonstrations have shown that the project would not be expected to cause or contribute to a violation of the NAAQS or MAAQS.

2015 Additional Modeling Analysis

In June 2015, additional air quality modeling was performed to address the fact that a new air quality permit had been issued for the Rock Creek Mine – located on the other side of the CMWA. Specifically, the Montanore Mine emissions were re-evaluated together with the emissions from both the Rock Creek Mine MAQP #2414-03 and the Troy Mine MAQP #1690-03. While the Rock Creek Mine is not yet operating, it is possible that both the Montanore and Rock Creek Mines may operate simultaneously in the future. Additionally, while the Troy Mine is currently not in production, and planned for the reclamation phase, the Troy Mine permit still exists at this time, and therefore was also included in this evaluation of emissions from all three mines.

This additional compliance demonstration addresses the 1-hour NO₂ NAAQS, 24-hour PM₁₀ NAAQS/MAAQs, annual PM₁₀ MAAQS (the annual PM₁₀ NAAQS was revoked in 2006; Federal Register 71 61144), 24-hour and annual PM_{2.5} NAAQS; at this time, there are not any 24-hour or annual PM_{2.5} state standards.

Receptors: For the initial Montanore Mine modeling analysis, a total of 7,659 receptors were used. Receptors were placed along the facility fenceline at 50 m. A Cartesian receptor grid was developed outside the fenceline at 250 m spacings for a distance to 1 kilometer (km), 100 m spacings from 1 km to 3 km, and at 500 m spacings from 3 to 10 km.

The Montanore Mine emissions were first modeled using this complete receptor set by pollutant and averaging period. The selection of the modeled concentration varied: high-eighth-high (H8H) for the 1-hour NO₂, and the high-second-high (H2H) for the 24-hour PM₁₀ and PM_{2.5}. There can only be one annual value since only one year of meteorological data was used so in total there were 5 different model runs. The 1-hour H8H NO₂ concentrations were comparative to the corresponding NAAQS and the H2H 24-hour particulate concentrations were conservative estimates. After modeling with the complete receptor set, five different receptor sets were developed by selecting the receptors with the highest 50 modeled concentrations for each pollutant and averaging period according to the selection methodology. All of these high concentration receptors occurred in the immediate vicinity of the Montanore Mine with the highest concentrations on the permit boundaries.

Source Groups: Nine different source groups were developed to determine the impacts of the off-site mine emissions with the Montanore Mine emissions on the maximum ambient pollutant concentrations from Montanore Mine. Each source group was modeled individually to assess their impacts:

- Montanore Mine emitting sources only (MONT);
- Montanore Mine emitting sources and all relevant Rock Creek (RC) emitting sources including the Exploratory Adit source without the RC Production Adit emissions (MONTRCEX);
- Montanore Mine (MONT) emitting sources and all relevant Rock Creek (RC) emitting sources including the Production Adit sources without the RC Exploratory Adit emissions (MONTRCPR);
- Montanore (MONT) and relevant Troy Mine (TROY) emitting sources (MONT+TROY);
- All Montanore, Rock Creek and Troy Mine relevant emitting sources except for the Production Adit emissions (ALL_EXP);
- All Montanore, Rock Creek and Troy Mine relevant emitting sources except for the Exploratory Adit emissions (ALL_PRO);
- All relevant Rock Creek Mine emitting sources including the Exploratory Adit source without the RC Production Adit emissions (RC_EXP);
- All relevant Rock Creek Mine emitting sources including the Production Adit sources without the RC Exploratory Adit emissions (RC_EXP); and
- All relevant Troy Mine emitting sources (TROY).

Although nine different sources groups were modeled only the highest of the modeled concentrations from the off-site mine emissions were listed in Tables 16 and 17 for simplification.

Table 16. MDEQ Montanore Mine 1-Hour NO₂ Modeling Results

<u>Phase</u>	<u>Individual Source Group</u>	<u>1-Hour NO₂ Modeled Concentration (µg/m³)¹</u>	<u>1-Hour NO₂ Background Concentration (µg/m³)</u>	<u>Total 1-Hour NO₂ Concentration (µg/m³)</u>	<u>1-Hour NO₂ NAAQS² (µg/m³)</u>	<u>Percent of NAAQS (%)</u>
Construction Phase	Montanore Mine Only	66.22 (82.78 * 0.8)	40	106.22	188.679	56.3
	Inclusion of Rock Creek and Troy Mines	66.23 (82.79 * 0.8)	40	106.23	188.679	56.3
Production Phase	Montanore Mine Only	62.51 (78.14 * 0.8)	40	102.51	188.679	54.3
	Inclusion of Rock Creek and Troy Mines	62.55 (78.19 * 0.8)	40	102.55	188.679	54.4

¹ µg/m³ = micrograms per cubic meter.

² NAAQS = National Ambient Air National Standard.

Table 16 clearly indicates that during the construction phase, the addition of Rock Creek and Troy mines to the 1-hour NO₂, results in only a 0.01 µg/m³ increase, thereby indicating the other mines do not impact the Montanore receptors. Similarly for the production phase, the addition of Rock Creek and Troy mines results in only a 0.04 µg/m³ increase. Furthermore, these NO_x emissions will not cause an exceedance of the 1-hour NO₂ NAAQS.

Particulate NAAQS/MAAQs Results: The daily and annual PM_{2.5} and PM₁₀ emissions were modeled using the Montanore Mine Production Phase locations and parameters since particulate emissions will not occur during the Construction stage. (In 2012, the EPA reduced the annual PM_{2.5} standard to 12 µg/m³. Unlike most new NAAQS, the EPA allowed grandfathering of pending preconstruction permitting applications if the application was deemed complete by December 14, 2012. This grandfathering would apply to the Montanore Mine and the compliance demonstration would not need to demonstrate compliance with the new annual PM_{2.5} standard.

For the 24-hour particulate concentrations, the high-second-high (H2H) concentrations were selected (Table 17). For comparison, the 24-hour PM₁₀ and PM_{2.5} background concentrations were 23.3% and 29.7%, respectively, of their corresponding NAAQS. The annual PM₁₀ background concentration was 28.0% of the MAAQS and the annual PM_{2.5} background concentration is 23.3% of the NAAQS.

Table 17. 2015 Daily and Annual Modeled Production Phase PM_{2.5} and PM₁₀ Results.

Pollutant	Averaging Period	Individual Source Group	Modeled Conc. (µg/m ³) ¹	Background Conc. (µg/m ³)	Total Conc. (µg/m ³)	NAAQS ³ (µg/m ³)	Percent of NAAQS (%)	MAAQs ⁴ (µg/m ³)	Percent of MAAQS (%)
PM ₁₀	24-hour ²	Montanore Mine Only	45.86	35 ⁶	80.87	150	53.9	150	53.9
		Inclusion of Rock Creek and Troy Mines	45.87		80.87		53.9		53.9
	Annual	Montanore Mine Only	11.57	14 ⁶	25.57	-----		50	51.1
		Inclusion of Rock Creek and Troy Mines	11.58		25.58				51.2
PM _{2.5}	24-hour ²	Montanore Mine Only	9.88	10.4 ⁵	20.28	35	57.9	-----	
		Inclusion of Rock Creek and Troy Mines	9.88		20.28		57.9		
	Annual	Montanore Mine Only	2.10	3.5 ⁵	5.60	15	37.3	-----	
		Inclusion of Rock Creek and Troy Mines	2.11		5.61		37.4		

¹ µg/m³ = micrograms per cubic meter.

² Selected modeled concentrations are high second high (H2H) values.

³ NAAQS = National Ambient Air National Standard.

⁴ MAAQS = Montana Ambient Air National Standard.

⁵ PM_{2.5} data obtained from the Cabinet Mountains Wilderness Interagency Monitoring of Protected Visual Environments (IMPROVE) Site.

⁶ PM₁₀ 1988-1989 Montanore Mine monitoring data.

As shown, the addition of the two off-site mine particulate emissions with the Montanore Mine particulate emissions did not change the modeling results significantly. Furthermore, the 24-hour and annual NAAQS/MAAQS were not exceeded using the corresponding PM_{2.5} and PM₁₀ emission rates.

PSD Class I increment and impacts on the Libby PM₁₀ nonattainment and PM_{2.5} maintenance areas were not examined. The reason was that the Montanore Mine emissions alone were insignificant based on the various significant impact levels so further analyses were unwarranted.

2015 SUMMARY

The Montanore Mine NO_x with the corresponding emissions from the Rock Creek and Troy Mines will not cause or contribute to a 1-hour NO₂ NAAQS. Furthermore, the daily and annual PM_{2.5} and PM₁₀ Montanore Mine Production Phase emissions with the corresponding particulate emissions from the Rock Creek and Troy Mines will not violate the corresponding NAAQS/MAAQS.

During the early period of the construction phase or better described as the “evaluation phase”, three Tier II generators (two for continuous operation, and one for a spare) will be moved onto the site and provide temporary electrical generation prior to two Tier III engines moving onto the site or until the transmission line is in place. These engines were evaluated as Tier II engines and are not the same engines that MMI may use for later periods of the construction phase. The Tier II engines will not be used other than during this early part of the construction phase and are considered portable sources. These Tier II engines along with adit emissions were modeled to show compliance with the 1-hour NO₂ NAAQS. The summary is on file with the Department.

VII. Taking or Damaging Implication Analysis

As required by 2-10-105, MCA, the Department conducted the following private property taking and damaging assessment.

YES	NO	
X		1. Does the action pertain to land or water management or environmental regulation affecting private real property or water rights?
	X	2. Does the action result in either a permanent or indefinite physical occupation of private property?
	X	3. Does the action deny a fundamental attribute of ownership? (ex.: right to exclude others, disposal of property)
	X	4. Does the action deprive the owner of all economically viable uses of the property?
	X	5. Does the action require a property owner to dedicate a portion of property or to grant an easement? [If no, go to (6)].
		5a. Is there a reasonable, specific connection between the government requirement and legitimate state interests?
		5b. Is the government requirement roughly proportional to the impact of the proposed use of the property?

	X	6. Does the action have a severe impact on the value of the property? (consider economic impact, investment-backed expectations, character of government action)
X		7. Does the action damage the property by causing some physical disturbance with respect to the property in excess of that sustained by the public generally?
	X	7a. Is the impact of government action direct, peculiar, and significant?
	X	7b. Has government action resulted in the property becoming practically inaccessible, waterlogged or flooded?
	X	7c. Has government action lowered property values by more than 30% and necessitated the physical taking of adjacent property or property across a public way from the property in question?
	X	Takings or damaging implications? (Taking or damaging implications exist if YES is checked in response to question 1 and also to any one or more of the following questions: 2, 3, 4, 6, 7a, 7b, 7c; or if NO is checked in response to questions 5a or 5b; the shaded areas)

Based on this analysis, the Department determined there are no taking or damaging implications associated with this permit action.

VIII. Environmental Assessment

An environmental impact statement is being completed by the Department and the United States Forest Service for this project.

Permit Analysis prepared by: Jenny O'Mara

Date: June 1, 2011

Appended August 8, 2015 by Craig Henrikson