

Draft Environmental Impact Statement

Troy Mine Revised Reclamation Plan

May 2011



**Kootenai National Forest
Three Rivers Ranger District**

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Draft Environmental Impact Statement

Troy Mine Revised Reclamation Plan

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Abstract: This Draft Environmental Impact Statement for the Troy Mine Revised Reclamation Plan describes the land, people, and resources potentially affected by the proposed revised reclamation activities. The purpose of the proposed revision is to return lands disturbed by mining to a condition appropriate for subsequent use of the area. Alternatives considered in detail include a No Action Alternative (the previously approved 1978 reclamation plan), the Proposed Action (Troy Mine, Inc.'s Revised Reclamation Plan), and an Agency-Mitigated Alternative (the Agencies preferred alternative). This Draft EIS analyzes Troy Mine, Inc.'s revised plan as well as agency-proposed modifications (*e.g.* adit closure, mine water management, water treatment and monitoring, reclamation cover requirements, subsidence monitoring, debris disposal, and road closures). The major state and federal actions include approval of a reclamation plan and any necessary permits to implement the reclamation activities including construction and long-term monitoring.

Reviewers should provide their comments to either KNF or DEQ during the review period of the Draft EIS. The KNF and the DEQ will analyze and respond to the comments jointly and will use the information acquired in the preparation of the final environmental impact statement (Final EIS). Reviewers have an obligation to structure their participation in the National Environmental Policy Act (NEPA) and Montana Environmental Policy Act (MEPA) process so that it is meaningful and alerts the agencies to the reviewers' position and contentions [Vermont Yankee Nuclear Power Corp. v. Natural Resource Defense Council, 435 U.S. 519, 553 (1978)]. Environmental objections that could have been raised at the Draft EIS stage may be waived if not raised until after completion of the Final EIS. [City of Angoon v. Hodel (9th Circuit, 1986) and Wisconsin Heritages, Inc. v. Harris, 490 F. Supp. 1334, 1338 (E.D. Wis. 1980)]. Comments on the Draft EIS should be specific and should address the adequacy of the statement and the merits of the alternatives discussed (40 Code of Federal Regulations (CFR) 1503.3).

Send Comments To: Bobbie Lacklen (Kootenai National Forest) email: TroyMineReclamation@fs.fed.us or Emily Corsi (MT DEQ) email: deqTroyMine@mt.gov or postal addresses listed above.

Comments Due: 45 days after the Notice of Availability is published in the *Federal Register*, which will be on or about May 20, 2011.

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Appendix F Troy Mine Area Surface Water Evaluation
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Appendix H Mine Water Plume Location and Identification Phase I Results and Phase 2 & 3 Work Plan
Appendix I Assessment of Natural Attenuation of Metals in a Decant Pond Disposal System

Executive Summary

This Executive Summary provides an overview of the contents of the Draft Environmental Impact Statement (EIS) for the Troy Mine Revised Reclamation Plan. The Draft EIS describes the land, people, and resources potentially affected by the proposed revised reclamation activities. This summary does not provide all of the information contained in the Draft EIS. If more detailed information is desired, please refer to the Draft EIS, its appendices, or referenced reports.

ES.1 Introduction

The United States Department of Agriculture (USDA) Forest Service (USFS) Kootenai National Forest (KNF) and the Montana Department of Environmental Quality (DEQ) have prepared this EIS in compliance with the National Environmental Policy Act (NEPA), the Montana Environmental Policy Act (MEPA), the Metal Mine Reclamation Act (MMRA), and with other relevant federal and state laws and regulations.

In 1978, the Montana Department of State Lands (DSL) and KNF issued a Draft and Final EIS that addressed potential impacts from both the operation and reclamation of the Troy Mine, which is operated by Troy Mine, Incorporated (Troy Mine, Inc.). Troy Mine, Inc. was formerly known as Genesis, Incorporated, and documents prepared under the earlier name referenced in this Draft EIS are attributed to Genesis.

In the fall of 1999, DEQ and KNF (the Agencies) initiated a review of the Troy Mine reclamation bond. DEQ and KNF notified the mining company that the approved 1978 reclamation plan needed to be revised and a substantial bond increase would be required. The mining company prepared a revised reclamation plan and the final draft was submitted to the Agencies in March of 2006 (Genesis 2006). The 2006 Revised Reclamation Plan is the subject of this Draft EIS and is referred to as the Proposed Action.

ES.1.1 Project Area Description

The Troy Mine is located about 15 miles south of Troy, Montana, in Lincoln County (Figure ES-1). The nearest towns to Troy are Libby, Montana, located 18 miles to the east and Bonners Ferry, Idaho (ID), located 33 miles to the west. The project area lies within the KNF immediately west and north of Bull Lake and is within the Stanley, Lake, and Ross creek drainages.

The Troy Mine is accessible from Montana Highway 56 (MT 56) and National Forest System Road (NFSR) 4626. The mine permit area covers 2,782 acres of public, private, and patented land. Approximately 57 percent of the project area is on private and patented land, and the other 43 percent is on the KNF.

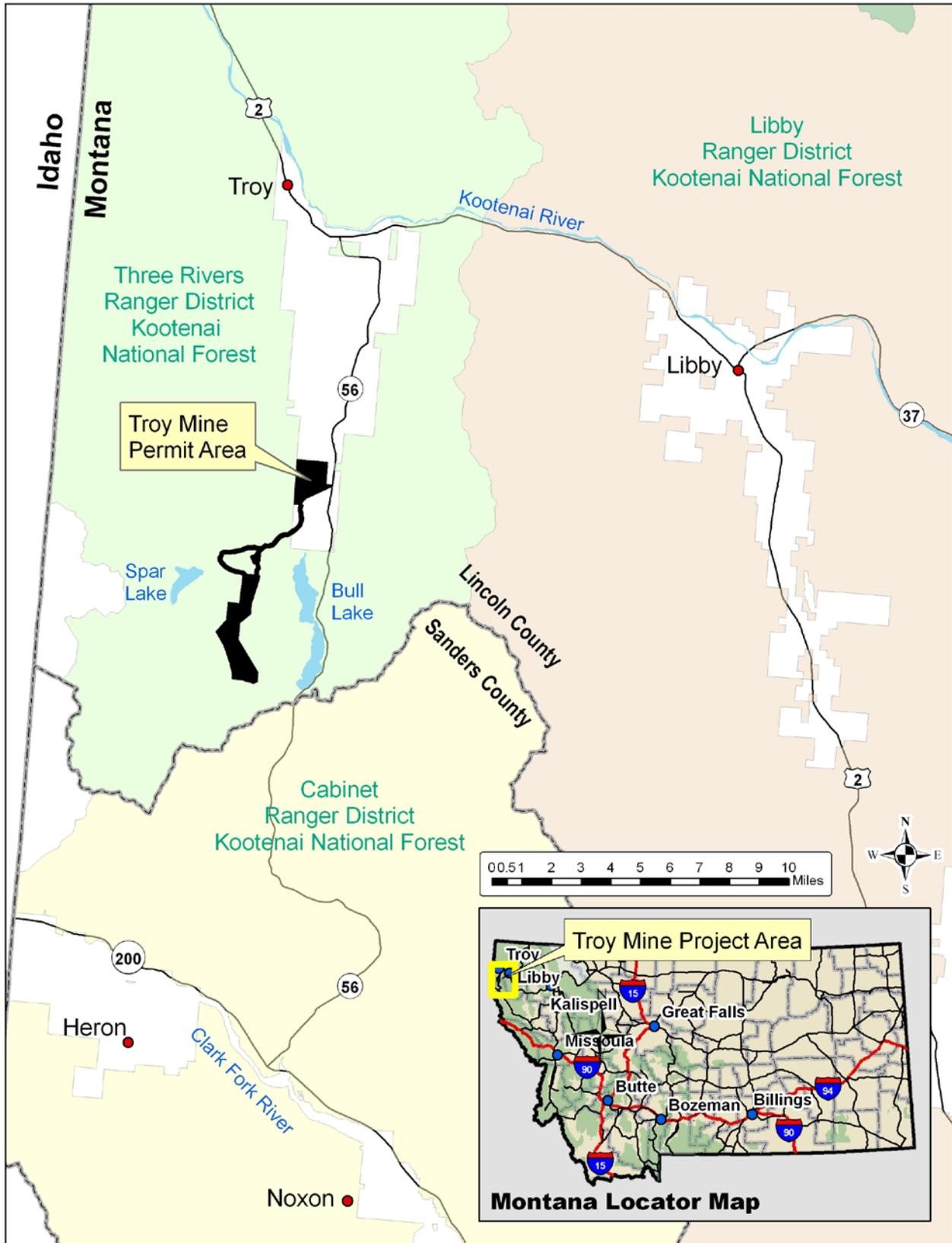


Figure ES-1. Project Area

The mine facilities consist of an underground mine, the mill, and various office facilities; the tailings and reclaim water pipelines; a power line; a tailings impoundment; and associated support facilities. The tailings facility and associated disturbances are on approximately 430 acres of disturbed area on private land owned by Troy Mine, Inc. Both the tailings and reclaim water pipelines and the power line are on National Forest System Lands (NFSL), private, and patented land. The South Adit portal is located on patented land, while the North Adit portal and the mill and office/shop facilities are located on unpatented claims on NFSL. There are approximately 15.6 acres of disturbed land at the portal patios and 34 acres of disturbed lands at the mill site. Associated roads, pipelines and other small disturbed areas exist throughout the project area.

ES.2 Purpose and Need

The purpose of the proposed reclamation plan is to return lands disturbed by mining to a condition appropriate for subsequent use of the area. The approved 1978 reclamation plan does not meet state or federal requirements for mine water discharge. The need for the revised reclamation plan stems from several objectives that need to be met after mine closure:

- Reclamation plans must meet state and federal requirements;
- Protection of surface and groundwater quality;
- Protection of public health and safety;
- Minimization of environmental risk; and
- Restoration of productive land use.

ES.3 Scope of Decisions To Be Made

The major state and federal actions include approval of a reclamation plan and any necessary permits to implement the reclamation activities including construction and long-term monitoring.

ES.3.1 Kootenai National Forest

KNF's required action is to respond to Troy Mine, Inc.'s request to approve the proposed Revised Reclamation Plan for the Troy Mine. To satisfy this request, KNF must:

- Select an alternative that meets the requirements of 36 Code of Federal Regulations (CFR) 228.8 which directs that all mining operations shall be conducted to minimize adverse environmental impacts on National Forest surface resources where feasible;
- Ensure implementation of the selected alternative would assist in preserving and maintaining forest resources to meet the long-term management goals of the 1987 Land and Resource Management Plan (Forest Plan), as amended; and
- Ensure compliance with other applicable federal laws.

KNF also has responsibility jointly with DEQ to review, analyze, and calculate the reclamation bond amount.

The KNF Forest Supervisor will use the EIS process to develop the information necessary to make an informed decision as required by 36 CFR 228, Subpart A. Based on the information presented and alternatives developed in this EIS, the KNF Forest Supervisor will issue a Record of Decision (ROD) on Troy Mine, Inc.'s proposal.

The ROD would document the Forest Supervisor decision on one of the following:

- No Action Alternative
- Approval of the Revised Reclamation Plan as submitted (the Proposed Action) as an amendment to the existing Plan of Operations for the Troy Mine, or
- Approval of a Revised Reclamation Plan (Agency-Mitigated Alternative), as an amendment to the existing Plan of Operations for the Troy Mine. The amendment would incorporate mitigations and stipulations to meet the mandates of applicable laws, regulations, and policies.

ES.3.2 Montana Department of Environmental Quality

DEQ's required action is to respond to Troy Mine, Inc.'s request to approve the proposed Revised Reclamation Plan for Troy Mine. To satisfy this request, DEQ must determine whether the Revised Reclamation Plan satisfies the requirements of the MMRA, Title 82, Chapter 4, Part 3, Montana Code Annotated (MCA).

The DEQ Director will use the EIS process to develop the information necessary to determine whether the Proposed Action meets the performance standards of the MMRA, including but not limited to:

- The removal of buildings and other structures at closure consistent with the post-mine land uses;
- Post-closure environmental monitoring programs and contingency plans;
- Compliance with state air and water quality standards.

The DEQ Director would issue a ROD documenting the decision on the reclamation proposal.

ES.4 Public Involvement

At the beginning of the NEPA/MEPA process, the Agencies conducted scoping to solicit public input on the purpose and need and the Proposed Action. A public scoping meeting was held in October 2007. The scoping process is described in a Scoping Report for the project. Based on the comments received during agency and public scoping, a number of major issues were identified that drove the development of alternatives to the Proposed Action.

At the time of the scoping, the project team determined that an environmental assessment (EA) would be produced to document the analysis. During the course of preparing the EA, several potential water quality issues were identified that are of sufficient significance to warrant the preparation of an EIS. These issues include the potential for mine water discharge to impact surface water and potentially

exceed aquatic life standards; the potential for the tailings pipeline to fail potentially resulting in erosion and discharge of contaminants into Stanley or Lake creeks; and issues related to the long-term maintenance of the pipeline. Given these potential issues, the Agencies issued a Notice of Intent to prepare an EIS in the Federal Register on April 14, 2011.

ES.5 Issue Identification and Alternative Development

Issues were identified through the agency and public scoping process, through the Agencies' review of the *2006 Revised Reclamation Plan*, and through interagency discussions on the development of alternatives. Issues were evaluated to determine whether the proposed action or an alternative would result in significant impacts. The Council on Environmental Quality (CEQ) regulations define significant impacts in terms of both context and intensity (40 CFR 1508.27). MEPA also provides direction on determining the significance of impacts similar to the definitions used under NEPA (ARM 17.4.608(1), MCA 75.1.201).

Major issues are those for which:

- there may be potentially significant impacts;
- there is a concern about potential effects directly or indirectly resulting from implementation of the Proposed Action; or
- there is a concern about the effectiveness of proposed mitigation measures.

The major issues identified include:

Water Management

- Adit closure and mine water distribution;
- Water treatment and disposal;
- Groundwater quality;
- Surface water quality; and
- Long-term monitoring of water quality

Reclamation

- Reclamation materials;
- Subsidence;
- Revegetation;
- Infrastructure (buildings and other structural materials and how they will be removed or reclaimed); and
- Topography (disturbed areas)

ES.6 Alternatives

Three alternatives were developed and evaluated in this EIS. The No Action Alternative consists of the 1978 Reclamation Plan that was previously approved and the reclamation work that has been

completed through August of 2010 by Genesis (now Troy Mine, Inc.). The Proposed Action describes the Revised Reclamation Plan submitted by Genesis to the Agencies in March of 2006. The Agency-Mitigated Alternative was developed by the Agencies and is based on issues derived from interagency and public scoping comments on the Proposed Action.

ES.6.1 No Action Alternative

The original reclamation plan was first analyzed in the *1978 Draft Environmental Impact Statement* (DSL and KNF 1978) and later approved by the Agencies. It does not directly address many of the issues identified through scoping.

ES.6.1.1 Water Management

Adit closure and mine water distribution

The No Action Alternative proposes to close the adits by plugging them with concrete. After mine closure, surface and groundwater would be expected to accumulate in the mine, eventually discharge onto the portal patios and infiltrate into groundwater, and ultimately enter Stanley Creek.

Water treatment and disposal

The No Action Alternative does not address water treatment.

Toe ponds at the base of the tailings impoundment capture seepage and embankment runoff which is then pumped to the impoundment. This pumping would not continue long-term after reclamation. Surface drainage would be from the low point of the impoundment surface to an appropriate natural drainage.

Groundwater quality

The No Action Alternative does not address groundwater quality beyond operational monitoring. Groundwater would enter the mine, flood the workings, and eventually exit the mine and discharge into the groundwater system and Stanley Creek.

Surface water quality

Under the No Action Alternative, seven existing water quality monitoring stations on Stanley, Fairway, and Lake creeks would continue to be sampled post-reclamation for flow and water quality three times per year until the Agencies agree that monitoring is no longer necessary.

Other than monitoring, management of water quality is not addressed under the No Action Alternative. Precipitation would enter the mine through fractures, the workings would flood, and the water would eventually exit the mine and discharge into Stanley Creek.

Long-term monitoring of water quality

Monitoring includes periodic water level and water quality sampling of monitoring wells, springs, and areas of groundwater expression in the vicinity of the mine.

As part of the baseline sampling program, two test wells were drilled in July of 1976. Surface water quality has been monitored at seven sites on Stanley, Fairway, and Lake creeks since 1986. Five

additional surface water sites are sampled and represent the farthest upgradient expressions of groundwater in drainages around the mine. These sites were chosen to monitor changes in the quality of groundwater discharging to surface drainages. These monitoring wells and sites would continue to be evaluated to determine potential mine water influence on surface and groundwater under the No Action Alternative.

Surface water quality monitoring as described above would continue post-reclamation three times per year until the Agencies agree that monitoring is no longer necessary.

ES.6.1.2 Reclamation

Reclamation materials

Soil salvaged from the west side of the tailings impoundment would be used to provide an average 12-inch cover over the portal patio at the mine and at those areas where buildings and facilities would be removed.

The surface of the tailings impoundment and the embankment would be covered with 18 inches of stockpiled soil and revegetated. The No Action Alternative does not specifically identify the source of these stockpiled soils. The soil needed to complete reclamation would likely come from the soil stockpiled from the construction of the tailings facility.

Subsidence

Subsidence was not addressed as part of the original 1978 reclamation plan. However, during operations, two surface subsidence features developed along the East Fault and a permit revision was issued to address these subsidence issues. Although the Agencies currently hold a bond for reclamation of possible future surface subsidence, it may not be sufficient to cover mitigation for surface subsidence on steep slopes.

Revegetation

The No Action Alternative proposes a mixture of introduced grasses and legumes, native shrubs, and trees to cover all disturbed areas upon reclamation. Soils would be seeded during the first appropriate growing season after necessary surface grading and preparation has been completed. Areas would be fertilized at 200 lb/acre and mulched on south-facing slopes.

Slopes and benches of the tailings embankment would be capped with an average of 18 inches of reclamation material. The tailings impoundment surface would have 18 inches of stockpiled lacustrine and volcanic ash-derived soil materials spread on the surface.

Ponderosa pine, Douglas-fir, western larch, and shrubs would be planted on embankment benches and the tailings impoundment. A grass and legume seed mix would be applied to provide complete vegetative cover. Container-grown tree seedlings would be planted (680 trees/acre density) with container-grown shrubs interspersed among the trees. In 1997 and 1999, 3,750 trees were planted on the northeast face of the slope below the North Adit.

The No Action Alternative calls for stockpile sites to be revegetated and planted with trees and shrubs after the soil has been used for reclamation.

Fertilization and irrigation would depend on reclamation progress. The operational irrigation system includes large irrigation sprinklers and aluminum sprinkler pipe.

Noxious weeds have invaded disturbed sites at the mill site, the tailings line corridor on road cuts and fills, and along the periphery of the tailings facility. There is a current noxious weed control plan approved by Lincoln County and KNF in place. The No Action Alternative would continue the current noxious weed control plan which includes chemical weed control.

Under the No Action Alternative, there is no provision to monitor dust or to minimize the potential for blowing dust through irrigation or revegetation.

Infrastructure

Buildings and all materials would be removed from the project area under the No Action Alternative including removal of the tailings pipelines, the reclaim water line, and the 115 kV transmission line. Disposition of underground equipment is not addressed in the No Action Alternative.

The No Action Alternative would leave the main mine access road (NFSR 4626) open for public recreation access to Spar Lake and Mt. Vernon although the gate would remain at the mill site limiting motorized access. All other roads would be removed and reclaimed, pending approval of KNF.

Topography

Under the No Action Alternative, the surface of the tailings impoundment would be graded and reworked to provide areas suitable for revegetation, but no changes in the configuration of the tailings embankment are proposed.

The benches at the mill site would be left flat or nearly flat. The cut and fill slopes would be regraded and re-established at 1.5 horizontal to 1 vertical (1.5H:1V) slopes. The northeast face of the slope below the North Adit has already been recontoured and revegetated.

At the mine itself, the slopes of the development rock fill patio would remain at their existing angle-of-repose. The surface and edges of the patios would be graded to both distribute surface water runoff and to prevent erosion.

Regrading of the borrow sites once excavations are complete is not addressed in the No Action Alternative.

ES.6.2 Proposed Action

The Revised Reclamation Plan, which is the Proposed Action under this EIS, was submitted to DEQ and KNF in March of 2006. The Proposed Action would reclaim the land to allow current or historic activities to continue or resume once reclamation has been completed.

Under the Proposed Action, the proposed reclamation would be accomplished in three phases: pre-closure, closure, and post-closure. Pre-closure tasks include on-going monitoring, testing, and evaluations necessary to complete design of reclamation elements. Closure tasks would take place two years after final cessation of mining and would include facility removal, regrading, revegetation, and maintenance of short-term components of the water management plan. Adit plugs would be installed during the closure period. Post-closure tasks would include management of mine water flowing through pipelines, maintenance of pipelines, and monitoring of water quality (mine water and surface/groundwater). Under the Proposed Action, the post-closure phase is estimated to last two to five years after mining ends.

ES.6.2.1 Water Management

Adit closure and mine water distribution

The Proposed Action would seal all mine openings against entry by backfilling with mine development rock or with material obtained during regrading of the portal areas. Backfill would be placed from the adit opening back 30 feet into the adits and tight to the roof. Rock remaining after adit plugging would be graded against the side of the slope to form a wedge. Two concrete non-hydraulic plugs would be constructed in the Service and Conveyor adits to funnel water into the collection pipe for conveyance to the decant ponds. No access to this pipe intake would be provided. No concrete plugs are proposed for the remaining adits.

Under the Proposed Action, the two tailings pipelines would be retained to convey water from the mine site to the decant ponds. Once the mine water is of sufficient quality for direct discharge to Stanley Creek, the portions of the tailings pipelines that are buried less than three feet deep would be removed. In the event that the pipeline in use needs repair, water would be diverted through the other pipeline until the first pipeline is repaired or replaced.

Two separate stream channels would be constructed across the mill pad and down the fill slope. Channels would be armored with coarse rock sides to provide stability in 100-year, 24 hour storms. An energy dissipation basin would be created at the toe of the fill slope.

Drainage from the tailings impoundment would continue to the decant ponds and would not be directed to a natural drainage.

Water treatment and disposal

The Proposed Action would route mine pool water through the tailings pipelines to the decant ponds until natural attenuation processes remove nitrogen and copper compounds to an acceptable background quality. The Proposed Action would also continue to use the toe ponds to capture seepage and embankment runoff. After reclamation, snowmelt and runoff from the toe ponds would be pumped to the impoundment to supply irrigation water for the newly-reclaimed surface, if needed, or directly to the decant ponds.

Groundwater quality

The Proposed Action includes continued use of the decant water disposal system to passively and effectively achieve metal attenuation in the mine water. The monitoring plan would include groundwater monitoring to evaluate potential sources of groundwater seepage from the mine as it floods.

Surface water quality

The Proposed Action water quality monitoring plan includes both annual macroinvertebrate monitoring and water quality and flow monitoring three times per year. This water quality monitoring program would continue under the Proposed Action until such time as the Agencies agree that monitoring is no longer necessary. The surface water quality monitoring sites that would be sampled are the same sites as those identified under the No Action Alternative.

The Proposed Action would also retain the toe ponds as permanent features to provide wildlife and wetlands habitat. After operations have ceased, the toe ponds would be connected by inter-pond channels. Although no discharge from the toe ponds is expected, an armored outfall would nonetheless be installed to protect against erosion. No channel to Lake Creek would be constructed.

Storm water runoff would continue to be directed to the decant ponds and the tailings would be contoured to maintain the general flow direction toward the decant ponds.

Long-term monitoring of water quality

The Proposed Action long-term surface and groundwater quality monitoring plan is the same as the No Action Alternative plan.

ES.6.2.2 Reclamation

Reclamation materials

As necessary, all reclamation materials would have chemical fertilizers added to promote successful revegetation. The Proposed Action would not add organic matter to any reclamation materials.

The Proposed Action would leave the stockpiled lacustrine and volcanic ash-derived soil materials west of the toe ponds to provide wildlife and wetlands habitat where they would act as a berm to maintain the toe ponds and to minimize the potential for sediment to reach Lake Creek. Reclamation materials for the tailings impoundment surface would be obtained from the borrow sites which are located east of the impoundment. The tailings facility surface would be covered with an average of 18 inches of growth medium.

The Proposed Action would cover development rock at the portal patios with a 12-inch layer of a finer-grained growth medium from local borrow sources to promote revegetation. However, the Proposed Action does not directly identify potential local borrow source locations.

Under the Proposed Action, the tailings embankment would be inspected annually. This geotechnical monitoring would continue until Troy Mine, Inc. and the Agencies agree to discontinue it.

Subsidence

Subsidence was not addressed as part of the Proposed Action.

Revegetation

Several different plant species mixes would be developed and vegetation types would be applied based on pre-mine occurrence, establishment potential, growth characteristics, soil stabilization qualities, commercial availability, experience from on-site tests, and post-mine land use objectives. Native species would be emphasized and noxious weed-free seed would be used. A wetland mix would be provided for designated areas. Annual ryegrass would be added to forest mixes to provide initial rapid stabilization.

A lower elevation forest mix would be seeded over the majority of the tailings surface, with the addition of some grassland and wetland mix. An upper elevation forest mix would be applied to the portal patios and the mill site office and shop area. Smaller disturbed areas would be planted with a grassland mix and would rely on natural establishment of woody species.

Under the Proposed Action, the borrow sites would be reclaimed after completion of all excavation activities. Impoundment-area borrow sites would be planted with the lower elevation forest species mix and the USFS borrow site would be revegetated with plant species typical of upper elevation forest types.

Fertilizer would be applied except within 200 feet of a perennial stream; mulching would be applied to slopes steeper than 20% with less than 50% coarse fragments. Irrigation may be used during the first season to ensure initial stand development (except for slopes steeper than 10% or upper elevation sites). The operational irrigation system would be used under gravity pressure to irrigate during the first growing season so that pumps would not be needed.

Under the Proposed Action, monitoring of revegetation would occur during the pre-closure and closure phases of mine operation. If poor vegetation growth is noted, additional site remediation would occur.

Similar to the No Action Alternative, the approved noxious weed control plan would continue to be implemented and chemical weed control may continue as needed.

Best Management Practices (BMPs) and irrigation would be used as needed to suppress dust until vegetation is established.

Infrastructure

The Proposed Action would rip asphalt from parking areas and bury it on site with a minimum of three feet of cover material. The buildings would be demolished and materials such as concrete, metal, glass, plastic, and wood would be buried on-site with a minimum of three feet of cover material. Fuel, water, and other tanks would be removed from the site.

Under the Proposed Action, underground equipment would be salvaged if possible. If a salvage market cannot be found, this equipment would be cleaned, all fluids would be removed, and the equipment would be abandoned in place.

The Revised Reclamation Plan states that any existing USFS roads would remain in place per USFS requirements. The Agencies interpret this requirement to mean that no roads are proposed for reclamation under the Proposed Action. The gate would remain in place at the mill site limiting access to non-motorized modes.

The existing storm water collection system would remain in place during the entire building demolition phase, with additional BMPs employed (such as silt fences to control erosion and protect surface water from runoff). The final grading plan would use diversion ditches, culverts, velocity control structures, and riprap in high runoff areas to reduce the potential for sedimentation in Stanley Creek.

All surface pipelines would eventually be removed and salvaged. The two operational 8-inch steel tailings pipelines would be used in succession to pipe mine water to the tailings facility until they wear out or until water quality improves enough to permit discharge into Stanley Creek. Once the pipelines are no longer needed, any sections that are buried less than three feet deep would be removed.

The main power line is the property of Northern Lights Inc. which would have the final decision on removal or preservation of all or portions of the 115-kV power line.

Topography

Slopes of the portal patios would be regraded by pulling the edges up and filling against the cut slope/roadway. Flat areas would be covered with 12 inches of growth medium. The mill site and office and shop areas would be regraded similar to the No Action Alternative except that some demolition debris would be buried on site.

The tailings embankment would be treated in the same manner as under the No Action Alternative. The toe ponds would be connected by inter-pond channels with an armored outfall. Once ore milling has ceased, the tailings impoundment surface is expected to slope to the east in a manner that allows surface water to flow to the eastern edge of the impoundment and into the decant ponds, where it would infiltrate and recharge groundwater. Therefore, no surface regrading would occur under the Proposed Action.

Impoundment-area borrow sites would be graded to reduce slopes to 2H:1V and to establish upper slope diversion ditches. The USFS borrow site would be regraded to blend in with the surrounding topography.

When mine water is no longer routed to the tailings facility, the decant ponds would be regraded to form one shallow depression which would be able to capture runoff from the tailings facility surface and to prevent surface water runoff from leaving the impoundment.

ES.6.3 Agency-Mitigated Alternative

The Agency-Mitigated Alternative is based upon the Proposed Action, but includes additional mitigation measures and monitoring requirements that address major issues identified during the earlier scoping and Interdisciplinary Team (IDT) review process.

ES.6.3.1 Water Management

Adit closure and mine water distribution

The Agency-Mitigated Alternative would plug the South Adit with development rock for approximately 130 feet into the adit (100 feet farther than the Proposed Action). Concrete intake structures would be installed in both the Service and Conveyor adits to capture mine water and to funnel it to the collection pipelines. Closure devices would be installed to prevent unauthorized public access to the Service and Conveyor adits and to allow for periodic cleanout of the intake structures.

A new, buried, mine water pipeline with an automatic leak detection system would replace the two existing 8-inch surface tailings pipelines. The original 10-inch reclaim water line would remain in place for use as an emergency water conveyance line and it also would be retrofitted with a leak detection system. The new pipeline would be buried or double-lined at stream crossings to minimize risk to surface and groundwater systems. In the unlikely event that the pipeline capacity of both lines is exceeded, mine water would flow over the concrete intake structures in the Service and Conveyor adits and would pass through the rock backfill.

A channel would be constructed from the Service and Conveyor adits to the mill site stream channels for emergency overflow from the adits in case the design capacities are ever exceeded. At the mill site and office and shop areas, only one stream channel would be constructed (rather than two under the Proposed Action). The channel would be lined with an impervious liner and rock used in the channel would be sized for the 100-year flow and would not include development rock.

Should mine water be of sufficient quality for direct discharge to surface water without treatment, it would be rerouted to a designed channel to discharge to Stanley Creek. At that time, both the new mine water and the old reclaim pipelines buried less than three feet deep would be removed, and the pipeline corridor and decant pond would be reclaimed.

Water treatment and disposal

Under the Agency-Mitigated Alternative, the ponds would be maintained as deep ponds in order to maintain geochemical functions that facilitate metals attenuation. A berm would be created to prevent storm water runoff from the tailings impoundment surface from draining directly to the decant ponds.

Groundwater quality

The Agency-Mitigated Alternative would be the same as the Proposed Action and continue the seepage pumping activities at the toe ponds until water quality standards are met. Any monitoring wells would be plugged and abandoned per ARM 36.21.810.

Surface water quality

There would be additional monitoring of seeps and springs at the mine during closure to verify whether state water quality standards have been met.

Long-term monitoring of water quality

In addition to the water quality monitoring described for the Proposed Action, the Agency-Mitigated Alternative would include post-closure water quality monitoring for a minimum of five years after mine water discharge actually commences. One additional surface water monitoring site would be added on upper Stanley Creek and four additional monitoring wells in the vicinity of the decant ponds would be added to verify that geochemical conditions in the area of mine water discharge are maintained.

ES.6.3.2 Reclamation

Reclamation materials

The Agency-Mitigated Alternative would use the stockpiled lacustrine and volcanic ash-derived soil materials west of the toe ponds to cover the tailings facility. The lowest portion of the vegetated outer slopes of the stockpile would be maintained to minimize water runoff and to prevent sediment from leaving the majority of the disturbed stockpile surface. A field review of existing reclamation would be conducted to determine if additional soil would need to be spread on the embankment face and benches where soil is thin and revegetation is not adequate.

At the mill site, the Agency-Mitigated Alternative growth medium soil would be the same as in the Proposed Action, but the USFS borrow area material would not be used because of the presence of rush skeletonweed. Both the North and South portal patios would be covered with growth medium from the mine and mill areas.

Growth material would be amended with an agency-approved, wood-based, organic amendment to raise the organic matter content to achieve 1,100 lbs of nitrogen per acre. At the tailings impoundment, this organic amendment would be tilled in to a depth of six inches and at the mine and mill site it would be tilled into the top 12 inches of reclamation material.

Growth medium would be placed on the tailings impoundment in one lift to prevent compaction. All growth media placed for reclamation would be ripped to loosen soil before seeding takes place.

Geotechnical monitoring of the tailings embankment would be conducted by a qualified professional engineer for a minimum of five years after reclamation is completed.

Subsidence

The existing surface subsidence feature that has not achieved a level of stability and utility comparable to the pre-disturbance condition would be reclaimed prior to mine closure. The reclamation bond would be increased to address the possibility of future subsidence on steep terrain. Annual inspections would be conducted to identify new surface subsidence features.

Revegetation

Species mixes would be adjusted to account for site-specific conditions as proposed under the Proposed Action. However, a wetland mix would not be used on the tailings impoundment and trees would be planted there as described in the No Action Alternative. Seed sources for native plant species would be

from northwestern Montana to the extent that these species are commercially available at the time of reclamation. Chemical fertilizers would not be used under the Agency-Mitigated Alternative.

The Agencies would perform a field review of previously reclaimed areas to determine if areas need additional cover materials, revegetation, or reseeded.

Noxious weeds would be controlled in conformance with the approved weed control plan.

Revegetated areas would be monitored until the requirements for bond release are met. Monitoring would also continue until vegetation is sufficiently established to maintain air quality.

Infrastructure

Asphalt from the parking lots and other paved areas would be crushed and used for road gravel on NFSR 4626 or hauled to an approved landfill off NFSL. All demolition materials, whether originating above or below ground, would be disposed of off NFSL in appropriate disposal areas to comply with the Montana Solid Waste Act. Underground equipment would be removed or abandoned in place as under the Proposed Action except that any equipment on NFSL would be removed.

Roads would either be maintained to minimize sediment delivery to surface waters or they would be treated per KNF specifications. Specific road treatments by road segment are described in the Draft EIS.

Water diversion culverts at the mill site would have both ends plugged with concrete, and culverts under roads would be left in place.

Topography

Portal patios would be regraded similar to the Proposed Action, but all growth medium for the mine and mill area would be salvaged from the mill site fill or from the borrow area east of the impoundment. All demolition debris would be disposed of off NFSL in appropriate disposal areas.

All drainage channels would be constructed from imported non-mineralized rock rather than from mine development rock to minimize the potential for metal leaching. Alignment of the larger drainage channel would be down the angle-of-repose mill fill slope. A third channel would be designed from the Service and Conveyor adits to connect with the mill site drainage channels for overflow from the adits if the design capacities are ever exceeded.

A qualified engineer would annually monitor and verify the stability of the embankment for a minimum of five years after reclamation is completed. All eroded or bare areas on the embankment would be repaired by spreading 12 inches of the stockpiled growth medium. The toe ponds would be treated as under the Proposed Action except that non-native fish species may be removed.

Grading of borrow sites and decant ponds would be as described in the Proposed Alternative.

ES.7 Environmental Consequences

The following sections provide a summary of the effects of implementing each alternative. Information is focused on activities and effects where different levels of effects can be distinguished between alternatives. Detailed effects analyses for each alternative are found in Chapter 3 of the Draft EIS.

Reclamation activities were found to have minimal to no effect on several of the resource areas analyzed and there were minimal differences between the potential effects of each alternative. These resource areas include air quality, cultural resources affiliated with tribal groups, traditional cultural properties, historic resources, land use, recreation, socioeconomics, sound, and visual scenery. Many of these same resource areas would experience a net positive benefit from reclamation over the long-term, including air quality, land use, recreation, socioeconomics, sound, and visual scenery. These resource areas are not discussed further in this summary and a more detailed description of potential effects is found in Chapter 3 of the Draft EIS.

Resource areas where there could be potentially substantial impacts under one or more alternatives include fish, geology, hydrology, reclamation materials, transportation, vegetation, and wildlife. The differences in potential effects between alternatives for these resource areas are described in the sections below. Potentially substantial impacts are summarized in Table ES-1.

ES.7.1 Fish

Potential impacts on fish could occur from sediment delivery to creeks and from water quality impacts.

The No Action Alternative and the Agency-Mitigated Alternative would temporarily increase sediment delivery to Stanley, Ross, and Lake creeks during reclamation activities but would reduce sediment loads and improve fish habitat over the long-term through road treatment. Sediment increases in Ross and Lake creeks would be small relative to existing sediment loads and would not result in measurable effects to cutthroat or bull trout habitat or populations. The Agency-Mitigated Alternative would introduce the smallest amount of sediment to stream channels due to design features and mitigation measures such as timing restrictions within Riparian Habitat Conservation Area (RHCA).

The Proposed Action would deliver the greatest amount of sediment to streams because roads would not receive treatment under this alternative. Any additional sediment from these sources would add to the already elevated sediment load that currently exists in Stanley Creek and would adversely impact water quality for an extended period of time. Some of this sediment would also be expected to reach Lake Creek, which is listed as impaired for sediment.

The No Action Alternative would discharge mine water directly to Stanley Creek that could exceed current surface water quality standards and could potentially impact macroinvertebrate, tailed frog, and brook trout abundance. Both the Proposed Action and the Agency-Mitigated Alternative would route mine water discharge to the decant ponds where natural attenuation mechanisms would provide long-term water quality treatment. The Proposed Action would use the existing tailings pipelines which are 30 years old. These pipelines have the potential to break allowing a large volume of adit water and sediment to reach Stanley Creek and/or Lake Creek until the pipeline could be shut off and repaired.

The Agency-Mitigated Alternative would mitigate this potential effect by constructing a new pipeline with an automatic leak detection system and would retain the existing buried line as a backup system. The Agency-Mitigated Alternative would include long-term maintenance of the water treatment/management system and monitoring of seeps and springs to detect potential water quality issues in a timely manner. The Agency-Mitigated Alternative would avoid potential surface water impacts by using only rock with little or no potential for near-neutral metal leaching in reconstructed stream channels.

ES.7.2 Geology

Geology effects include consideration of how the geochemical composition of the geologic materials would affect revegetation success, mitigation for potential subsidence events, and effects of reclamation on topography.

In all three reclamation alternatives, the geology and geochemical composition would have minimal impact on revegetation success. There are some differences between alternatives in the selection of materials for reclamation in different parts of the project area. Under the Agency-Mitigated Alternative, no additional measures would be required to mitigate geochemical impacts to reclamation success. The use of the rocky glacial and the lacustrine and volcanic ash-derived soils as growth media would minimize root contact with mined materials. This would effectively minimize the potential effects of plant uptake of metals from the development rock and tailings.

After mine closure, another subsidence event could occur regardless of the alternative selected. However, only the Agency-Mitigated Alternative includes an adequate range of practicable mitigation measures to address potential subsidence events.

Similarly, all three alternatives would provide a net positive effect to local topography through increased soil stability, erosion resistance, and storm water control. Regrading would not return the mine area or the tailings impoundment area to pre-mine conditions, but revegetation would soften the man-made appearance. The portal patio slopes would resemble talus slopes, and the tailings impoundment would resemble a terrace above Lake Creek. The Agency-Mitigated Alternative would use the most appropriate technology currently available including engineering and reclamation practices that have been proven effective to stabilize soils, minimize erosion, and to limit infiltration into mined materials containing metals.

ES.7.3 Hydrology

The No Action Alternative would not comply with the Federal Clean Water Act, Montana Water Quality Act, USFS policy, or with the Kootenai National Forest Plan because untreated mine water that would exceed water quality standards would be discharged to surface water. Moreover, moderate to high sediment delivery is likely from the mill site, mine portals, and from the tailings impoundment following the proposed reclamation.

In contrast, mine water disposal under either the Proposed Action or the Agency-Mitigated Alternative would reduce potential water quality impacts to Stanley Creek and to upper Lake Creek. Under both the

Proposed Action and the Agency-Mitigated Alternative, the mine discharge would be routed to the decant ponds for treatment. At the decant ponds, the water would infiltrate and be treated by natural attenuation mechanisms along the groundwater flow path to reduce concentrations of constituents of concern to levels that would meet water quality standards. There is a greater risk of short-term water quality violations under the Proposed Action because of the higher risk of accidental discharge of mine water from failure of the tailings pipeline to Stanley or Lake creeks. The likelihood of surface water quality impacts would be further reduced under the Agency-Mitigated Alternative by installing a new buried mine water pipeline with a leak detection and backup system for mine water transport.

Stanley and Lake creeks have been listed on the TMDL 303d list as impaired streams. Probable causes of impairment of Stanley Creek are copper and nutrients. Probable causes of impairment of Lake Creek are nutrients, sediment, and physical substrate habitat alterations. Because nitrate concentrations would decrease after blasting ceases, closure and reclamation of the mine would reduce nutrient loading to surface water under all alternatives. After mine closure, there would be reduced risk of spills of mine tailings into surface water under all alternatives. The No Action Alternative would result in increased copper loading from mine water discharge to Stanley Creek and would not accomplish the goals of the TMDL program. Both the Proposed Action and the Agency-Mitigated Alternative would reduce the potential for loading of copper to Stanley Creek.

Reclamation of mine roads on NFSL under the No Action and Agency-Mitigated alternatives would reduce sedimentation and siltation in Lake Creek over the long-term. The Proposed Action would not reduce sedimentation and siltation in Lake Creek over the long-term because it would not treat unneeded roads. Under the Proposed Action, sediment would also originate from stream erosion across the mill site. Any additional sediment from untreated roads and stream erosion across the mill site would add to the already elevated sediment load that currently exists in Stanley Creek and would adversely impact beneficial uses for an extended period of time. Some of this sediment would also be expected to reach Lake Creek, which is listed as impaired for sediment.

ES.7.4 Reclamation Materials

All three alternatives would provide reclamation of disturbed sites. The growth medium replacement plans for the tailings impoundment under the No Action and Agency-Mitigated alternatives would produce the best long-term results in terms of soil quality and plant productivity. The necessary volume of soil already exists in the soil stockpiles, and the glacial outwash borrow materials would not be needed under either of these alternatives. No additional disturbance would occur in the glacial outwash borrow areas under these two alternatives. The Agency-Mitigated Alternative would use BMPs not included in the No Action Alternative to minimize potential impacts of erosion to Lake Creek and to the toe ponds that could possibly result from use of stockpiled materials. Under the No Action Alternative there may still be issues with erosion of fine-grained soils that would not be stable on slopes over eight percent in the mine and mill area.

The No Action Alternative and the Proposed Action would use chemical fertilizers as needed to improve productivity. The Agency-Mitigated Alternative would use organic, wood-based amendments to improve the nitrogen content of the growth media. The Agency-Mitigated Alternative would also

require appropriate soil testing to identify other amendments, such as organic fertilizer, that may be needed to increase soil quality and revegetation success.

The MMRA requires the reclamation of all disturbed lands to comparable stability and utility as that of adjacent lands. The No Action and Agency-Mitigated alternatives would reclaim all mining lands to comparable stability and utility; however, the Agency-Mitigated Alternative would achieve these goals more effectively and would use the soil materials that were stockpiled prior to construction of the tailings impoundment. The Proposed Action would not produce comparable utility on the reclaimed tailings impoundment.

ES.7.5 Transportation

Under all three alternatives there would be a substantial reduction in traffic after reclamation activities are completed. This reduction in traffic would reduce road maintenance costs on local road networks.

The Proposed Action maintains the existing road system and related road maintenance costs. The No Action and Agency-Mitigated alternatives implement BMPs on 19.2 miles of road needed for long-term access (includes stabilization for intermittent stored service) and decommission 6.5 miles of unneeded road, thereby reducing long-term road maintenance costs as compared to the Proposed Action. The Agency-Mitigated Alternative further reduces long-term road maintenance costs by replacing the 6 miles of paved surface on NFSR 4626 with gravel.

ES.7.6 Vegetation

There would be little new disturbance from implementing any of the reclamation alternatives. In general, all three alternatives would revegetate areas that have been disturbed for over 30 years. Disturbed lands would be covered with a growth medium to promote vegetation and would be reseeded or planted, thereby returning the land to a more natural, mostly vegetated state. Under all three alternatives, most of the site would eventually become reforested, but the diverse native plant communities that were originally present would never fully re-establish. The loss of many native species would limit wildlife habitat on public and private lands for some species, and it would take several decades for a forest-dominated habitat to develop on reclaimed lands.

Potential issues and differences between alternatives with respect to vegetation include the seed and plant mixes proposed, the use of soil amendments to promote plant growth, the use of various borrow materials that have differing amounts of noxious weed seed, and the treatment of invasive, noxious weeds.

The No Action Alternative proposes one seed and plant mix that would be used on all disturbed sites regardless of elevation. This mix includes non-native grasses and legumes and because the No Action Alternative includes planting of non-native species, it would not comply with the Forest Service Northern Region Native Plant Policy. The No Action Alternative would not meet current standards for public lands, and thus would be considered not feasible as far as revegetation is concerned.

The Proposed Action includes five different seed/planting mixtures of native grasses, legumes, shrubs, and trees proposed for site-specific use on the basis of pre-mine species occurrence, establishment potential, growth characteristics, borrow stabilization qualities, commercial availability, experience gained from previously completed reclamation activities, and post-mine land use objectives. Seed and plant mixes would be used with consideration for differences in plant communities based on elevation. Under the Agency-Mitigated Alternative, these seed and plant mixes would be required to use seed sources native to northwestern Montana.

Both the No Action Alternative and the Proposed Action would use chemical fertilizers to promote plant growth. The Agency-Mitigated Alternative adds an agency-approved, wood-based, organic amendment in the top six inches of reclamation materials at the tailings impoundment, and in the top 12 inches of reclamation materials at the mine portals, and mill site. Approximately 1,100 lbs/acre of organic nitrogen would be added to the growth medium in this fashion.

Use of the USFS borrow source (which contains rush skeletonweed, a new invader weed species) under both the No Action Alternative and the Proposed Action would not comply with the KNF noxious weed MOU with Lincoln County. The No Action Alternative would use the lacustrine and volcanic ash-derived soil materials from near the tailings impoundment to reclaim the mine and mill areas. However, another new invader species, meadow knapweed, is found in those materials. Use of these reclamation materials on NFSL under the No Action Alternative would not comply with the KNF noxious weed MOU with Lincoln County.

The Agency-Mitigated Alternative would better comply with the regulatory framework because it would not use the USFS borrow area containing rush skeletonweed and would limit the use of lacustrine and volcanic ash-derived soil material containing meadow knapweed to private lands.

ES.7.7 Wildlife

There are no differences between the three alternatives and no substantial impacts for the following wildlife species:

- Threatened or Endangered Species: Canada lynx, gray wolf
- Sensitive Species: bald eagle, black-backed woodpecker, Coeur d'Alene salamander, common loon, fisher, flammulated owl, harlequin duck, peregrine falcon, Townsend's big-eared bat, wolverine
- Management Indicator Species: elk, mountain goat, pileated woodpecker
- Migratory birds

There are substantial differences between the alternatives with respect to grizzly bear and western toad.

The No Action and Agency-Mitigated Alternatives would reclaim most roads, which would improve habitat conditions for grizzly bear. The Agency-Mitigated Alternative includes seasonal restrictions on road reclamation work that could further minimize effects on grizzly bear. The Proposed Action does

not include road reclamation, although because it would not build or open roads to motorized traffic it would maintain current road densities.

The No Action Alternative includes sweet clover (*Melilotus* spp.) in the seed mix which could create human-grizzly conflicts in areas where it is planted because it attracts grizzly bears. The No Action Alternative, if approved today, would not be in compliance with ESA because it creates human grizzly conflicts. Both the Proposed Action and the Agency-Mitigated Alternative would use native seed mixes for revegetation and neither alternative would use sweet clover.

The No Action Alternative and Proposed Action could adversely affect western toad individuals and breeding/metamorphosis habitat in the toe ponds at the tailings impoundment area during reclamation material excavation and by alterations to the toe ponds. Agency-Mitigated Alternative includes a variety of mitigation measures to avoid and minimize these potential impacts.

Table ES-1. Potentially Substantial Effects by Alternative

	No Action Alternative	Proposed Action	Agency-Mitigated Alternative
Fish	Alternative would result in potential water quality impacts from mine water discharge to Stanley Creek. Road reclamation would minimize potential sediment delivery to streams over the long-term.	Sediment delivery quantities to streams would continue because road reclamation would not occur; potential water quality and erosion impacts from potential breakage of tailings pipelines carrying mine water discharges.	Additional mitigation measures and monitoring would minimize potential for water quality violations (see ES.6.1 and ES.6.3). Road reclamation would minimize sediment delivery to streams over the long-term.
Geology	Alternative does not address subsidence.	Subsidence measures would not be adequate.	Subsidence effects would be mitigated.
Hydrology	Untreated mine water would be discharged to surface water and would violate water quality standards.	Alternative poses a high risk of short-term water quality violations because of the higher risk of accidental discharge of mine water from the tailings pipeline to Stanley or Lake creeks.	Additional mitigation measures and monitoring would minimize potential for water quality violations (see ES.6.3).

	No Action Alternative	Proposed Action	Agency-Mitigated Alternative
Reclamation Materials	Use of fine-grained soils that would not be stable on slopes over eight percent in the mine and mill area would result in erosion.	Alternative would not result in comparable utility on the reclaimed tailings impoundment.	Alternative would use the soil materials that were stockpiled prior to construction of the tailings impoundment and would include use of organic, wood-based amendments. Materials would be applied appropriately depending on slope and grain size (e.g. fine-grained materials on flatter areas, coarser grained materials on steeper slopes.)
Transportation	Alternative would reclaim and stabilize roads.	Alternative maintains the existing road system and related road maintenance costs.	Alternative would reclaim and stabilize roads. Road maintenance costs on NFSR 4626 would be further reduced compared to other alternatives.
Vegetation	Plant species mix proposed includes non-native species including sweet clover. Alternative would use the USFS borrow source which contains rush skeletonweed. The lacustrine and volcanic ash-derived soil materials from near the tailings impoundment would be used to reclaim the mine and mill areas, spreading meadow knapweed to these areas. Alternative would not comply with noxious weed and native species policies.	Alternative would use the USFS borrow source (which contains rush skeletonweed) and would not comply with noxious weed and native species policies.	The spread of noxious weeds would be minimized by restricting the use of the USFS borrow site and limiting use of lacustrine and volcanic ash-derived soils to the tailings impoundment area. Seed sources for native plant species would be from northwestern MT, if available at the time of reclamation. Alternative would comply with noxious weed and native species policies.

	No Action Alternative	Proposed Action	Agency-Mitigated Alternative
Wildlife	<p>Alternative includes sweet clover in the seed mix which could create human-grizzly conflicts in areas where it is planted. The No Action Alternative, if approved today, would not be in compliance with ESA.</p> <p>Western toad habitat would be potentially affected by reclamation material excavation and alterations to the toe ponds.</p>	<p>Alternative would not reclaim roads and so would not result in an improvement in grizzly habitat parameters.</p> <p>Western toad habitat would be potentially affected by reclamation material excavation and alterations to the toe ponds.</p>	<p>Potential impacts to grizzly bear would be mitigated by requiring native plant in the revegetation mixes and road reclamation.</p> <p>Western toad habitat effects would be minimized through appropriate BMPs.</p>

Chapter 1 Purpose of and Need for Action

1.1 Introduction

The United States Department of Agriculture (USDA) Forest Service (USFS) Kootenai National Forest (KNF) and the Montana Department of Environmental Quality (DEQ) have prepared this Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA), the Montana Environmental Policy Act (MEPA), the Metal Mine Reclamation Act (MMRA), and with other relevant federal and state laws and regulations.

Troy Mine, Incorporated (Troy Mine, Inc.), a subsidiary of Revett Silver Company, operates the Troy Mine, an underground copper and silver mine in Lincoln County, Montana. Prior to December 2010, Troy Mine, Inc. was named Genesis, Incorporated (Genesis). Troy Mine, Inc., under the name Genesis, prepared the revised reclamation plan that is under review as the Proposed Action and which is referenced throughout this document as “Genesis 2006”. The name “Genesis” is used in this EIS when referencing documents that were prepared by the mining company when it was operating under that name.

In 1978, the Montana Department of State Lands (DSL) and KNF issued a Draft and Final Environmental Impact Statement (EIS) that addressed potential impacts from both the operation and reclamation of the Troy Mine. The purpose of this EIS is to evaluate the potential effects of the 2006 Revised Reclamation and Closure Plan for the Troy Mine (Proposed Action). This EIS discloses the direct, indirect, and cumulative environmental impacts that would result from the Proposed Action or from other alternatives on the natural and social environment. The 1978 reclamation plan is carried forward within the No Action Alternative of this EIS. Finally, this EIS presents mitigation measures for any potential impacts that are identified under the Agency-Mitigated Alternative.

1.2 Document Structure

This document is organized into eight chapters:

- *Chapter 1. Purpose of and Need for Action:* Includes information on the history of the project proposal, the purpose of and need for the project, a description of the Proposed Action, and the decision framework for evaluating alternatives’ effectiveness at achieving that purpose and need.
- *Chapter 2. Alternatives, including the Proposed Action:* Provides a description of the existing facility, a detailed description of Troy Mine, Inc.’s Proposed Action, and the Agencies’ alternative methods for achieving the stated purpose. The alternatives were developed based on the key issues raised by the public and other agencies. This section details how KNF and DEQ informed the public during scoping of the proposal and summarizes the key issues identified.
- *Chapter 3. Affected Environment and Environmental Consequences:* Describes the existing environmental resources in the project area and the potential environmental effects of implementing the Proposed Action and other alternatives. The analyses are organized by resource area and discuss potential impacts, including direct, indirect, and cumulative impacts. This discussion also addresses the effectiveness of mitigation measures.

- *Chapter 4. Consultation and Coordination:* Provides a list of preparers and agencies consulted during the development of the environmental impact statement and a summary of the results of this consultation.
- *Chapter 5. Index:* Provides a means of locating an assortment of key phrases used throughout the document.
- *Chapter 6. Acronyms:* Provides the compound term for the abbreviations used throughout the document.
- *Chapter 7. Glossary:* Provides definitions for technical terms used throughout the document.
- *Chapter 8. References:* Provides a list of documents used for background data throughout the document.
- *Appendices:* Provide detailed original information to support the analyses presented in the main environmental impact statement, such as public comments and responses, and various technical studies.

Additional documentation, including more detailed analyses of project area resources, may be found in the project record (PR) located at the main office of the DEQ (Lee Metcalf Building, 1520 E. Sixth Avenue, Helena, Montana) and at the KNF Supervisor's Office (31374 US Hwy 2, Libby, Montana).

The following disclaimer pertains to all Geographic Information System (GIS) maps used in this document: these products are reproduced from geospatial information prepared by the USFS. GIS data and product accuracy may vary. They may be developed from sources of differing accuracy, accurate only at certain scales, may be based on modeling or interpretation, or may be incomplete while being created or revised. Using GIS products for purposes other than those for which they were originally created may yield inaccurate or misleading results. Therefore, the USFS reserves the right to correct, update, modify, or replace GIS products without notification. For more information, contact the KNF Supervisor's Office.

1.3 Project Area Description

The Troy Mine is located about 15 miles south of Troy, Montana, in Lincoln County (**Figure 1-1**). The nearest towns to Troy are Libby, Montana, located 18 miles to the east and Bonners Ferry, Idaho (ID), located 33 miles to the west.

The Troy Mine is accessible from Montana Highway 56 (MT 56) and National Forest System Road (NFSR) 4626, both of which are paved. Approximately 57 percent of the project area is on private and patented land, and the other 43 percent is on the KNF. The project area lies within the KNF immediately west and north of Bull Lake and encompasses a major portion of the Stanley Creek drainage and portions of the Lake and Ross creek drainages. The area is popular for recreation, including boating, fishing, hunting, camping, winter recreation, pleasure driving, berry picking, and hiking.

The mine permit area covers 2,782 acres of public and private and patented land (SRK 2005). The Troy Mine is comprised of 24 patented lode-mining claims and approximately 188 unpatented lode-mining claims that are situated on National Forest System Lands (NFSL) managed by KNF (**Figure 1-2**). The patented lode-mining claims that are currently owned by Troy Mine, Inc. were originally acquired from

the American Smelting and Refining Company (ASARCO) in September of 1999. The mine facilities consist of an underground mine, the mill, and various office facilities; the tailings and reclaim water pipelines; a power line; a tailings impoundment; and associated support facilities. The tailings facility and associated disturbances are on Troy Mine, Inc.'s private land, and both the tailings and reclaim water pipelines and the power line are on NFSL and other private and patented land. The South Adit portal is located on patented land, while the North Adit portal and the mill and office/shop facilities are located on unpatented claims situated on NFSL.

The permit area falls within the following public land survey system (PLSS) sections (**Figure 1-2**):

- Township 30 North, Range 33 West, Sections 31 and 32;
- Township 29 North, Range 33 West, Sections 5, 6, and 7;
- Township 29 North, Range 34 West, Sections 12, 13, 14, 23, 24, 25, 26, 35, and 36; and
- Township 28 North, Range 33 West, Sections 5 and 6.

1.4 Background

1.4.1 Exploration and Operations

The Bear Creek Mining Company (a subsidiary of Kennecott Minerals) investigated the Stanley Creek area in the early 1960s and located copper and silver deposits along the south fork of Stanley Creek. Drilling operations conducted up to 1967 delineated the Troy deposit. Exploration adits were driven in 1967 and in 1968 to further evaluate the deposit.

In 1973, ASARCO leased the Troy Mine Project from Kennecott and began developing the mine. ASARCO began production in 1981, but suspended operations in April of 1993 due to low metals prices. In 1999, Genesis (now Troy Mine, Inc.) purchased the lease agreement for the Troy Mine Project from ASARCO and in 2000 purchased the property from Kennecott. Mining once again began in November of 2004 with the expectation of a 6-year mine life at a production rate of 6,000 tons per day.

1.4.2 Operating Permit History

In May of 1976, ASARCO applied for an operating permit from DSL, which was the Hard Rock Mining permitting agency prior to DEQ. ASARCO also applied for a Plan of Operations from KNF at the same time. The original application included the operating plan for the Troy Mine Project. ASARCO submitted a reclamation plan in December of 1976. Specifics on reclamation seeding mixtures and rates were submitted in a letter to DSL on December 20, 1976.

DSL and KNF issued a Draft and Final EIS in 1978 that addressed the potential impacts of both the operating and reclamation plans (DSL and KNF 1978). KNF issued a Record of Decision (ROD) on October 23, 1978. On November 27, 1978, DSL issued Operating Permit #00093 which permitted 2,751 acres.

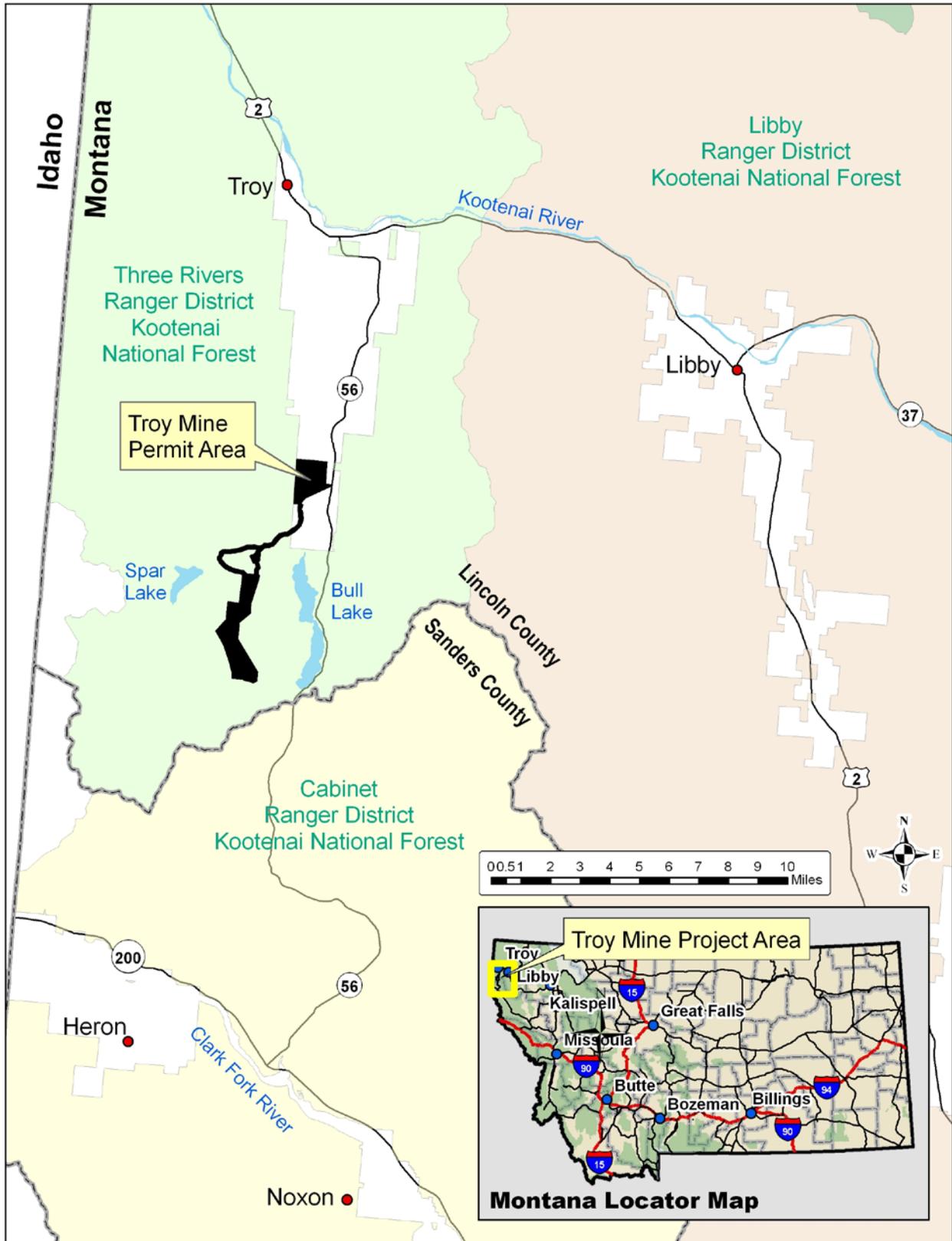


Figure 1-1. Project Area

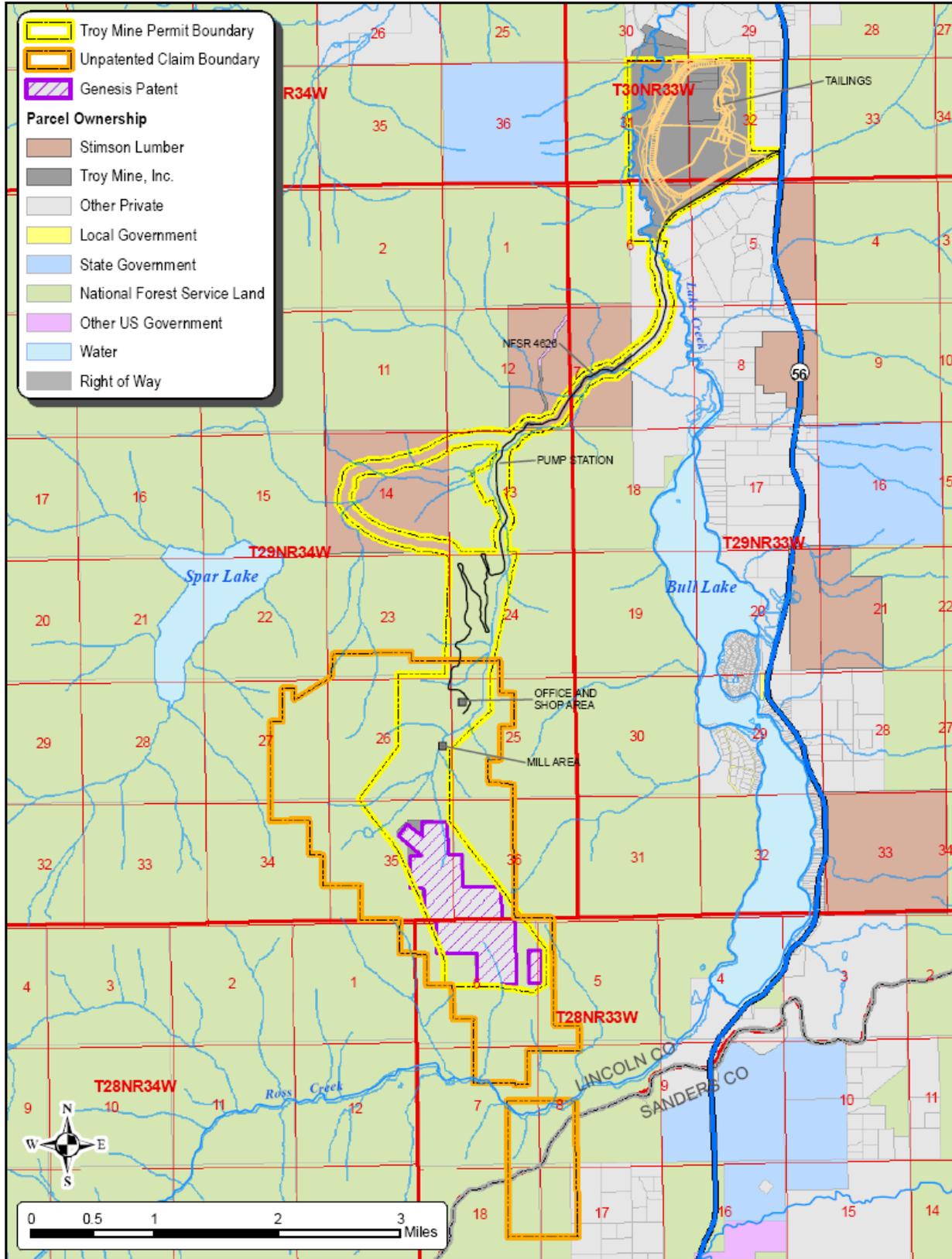


Figure 1-2. Troy Mine Permit Area and Ownership

Four amendments to Operating Permit #00093 were approved by DSL from 1979 to 1992:

- Amendment #001 (approved July 20, 1979) incorporated the construction of three facilities that were not addressed in the original mining and reclamation plans. These facilities included the tailings impoundment, the staging area, and an aggregate storage area.
- Amendment #002 (approved November 1982) incorporated a percolation pond and a 100-year flood analysis.
- Amendment #003 (approved July 1983) covered the construction of the toe ponds, the stockpiling of soil material, and the elimination of the requirement for the installation and use of perforated pipe beneath the tailings embankment.
- Amendment #004 (approved May 1992) allowed the construction of a new south ventilation adit and secondary escapeway, the deposition of development rock material from the new adit in the existing South Adit development rock dump, and the addition of one acre of disturbance at the portal of the new adit. This amendment increased the permitted acreage from 2,751 acres to 2,752 acres. The original reclamation bond was calculated on November 27, 1978, at \$1,000 per acre. The new reclamation bond was inclusive of Amendment #004 and increased the 1978 bond amount by \$11,500 to \$2,763,500.

DEQ approved the assignment of Operating Permit #00093 from ASARCO, to Genesis (now Troy Mine, Inc.) in March of 2005. KNF approved the assignment to Genesis on April 1, 2005.

1.4.3 Revised Reclamation Plan and Bond Review

In the fall of 1999, DEQ and KNF (the Agencies) initiated a review of the reclamation bond. DEQ and KNF notified ASARCO that the approved 1978 reclamation plan needed to be revised and a substantial bond increase would be required. ASARCO and Genesis submitted a draft revised reclamation plan to the Agencies in January of 2000, which the Agencies reviewed. The Agencies notified ASARCO of the deficiencies identified in the plan and required an interim reclamation bond of \$10.5 million during the review period, which ASARCO posted. A second revised draft of the reclamation plan was submitted to the Agencies in December of 2000. The Agencies reviewed the second draft of the revised plan and in February of 2001, identified further deficiencies. ASARCO responded to the Agencies' comments in May of 2004. The Agencies reviewed ASARCO's 2004 response and sent another letter outlining deficiencies. In March of 2005, the permit was assigned to Genesis. Genesis revised the reclamation plan in response to the Agencies' comments and submitted it in October of 2005. The final draft of the revised reclamation plan was submitted to the Agencies in March of 2006 (Genesis 2006) and is the subject of this environmental impact statement (the Proposed Action). In May of 2006, an agreement was reached between the Agencies and Genesis (now Troy Mine, Inc.). This latest agreement set the reclamation bond at \$11.9 million with incremental increases to \$12.9 million over the next three years.

1.4.4 Other Changes to the Operating Permit

Over time, there have been other changes to the Operating Permit, in addition to the amendments and bond revision discussed above, including:

- In January of 2005, DEQ approved relocation of the concentrate loadout facility from Troy to the industrial park in Libby.

- On March 16, 2007 DEQ approved a minor revision to cover the cost of reclaiming future potential subsidence areas along the East Fault resulting from the underground mine workings.
- On November 5, 2009 DEQ approved the mining of the C-Beds at Troy, and a permit boundary relocation at the mine site increased the permit boundary from 2,752 acres to 2782.3 acres.
- On May 10, 2010, DEQ approved a temporary loadout site in the industrial park in Libby to replace the old loadout which burned down.
- On February 16, 2011, DEQ approved a new loadout facility to replace the one that was destroyed by fire.

Other minor revisions have been approved over the years, including:

- A weed control plan;
- Two pumpback water systems;
- Installation of new water monitoring wells and a piezometer for sampling at the tailings impoundment;
- A new pipeline spill response plan; and
- New safety berms along the access road.

1.5 Proposed Action

Troy Mine, Inc. proposes to reclaim lands disturbed by mining activities with the following reclamation elements:

- Roads would remain in place per USFS requirements;
- Removal of buildings and structures;
- Non-hydraulic plugging (backfilling) of the adits and recontouring the slope of the South Portal patio;
- Minimal regrading of portal patios to close adits; angle-of-repose patio slopes would remain;
- Revegetation of most of the disturbed areas;
- Mine water disposal to the decant ponds by using the existing tailings pipelines and reclaim water line; and
- Monitoring of surface water bodies and embankment stability.

The Proposed Action is described in greater detail in Chapter 2, **Section 2.4.2**.

1.6 Purpose of and Need for Action

The purpose of the proposed reclamation plan is to return lands disturbed by mining to a condition appropriate for subsequent use of the area. The approved (1978) reclamation plan does not meet state or federal requirements for mine adit water discharge. The need for the revised reclamation plan stems from several objectives that need to be met after closure:

- Reclamation plans must meet state and federal requirements;

- Protection of surface and groundwater quality;
- Protection of public health and safety;
- Minimization of environmental risk; and
- Restoration of productive land use.

1.6.1 Kootenai National Forest

KNF's required action is to respond to Troy Mine, Inc.'s request to approve the proposed Revised Reclamation Plan for the Troy Mine. To satisfy this request, KNF must:

- Select an alternative that meets the requirements of 36 Code of Federal Regulations (CFR) 228.8 which directs that all mining operations shall be conducted, so as, where feasible, adverse environmental impact on National Forest surface resources are minimized;
- Ensure implementation of the selected alternative would assist in preserving and maintaining forest resources to meet the long-term management goals of the 1987 Land and Resource Management Plan (Forest Plan), as amended;
- Ensure compliance with other applicable federal laws; and
- Ensure the selected alternative, where feasible, would minimize adverse environmental impacts on National Forest System resources.

KNF also has responsibility jointly with DEQ to review, analyze, and calculate the reclamation bond amount.

1.6.2 Montana Department of Environmental Quality

DEQ's required action is to respond to Troy Mine, Inc.'s request to approve the proposed Revised Reclamation Plan for Troy Mine. To satisfy this request, DEQ must determine whether the Revised Reclamation Plan satisfies the requirements of the MMRA, Title 82, Chapter 4, Part 3, Montana Code Annotated (MCA).

1.6.3 Troy Mine, Incorporated

Under the MMRA, Troy Mine, Inc. is required to conduct reclamation in accordance with the provisions of an approved operating and reclamation plan. Troy Mine, Inc. has identified the following reclamation goals:

- Re-establish and improve wildlife habitat;
- Protect groundwater and surface water quality in Fairway, Stanley, and Lake creeks;
- Protect air quality in the surrounding areas;
- Provide public access to federal lands; and
- Protect public health and safety by removing potential hazards that could result from mine openings and facilities.

1.7 Agency Roles and Responsibilities

This Troy Mine EIS presents the Agencies' analysis of potential environmental impacts under both NEPA and MEPA regulations and guidelines. The Agencies will consider this analysis when making their final decisions concerning the approval of the revised reclamation plan. Under NEPA and MEPA, KNF and DEQ are required, within the confines of public and agency scoping, to consider reasonable alternatives to a proposed project. A brief description of agency roles and responsibilities, by agency, is provided below. A more detailed description is provided in the "Regulatory Framework" sections for each affected resource area in Chapter 3.

1.7.1 Federal Agencies

1.7.1.1 Kootenai National Forest

KNF is required to comply with NEPA regulations (40 CFR parts 1500 to 1508) to minimize adverse environmental impacts on NFSL surface resources through informed decision making. USFS regulations (36 CFR, Subpart A) apply to operations conducted under U.S. mining laws as they affect surface resources of NFSL under the jurisdiction of the Secretary of Agriculture. Compliance with all other applicable federal and state laws and regulations is also mandatory. These laws are discussed in Chapter 3 in greater detail. Furthermore, KNF will take all practical measures to harmonize final reclamation with scenic values and maintain and protect fisheries and wildlife habitat that may be affected by the Proposed Action. KNF must also ensure timely interim and final reclamation on NFSL.

KNF shares responsibility for monitoring and inspecting reclamation of the Troy Mine project area with DEQ. Both Agencies have authority to require a reclamation bond to ensure that the lands disturbed by the mining operation are reclaimed in accordance with an approved reclamation plan.

KNF is required by the Endangered Species Act of 1973 (ESA) (16 United States Code (USC) § 1531 *et seq.* and 50 CFR 17) to ensure that any actions it approves will not jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat for such species.

The National Forest Management Act (NFMA) requires that USFS "provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives, and within the multiple-use objectives of a land management plan adopted pursuant to this section, provide, where appropriate, to the degree practicable, for steps to be taken to preserve the diversity of tree species similar to that existing in the region controlled by the plan" (16 USC 1604(g)(3)(B)). The Kootenai Forest Plan requires "the maintenance of viable populations of existing native and desirable non-native vertebrate species, as monitored through indicator species, will be attained through the maintenance of a diversity of plant communities and habitats" (Forest Plan Volume 1, page II-22).

The 1987 Land and Resource Management Plan (Forest Plan) is the guiding USFS document for this EIS. The U.S. District Court, Northern District of California invalidated the 2008 USDA Forest Planning Rule on June 30, 2009. The court has vacated the rule and remanded the matter to the agency. USDA has

determined that the 2000 planning rule is now in effect, including its transitional provisions as amended in 2002 and 2003 and as clarified by interpretative rules issued in 2001 and 2004. Moreover, KNF is in the process of revising its 1987 Forest Plan.

1.7.1.2 United States Army Corps of Engineers

Modifications to the tailings embankment and other reclamation activities would not affect wetlands and therefore, would not require a permit under Section 404 of the federal Clean Water Act (33 USC §1251 *et seq.*). However, restoration of channels for the natural ephemeral drainages currently piped across the mill site may be considered an activity in a water of the U.S. that could be regulated under Section 404. The United States Army Corps of Engineers (USACE) is the permitting authority for the discharge of dredged or fill materials into waters of the U.S. Although USACE has issued a nationwide permit for restoration activities that may apply, use of the nationwide permit would still require review and authorization of the proposed activity by USACE.

1.7.1.3 United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) has responsibilities under the Fish and Wildlife Coordination Act of 1934 (16 USC 661-667e), the ESA, and the Bald and Golden Eagle Protection Act (16 USC 668-668d). Responsibilities under the Fish and Wildlife Coordination Act require federal agencies issuing permits (*i.e.* USACE Section 404 Permit) to consult with the USFWS to prevent the loss of or damage to fish and wildlife resources where “waters of any stream or other body of water are proposed...to be impounded, diverted...or otherwise controlled or modified.”

1.7.2 State or County Agencies

1.7.2.1 Montana Department of Environmental Quality

DEQ administers the MMRA, which governs the mine operating permit, as well as the Montana Clean Air Act (75-2-101, *et seq.*, MCA), and the Montana Water Quality Act (75-5-101, *et seq.*, MCA). DEQ must also comply with MEPA (75-1-101, *et seq.*, MCA) and other applicable state laws.

Hard Rock Operating Permit: The MMRA requires an approved operating permit for all mining activities that disturb more than 5 acres at any one time. The basic objective of the MMRA is to require reclamation of disturbances caused by mining to establish the plant cover, soil stability, water condition, and safety conditions that would be appropriate to any proposed subsequent use of the area.

DEQ is authorized to require a reclamation performance bond for mining operations governed by the MMRA. The reclamation bond amount is established by DEQ and KNF and must be sufficient for the Agencies to complete reclamation in the event of default by the operator. Reclamation bonds include the costs that would be paid by the Agencies to reclaim the site to comparable stability and utility and to assure that there would be no continuing impacts to the environment. Consequently, the capping of reactive rock dumps, cover placement on tailings impoundments, and long-term water treatment are often components of bond calculations. Bonding for water management and treatment is based on the quantity of water that must be managed, the expected water quality, and the method(s) of water treatment that may be used. Therefore, the analyses and findings in this EIS will provide the Agencies

with sufficient information to estimate the costs of reclamation should they need to conduct reclamation activities.

Water Quality Permits: The Montana Water Quality Act provides a framework for the classification of surface and groundwater according to their beneficial uses. The Montana Water Quality Act establishes water quality standards and permitting programs to control the discharge of pollutants into state waters. DEQ has been authorized by the U.S. Environmental Protection Agency (EPA) to administer water discharge permits, including storm water permits. Discharges to groundwater are regulated under the MMRA. Mining operations must comply with Montana ground and surface water quality standards.

If a permit under Section 404 is required (**Section 1.7.1.2**), then a 401 certification under Section 401 of the federal Clean Water Act (33 USC 1251, *et seq.*) may be required from the state. The 401 certification process ensures that discharges comply with applicable state water quality standards and that there would be no violation of state law if a federal permit or license is approved. In Montana, DEQ provides Section 401 certification pursuant to state rules (ARM 17.30.1701 *et seq.*).

1.7.2.2 Lincoln County Vegetation Management Board

The Lincoln County Vegetation Management Board implements a comprehensive vegetation management program to prevent, contain, reduce, or eradicate noxious weed species and to provide safe travel vectors within the boundaries of Lincoln County. Lincoln County's *Integrated Noxious Weed Management Plan*, January 2004, is available at this web site: <http://www.lincolncountymt.us/weeds>. The goals of the Board are to use education, management, and control to prevent the introduction and to reduce or limit the spread of noxious weed species in the county and to restore healthy plant communities. Thus, the Lincoln County Vegetation Management Board would cooperate with KNF and DEQ to coordinate weed management efforts during the reclamation process.

1.8 Decision Framework

KNF and DEQ signed a Memorandum of Understanding (MOU) "to more effectively review the reclamation plan and manage the environmental analysis of that plan." DEQ and KNF are the Lead Agencies and will be referred to throughout this document as the Agencies that are working cooperatively on this project. The Deciding Officers for the project are the DEQ Director and the KNF Forest Supervisor. Based on the analyses in this EIS, the Deciding Officers only determine whether the Proposed Action is in compliance with respective state and federal laws.

1.8.1 Federal Agencies with Permit or Plan Approval

1.8.1.1 Kootenai National Forest

The KNF Forest Supervisor will use the EIS process to develop the information necessary to make an informed decision as required by 36 CFR 228, Subpart A. Based on the information presented and alternatives developed in this EIS, the KNF Forest Supervisor will issue a Record of Decision (ROD) on Troy Mine, Inc.'s proposal. The decision objective is to select an action that meets both the purpose and

need of the project and respects the legal rights of Troy Mine, Inc., but still protects the environment in compliance with applicable laws, regulations, and policies.

The ROD would document the Forest Supervisor decision on one of the following:

- No Action Alternative
- Approval of the Revised Reclamation Plan as submitted (the Proposed Action) as an amendment to the existing Plan of Operations for the Troy Mine, or
- Approval of a Revised Reclamation Plan (Agency –Mitigated Alternative), as an amendment to the existing Plan of Operations for the Troy Mine. Amendment would incorporate mitigations and stipulations to meet the mandates of applicable laws, regulations, and policies.

1.8.1.2 United States Army Corps of Engineers

USACE has the authority to issue or deny 404 permits for work in waters of the U.S. Once reclamation commences at the Troy Mine, Troy Mine, Inc. would be required to submit detailed design plans for any work in surface waters to USACE for review so that USACE could evaluate the design and authorize the work if appropriate.

1.8.1.3 United States Fish and Wildlife Service

The USFWS will review the biological assessment prepared for this project and decide whether the determination of KNF concerning impacts to any federally listed species or habitat is sufficient and/or reasonable. If, during informal consultation, it is determined by KNF, with the written concurrence of the USFWS, that the action is not likely to adversely affect listed species or critical habitat, the consultation process is terminated, and no further action would be necessary (50 CFR 402.13).

The determination of "*Not Likely to Adversely Affect*" is made when effects on listed species or critical habitat are expected to be discountable, insignificant, or completely beneficial. A "*Not Likely to Adversely Affect*" determination requires written concurrence from the USFWS.

1.8.2 State Agencies with Permit or Plan Approval

1.8.2.1 Montana Department of Environmental Quality

The DEQ Director will use the EIS process to develop the information necessary to determine whether the Proposed Action meets the performance standards of the MMRA, including but not limited to:

- The removal of buildings and other structures at closure consistent with the post-mine land uses;
- Post-closure environmental monitoring programs and contingency plans;
- Compliance with state air and water quality standards.

Chapter 2 Alternatives

This chapter provides a description of the existing mine and facilities, a discussion of issues identified during scoping and interagency review, and a detailed description of the Proposed Action. The No Action Alternative and the Agency-Mitigated Alternative are also described in detail.

2.1 Existing Mine Facilities

The Troy Mine Permit Area totals approximately 2,782 acres and is distributed 57 percent on private and patented land and 43 percent on National Forest Service Lands (NFSL). The Troy Mine Permit Area includes several activity areas (*i.e.*, mine, office and shop area, mill site, and tailings impoundment area) connected by National Forest System Road (NFSR) 4626 (**Figure 1-2**). The following information describes the existing facilities at the Troy Mine, identifies facility locations, and clarifies the status of any past reclamation.

2.1.1 Land Ownership

Land ownership within the permit boundary is varied (**Figure 1-2**) and includes the following areas starting at the northern boundary at Montana State Route 56 (MT 56):

- The tailings facility, toe ponds, and several borrow areas lie within 780 acres of private land owned by Troy Mine, Inc.; land which is adjacent to the first 1.28 miles of access road off MT 56.
- The permit boundary extends across private lands with multiple owners along the next 1.06 miles of NFSR 4626 (approximately 77 acres).
- Along the next 1.14 miles of NFSR 4626, the permit area includes lands owned by Stimson Lumber (approximately 81 acres) with an additional tract of land owned by Stimson Lumber located west of NFSR 4626 in Section 14 (this 149 acres has no known facilities).
- Approximately 3.5 miles from MT 56, NFSR 4626 enters USFS lands and travels about 7.23 miles to the mine area (approximately 1,134 acres of USFS land are included within the permit boundary).

Troy Mine, Inc. patented mining claims cover approximately 420 acres and are located in the southern portion of the permit area. In addition to the permit area and the patented mining claims, Troy Mine, Inc. holds another 3,760 acres in unpatented mining claims, all of which are on National Forest System Lands (NFSL).

2.1.2 Tailings Impoundment Area

The tailings impoundment is located just west of MT 56 and is accessed from the local access road (**Figure 2-1**). The tailings facility covers approximately 430 acres of disturbed area (Genesis 2006, Table 4-1). Included in the 430 acres are the following components:

- Embankment – the face of the embankment has been reclaimed by placing soil, seeding with grasses and forbs, and planting of trees.
- Tailings impoundment – the surface is divided into three cells (Cells 1, 2, and 3 from south to north) by two interior dikes. A portion of Cell 3 has received interim reclamation.
- Decant ponds (or barge ponds) – these three ponds receive mine tailings water and storm water runoff from the impoundment surface.
- Borrow areas – three borrow areas are delineated at the tailings impoundment area; the Cell 3 Borrow Pit is located on the eastern edge of Cell 3; the East Borrow Pit is located adjacent to the tailings impoundment northeast of the decant ponds; and the North East Borrow Pit is located at the northeast corner of Cell 3.
- Soil stockpiles – soil removed from the tailings impoundment area was stockpiled between Lake Creek and the toe ponds west of the embankment. The stockpiles function as a berm to contain the toe ponds. A second small soil stockpile is located just east of the Cell 3 Borrow Pit.
- Toe ponds – water seeping through the impoundment embankment emerges at the base of the embankment. The four toe ponds contain impoundment seepage, natural groundwater, and runoff from the embankment face. The southernmost toe pond is typically dry. The three northern toe ponds usually contain standing water, which is sometimes pumped to the impoundment during the spring snowmelt runoff period of each year. The pumping keeps the toe pond levels low when the mill is operational and also helps to control nitrate migration.
- Other features:
 - Reclaim Water Pump Station and Pond– water is pumped from the decant ponds to this station and then pumped to the mill;
 - Tailings Embankment Monitoring System – eleven piezometers are used to monitor the water table level (phreatic surface) in the tailings embankment;
 - Ground and Surface Water Monitoring System – includes twelve wells, six springs or surface water expressions, and the toe ponds;
 - Quonset Hut – located southeast of the impoundment, is used to store equipment and has a domestic well and septic system;
 - Toe Pond #2 Sump and Pumping System – is an Enviro-pump that captures spring water below toe pond #2;
 - Equipment Storage Area – east of the impoundment;
 - 115-kiloVolt (kV) Power Lines owned by Northern Lights, Inc.;
 - Local Access Roads; and
 - Maintenance Sump – located southwest of the impoundment.

2.1.3 Office/Shop and Mill Areas

The office/shop and mill areas are located approximately 8 miles south of the impoundment area (**Figure 2-2**). The disturbed acreage for this area of the mine is approximately 34 acres and includes the following components:

- two percolation ponds (1.5 acre lower percolation pond and 0.5 acre upper percolation pond) to capture and infiltrate storm water runoff;
- storm water sump;
- wood-frame storage building;
- steel tailings thickener tank;
- office building;
- shop building;
- mill water pump building;
- warehouse shed, steel shed, and storage building;
- above ground 200,000-gallon-capacity diesel fuel tank;
- two 30,000 gallon propane tanks;
- core storage building;
- mill building;
- secondary crusher building;
- steel fine ore bin;
- sewage treatment building;
- steel water tank; and the
- Service and Conveyor adits.

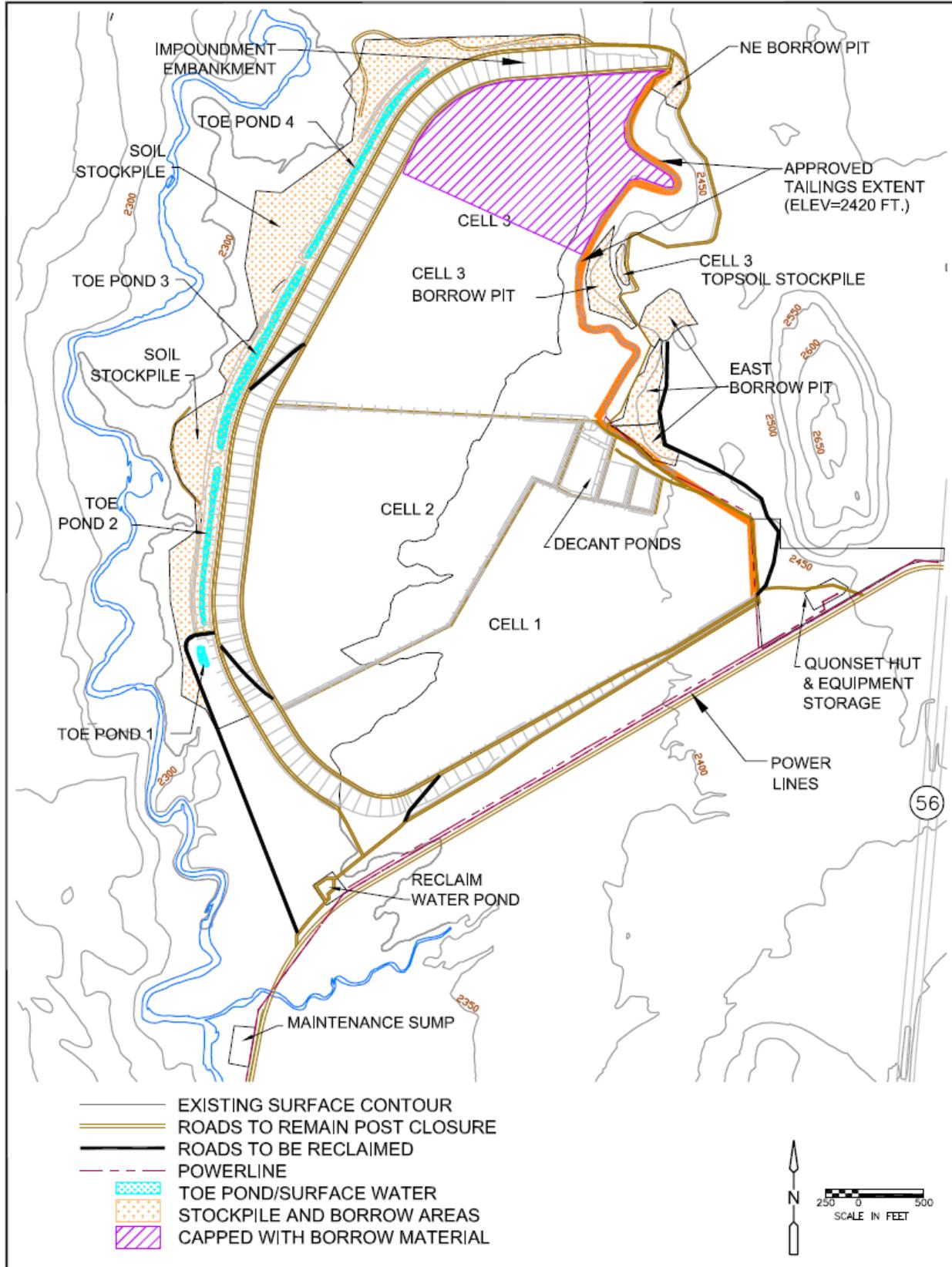


Figure 2-1. Tailings Impoundment Area

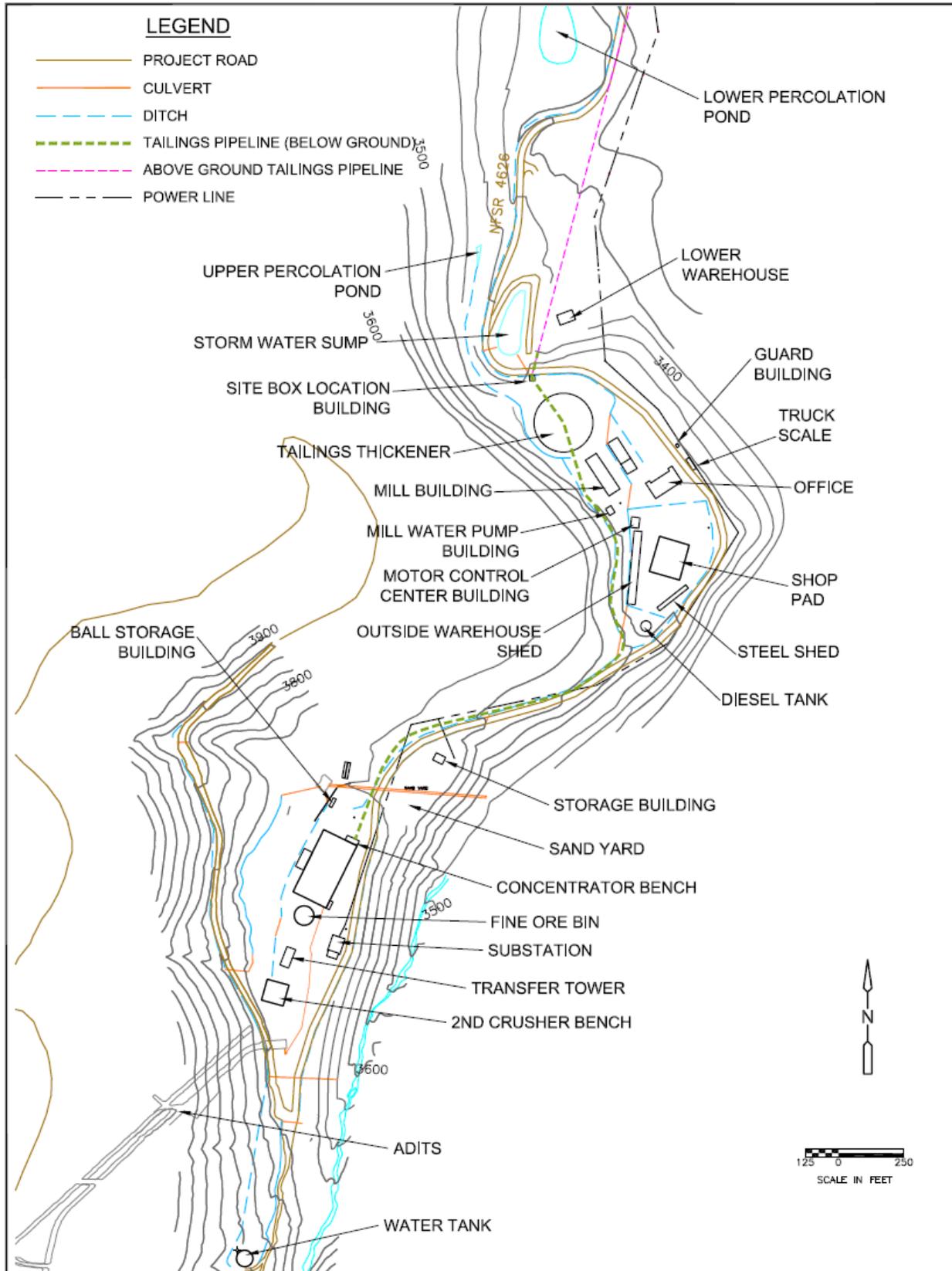


Figure 2-2. Office/Shop and Mill Areas

2.1.4 Other Mine Components

Other mine components include the underground mine workings and operational areas outside of those previously described:

- Mine portals (entrances) at the North Ore Body and South Ore Body - there are nine portals into the mine, accessing seven adits. There are three north portals that branch off a single adit (the North Adit) and two east portals that lead into the mine workings (the two east adits). Additionally, there is one west portal, one south portal, one Conveyor portal, and one Service portal leading to the West, South, Conveyor, and Service adits, respectively. Portals and adits are shown in **Figure 2-3**.
 - The Service Adit carries all mine water outflows and serves as the primary personnel and equipment access to the North Ore Body.
 - The one-mile-long Conveyor Adit runs parallel to the Service Adit and is used for transporting crushed ore to the surface.
- Portal patios - the North Portal patio is approximately 12 acres in size and includes the North, East, and West portals. The South Portal patio is approximately 3.6 acres in size and includes the South Portal.
- Ventilation adits - there are four ventilation adits at the Troy Mine. One ventilation adit leading to each of the North, East, and West portals, and one ventilation adit located at the South Adit portal (the exploration adit developed by Kennecott in the 1960s).
- Underground equipment (jaw crusher, conveyor belt, rollers, ventilation system, etc.).
- Loadout facility located in Libby, Montana (**Figure 2-4**).
- A utility corridor that contains the tailings lines, a buried reclaim water line, and the 115-kV electrical power line that runs from the mill site to the tailings impoundment (**Figure 2-2**). After construction of these facilities, the disturbed area was seeded with a grass mix. Small trees that established in the corridor have been thinned out as required for pipeline and power line maintenance since construction in 1980.
- Pump station – there is one pump station located between the tailings impoundment area and the office/shop and mill areas (**Figure 1-2**).

A plan view of existing underground facilities is shown in **Figure 2-3**.

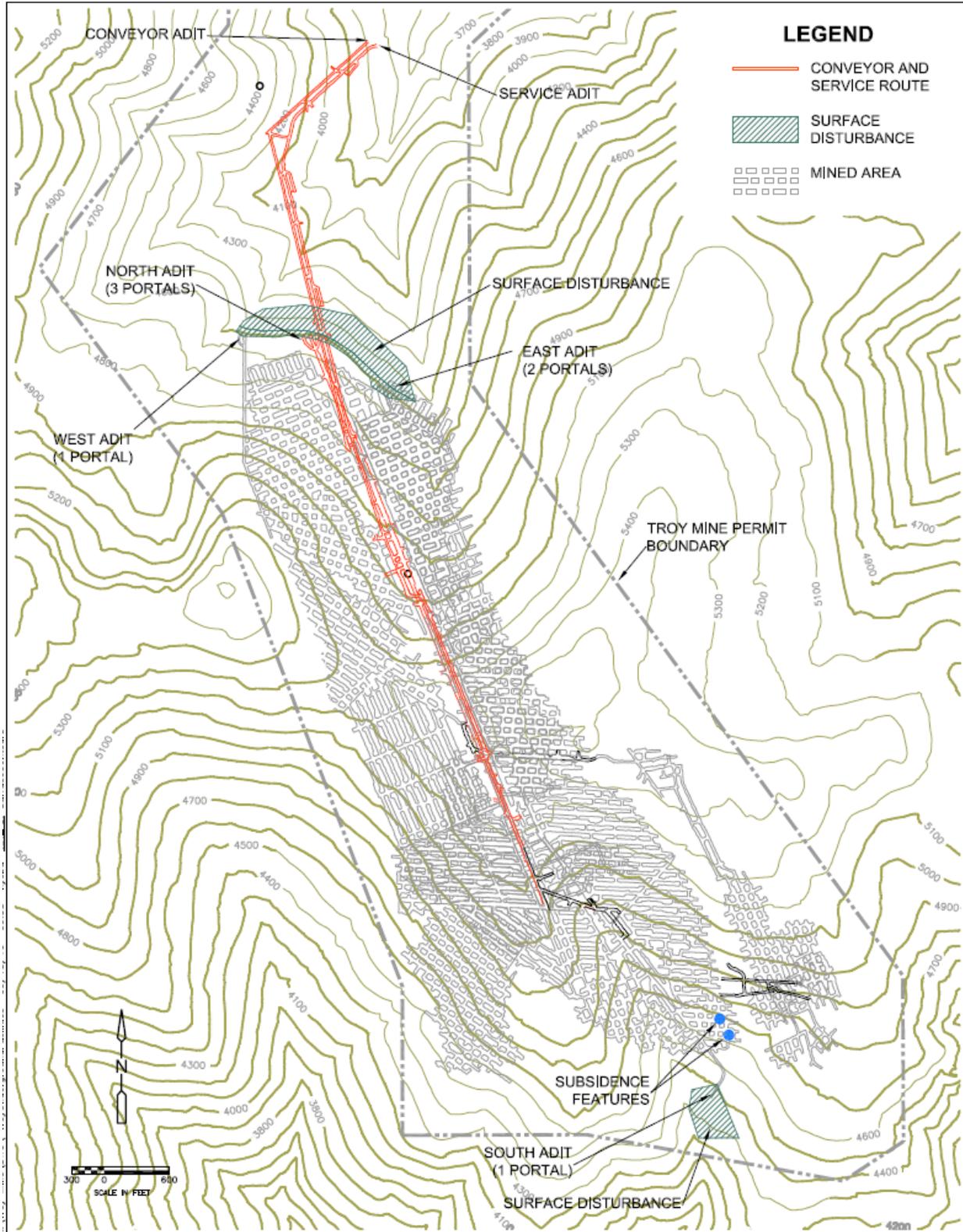


Figure 2-3. Underground Facilities

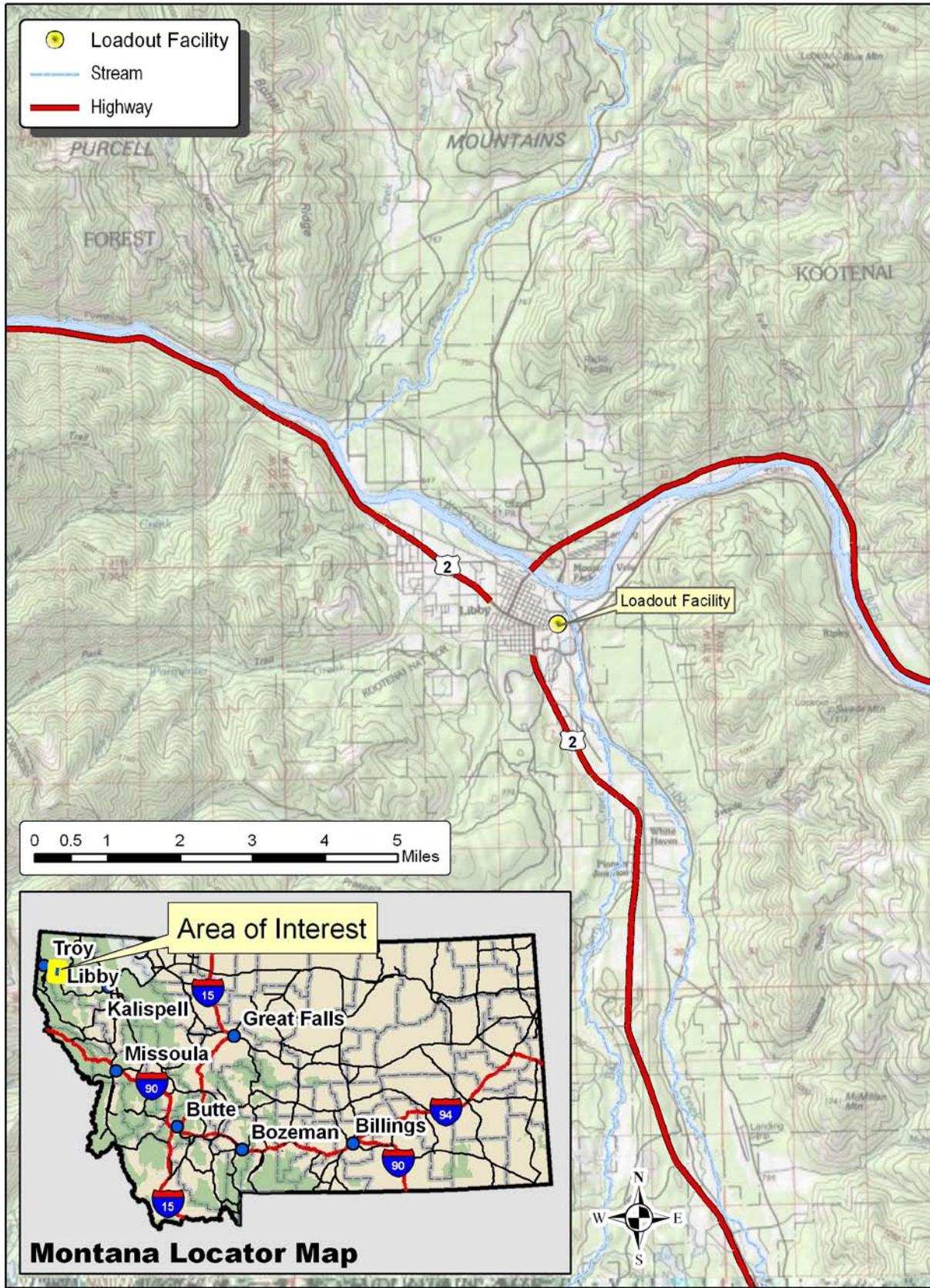


Figure 2-4. Libby Loadout Facility Location

2.2 Public Involvement

At the beginning of the NEPA/MEPA process, scoping began by involving the public. A press release was published in area newspapers and announced on local TV and radio stations on October 11, 2007. This press release requested public input on Genesis's *2006 Revised Reclamation Plan*. USFS ran an advertisement in four area newspapers: the *Western News* on October 24, 2007; the *Sanders County Ledger* on October 25, 2007; the *Daily Inter Lake* on October 21, 2007; and in the *Bonner County Daily Bee* on October 24, 2007. The comment period extended from October 11, 2007, through December 28, 2007.

The public scoping meeting and open house were held at the Kootenai Senior Citizens Center in Troy, Montana, on Tuesday, October 30, 2007, and began at 6:30 pm with a presentation that was followed by an open house.

The Agencies agreed upon the format for the scoping meeting prior to the event. The project consultant Camp Dresser and McKee, Inc. (CDM) started the meeting with a 20-minute presentation that introduced the project team and discussed the scoping process, history of the mine, and the potential remedial alternatives. Following the presentation, an open house was set up for meeting attendees. Seven different tables, each representing a particular topic, were set up in a large meeting room. Each table was staffed by one or more KNF, DEQ, or consultant team (CDM and AMEC) employees, and two copies of the revised reclamation plan were available for review. The following topic areas were included:

- NEPA and MEPA;
- engineering and geotechnical;
- hydrology and water quality;
- reclamation, soils, and vegetation;
- permit amendment process;
- wildlife and fisheries; and
- Troy Mine and Genesis (now Troy Mine, Inc.)

Thirty-three people signed into the meeting and open house. Attendees were encouraged to move freely from table to table, depending upon their interests, and to list questions. A detailed description of the scoping process is described in the Scoping Report in **Appendix A**.

During the course of preparing an EA, several potential water quality impacts were identified that the Agencies determined were of sufficient significance to warrant the preparation of an EIS. These issues include:

- The potential for mine water to discharge to springs, seeps, or streams after mine closure, potentially causing surface water standards for aquatic life to be exceeded.
- The potential for the tailings pipeline to fail, potentially resulting in erosion and the discharge of metals, nutrients, and sediment into Stanley or Lake creeks.
- The issue of long-term maintenance of the pipeline.

Given these potential impacts, KNF did not believe that it could conclude the EA process with a Finding of No Significant Impact under 40 CFR 1508.13 and FSH 1909.15(b). DEQ believes that these potential impacts are sufficiently significant to trigger the need to prepare an EIS under the criteria set forth in ARM 17.4.608. The potential contamination of surface water from mine water-impacted springs and seeps could last for a significant period of time. In keeping with the potential severity of impacts from potential seeps and springs and the potential for discharge from the pipeline to surface water, there did not appear to be sufficient assurance that the impacts would not occur. Finally, the surface waters around the Troy Mine are of sufficient value to further justify the preparation of an EIS given the potential impacts to this environmental resource.

Therefore, the document preparation process was revised prior to the release of a public draft EA to preparation of a draft EIS. KNF published a Notice of Intent (NOI) in the *Federal Register* on April 14, 2011. The NOI described KNF and DEQ's intent to prepare an EIS for the Troy Mine Revised Reclamation Plan and referenced the scoping process where public comment on the proposal had been solicited.

2.3 Issue Identification

Issues were identified through the agency and public scoping process, through the Agencies' review of the *2006 Revised Reclamation Plan*, and through interagency discussions on the development of alternatives. An Interdisciplinary Team (IDT) consisting of lead agency personnel and the consultant team preparing the environmental impact statement (EIS) helped identify issues. Agency personnel included staff from the co-lead Agencies. Input from other agencies (as discussed in Chapter 1) was also solicited. Both DEQ and KNF provided ongoing policy guidance and oversight while this EIS was being prepared. Agency personnel also contributed information on land use and management practices throughout the project.

A *Scoping Report* was prepared to describe the results of scoping activities conducted between October and December 2007 (see **Appendix A**). This *Scoping Report* summarized major issues identified during the scoping period and identified those carried forward for further evaluation in this EIS. At the time of scoping, the Agencies proposed preparing an EA, however, as analyses proceeded, potential significant impacts were identified that resulted in the preparation of an EIS instead. Throughout the scoping process, opportunities were available for the public and agencies to present concerns and issues for consideration during the EIS process.

Issues obtained via scoping were separated into two groups: Major Issues and Issues Considered but Not Evaluated.

- Major issues were defined as those for which:
 - there may be potentially significant impacts;
 - there may be a concern about potential effects directly or indirectly resulting from implementation of the Proposed Action; or
 - there may be a concern about the effectiveness of proposed mitigation measures.
- Issues considered but not evaluated were those that were:
 - outside the scope of the analysis;
 - already decided by law, regulation, Forest Plan, or other higher-level decision;
 - irrelevant to the decision to be made; or
 - conjectural and not supported by scientific or factual evidence.

Major issues may guide development of alternatives. Issues considered but not evaluated further are those that do not affect the development of a range of reasonable alternatives.

Issues were evaluated to determine whether the proposed action or an alternative would result in significant impacts. The Council on Environmental Quality (CEQ) regulations define significant impacts in terms of both context and intensity (40 CFR 1508.27). CEQ implementing regulations (40 CFR 1500 *et seq.* 2003) for NEPA explain this delineation in Section 1501.7 as a process to “...identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review...” (40 CFR 1501.7 (a)(3); 2003). MEPA also provides direction on determining the significance of impacts similar to the definitions used under NEPA (ARM 17.4.608(1), MCA 75.1.201). Non-relevant issues must be addressed briefly to document why each issue is considered non-relevant and does not need further evaluation (ARM 17.4.608(1)).

A number of the issues identified during scoping were carried forward as major issues for further consideration in the EIS process. During the evaluation of potential impacts, some issues were found to have potentially significant impacts which led to the preparation of this EIS rather than an EA as had been proposed during early scoping. Several issues were considered but were not recommended for further evaluation by consensus of the IDT. The issues that were considered but eliminated from further evaluation are discussed and summarized in **Section 2.3.2**.

2.3.1 Major Issues

The following information covers major issues identified during scoping and by the IDT, along with a summary of how each issue was evaluated for this EIS. Major issues, as previously defined, are those that may have significant impacts or where there is disagreement about potential effects or the effectiveness of mitigation measures. Major issues may be any number of social, environmental, or economic effects or influences that would potentially result from implementation of an alternative.

Major issues identified primarily relate to adit closure, mine water distribution, mine water treatment and disposal, the longevity and success of copper attenuation mechanisms, disposition of building materials, subsidence, and to the source of reclamation materials.

2.3.1.1 Water Management

Adit Closure and Mine Water Distribution

One of the primary issues identified through the scoping process and interagency review concerns the closure of the adits and treatment of water that may flow from the mine upon closure. Issues involved with adit closure focused on the following questions:

- Should hydraulic or non-hydraulic plugs be used to close adits? Non-hydraulic plugs pass water thus preventing pressure from building up on the plug itself, but hydraulic plugs are sealed to prevent water from passing through the plug. These plugs allow hydraulic pressure to build up and, in turn, may create the possibility for seeps or springs to develop in other areas.
- How much water will be held in the mine when it floods and what is its quality?
- Where will mine water drain, and does it have the potential to reach ground and surface waters?
- Does the 30 year-old tailing pipeline have the integrity to be used as a mine water discharge line?
- What is the quality of water over time?

Both the closure of adits and the destination of water from underground workings were analyzed in order to address concerns relating to surface and groundwater quality (**Section 3.9**).

Water Treatment and Disposal

Concerns were received regarding Troy Mine, Inc.'s intent, as outlined in the *2006 Revised Reclamation Plan*, to send mine water to the tailings impoundment area for long-term water treatment and disposal. Some of the comments about water treatment included:

- Would there be any treatment of discharged mine water?
- Could mine water be treated in the Service Adit prior to discharge?
- Could decant ponds be replicated at the mill site and the seven-plus miles of tailings pipelines be removed?
- Could mine water be treated in the short term rather than over the long term (indefinitely)?

The need for mine water treatment depends on future anticipated levels of metals in mine water and the duration and success of attenuation mechanisms, both primary and secondary. Information on water quality, treatment, and disposal is summarized in Chapter 3 (**Section 3.9**).

Groundwater Quality

The following comments were received on groundwater protection, which includes the natural attenuation process for copper and the length of time that natural processes could be sustained:

- After 20 years of diverting water to the decant ponds, why would groundwater be an issue under this proposal?
- Will a Montana Pollutant Discharge Elimination system (MPDES) permit be required for the discharge of mine water?

Several studies and an assessment of natural attenuation of metals in the decant pond disposal system have been completed. The results of these studies are summarized in Chapter 3 (**Section 3.9**).

Surface Water Quality

Concerns on mine water reaching surface waters included:

- How does the *2006 Revised Reclamation Plan* address long-term seepage and groundwater discharge to Lake Creek?
- What are the potential impacts of increased flows from the underground workings on water quality in nearby streams, creeks, and the toe ponds?
- Statement of concern that discharges from the mine have begun to appear in the vicinity of Ross Creek.

Ground and surface water data and monitoring reports were reviewed and are summarized in Chapter 3 (**Section 3.9**).

Long-Term Monitoring of Water Quality

The following comments were received on potential long-term impacts to water quality and on the feasibility of long-term monitoring:

- What will mine water copper concentrations be in the future?
- What is the likelihood of copper reaching Lake Creek?
- What are the potential impacts to Ross Creek?
- How long could monitoring realistically continue?

Chapter 3 (**Section 3.9**) summarizes the assessment of natural attenuation of metals in the decant pond disposal system.

2.3.1.2 Reclamation

Reclamation Materials

Soil intended for reclamation of the tailings impoundment was originally stockpiled between the base of the impoundment embankment and Lake Creek. This stockpiled soil currently serves as a berm to contain seepage from the base of the impoundment. The toe ponds have developed into wetland habitat used by many species. Public comments on reclamation includes the following:

- One comment stated a preference for using the soil stockpiles at the toe ponds instead of disturbing new areas.
- Another comment stated that impacts would be lessened if the soil stockpiles at the toe ponds were not disturbed.

The volume and type of soil that would be needed to meet revegetation goals is evaluated in Chapter 3 (**Section 3.13**).

Subsidence

Comments were received both on subsidence during operations and on the potential for post-closure subsidence.

- One comment questioned how future occurrences of subsidence would be addressed.
- Another comment questioned how hydrology would be affected by future subsidence.
- A comment was also received stating that the amount of the reclamation bond should be commensurate with mitigation of possible further incidents.

The potential for subsidence is analyzed in Chapter 3 (**Section 3.8**).

Revegetation

Proposed seed mixes need to reflect current standards for using native species. Current revegetation standards are included and addressed in this EIS (**Section 3.16**).

- Comments were received on the potential for dust blowing from the tailings impoundment. Revegetation and its effect on blowing dust are addressed in Chapter 3 (**Section 3.16**).
- A comment from the public stated a preference for releasing water through the pipelines to the tailings impoundment to provide water needed for revegetation.

This EIS analyzes irrigation and dust control methods with respect to revegetation (**Section 3.16**).

Infrastructure

The IDT agreed that appropriate and current standards on disposition of buildings and other structural materials at the mine on NFSL be followed and be an issue to be included and addressed in this EIS (**Table 2-1**).

Topography

The IDT identified several changes and refinements to the Proposed Action, including regrading at the decant ponds, borrow areas, and at the toe ponds. All of this information is included and addressed in this EIS (**Section 3.13**).

2.3.2 Issues Considered and Not Evaluated Further

The scoping process provided many opportunities for the public to present concerns and issues to be considered during the EIS process. Concerns that were determined to be outside the scope of the analysis, those already decided by law or regulation, irrelevant to the decision to be made, or conjectural in nature were not evaluated in detail in this EIS. Concerns that were considered but not

evaluated further are also summarized in this section. After each comment, the Agencies' response is presented in italics.

1. The milling process uses iron, but occurrences of iron staining have been attributed to natural processes. Fate and transport of iron should be studied as carefully as copper.

The natural attenuation processes for iron were studied in CDM's Troy Mine Copper Attenuation Study – Secondary Processes (Appendix D). Although this study did not directly discuss the use of iron in the milling process, it verifies that reductions in concentrations of iron were observed as a result of mixing mine or decant water with existing groundwater. Although iron concentrations exceeding standards are occasionally observed in Lake Creek, iron is a naturally-occurring element in the project vicinity:

A number of springs that occur along the Lake Creek terrace have been investigated throughout the life of the mine; one of these was identified through observation of iron staining. Springs with iron staining occur naturally throughout the Kootenai, Clark Fork, and Lake Creek valleys. The source of iron is naturally occurring in sedimentary beds of Pleistocene lake sediments likely deposited from prehistoric glacial lakes (Genesis 2006, page 3-11).

Regardless of its source, iron is a naturally-occurring element in the project vicinity; and its concentration in mine waters lessens when combined with existing groundwater. Please refer to The Troy Mine Copper Attenuation Study – Secondary Processes Report (Appendix D). This potential issue will not be evaluated further.

2. Concerns were raised about the stability of the impoundment, the potential effects of continued discharge of mine water, and about the effect of placing additional tailings lifts upon impoundment stability. Also raised was a question about what the potential effect on operation of the Northern Lights Dam would be if the impoundment failed.

The tailings have been permitted by the Agencies to an elevation of 2,420 feet for Cells 1, 2, and 3. Impoundment stability has been addressed in many previous documents and inspection reports, including Knight Piésold's 2007 report "Genesis Inc. Troy Mine Report on Phase 2 Program to Define the Maximum Safe Elevation for the Tailings Embankment." The Genesis 2006 Revised Reclamation Plan includes a geotechnical monitoring plan that calls for yearly inspections to ensure impoundment stability. The yearly inspections would continue for five years after mine closure or until Troy Mine, Inc. and the Agencies agree to discontinue monitoring. An inspection report prepared for verification of stability would be required by a geotechnical engineer at mine closure. Finally, the impoundment would be more stable after closure when wet tailings are no longer being added to the impoundment; at that point, groundwater elevation levels would decrease near the embankment.

3. A cash bond should be required to cover all obvious and potential problems that could be associated both with reclamation and with perpetual maintenance, which would include mandatory review at 10-year intervals.

Section 82-4-338 (1)(a) MCA describes the bond instruments that the applicant for an operating permit may file that are acceptable to DEQ. Bond types acceptable to USFS for mineral activities are found at 36 CFR 228.13 and in Forest Service Manual 2817.24

The instruments deemed adequate by the State of Montana and USFS include: a cash deposit, an assignment of a certificate of deposit, an irrevocable letter of credit, or other surety acceptable to the Agencies. Pursuant to a Memorandum of Agreement, the Agencies have accepted a joint bond for the Troy Mine project. Once the environmental documentation process is complete, the joint bond will be recalculated to address all requirements identified and deemed necessary in the final decision. Long-term water treatment would be included in the recalculated bond only if it is considered necessary at the conclusion of the analysis.

During operations, bonds are reviewed for adequacy at a minimum every five years, when there is a change to the plan of operations, or when changes in environmental conditions warrant a review. After closure, the bond amount would be reviewed on a minimum five-year basis until needed reclamation is deemed complete and the bond could be released. Additionally, DEQ reviews each bond for adequacy on an annual basis.

This potential issue is addressed by law or regulation.

4. A concern was raised regarding whether buried drums were addressed in the Genesis 2006 Revised Reclamation Plan and if they would be unearthed and sampled.

In December of 2002, the Cabinet Resource Group (CRG) initiated a lawsuit against ASARCO and Sterling Mining Company (now Revett Silver Company). This lawsuit alleged that barrels of hazardous waste were buried within the tailings impoundment during ASARCO's operation of the Troy Mine. CRG also claimed that barrels containing solvents, waste oil, and grease were buried in the tailings impoundment. The allegations were never substantiated, and in July of 2006, the U.S. District Court dismissed the case without prejudice. ASARCO has admitted to burying drums but has also stated that the drums did not contain contaminants. This potential issue is beyond the scope of this analysis.

5. A commenter proposed that the action should include replicating the decant ponds at the mill site so that the tailings pipelines could be removed.

For a number of reasons, the mill site likely would not be a suitable location for metals attenuation to occur. First, the decant ponds are underlain by natural subsoils and thick glacio-alluvial deposits that provide both slow percolation of the water and adequate residence time for metals removal reactions to take place. The mill pad would be covered with 12 inches of growth medium underlain by permeable development rock fill. Should any metals-bearing water reach the development rock fill below, this water would reach Stanley Creek, which is in close proximity to the pad. At the tailings facility, there are iron-bearing natural groundwaters that provide a

secondary mechanism to attenuate metals should the primary removal processes fail to operate in the future. Such a secondary process would not be present at the mill pad. Please see Chapter 3, Section 3.9, for further discussion on the natural attenuation mechanisms at the decant ponds. This potential issue is not considered further, because it is not a feasible alternative.

6. A concern was raised about the potential for contamination at the mouth of Lake Creek from Troy Mine operations. The Northern Lights Dam traps sediment at the mouth of Lake Creek. This section of the creek has been dredged twice, but no analysis of sediments has been conducted to determine if the sediments are contaminated from Troy Mine operations.

In 2009, 24 years of data were compiled. A study was conducted of macro-invertebrates at locations both above and below mining operations in Fairway-Stanley and Lake creeks. The purpose was to determine whether significant non-point source pollution was occurring in local streams due to Troy Mine, Inc.'s activity (the Troy Mine has no point sources reaching any streams). This study concluded that over the last 23 years, no biologically-significant changes in macroinvertebrate communities at either of the creeks have been observed that could be attributed to the mine. Both creeks continue to have key species known to be especially sensitive to metal concentrations (Parametrix 2009). Because the Northern Lights Dam is at the mouth of Lake Creek (downstream of the macroinvertebrate study), the potential for contamination at the Northern Lights Dam has been eliminated by scientific evaluation.

7. A commenter proposed that no reclamation other than tree planting should occur and that the mine should be left open as an educational resource and a tourist attraction.

This suggestion is not feasible because potential impacts to water quality, land use, public safety, wildlife, and fisheries would greatly outweigh any benefits of leaving the mine open. Moreover, leaving the Troy Mine open as a tourist attraction does not meet the purpose and need of the reclamation project.

2.4 Comparison of Alternatives

Three alternatives are evaluated in this EIS. The No Action Alternative consists of the reclamation plan provided by ASARCO in 1978 and the reclamation work that has been completed through August of 2010 by Genesis (now Troy Mine, Inc.). The Proposed Action describes the Revised Reclamation Plan submitted by Genesis to the Agencies in March of 2006. The Agency-Mitigated Alternative was developed by the Agencies and is based on issues derived from interagency and public scoping comments on the Proposed Action.

The alternative descriptions are aligned with the issues that were carried forward from the public scoping process as described earlier in this chapter and include the following:

1. Water Management
 - Adit Closure and Mine Water Distribution
 - Water Treatment and Disposal

- Groundwater Quality
- Surface Water Quality
- Long-Term Monitoring of Water Quality

2. Reclamation

- Reclamation Materials
- Subsidence
- Revegetation
- Infrastructure (buildings and other structural materials and how they would be removed or reclaimed)
- Topography (disturbed areas)

A description of each alternative, including a discussion of how each alternative addresses the issues is presented in **Table 2-1** and in the following sections.

Table 2-1. Comparison of Alternatives

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative
<u>Water Management</u>				
Adit Closure and Mine Water Distribution				
1 Adit Closure - Service and Conveyor Adits		The portals would be sealed with concrete, and water drainage from the Service and Conveyor adits would be allowed to discharge onto the development rock patio fill (pg. 65).	Concrete non-hydraulic plugs would be constructed in the Service and Conveyor adits to funnel water into the collection pipe for conveyance to the decant ponds. Plugs would consist of concrete followed by coarse rock from the portal patios (pg. 7-6). No access to intake would be provided.	Modifications to the Proposed Action include: 1) Concrete plugs would not be installed. 2) In the Service and Conveyor adits, a concrete structure would be installed to capture mine water and funnel it to the collection pipes. 3) Additional monitoring of seeps and springs would be required to verify whether state water quality standards have been met. 4) Closure devices would be installed to prevent unauthorized access to the Service and Conveyor adits and to allow cleanout of the intake structures.
2 Mine Site and Closure of Other Adits	Adits (North-3, South-1, East-2, West-1)	Upon closure of the mine, the entrance would be sealed with concrete and drainage for water would be provided. (pg 65). Portals would be sealed with concrete.	Development rock would be used as backfill from the adit opening back 30 feet into the adit and tight against the roof (pg 4-4); rock remaining after adit plugging would be graded against the side of the slope to form a wedge (pg. 4-1, Table 4-2). The South Adit would decline back into the mine (pg 4-4). Adits that are not expected to discharge water, would be backfilled with coarse rock from the patios but would not receive concrete plugs (pg. 7-4 to 7-7).	Modifications to the Proposed Action include: 1) Development rock would be used at the portal patio to plug the South Adit. The South Adit plug would extend approximately 130 feet into the adit, rather than the 30 feet as in the Proposed Action. 2) Development rock that has accumulated in stream channels adjacent to the mine site would be removed from channels and included in the backfill materials for the South and West adits.

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative
3 Outflows from Adits		<p>Mine water would be discharged to Stanley Creek; groundwater flows into the surrounding groundwater system and would gravity-flow from the Service Adit (pg 7-2). Drainage from the adits would be allowed to infiltrate at the point of discharge outside the portals (pg. 65).</p>	<p>Mine water would discharge to the decant ponds and/or tailings impoundment surface (pg 7-4). Mine water would only discharge from the Service and Conveyor adits. Mine water would then be conveyed through the tailings pipelines and discharged to the decant ponds (pg. 4-4).</p>	<p>Modifications to the Proposed Action include: 1) The reclaim water line would be used as a secondary water conveyance line. Inspection of the reclaim water line would be required prior to use. 2) A new, buried water line would be designed and installed adjacent to the reclaim water line. The new water line(s) would be designed to handle the anticipated volume of mine discharge. 3) The design for the new lines would include the installation of remote safety measures that would identify changes in flow and automatically change flow to the other pipeline until repairs have been made. 4) The intake structure would be designed to collect water from both the Conveyor and Service adits. 5) A channel would be constructed from the Service and Conveyor adits to the mill site stream channels for emergency overflow from the adits in case the design capacities are ever exceeded (Appendix E and Figure 3-3).</p>
4 Tailings Pipelines	Two 8-inch steel Tailings Pipelines	<p>The tailing pipelines would be removed, and disturbed areas would be reclaimed and revegetated (pg. 66)</p>	<p>The tailings pipelines would be retained to convey water from the mine site to the decant ponds. Once the mine water is of sufficient quality for direct discharge to Stanley Creek, the tailings pipelines, portions of which are buried less than 3 feet, would be removed. (pg. 4-14).</p>	<p>The tailings pipelines would be removed after new mine water pipeline and safety measures are in place and tested. Disturbed areas would be reclaimed and revegetated.</p>

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative
5	Reclaim Water Line and Pump Stations One 10-inch steel pipeline	The reclaim water line and pump stations would be removed, and disturbed areas would be reclaimed (pg. 66)	Until it wears out, the reclaim water line would be retained to convey water from the mine site to the decant ponds. Once the mine water is of sufficient quality for direct discharge to Stanley Creek, the remaining pipeline would be capped and abandoned in place. Reclaim pump stations would be salvaged and the buildings would be removed (pg 4-19).	The reclaim water line would be used as an emergency water conveyance line. Inspection of the reclaim water line would be required prior to its use and remote safety measures would be installed as in the new pipeline. A new, buried water line would be designed and installed adjacent to the reclaim water line. The water line(s) would be designed to handle the anticipated volume of mine discharge and would be buried or double-lined at stream crossings. When the mine water is of sufficient quality for direct discharge to Stanley Creek, the installed pipelines less than three feet deep would be removed, and the pipeline corridor and decant pond would be reclaimed.
6	Mill Site and Office and Shop Areas Drainages	Not Addressed	Two separate stream channels would be constructed across the mill pad and down the fill slope. Channels would be armored with coarse rock sized to provide stability in 100-year, 24-hour storms. An energy dissipation basin would be created at the toe of the fill slope (pg. 4-7, Figures 4-3 and 4-3).	Modifications to the Proposed Action include: 1) Both drainage channels would be combined into one channel. 2) The channel would be lined with an impervious liner. 3) Development rock would not be used to construct the drainage channel. 4) Rock structures in the channel would be angular and sized for the 100-year flow. 5) The new channel would be routed across the mill site and down the fill slope to the pre-existing channel location (Figure 3-3).
7	Tailings Impoundment Surface	Surface drainage ditches would conduct storm water to a natural drainage. A spillway would be constructed to divert drainage (pg. 66)	The existing drainage that slopes toward the decant ponds would be maintained. There would be no need for a spillway (pg. 7-9).	Modifications to the Proposed Action include construction of berms to prevent storm water runoff from entering the decant ponds.
Water Treatment and Disposal				
8	Decant Ponds	Not Addressed	When mine water is no longer routed to the decant ponds, the ponds would be recontoured to form shallow depressions to capture runoff and to provide wetland habitat (pg 4-18).	In order to maintain existing geochemical conditions, the decant ponds would be maintained as deep ponds (10 to 15 feet deep and approximately 4 acres in size with a divider berm to provide for periodic cleanout of the pond).

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9	Tailings Impoundment Surface Cells 1,2,3	The surface of the impoundment would be graded and reworked to provide a suitable area for revegetation (pg 66).	No major regrading of the tailings impoundment surface is proposed; the surface would slope to the east, draining to the decant ponds (pg. 4-15 and 4-18)	Modifications to the Proposed Action include: 1) Final permitted elevation of the tailings is 2,420 for Cells 1, 2, and 3. 2) A berm would be created to prevent storm water runoff from the impoundment surface from draining directly to the decant ponds.
Groundwater Quality				
10	Seepage from Tailings Embankment	The toe ponds were constructed by ASARCO in 1983 to capture seepage and embankment runoff (pg. 3-6). Enviro-pump S-1 is used to convey groundwater seepage to Toe Pond 2 (pg. 3-10). Snowmelt or runoff from toe ponds 2, 3, and 4 is currently pumped to the impoundment (pg 7-10).	The current system would be maintained post-closure until the water quality is suitable for release to Lake Creek.	Same as Proposed Action
11	Monitoring Wells	Not Addressed	Remain as long as needed, then plugged and abandoned as per ARM 36.21.810) (Genesis 2006, pg 4-19, Appendix F and Table F-1).	Same as Proposed Action
Surface Water Quality				
12	Surface Water Quality	<p>A sampling program was designed and implemented to determine baseline conditions for surface waters for analysis in the 1978 Draft EIS (DSL and KNF 1978, page 107).</p> <p>Surface water monitoring of Stanley, Fairway, and Lake creeks has been conducted since 1986. The program included bioassay testing, macroinvertebrate monitoring, and water quality and flow monitoring three times per year (Genesis 2006, Appendix F, page 5). The seven water quality monitoring stations listed in Table 2.3 would continue to be sampled post-reclamation for flow and water quality three times per year until the Agencies agree that monitoring is no longer necessary (Genesis 2006, Appendix F, pages 5-6).</p>	<p>The Proposed Action Water Monitoring Plan includes annual macroinvertebrate monitoring and water quality and flow monitoring three times per year (Genesis 2006, Appendix F, page 5). The water quality monitoring program would continue under the Proposed Action until the Agencies agree that monitoring is no longer necessary. The surface water quality monitoring sites that would be sampled are the same as those listed in Table 2.3.</p>	There would be additional monitoring of surface water at the mine during closure to verify whether state water quality standards have been met.

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Long-Term Monitoring of Water Quality				
13	Water Quality Monitoring	Scheduled monitoring of the two test wells drilled in July of 1976 would continue throughout the life of the project (DSL and KNF 1978, page 58). Surface water monitoring of Stanley, Fairway, and Lake creeks has been conducted since 1986. The program included bioassay testing, macroinvertebrate monitoring, and water quality and flow monitoring three times per year (Genesis 2006, Appendix F, page 5).	Water quality monitoring would continue during and after reclamation until the Agencies agree that monitoring is no longer necessary.	Modifications to the Proposed Action include additional monitoring of surface waters including seeps and springs to verify whether state water quality standards have been met. In addition to the two Ross Creek springs RCT1 and RCT2 currently in the 2006 monitoring plan, this alternative adds SC-15 on upper Stanley Creek. In the vicinity of the decant ponds, additional wells would monitor water quality annually to verify geochemical conditions in the area of the mine water discharge are maintained. These wells are MW01-15, MW01-16, MW-95-7, and MW-95-8 (Figure 2-5).
Reclamation				
Cover Source Materials				
14	Stockpile at Toe Ponds	Troy Mine, Inc. indicates that a volume of 818,500 cubic yards (cy) of soil is stockpiled at/around impoundment with 162,000 cy at Cell 3 soil stockpile	The soil was salvaged from the upper 24 inches of a 40-acre area in the east half of Section 31, T30N, R33W (pg. 66) under the impoundment.	The soil stockpiled to the west of the tailings embankment would be left in place to maintain wildlife habitat (pg. 4-16).

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15 Tailings Impoundment Surface	2006 bond calculation assumes 766,600 cy would be needed to cover impoundment surface with 18 inches of soil	The tailings impoundment surface would be covered with approximately 18 inches of stockpiled soil near the impoundment and vegetated (pg. 66).	The 18 inches of reclamation material for the surface of the tailings impoundment would be obtained from borrow sources located east of the impoundment (pg. 4-16).	Up to 90% of the stockpiled soil west of the toe ponds would be used first, then borrow east of the impoundment would be used for the balance of soil, if needed. The soil would be placed in one soil lift to prevent compaction. The soil would be ripped before seeding. Soil would be amended with an agency-approved, wood-based, organic amendment to add 1,100 lbs of nitrogen per acre. Any materials originating in borrow pits to be used in reclamation would be in accordance with Agencies' growth media specifications.
16 Mill Site and Office and Shop Area	27 acres @ 12 inches of cover = 43,560 cy growth media needed	Following removal of unneeded buildings and resurfacing of the bench, no additional capping at the mill and plant site would be proposed (pg. 65).	The growth media within the mill and office/shop pads, the upper percolation pond embankment, old warehouse pad slope, or the USFS borrow site (in Section 24) would be used for reclamation use in the mill area (pg. 4-7 to 4-11, Table 4-1).	Growth medium from the mine and mill area would be used first, then rocky glacial borrow east of the impoundment would be used for the balance, if needed. The mill site and office and shop areas would be covered with 12 inches of growth media. The USFS borrow site and stockpiled soil west of the impoundment would not be used. Growth material would be amended with an agency-approved, wood-based, organic amendment to add 1,100 lbs of nitrogen per acre. Woody material greater than 3 inches in diameter would be scattered at the rate of 25 tons per acre. Any materials originating in borrow pits to be used in reclamation must be in accordance with Agencies' growth media specifications.

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17 North and South Portal Patios	15.28 acres total, 11.6 acres to be left as talus and cut slopes; 3.7 acres to be reclaimed @ 12 inches of cover = 5,969 cy cover growth media needed	Not Addressed	A 12-inch layer of cover growth media from a local borrow source would be placed over the regraded surface (pg. 4-1).	Growth medium from the mine and mill area would be used first, then rocky glacial borrow east of the impoundment would be used for the balance, if needed. Growth material would be amended with an agency-approved, wood-based, organic amendment to add 1,100 lbs of nitrogen per acre. Woody material greater than 3 inches in diameter would be scattered at the rate of 25 tons per acre.
Subsidence				
18 Subsidence	Existing surface expression of subsidence totals less than 1 acre.	Potential subsidence was not addressed in the reclamation plan approved in 1978. Two surface subsidence features, most likely chimney subsidence, have formed during operations. Subsidence occurs due to wide roof spans and poor ground conditions associated with the weak rock mass along the East Fault zone. Efforts to reclaim subsidence areas occurred in 2005 and 2006. As of 2010, one area appears to have returned to adequate stability and utility. Reclamation of the other subsidence area was not successful. Reclamation of one future subsidence feature has been covered by a minor revision to the operating permit (Montana DEQ MR 07-001). A bond is in place for a future subsidence event.	Not Addressed	The Agencies would require Troy Mine, Inc. to repair the existing surface subsidence feature that has not achieved a level of stability and utility comparable to the pre-disturbance condition. The reclamation bond would be increased to address the possibility of future subsidence, including surface subsidence occurring on steep slopes.
19 Subsidence Monitoring		Not Addressed	Not Addressed	Annual aerial inspections of the mine shadow area would be conducted by Troy Mine, Inc. with agency participation. Surveys would be conducted until bond release, and the subsidence portion of the reclamation bond would be held for a minimum of twenty years after the mine has been decommissioned and the adits have been plugged.

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Revegetation					
20	General	Vegetation would consist of a mixture of mostly introduced grasses and legumes and native shrubs and trees (pg. 67)	Vegetation types would be determined based on pre-mine occurrence, establishment potential, growth characteristics, soil stabilization qualities, commercial availability, experience from on-site tests, and post-mine land use objectives. Native species would be emphasized (pg. 6-1) and noxious weed-free seed would be used (pg 6-2). A wetland mix would be provided for designated areas (pg 1-4). Annual ryegrass would be added to forest mixes to provide initial rapid stabilization (pg. 6-2). Fertilizer would be applied except within 200 feet of a perennial stream; mulching would be applied to slopes steeper than 20% with less than 50% coarse fragments (pg 6-8). Irrigation may be used during the first season to ensure initial stand development (except for slopes steeper than 10% or upper elevation sites) (pg 6-9).	Modifications to the Proposed Action include the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation. Organic fertilizer would be used rather than chemical fertilizer.	
21	Tailings Impoundment Surface	303 acres	The tailings impoundment surface would be covered with 12 to 24 inches of soil. Container grown tree seedlings would be planted at a spacing of 680 trees/acre. Shrubs would be planted between the trees. The seed mix would be applied after 2-3 growing seasons (pgs. 68-69).	The lower elevation forest mix would be seeded over the majority of the tailings surface, with the addition of some grassland and wetland mix (pg 6-2). During the initial growing season, Irrigation may be used (pg. 4-18).	Modifications to the Proposed Action include: 1) The wetland mix would not be used on the tailings impoundment. 2) Trees would be planted as in No Action Alternative. 3) The seed sources for native plant species should be from northwestern MT, if available at the time of reclamation.
22	Tailings Embankment Slopes and Benches	42 acres	Tree species would be planted on benches at an 8-foot spacing, with shrubs in between. All slopes would be seeded and fertilized. South-facing exposures would be mulched and irrigated if necessary (pg. 68). Over the period 1995-98, over 35,000 tree seedlings were planted on the 42-acre tailings embankment (833 trees/acre). The slopes and benches are currently covered with grass and trees. No additional revegetation of the tailings embankment is proposed; a 42-acre surface on the impoundment has been reclaimed (pg 2-5).	Same as No Action	The Agencies would perform a field review of previously reclaimed areas to determine if additional areas need covering with soil, revegetation, or reseeding. If areas are reseeded, the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation.

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23	Troy Mine, Inc. Borrow Sites	East Impoundment and NE Impoundment areas, Cell 3 borrow	Not Addressed	The borrow sites would be planted with lower elevation forest type vegetation (pg. 4-18 and 6-2).	Modification to the Proposed Action includes the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation.
24	Reclaim Water Pump Station	Not Addressed	The reclaim water pump station would be revegetated to grassland and would rely on natural establishment of woody species (pg 4-19).	Modification to the Proposed Action includes the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation.	
25	Mill Site and Office and Shop Areas	Fertilizer would be added at 200 lbs/acre prior to seeding. South-facing exposures would be mulched (pg. 68).	The mill site office and shop area would be planted with an upper elevation forest mix (pg 6-2).	Modification to the Proposed Action includes the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation. Disturbed ground would be mulched and plants would be inoculated with appropriate mycorrhizal fungi if available. Organic fertilizer would be used rather than chemical fertilizer.	
26	North and South Portal Patios	Details for revegetation of the portal patios were not discussed in the 1978 EIS. In 1997 and 1999, 3,750 trees were planted in the North Portal area (pg. 2-3).	The recontoured portal patios and development rock fill would be revegetated with an upper elevation forest mix (pg. 4-1). The exterior face of the adit plugs would be covered with borrow material and fine-grained material to provide copper attenuation in event of leakage (pg 7-6).	Modification to the Proposed Action includes the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation. Disturbed ground would be mulched and plants would be inoculated with appropriate mycorrhizal fungi if available. Organic fertilizer would be used rather than chemical fertilizer.	
27	USFS Borrow Source	Not Addressed	The borrow sites would be planted with upper elevation forest type vegetation (pg. 4-11).	Modifications to the Proposed Action include: 1) The seed sources for native plant species should be from northwestern MT, if available at the time of reclamation. 2) The USFS borrow area would not be used in order to prevent the spread of rush skeletonweed. USFS would be responsible to reclaim this borrow area.	
28	Smaller disturbed areas	Tailings pipelines and reclaim line, roads, power line corridors, storage areas, etc.	Revegetated (pg 66).	Smaller disturbed areas would be planted with grassland mix (pg 6-2) and would rely on natural establishment of woody species.	Modification to the Proposed Action includes the provision that the seed sources for native plant species should be from northwestern MT, if available at the time of reclamation.

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29	Wetlands	Not Addressed	Wetlands would be reclaimed with an herbaceous wetland mix and a forested wetland mix (pg 6-5).	Modifications to the Proposed Action include: 1) The seed sources for native plant species should be from northwestern MT, if available at the time of reclamation. 2) The decant ponds and tailings impoundment surface area would not be reclaimed with a wetland seed mix.
30	Revegetation Monitoring	Not Addressed	Monitoring of revegetation success would occur during pre-closure and closure phases; if poor growth was noted, additional site remediation would occur (Genesis 2006, pg 8-1, Appendix G). The duration of revegetation monitoring would depend on results (pg. 8-3).	Modification to the Proposed Action includes monitoring until the requirements for bond release are met. This includes long-term monitoring of noxious weeds, including meadow knapweed and rush skeletonweed.
31	Noxious Weed Management	Not Addressed in the 1978 plan but a county and KNF approved weed plan is currently in place.	The Weed Management Plan proposed in 2006 Revised Reclamation Plan, Appendix E would be followed. Revegetated areas would be monitored for noxious weeds, forest would be established to shade out weeds, a cover crop may be used, and limited use of herbicides would occur (pg. 6-9).	Modifications to the Proposed Action include the provisions that equipment would be washed prior to coming on site and other weed prevention BMPs would be required.
32	Air Quality	Not Addressed	BMPs and irrigation would be used as needed to suppress dust until vegetation is established (pg 8-3).	Modification to the Proposed Action includes monitoring until vegetation is established to maintain air quality.
Infrastructure				
33	Storm Water Collection and Diversion	Not Addressed	Existing storm water collection and diversions would remain in place with BMPs as required with appropriate velocity control structures and riprap to prevent erosion (pg. 4-13).	Modifications to the Proposed Action include: 1) The gunite liner would be removed from existing collection/diversion ditches and the surface would be regraded to slope to a ditch on the uphill side of the access road. This ditch would drain to the large, natural drainage across the mill pad. 2) An approved Storm Water Pollution Prevention Plan (SWPPP) would be required for all reclamation activities.

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34	Asphalt (parking lots, etc)	Paving was completed after the Plan was approved. Removal of asphalt was not addressed	Asphalt would be ripped and buried on site with minimum of 3 feet cover material (pg. 4-6).	Asphalt from paved areas would be pulverized and used for NFSR 4626 road gravel.	
35	Concrete from buildings	Concrete would be removed from the site. The bench surfaces would be regraded to 1.5H:1V slopes (pg 65).	Concrete would be buried on site with minimum of 3 feet cover material (pg. 4-6).	Modification to the Proposed Action includes the provision that materials would be disposed of off NFSL in appropriate disposal areas in compliance with the MT Solid Waste Act.	
36	Metal, glass, plastic wood from buildings	Construction debris would be removed from the site. The bench surfaces would be regraded to 1.5H:1V slopes (pg 65).	The buildings would be demolished and construction debris materials buried on site with minimum of 3 feet cover material (pg. 4-6).	All materials would be disposed of in appropriate disposal areas off NFSL in compliance with the MT Solid Waste Act.	
37	Water diversion culverts	Not Addressed	Culverts would be sealed by plugging upper ends with concrete (pg. 4-7).	Both ends of the culverts would be plugged with concrete.	
38	Fuel/Other tanks	Surface diesel fuel tank, two large and numerous small propane tanks	Not Addressed	Removed from site (pg. 4-13).	Same as Proposed Action
39	Water Tank	300,000 gallons	Not Addressed	The water tank would be sold or scrapped (pg. 4-14).	The water tank would be removed from site.
40	Water Supply Lines	Not Addressed	Not Addressed	The water supply lines would be abandoned in place (pg. 4-14).	When no longer needed for mine closure, any water supply lines would be removed off NFSL.
41	Domestic Water Well	Not Addressed	Not Addressed	The domestic water well would be used for irrigation during the first growing season after reclamation if needed, then abandoned/plugged per ARM 36.21.810 (pg. 4-14).	The domestic water well or mine water from the decant ponds would be used for irrigation for the first 3 growing seasons if needed.
42	Large-Capacity Make-up Wells Near Stanley Creek	Not Addressed	Not Addressed	Plugged/abandoned per ARM 36.21.810 (pg.4-14).	Same as Proposed Action
43	Small Pump Buildings	Not Addressed	Not Addressed	Reclaimed (pg. 4-14).	Same as Proposed Action
44	Surge Pond	Not Addressed	Not Addressed	Reclaimed (pg. 4-14).	Same as Proposed Action
45	Sewage Treatment Facility	Not Addressed	Not Addressed	Removed and salvaged (pg. 4-14).	Removed from site.
46	Tailings Irrigation System	Not Addressed	Not Addressed	The tailings irrigation system would be left in place to assist in reclamation then salvaged and removed (pg 4-18 and 4-19).	The tailings irrigation system would be left in place to assist in reclamation and then removed.
47	Reclaim Water Pond	Not Addressed	Not Addressed	The liner for the reclaim water pond would be cut, folded in, and buried in place (pg 4-19).	Modification to the Proposed Action includes the provision that the buried liner would be covered with 3 feet of soil.
48	Quonset Hut	Not Addressed	Not Addressed	Left in place for storage and office space (pg 4-19).	Same as Proposed Action
49	Fences	Not Addressed	Not Addressed	Removed (pg 4-20).	The fence surrounding the USFS borrow area would be left in place to avoid use and subsequent spreading of rush skeletonweed.

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50	Access Roads #4551	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road would be converted to a trail.
51	# 4624	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to KNF specifications.
52	# 4624 B	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to KNF specifications.
53	Main access # 4626 to mill site	The main access road would be retained to provide recreational access to Spar Lake and Mt. Vernon areas (pg 65).	The current paved surface of the main access road would remain (pg. 4-1).	Modifications to the Proposed Action on NFSL include: 1) Asphalt surface would be pulverized and ripped in place. 2) A 4-inch lift of aggregate would be placed on the pulverized surface. 3) Approximately 300 feet of asphalt would be repaired and maintained on the Stanley Creek bridge approaches. Guardrails and safety berms would be removed. The Stanley Creek Bridge would be left in good condition meeting current safety standards and capable of supporting legal highway loads.
54	# 4626 from mill site to junction with #4 629	The main access road would be retained to provide recreational access to Spar Lake and Mt. Vernon areas (pg 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Implement BMPs on any segments or stream crossings at risk of contributing sediment to streams.
55	# 4626C	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to USFS specifications.
56	# 4626D	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to USFS specifications.

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57	# 4626F	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to USFS specifications.
58	# 4626G	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to USFS specifications.
59	# 4628	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Stabilize road for intermittent stored service; install water bars; upsize culverts or construct armored overflows to pass 100-year flows; remove unstable sections of road fill. Road work would not be permitted until after June 15 for grizzly bear protection.
60	# 4628C	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Road fully recontoured; all culverts removed; stream crossings reconstructed; seeded and planted according to USFS specifications.
61	# 4629	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	From MP 0.0 to 0.8: Stabilize road for intermittent stored service; install water bars; upsize culverts or construct armored overflows to pass 100-year flows; remove unstable sections of road fill. From MP 0.8 to 1.34: Implement BMPs on segments at risk of contributing sediment to streams.
62	# 4630A	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Stabilize road for intermittent service; install water bars; upsize culverts or construct armored overflows; remove unstable sections of road fill; seeded and planted according to USFS specifications.
63	# 9003	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Scarify; seed and plant according to USFS specifications.

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64 Mining Related Roads on NFSL	# 4626E, # 4626H, # 4626I, # 4628, # 4628B, # 4628D, # 4628F, # 4628G, # 4628J, # 4642, # 4642A, # 4642B, # 4645, # 14391, # 14993	Disposition up to USFS at time of closure (pg. 65).	The existing USFS roads would remain in place per USFS requirements (pg 4-1). Agencies interpret this to mean that roads would not be reclaimed at the time of closure.	Decommission by Abandonment.
65 Private Roads on Patented Lands	# 4624, # 4624A; # 4626 (private portion), # 4626J, K and L; # 4628D, E, F, G, H, I, J; # 4629A, B, C; # 4642 # 4645 # 14386 # 14387 # 14398 # 14398A # 54628 # 54628A # 54628B # 54629	Not Addressed	Not Addressed	Roads would be field reviewed by the Agencies to identify reclamation needs. Roads would be waterbarred or otherwise reclaimed as needed to reduce adverse impacts to water quality.
66 Private Roads on Troy Mine, Inc. Land by Tailings Impoundment	Various roads used for access to tailings impoundment	Not Addressed	Not Addressed	Roads would be field reviewed by the Agencies to decide if they are needed for the proposed post-mine land use. Roads not needed would be reclaimed.
67 Transmission Line	115 kV	Removed and disturbed areas reclaimed and revegetated (pg. 66).	Northern Lights Inc. would have the final decision regarding removal or preservation of all or portions of the 115-kV power line.	Modifications to the Proposed Action include consideration of the needs for routing and disposal long-term. The transmission line would be maintained in place until no longer needed for reclamation. On NFSL, Northern Lights Inc. would be required to follow the terms and conditions of their Special Use permit issued by KNF.
68 Substation		Not Addressed	Left in place for future use by Northern Lights (pg. 4-13).	Same as Proposed Action

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative
69	Maintenance Sump	Not Addressed	Regraded to blend with surrounding topography (pg. 4-15).	Remove remaining contaminants and restore to original floodplain contours. Any tailings or contaminated soil would be removed before regrading.
70	Tailings Impoundment Geotechnical Monitoring	Not Addressed in the 1978 EIS but has been addressed operationally.	Annual inspections of the tailings embankment would occur (Genesis 2006, pg 8-2 and Appendix H). Geotechnical monitoring would continue until Troy Mine, Inc. and the Agencies agree to discontinue it.	Modifications to the Proposed Action include the provisions that a qualified professional engineer would annually monitor and verify the stability of the embankment for a minimum of five years after reclamation is completed. The engineer's report would be submitted to the Agencies. The Agencies would be consulted for concurrence before monitoring ceases.
Topography				
71	Mine Site North and South Portal Patios	The slopes of the mine development rock patio fill would remain at the natural angle-of-repose and would be capped with 12 inches of soil (pg. 64-65). The northeast face of the development rock patio fill slope below the North Adit has been recontoured and revegetated (pg. 2-3 and Figure 4-1).	The slopes would be regraded by pulling edges up and filling against the cut slope/roadway, covered with growth medium (coarse fraction from patios, field-reviewed for adequacy of volume and placement). Flat areas would be covered with 12 inches growth medium, if available, from patios, then ripped and seeded (pg. 4-1).	Modifications to the Proposed Action include: 1) All growth medium for the mine and mill area would be salvaged from the mill site fill. 2) If there is not enough material at the mill site, rocky glacial borrow east of the impoundment would be used. 3) A stream channel would be constructed at the west ventilation adit portal.
72	Mill Site and Office and Shop Areas Entire Area	Regrade the bench surfaces to a 1.5H:1V slope (pg 65). The mill site bench and cut fill slopes would be left in their current configuration. After removal of the buildings, the bench surfaces would be graded smooth.	Same as No Action, except some demolition debris would be buried on site (pg. 4-6 and 4-7, Figure 4-2 and 4-3, Exhibit F) - see Infrastructure section above, lines #35-38. The office and mill pads would be outsloped at approximately 6 – 7% (pg. 4-7, Figure 4-2).	Modifications to the Proposed Action include: 1) All demolition materials would be disposed of off NFSL in appropriate disposal areas in compliance with the MT Solid Waste Act. 2) Development rock fill would be minimized. 3) The area would be regraded and fill would be at least 3 feet deep over debris.
73	Tailings Embankment	No regrading of the tailings embankment is proposed.	Same as No Action	All eroded or bare areas on the embankment would be repaired by spreading 12 inches of the stockpiled growth medium. The areas would be seeded and/or planted with agency-approved mixes.

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative	
74	Toe Ponds	Not Addressed	Connected by inter-pond channels with armored outfall (installed as safety measure) (pg 4-15, Figure 4-6).	Modification to the Proposed Action includes the provision that MT Department of Fish, Wildlife, and Parks (FWP) would survey the ponds for non-native fish species and determine whether removal of the fish is recommended; if so, FWP would issue a permit for this activity. Inter-pond channel construction and fish removal would not begin until September or when juvenile western toads are no longer observed at the breeding site.	
75	Borrow Sites	Borrow sites (USFS)	Not Addressed	Borrow sites would be regraded to match existing slopes upon completion of borrow activities and planted with upper elevation forest type vegetation (pg. 4-11, Figure 4-5).	The USFS borrow area would not be used in order to prevent the spread of rush skeletonweed. KNF would be responsible to reclaim this borrow area. The fence surrounding the USFS borrow area would be left in place to avoid use and subsequent spreading of rush skeletonweed.
76	Troy Mine, Inc. Borrow Sites (East Impoundment and NE Impoundment Areas and Cell 3 Borrow Pit)	Not Addressed	The borrow sites would be graded to a 2:1 slope reduction including the upper slope diversion ditches (pg 4-18).	The borrow sites would be graded to 3:1 slopes. The upper layers of soil would be salvaged and stockpiled. Once the borrow site was used, the salvaged soils would be replaced and seeded/revegetated. Troy Mine, Inc. would provide the Agencies with a quantification of the volume of borrow to be removed and location(s) for the soil stockpile(s).	
Underground Equipment					
77	Mobile Equipment	Not Addressed	Not Addressed	All mobile equipment would be removed from mine, if possible. If abandoned in place, all fluids would be drained and disposed of properly.	

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

Component	Specific Features	No Action (1978 EIS pgs 64-70) and Existing Conditions / Reclamation completed to date (2006 Revised Rec. Plan pgs 1-1 - 10-1)	Proposed Action (2006 Revised Reclamation Plan) ¹	Agency-Mitigated Alternative
78	Jaw Crusher	Not Addressed	The jaw crusher would be salvaged if possible or abandoned in place (and oil sumps and reservoirs cleaned) (pg. 4-4 and 4-6).	The jaw crusher components on NFSL would be removed; other components would be removed as necessary to close the adits and remaining equipment may be abandoned in place or removed from the mine. A final agency inspection of the workings would be required.
79	Conveyor	Not Addressed	Salvaged if possible or abandoned in place (pg. 4-4 and 4-6).	The conveyor components on or that extend onto NFSL would be removed; other components would be removed as necessary to close the adits and remaining equipment may be abandoned in place or removed from the mine. A final agency inspection of the workings would be required.
80	Ventilation System	Not Addressed	Fans, motors, and attached electrical equipment would be removed and disposed of off-site; metal, fiberglass, wood, concrete, etc. would be abandoned in place (pg. 4-6).	Any ventilation system components at the surface and at least 100 feet back into the adits would be removed. Components further underground would be abandoned in place or removed from the mine. A final agency inspection of the workings would be required.
Libby Concentrate Loadout				
81	Loadout Facility	Not Addressed in the 1978 Reclamation Plan but there is an approved reclamation plan for the facility (Minor Revision 04-001 to operating permit #00093)	The concentrate loadout was in a building with a concrete floor which received periodic cleaning. Operationally, rail cars were covered before leaving the building (pg. 3-13).	The former concentrate loadout facility burned down in 2010. A new covered facility was approved in 2011 in Libby. Cleanup of the former loadout would be per the approved reclamation plan. Any monitoring wells would be plugged and abandoned per ARM 36.21.810.

¹ Page numbers referenced under the Proposed Action are for the 2006 Revised Reclamation Plan

2.4.1 No Action Alternative

The No Action Alternative consists of the original 1978 Reclamation Plan and includes reclamation activities that have already been completed. The reclamation plan was first analyzed in the *1978 Draft Environmental Impact Statement (Draft EIS) (DSL and KNF 1978)* and later approved by the Agencies.

2.4.1.1 Water Management

Adit Closure and Mine Water Discharge

The 1978 reclamation plan proposed to close the adits by shutting them with concrete; however, no additional detail was provided (DSL and KNF 1978, page 63). After mine closure, surface and groundwater would be expected to enter and accumulate in the mine, eventually exit the mine,

discharge onto the development rock fill patio, infiltrate into groundwater, and ultimately enter Stanley Creek.

Water Treatment and Disposal

The No Action Alternative does not address water treatment. Mine water outflows would be allowed to exit the mine, infiltrate into the portal patio, discharge into the groundwater system, and flow into Stanley Creek.

Toe ponds at the base of the tailings impoundment were constructed by ASARCO in 1983 to capture seepage and embankment runoff. The sump and pumping system (Enviro-pump) was installed to convey groundwater seepage to toe pond 2. Snowmelt from toe ponds 2, 3, and 4 is currently pumped to the impoundment, but this pumping would not continue long-term after reclamation. Surface drainage would be provided from the low point of the impoundment surface to an appropriate natural drainage (DSL and KNF 1978).

Groundwater Quality

The No Action Alternative does not address groundwater quality beyond operational monitoring. **Section 3.9** describes groundwater quality in more detail. Groundwater is monitored during operation at the locations and frequencies shown in **Table 2-2**.

Table 2-2. No Action Alternative Groundwater Monitoring Sites and Schedule

Monitoring Site	Monitoring Parameter	Monitoring Frequency
Mine water - outflow, adit pipe (SA-P)	Quality	Quarterly
Mine water - outflow, adit pipe (SA-P)	Flow	Continuous (daily average)
Mine water - Service Adit ditch (SA-D)	Quality	Quarterly
Mine water - Service Adit ditch (SA-D)	Flow	Continuous (daily average)
MW-1	Water level and quality	Annually
MW-2	Water level and quality	Annually
MW-3	Water level and quality	Annually
MW-4	Water level and quality	Annually
IW-1	Water level and quality	Annually
Toe ponds	Water level and quality	Quarterly
S-1 (Spring near toe ponds)	Water level and quality	Quarterly

Monitoring Site	Monitoring Parameter	Monitoring Frequency
MW-95-4	Water level and quality	Spring, summer, fall
MW-95-7	Water level and quality	Spring, summer, fall
MW-95-8	Water level and quality	Spring, summer, fall
MW-97-12	Water level and quality	Spring, summer, fall
MW-97-14	Water level and quality	Spring, summer, fall
MW-01-15	Water level and quality	Spring, summer, fall
MW-01-16	Water level and quality	Spring, summer, fall
MW-2010-1	Water level and quality	Spring, summer, fall
MW-2010-2	Water level and quality	Spring, summer, fall
Surface water – Ross Ck RCT 1	Quality and flow	Annually – during low flow
Surface water – Ross Ck RCT 2	Quality and flow	Annually – during low flow
Surface water – Emma Gulch	Quality and flow	Annually – during low flow
Surface water – Weasel Gulch	Quality and flow	Annually – during low flow
Surface water – Stanley Creek	Quality and flow	Annually – during low flow

In addition to the mine groundwater monitoring, groundwater was monitored at the concentrate loadout in Libby in accordance with Operating Permit #00093 Minor Revision 04-001. Two existing shallow wells, new groundwater wells, and a drain have been sampled at the loadout facility. This facility burned down in 2010, and a temporary loadout facility was used until a new covered facility was approved in 2011 near the temporary facility. The new wells to be installed at the new loadout facility would be monitored until the site is reclaimed and the bond is released.

Under the No Action Alternative, groundwater would enter the mine, flood the workings, and eventually exit the mine and discharge into the groundwater system and Stanley Creek.

Surface Water Quality

A sampling program was designed and implemented to determine baseline conditions for surface waters for analysis in the 1978 Draft EIS (DSL and KNF 1978, page 107). Four toe ponds were installed in 1983 to contain storm water runoff (Genesis 2006, page 7-10). Operationally, the three northern toe ponds usually contain standing water, but the southernmost toe pond is typically dry. A sump and pumping system is currently used to capture groundwater that emerges downhill from the toe ponds.

During operations, water is continuously pumped from the sump to toe pond #2 to prevent migration of nitrate.

Surface water monitoring of Stanley, Fairway, and Lake creeks has been conducted since 1986. The program included bioassay testing, macroinvertebrate monitoring, and water quality and flow monitoring three times per year (Genesis 2006, Appendix F, page 5). The seven water quality monitoring stations listed in **Table 2-3** would continue to be sampled post-reclamation for flow and water quality three times per year until the Agencies agree that monitoring is no longer necessary (Genesis 2006, Appendix F, pages 5-6).

Under the No Action Alternative, precipitation would enter the mine through fractures, the workings would flood, and the water would eventually exit the mine and discharge into groundwater and Stanley Creek.

Table 2-3. No Action Alternative Surface Water Monitoring Sites and Schedule

Monitoring Site	Monitoring Parameter	Monitoring Frequency
LC-1	Quality and flow	Spring, summer, fall
LC-2	Quality and flow	Spring, summer, fall
LC-4	Quality and flow	Spring, summer, fall
FC-1	Quality	Spring, summer, fall
SC-2	Quality and flow	Spring, summer, fall
SC-15	Quality	Spring, summer, fall
SC-17A	Quality	Spring, summer, fall

Long-Term Monitoring of Water Quality

As part of the baseline sampling program described above, the 1978 Draft EIS includes continued monitoring of the two test wells drilled in July of 1976 throughout the life of the project (DSL and KNF 1978, page 58). Operational monitoring consists of periodic water level and water quality sampling of monitoring wells, springs, and areas of groundwater expression in the vicinity of the mine. Operational groundwater monitoring site locations are listed in **Table 2-2**, and locations are shown on **Figure 2-5**. The three sites shown for SC-15 on **Figure 2-5** are added under the Agency-Mitigated Alternative.

The five surface water sites listed in **Table 2-2** represent the farthest upgradient expressions of groundwater in drainages around the mine and were chosen to monitor changes in the quality of groundwater discharging to these drainages (Genesis 2006, Appendix F, page 2). In coordination with the Agencies, Genesis (now Troy Mine, Inc.) has also monitored groundwater in a tributary below the South Adit portal to evaluate any effects on groundwater seepage as the mine floods. These monitoring

sites would continue to be evaluated to determine potential mine water influence on surface and groundwater. Scheduled monitoring of the two wells drilled in July of 1976 would continue throughout the life of the project (DSL and KNF 1978, page 58).

Surface water quality monitoring as described above would continue post-reclamation three times per year until the Agencies agree that monitoring is no longer necessary (Genesis 2006, Appendix F, pages 5-6).

2.4.1.2 Reclamation

Reclamation Materials

Soil was salvaged from the east half of Section 31 in Township 30 North, Range 33 West (west side of the tailings impoundment) to a depth of 24 inches. The salvaged soil would be used to provide an average 12-inch cover over the mine development rock-fill patio at the mine and at those areas where buildings and facilities would be removed (DSL and KNF 1978, page 66).

The surface of the tailings impoundment and the embankment would be covered with 18 inches of the stockpiled soil and revegetated (DSL and KNF 1978, page 66). The Draft EIS does not specifically identify the source of these stockpiled soils. The soil needed to complete reclamation would likely come from the soil stockpiled from the construction of the tailings facility.

Approximately 162,000 cubic yards of soil were stockpiled in Section 32 of Township 30 North, Range 33 West (just east of the tailings facility) (Genesis 2006) and revegetated to prevent erosion (DSL and KNF 1978, page 67). In addition, approximately 818,500 cubic yards of soil were stockpiled outside the perimeter of the tailings impoundment between the toe ponds and Lake Creek for use in reclaiming the impoundment area (Genesis 2008). These west stockpiles are located on the bench above the Lake Creek floodplain and were stabilized with a grass and legume mixture until needed for reclamation. Reclamation plans call for stockpile sites to be revegetated and planted with trees and shrubs after the soil has been used (DSL and KNF 1978, page 67).

Subsidence

Subsidence was not addressed as part of the original 1978 reclamation plan. During operations, two surface subsidence features developed along the East Fault. Genesis (now Troy Mine, Inc.) made an effort to reclaim the subsidence in 2005 and 2006. In 2007, Genesis applied for a permit revision to address these subsidence issues. During an inspection in fall of 2010, reclamation success at the two features was evaluated. While the first subsidence feature appeared to be successfully reclaimed, the second area of disturbance was located on a steep slope and showed evidence of erosion and instability. There was little vegetative cover established on the disturbance. It is possible that further subsidence could occur in the future, particularly in the poor ground conditions encountered in the vicinity of the East Fault. Although the Agencies currently hold a bond for reclamation of possible future surface subsidence, they have determined that a bond increase may be required to cover mitigation for surface subsidence on steep slopes, especially near the East Fault.

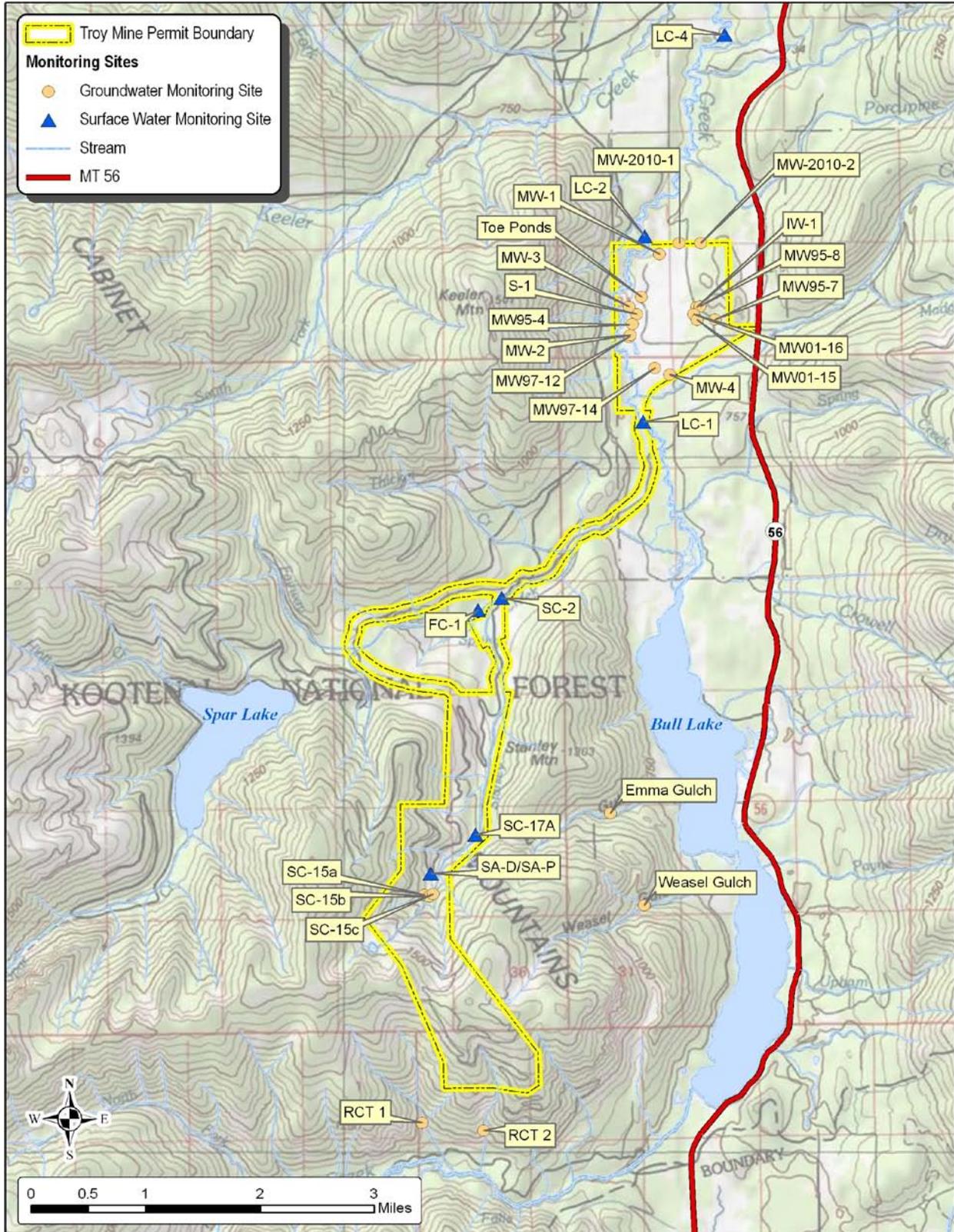


Figure 2-5. Proposed Surface and Groundwater Monitoring Sites

Revegetation

The No Action Alternative proposes a mixture of introduced grasses and legumes and native shrubs and trees to cover all disturbed areas upon reclamation (DSL and KNF 1978, page 67).

Soils would be seeded during the first appropriate growing season after necessary surface grading and preparation has been completed. If primary reclamation attempts fail, the Agencies would be consulted before replanting occurred (DSL and KNF 1978, page 67). Cut and fill slopes resulting from access roads, the mill and office sites, development rock fill patio, utility corridors, and other disturbances would be seeded with the grass and legume mixture, fertilized at 200 lb/acre, and mulched on south-facing slopes. Tree and shrub species would be seeded both on cut-and-fill slopes and on flat surfaces to stabilize soil while areas infill with naturally seeded native trees (DSL and KNF 1978, page 68).

Slopes and benches of the tailings embankment would be capped with 12 to 24 inches of soil (average 18 inches), and ponderosa pine, Douglas-fir, western larch, and shrubs would be planted on benches. A grass and legume seed mix would be applied on slopes and would be expected to eventually fill in the benches. Fertilization and irrigation would depend on reclamation progress and other indicators (DSL and KNF 1978, page 68). The operational irrigation system includes large irrigation sprinklers and aluminum sprinkler pipe.

The tailings impoundment surface would have 18 inches of stockpiled lacustrine and volcanic ash-derived soil materials spread on the surface. Container-grown tree seedlings would be planted (680 trees/acre density) with container-grown shrubs interspersed among the trees. After two to three growing seasons, a grass and legume mixture would be applied to provide complete vegetative cover (DSL and KNF 1978, page 68-69).

In 1978, ASARCO proposed construction of a small tailings impoundment to be used to experiment with reclamation studies and revegetation success during mine operation. The intent was to improve reclamation success through application of test results (DSL and KNF 1978, page 66). Although the small impoundment was never constructed, ASARCO conducted testing and reclamation studies at Cell 2 of the tailings impoundment in 1995. Three vegetation test plots, covering 30 acres, were planted with a grass seed mixture and 20,400 seedlings, in addition to 200 large transplanted native trees (Genesis 2006 page 2-5 – 2-6). See **Section 2.4.2.2** for further discussion of the findings.

In 1997 and 1999, 3,750 trees were planted in the North Adit area (Genesis 2006, page 2-3).

In the interim, noxious weed invasion has occurred at the mill site, tailings line corridor on road cuts and fills, and along the periphery of the tailings facility (Genesis 2006). Although the 1978 Plan did not specifically address noxious weed control, there is a current noxious weed control plan approved by Lincoln County and KNF in place. The No Action Alternative would continue the current noxious weed control plan which includes chemical weed control.

Under the 1978 Plan, there was no provision to monitor dust or to minimize the potential for blowing dust through irrigation or revegetation.

Infrastructure

If a suitable use for the buildings is not identified, the buildings and all materials would be removed from the project area under the No Action Alternative (DSL and KNF 1978, page 65).

After reclamation has been completed, the No Action Alternative would leave the main mine access road (NFSR 4626) open for public recreation access to Spar Lake and Mt. Vernon. KNF would have the final decision regarding the disposition of NFSR 4626. All other roads would be removed and reclaimed, pending approval of KNF. But if roads remain at KNF's request, maintenance would become the responsibility of KNF (DSL and KNF 1978, page 65).

The No Action Alternative includes removal of the tailings pipelines, the reclaim water line, and the 115 kV transmission line (DSL and KNF 1978, page 66).

Topography and Reclamation Materials

Under the No Action Alternative, the surface of the tailings impoundment would be graded and reworked to provide areas suitable for revegetation, but no changes in the configuration of the tailings embankment at closure were proposed (DSL and KNF 1978, page 66).

When the original mill site was constructed, several cut and fill benches were created, and upon reclamation, these benches would be left flat or nearly flat. The cut and fill slopes would be regraded and re-established at 1.5 horizontal to 1 vertical (1.5H:1V) slopes (DSL and KNF 1978, page 65).

According to Troy Mine, Inc., the northeast face of the slope below the North Adit has been recontoured and revegetated (Genesis 2006, page 2-3). Approximately 2.5 acres have not been revegetated at the North Portal (Genesis 2006, page 2-2).

At the mine itself, the slopes of the development rock fill patio would remain at their existing angle. The surface and edges of the development rock fill patios would be graded both to distribute surface water runoff and to prevent erosion. The development rock fill patios would be capped with 12 inches of soil (DSL and KNF 1978, page 64-65).

2.4.2 Proposed Action

The original reclamation plan for the Troy Mine was submitted by ASARCO in 1976 as part of the operating permit application and was adopted in 1978. In the fall of 1999, the Agencies reviewed the reclamation bond. They notified ASARCO that a substantial bond increase would be required and that the 1978 reclamation plan needed to be revised. Thus, ASARCO and Genesis (now Troy Mine, Inc.) submitted a draft revised reclamation plan to DEQ and KNF in January of 2000. The Agencies reviewed several drafts of the plan between 2000 and 2005 (see **Section 1.4.3**). The Revised Reclamation Plan, which is the Proposed Action under this EIS, was submitted to DEQ and KNF in March of 2006.

The Proposed Action would reclaim the land to allow current or historic activities to continue or resume once reclamation has been completed. NFSL are managed by the direction of the 1987 Forest Plan. Private land in the project area is primarily managed for forest production, recreation, and mining.

Historic use of private property in the tailings facility area included tree farming. These uses would continue after closure.

Under the Proposed Action, the proposed reclamation would be accomplished in three phases: pre-closure, closure, and post-closure. Pre-closure tasks include on-going monitoring, testing, and evaluations necessary to complete design of reclamation elements that include a short-term water management plan and engineering design of the adit plugs. Closure tasks would take place two years after final cessation of mining and would include facility removal, regrading, revegetation, and maintenance of short-term components of the water management plan. Adit plugs would be installed during the closure period. Post-closure tasks would include management of mine water flowing through pipelines, maintenance of pipelines, and monitoring of water quality (mine water and surface/groundwater). Under the Proposed Action, the post-closure phase is estimated to last two to five years after mining ends.

2.4.2.1 Water Management

Adit Closure and Mine Water Distribution

The Proposed Action would seal all mine openings against entry by backfilling with mine development rock or with material obtained during regrading of the portal areas. Backfill would be placed from the adit opening back 30 feet into the adits and tight to the roof (Genesis 2006, page 4-4). Rock remaining after adit plugging would be graded against the side of the slope to form a wedge (Genesis 2006, page 4-1). The fill material at the adits is primarily composed of large-sized development rock. Material for the portal closures would be obtained from each portal's patio crest. A 12-inch layer of growth medium from a local borrow source would be placed over the regraded surface (Genesis 2006, page 4-1).

Approximately 4,421 cubic yards of fill material would be needed to backfill the adits (Genesis 2006, page 4-5). The North Adit would be closed last because it is located at the highest elevation and would provide ventilation and access while other adits are being closed. No long-term access to the underground workings is proposed. During operations, the South Adit was reconfigured to create a decline into the mine to prevent water from discharging from the mine. Two concrete non-hydraulic plugs are proposed for the Service and Conveyor adits and would be installed at an elevation of 3,720 feet. No concrete plugs are proposed for the North or South adits because their portal elevations (4,490 feet and 4,310 feet, respectively) are above that of the intersection of the Service Adit with the mine void (4,225 feet) where mine water would discharge. Both the North and South adits would be backfilled and their faces revegetated. No concrete plugs are proposed for the remaining adits (Genesis 2006, page 7-6).

Under the Proposed Action, the two tailings pipelines and the reclaim water line would be used until they wear out or until water quality is suitable for release into Stanley Creek (Genesis 2006, page 4-14 and 7-4). In the event that the pipeline in use needs repair, water would be diverted through the other pipeline until the first pipeline is repaired or replaced. The Proposed Action recommended that the non-hydraulic plugs installed at the Service and Conveyor adits include partial concrete dams or bulkheads that would allow water flowing down the adits to be collected and funneled into a pipe. Additional

design details would be needed before final locations and construction requirements could be prepared and would consider:

- local geology;
- potential head (hydraulic pressure) of water above the adit plug, including the rate of inflows from the surface; and
- integrity of the local rock.

The non-hydraulic adit plugs would be located behind the portal closures at stable locations. The portal backfill would be covered with local borrow material to provide an additional metal attenuation mechanism should the adit plugs leak (Genesis 2006, pages 7-4 to 7-6). These adit plugs would be designed to allow small amounts of seepage through the rock backfill and growth medium. The Service Adit plug would be designed to prevent a pool of water from building up behind the portal reclamation cover material (Genesis 2006, page 7-6).

The mine pool level would seasonally fluctuate with inflowing water and reach hydraulic equilibrium in the different workings at different elevations. Both the North and the East Ore Body workings are connected by a drift (horizontal mine tunnel) at an elevation of 4,186 feet. Once this elevation was reached, the mine pool in the North Ore Body would flow into the East Ore Body pool. The mine pool equilibrium elevation would be at 4,225 feet in the North and East Ore bodies. The mine pool in the South Ore Body would not flow into the North Ore Body pool, but would reach equilibrium at approximately the 4,248-foot elevation (Genesis 2006, page 7-6). Some groundwater would likely dissipate into fracture zones.

Water Treatment and Disposal

The 2006 Reclamation Plan states that its water management goals include reducing long-term management requirements, protecting water resources, and integrating water management facilities and functions with other reclamation components. Water management would consist of effective control, conveyance, and passive treatment of water from the reclaimed mine facilities. Water that would require active management includes water from the underground workings, surface water runoff from the tailings facility, and from groundwater captured by the sump (Enviro-Pump). The Proposed Action includes continuation of active management of tailings facility water until natural attenuation processes remove nitrogen and copper compounds to an acceptable background quality (Genesis 2006, page 7-8).

The Proposed Action would route mine pool water through the tailings pipelines to the decant ponds and continue to use the toe ponds to capture seepage and embankment runoff. After reclamation, snowmelt and runoff from toe ponds 2, 3, and 4 would be pumped to the impoundment to supply irrigation water for the newly-reclaimed surface, if needed, or would be pumped directly to the decant ponds (Genesis 2006, page 7-10).

Groundwater Quality

The Proposed Action includes continued use of the decant water disposal system to passively and effectively achieve metal attenuation in the mine water (Land and Water Consulting, Inc. 2004 in Genesis 2006, Appendix C). Genesis (now Troy Mine, Inc.) proposed a water monitoring plan in Appendix F of the 2006 reclamation plan. The monitoring plan would be modified as needed and would include groundwater monitoring to evaluate potential sources of groundwater seepage from the mine as it floods. Proposed groundwater monitoring sites are listed in **Table 2-2**. Overall, this water quality monitoring program would continue under the Proposed Action until the Agencies agree that monitoring is no longer necessary (Genesis 2006, page 8-2).

Surface Water Quality

The Proposed Action water quality monitoring plan includes both annual macroinvertebrate monitoring and water quality and flow monitoring three times per year (Genesis 2006, Appendix F, page 5). This water quality monitoring program would continue under the Proposed Action until such time as the Agencies agree that monitoring is no longer necessary. The surface water quality monitoring sites that would be sampled are the same sites which are listed in **Table 2-3**.

After the impoundment is finally reclaimed under the Proposed Action, surface water from the toe ponds may be used to irrigate a small portion of the impoundment or may be piped directly to the decant ponds (Genesis 2006, page 7-10). The toe pond pumping system would be maintained post-closure until the quality of groundwater seepage would be suitable for release (Genesis 2006, page 7-10).

The Proposed Action would also retain the toe ponds as permanent features to provide wildlife and wetlands habitat. After operations have ceased, the toe ponds would be connected by inter-pond channels. Although no outfall from the toe ponds is expected, an armored outfall would nonetheless be installed to protect against erosion. No channel to Lake Creek would be constructed (Genesis 2006, page 4-15).

After mine closure, the Proposed Action would continue to direct storm water runoff to the decant ponds. Surface contouring (placement of final lifts of tailings before mine closure) would maintain the general flow direction toward the decant ponds. Moreover, this same collection system would be maintained following final reclamation (Genesis 2006, page 7-9 – 7-10).

Long-Term Monitoring of Water Quality

Water quality monitoring under the Proposed Action would continue during and after reclamation until such time as the Agencies agree that monitoring is no longer necessary (Genesis 2006, page 8-2). The purpose of the Proposed Action's water quality monitoring plan is to:

- Continue collecting hydrologic data for a statistically valid database in areas of environmental concern;
- Monitor water resources in the area for potential changes from historic baseline data; and
- Address water-related issues which may arise during reclamation of the Troy Mine.

The Proposed Action long-term groundwater quality monitoring plan is the same as the No Action Alternative plan as listed in **Table 2-2**.

2.4.2.2 Reclamation

Reclamation Materials

Troy Mine, Inc. states that the stockpiled soil (composed of lacustrine and volcanic ash-derived soil material), the native borrow (composed of glacial outwash) at the tailings impoundment, and the rocky glacial material at the mine site all show little difference in composition. The main difference is that the stockpiled soil is fine-grained with a low coarse-fragment content, and the borrow and rocky glacial materials have a higher coarse-fragment content. As necessary, all cover sources would be chemically fertilized to promote successful revegetation. Finally, the Proposed Action would not add organic matter to any reclamation materials (Genesis 2006, page 5-4).

The Proposed Action would leave the stockpiled lacustrine and volcanic ash-derived soil materials west of the toe ponds to provide wildlife and wetlands habitat (Genesis 2006, page 4-15) where they would act as a berm to maintain the toe ponds and to minimize the potential for sediment to reach Lake Creek.

The stockpiled material at the tailings facility has been vegetated. Reclamation materials for the tailings impoundment surface would be obtained from the borrow sites which are located east of the impoundment. Under the Proposed Action, approximately 766,600 cubic yards of reclamation material would be needed to cover the tailings facility surface with an average of 18 inches of growth medium (Genesis 2006, Table 4-1 and page 4-16).

The Proposed Action would cover development rock at the portal patios with a finer-grained material on the surface to promote revegetation. These areas would be covered with a 12-inch layer of growth medium from local borrow sources (Genesis 2006, page 4-1). However, the Proposed Action does not specify or directly identify potential local borrow source locations.

Subsidence

Subsidence was not addressed as part of the Proposed Action.

Revegetation

The revegetation goals under the Proposed Action include:

- stabilizing disturbed areas through erosion and sediment control;
- re-establishing vegetative cover that has comparable stability and utility to pre-mine vegetation communities; and
- restoring watershed, wildlife, recreational, and aesthetic values to meet post-operation land use objectives (Genesis 2006, page 6-1).

Under the Proposed Action, the borrow sites (USFS Borrow, Cell 3 Borrow, East Borrow, and North East Borrow) would be reclaimed after completion of all excavation activities. Impoundment-area borrow sites would be planted with plant species typical of lower elevation forest types. The USFS borrow site

would be revegetated with plant species typical of upper elevation forest types (Genesis 2006, page 4-11). Revegetation at the mine portal patios would also use the same upper elevation forest mix. The angle-of-repose rock slope below the portal patios would not be regraded (Genesis 2006, page 4-1). The borrow area on the east side of the impoundment would be reclaimed after cover-soil spreading activities are completed (Genesis 2006, page 4-16).

When the tailings pipelines are no longer needed, reclamation of the tailings pipelines would only occur at the locations of the support structure footprints (about 3 feet by 7 feet in size). These areas would be regraded after the concrete is removed and would be seeded with a grassland seed mix (Genesis 2006, pages 4-14 – 4-15).

Under the Proposed Action, the operational irrigation system would be used under gravity pressure to irrigate during the first growing season so that pumps would not be needed (Genesis 2006, page 4-18). Irrigation would be expected to continue for the one to two years following final reclamation as a way to establish vegetative cover and to prevent wind erosion (Genesis 2006, page 4-18).

Irrigation would not be proposed at the upper elevation sites or on slopes steeper than 10 percent. However, if needed, the surface of the tailings facility would be irrigated during the first growing season after seeding and planting by using the sprinkler system currently in place (Genesis 2006, page 6-9). The mill site water well would be available for irrigation during the first growing season (Genesis 2006, page 4-14).

The reclaim water pond near the impoundment would be revegetated to grassland and would rely on the natural establishment of woody species. The Quonset Hut industrial site currently located near the tailings facility would not be reclaimed, because the area would be retained for industrial uses during post-reclamation activities (Genesis 2006, page 4-19).

The *2006 Revised Reclamation Plan* covers specific information on seed mixes for disturbed lands (Genesis 2006, page 6-1) and includes three upland mixes to account for the different post-mining proposed vegetation communities and for the elevation differences in the project area. The upper elevation forest mix would be used at the mill site and other upper elevation disturbance areas, and the lower elevation forest mix would be used over the majority of the tailings facility and over the borrow areas east of the impoundment. The grassland mix would be used on smaller disturbed areas peripheral to the tailings facility (roads, power line corridors, etc.) and would also be used on the tailings impoundment surface to establish a diversity of vegetation. Annual ryegrass would be added to the upland mixes (Genesis 2006, pages 6-2 – 6-3). Two wetland seed mixes would be used for reclamation of herbaceous and forested wetlands (Genesis 2006, page 6-5). Finally, trees and shrubs would be established on areas designated as forested areas (Genesis 2006, page 6-7).

The Proposed Action includes specific seeding rates, seed application methods (Genesis 2006, page 6-5), fertilizer, and mulching specifications (Genesis 2006, page 6-8), tree and shrub planting (Genesis 2006, page 6-7), and irrigation and noxious weed management (Genesis 2006, page 6-9) (Section 6 of the *2006 Revised Reclamation Plan*). Also included would be continuation of chemical weed control under the approved noxious weed control plan.

Under the Proposed Action, monitoring of revegetation would continue during the pre-closure and closure phases of mine operation. Specifically, the revegetation monitoring plan (Genesis 2006, page 8-1) would evaluate:

- adequacy of revegetation to limit off-site sedimentation;
- woody plant survival rates;
- vegetation vigor to assess whether supplemental fertilization may be desirable;
- diversity of seeded and invading species;
- competition between herbaceous and woody species to determine if lower herbaceous seeding rates or other measures are desirable to promote woody species survival and growth;
- noxious weed presence; and
- prevalence of hydrophytic species (plants that flourish in saturated soils) in areas designated for wetlands establishment.

If poor vegetation growth is noted, the above areas would be evaluated and, if necessary, reclamation techniques would be modified (Genesis 2006, page 8-1).

Infrastructure

Under the Proposed Action, underground equipment would be salvaged if possible. If a salvage market cannot be found, this equipment would be abandoned in place. Underground equipment includes the jaw crusher, the conveyor belt, rollers, the ventilation system, and oil-filled switches and transformers. If salvage and removal are not possible, all fluids would be removed, and the equipment would be cleaned and abandoned in place (Genesis 2006, page 4-4 – 4-6). Any oils, lubricants, cleaners, or chemicals used underground would be removed at the end of mining. All oil-filled switches, transformers, and motors with oil sumps would be removed from underground equipment, but removal of the rest of the underground electrical service is not proposed. The mechanical ventilation system is located primarily underground; and ventilation fans, motors, and attached electrical components would be removed and disposed of off-site. Other inert components of the ventilation system, including metal, fiberglass, wood, and concrete, would remain underground (Genesis 2006, page 4-6).

The office/shop area includes buildings, parking areas, culverts, and water tanks. The Proposed Action would rip asphalt and bury it on site with a minimum of 36 inches of cover material (includes asphalt from parking areas) (Genesis 2006, page 4-6). The buildings would be demolished so that materials such as concrete, metal, glass, plastic, and wood would be buried on-site with a minimum of 36 inches of cover material. Fuel, water, and other tanks would be removed from the site, and the water tank would be sold or scrapped (Genesis 2006, page 4-14).

Any existing USFS roads would remain in place per USFS requirements (Genesis 2006, page 4-1). Agencies interpret this requirement to mean that no roads are proposed for reclamation under the Proposed Action.

Table 2-4. Proposed Action Road Reclamation

Road	Status	Reclamation
NFSR 4626 from HWY 56 to mine	Remain Open	Leave paved
NFSR 4626C to percolation pond	Remain Open	None
NFSR 4626/4628 Mill to South Portal	Preexisting; Remain Open	None
NFSR 4626F to North Portal	Preexisting; Remain Open	None
NFSR 4628C to South Portal	Remain Open	None

Source: Genesis. 2006. *Genesis Incorporated Troy Mine Revised Reclamation Plan, excerpted from Table 4-1.* March 2006.

Existing water diversion culverts at the mill site would be sealed with concrete at the upper ends and left in place. The two drainage channels to be constructed would be armored with coarse rock to protect against the 100-year, 24-hour storm design flow. Flows from natural drainages would be routed through the mill site in the armored channels, and a rock catch basin at the bottom of the slope would provide energy dissipation and erosion control (Genesis 2006, page 4-7). Water supply lines would be buried and abandoned in place (Genesis 2006, page 4-14).

The existing storm water collection system would remain in place during the entire building demolition phase, with additional best management practices employed (such as silt fences to control erosion and protect surface water runoff). The final grading plan would use diversion ditches, culverts, velocity control structures, and riprap in high runoff areas to reduce the potential for sedimentation in Stanley Creek. Areas of high runoff would be rip rapped to control erosion (Genesis 2006, page 4-13).

All surface pipelines would eventually be removed and salvaged. The two operational 8-inch steel tailings pipelines would be used in succession to pipe mine water to the tailings facility until they wear out or until water quality improves enough to permit discharge into Stanley Creek. Once the pipelines are no longer needed, any sections that are buried less than three feet deep would be removed. Pipeline sections that are buried more than three feet deep would be capped and abandoned in place. All of the surface pipeline support structures would be removed from the pipeline corridor and disposed of at the tailings facility or at the mill site (Genesis 2006, page 4-14).

The 200,000-gallon surface diesel fuel tank would be sold or cut up for scrap. The two 30,000-gallon propane tanks and other smaller propane tanks would be removed from the project area (Genesis 2006, page 4-13).

The main power line is the property of Northern Lights Inc. Northern Lights Inc. would have the final decision on removal or preservation of all or portions of the 115-kV power line.

Water supply at the mill site includes a well, piping, and a 300,000-gallon capacity water tank. The tank would be sold or cut up for scrap metal, and the buried pipelines would be abandoned in place. A domestic water well located southeast of the tailings impoundment would be used, if necessary, for irrigation during the first growing season; after which time, the well would be plugged and abandoned as required by ARM 36.21.810. The large capacity make-up water wells near the Stanley Creek Bridge would also be plugged and abandoned. The small pump buildings and the surge pond would be reclaimed (Genesis 2006, pages 3-7 and 4-14).

The sewage treatment facility would be removed and the building would be salvaged. The reclaim pump stations located south of the impoundment next to Stanley Creek would be salvaged and the buildings removed (Genesis 2006, page 4-14). The liner of the reclaim water pond near the tailings impoundment would be cut, folded in, and buried in place. The Quonset Hut would be used for storage and office space after removal of the mill site facilities. All fences would be removed during demolition of the mill site (Genesis 2006, page 4-19).

Topography

Under the Proposed Action, the volume of material to be moved as part of regrading the mill site would be approximately 27,000 cubic yards, and the total volume for the office/shop area would be approximately 54,000 cubic yards. Rocky glacial materials stored beneath the mill site and office/shop area building pads would be used for reclamation at the mill site. Should additional growth media be needed during reclamation, the upper percolation pond embankment, the old warehouse pad slope north of the office building, and/or the USFS borrow site would be used (Genesis 2006, page 4-7). The Proposed Action assumes that the original mine and mill site growth media had a considerable coarse fragment content. If sufficient growth media with a large coarse fragment content are not available, rocky glacial materials from the USFS borrow area would be used to cover steeper slopes (Genesis 2006, page 4-11).

Since the development rock piles are part of the plant site, once the buildings have been removed, the development rock would be incorporated into the final grading plan for the plant site. However, the grading would be minimal (Genesis 2006, Figure 4-2).

Slopes of the portal patios would be regraded by pulling the edges up and filling against the cut slope/roadway. The regraded areas would be covered with 12 inches of growth medium, if available, from patios and then ripped and seeded (Genesis 2006, page 4-1). Development rock would be used as backfill from the adit opening back 30 feet into the adit and placed tight against the roof (pg 4-4); rock remaining after adit plugging would be graded against the side of the slope to form a wedge (pg. 4-1, Table 4-2). During operations, the South Adit would be reconfigured to create a decline into the mine to

prevent water from discharging from the mine (pg 4-4). Two concrete non-hydraulic plugs are proposed for the Service and Conveyor adits (pg. 7-6).

The maintenance sump located south of the tailings impoundment is an unlined 0.5-acre excavation, about four to five feet deep (**Figure 2-1**). This sump would be regraded to blend with surrounding topography, and original soil from the area would be spread over the disturbed area and seeded (Genesis 2006, page 4-15). The reclaim water pond would also be regraded to blend with surrounding topography and would be seeded (Genesis 2006, page 4-19).

Impoundment-area borrow sites would be graded to reduce slopes to 2H:1V and to establish upper slope diversion ditches (Genesis 2006, page 4-18). The USFS borrow site would be regraded to blend in with the surrounding topography (Genesis 2006, Figure 4-5 and page 4-11).

Once ore milling has ceased, the tailings impoundment surface is expected to slope to the east at an approximate grade of about one-half of one percent. Thus, no surface regrading would occur under the Proposed Action. The slope to the east would allow surface water to flow to the eastern edge of the impoundment and into the decant ponds, where it would infiltrate and recharge groundwater (Genesis 2006, page 4-15 and 4-18).

When mine water is no longer routed to the tailings facility, the decant ponds would be regraded to form one shallow depression which would be able to capture runoff from the tailings facility surface and to prevent surface water runoff from leaving the impoundment. This depression would also provide an ideal wetland habitat (Genesis 2006, page 4-18).

2.4.3 Agency-Mitigated Alternative

The Agency-Mitigated Alternative is based upon the Proposed Action, but includes additional mitigation measures and monitoring requirements that address major issues identified during the earlier scoping and IDT review process. **Table 2-1** highlights the modifications proposed under the Agency-Mitigated Alternative as compared to the Proposed Action. The Agency-Mitigated Alternative includes the following major modifications to the Proposed Action:

- Hydraulic plugs would not be used at the Service and Conveyor adits. Concrete structures would be constructed to capture mine water and route it to the tailings impoundment for treatment and disposal.
- A closure device would be incorporated into the Service and Conveyor adits to prevent unauthorized public access, to allow maintenance of the underground workings that lead to the intake structures, and to facilitate maintenance and cleanout of the intake structures in the Service and Conveyor adits.
- A new buried water pipeline would be built to transport water from the mine to the decant ponds rather than using the 30+ year-old tailings lines.
- Additional monitoring of seeps and springs would be required to verify that water quality standards were met.

- The toe ponds between the tailings impoundment and Lake Creek would be surveyed by FWP prior to mine closure. FWP would determine whether non-native fish species occupy the toe ponds and whether a potential risk exists to native fish resources in Lake Creek and the Kootenai River. FWP would then make the subsequent decision and recommendation on removal of any fish. If fish removal is recommended, FWP would issue a permit to the contractor or company conducting the removal of any unwanted fish species. Inter-pond channel construction and fish removal would not begin until September or when juvenile western toads are no longer observed at the breeding site.
- The existing surface subsidence feature that has not yet achieved a level of stability and utility comparable to the pre-disturbance condition would be required to be reclaimed. The reclamation bond would be increased to address the possibility of future subsidence, including surface subsidence occurring on steep slopes.

2.4.3.1 Water Management

Adit Closure and Mine Water

The Agency-Mitigated Alternative differs in several ways from the Proposed Action. The Agency-Mitigated Alternative would use development rock at the portal patio to plug the South Adit. The South Adit plug would extend approximately 130 feet into the adit, rather than just the 30 feet as stated in the Proposed Action. The Service and Conveyor adits would be closed with development rock instead of with concrete non-hydraulic plugs. Concrete intake structures would be installed in both the Service and Conveyor adits to capture mine water and to funnel it to the collection pipelines. Closure devices would be installed to prevent unauthorized public access to the Service and Conveyor adits and to allow for periodic cleanout of the intake structures (see **Appendix G**). The concrete structures are needed because of the volume of water anticipated and because of the need for active management of the water collection system. The adits would be closed by the combination of the development rock backfill and the intake structures and secured against unauthorized access by the closure devices.

The two existing 8-inch surface tailings pipelines would be removed after a new, buried, mine water pipeline is in place and after safety measures are implemented and the pipelines have been tested. Any disturbed areas would be reclaimed and revegetated. The original 10-inch reclaim water line would remain in place and be used as an emergency water conveyance line. However, inspection of the reclaim water line would be required prior to using the line for this purpose. This new, buried, mine water pipeline would be designed and installed adjacent to the existing reclaim water line. This new mine water pipeline would be designed to handle the anticipated volume of mine discharge and would include options for routing water through both buried pipelines during high flows, as described in **Appendix G**.

The new mine water pipeline would be designed to follow the route of the existing tailings pipelines and would have the hydraulic capacity to handle the estimated peak discharge of 6.9 cfs (**Appendix G**). The land gradient is rather steep near the adit openings but flattens as it approaches the decant ponds. The new mine water pipeline would be designed to accommodate changes in slope. The new mine water pipeline would vary between 10-inch to 18-inch diameter and would likely be constructed of butt-welded high-density polyethylene (HDPE) pipe. The actual pipe diameter and material would be

determined during the final design phase at closure (**Appendix G**). The pipeline would be buried or double-lined at stream crossings to minimize risk to surface and groundwater systems.

A leak detection system would monitor for any potential failure of both the new mine water pipeline and the retrofitted old reclaim water pipeline. The six-mile long pipelines would be monitored using flow meters placed close to the mine adit (upper) and close to the discharge end (lower). Values from both meters would be compared in conjunction with a calculated time delay to compensate for the length of pipe between the flow meters. The values at the two monitors should correspond within an adjustable percentage. If the flows do not correspond, a leak or break in the pipeline would be indicated and an automated alarm would activate. Transmission of mine water would be shifted to the backup pipe. The damaged pipe would then be taken out of commission and the discrepancy would be investigated for repair. In the unlikely event that the pipeline capacity of both lines is exceeded, mine water would flow over the intake structure in the Service and Conveyor adits and would pass through the rock backfill. At the mine portal, mine water would drain to a constructed channel which would lead to Stanley Creek (**Appendix F**). Finally, the old line would be retrofitted with a leak detection system similar to the new line installed at closure.

Should mine water be of sufficient quality for direct discharge to surface water without treatment, it would be rerouted to a designed channel to discharge to Stanley Creek. At that time, both the new mine water and the old reclaim pipelines buried less than three feet deep would be removed, and the pipeline corridor and decant pond would be reclaimed. Reclamation of decant ponds would include regrading the decant pond berms to form gently sloping terrain within the reclaimed tailings impoundment. After regrading, cover soil would be placed, and the area would be reseeded with an upland species seed mix. Water discharging from the Service Adit would be routed overland through a constructed channel to Stanley Creek in the vicinity of the closed portal (**Appendix E**).

Water Treatment and Disposal

Mine water would be disposed of at the location of the existing decant ponds as described in the Proposed Action. Under the Agency-Mitigated Alternative, the ponds would be maintained as deep ponds in order to maintain geochemical functions. A berm would be created to prevent storm water runoff from the tailings impoundment surface from draining directly to the decant ponds. Preventing runoff to the ponds would minimize hydraulic overloading of the ponds and would prevent clogging with additional sediment and debris. The ponds would be approximately four acres in size and would be 10-15 feet deep to maintain existing geochemical conditions. The ponds would contain a central divider berm to allow periodic cleanout of sediment and other debris as needed.

Groundwater Quality

The Agency-Mitigated Alternative would continue the Proposed Action seepage pumping activities at the toe ponds until such time as water quality standards are met. Any monitoring wells would be plugged and abandoned per ARM 36.21.810.

Surface Water Quality

There would be additional monitoring of seeps and springs at the mine during closure to verify whether state water quality standards have been met. Water quality monitoring locations would be determined based on the results of the spring and seep survey of upper Mount Vernon that would be conducted during operations under the Agency-Mitigated Alternative. The spring and seep survey would include a review of the upper, northern tributary to Ross Creek and would identify where perennial flow begins and whether there are obvious springs and seeps in these areas. Based on the results, additional sites would be identified for water quality monitoring post-closure.

Long-Term Monitoring of Water Quality

In addition to water quality monitoring at closure under the Proposed Action, the Agency-Mitigated Alternative would include post-closure water quality monitoring for a minimum of five years after mine water discharge actually commences. Post-closure water quality monitoring of seeps and springs would verify whether state water quality standards were met. In addition to the sites listed in Table 2-3, all three sites at SC-15 (SC-15A, SC-15B, and SC-15C) would be monitored three times a year. Tables 2-2 and 2-3 include all sites expected to be monitored after mine closure.

2.4.3.2 Reclamation

The Agency-Mitigated Alternative would differ from the Proposed Action in the following measures:

- Growth material for the tailings impoundment would be amended with an agency-approved, wood-based, organic amendment to raise the organic matter content in the upper six inches to achieve 1,100 lbs of nitrogen per acre. Any materials originating in borrow pits to be used in reclamation would be in accordance with Agencies' growth media specifications. Mine and mill site reclamation material would be amended to achieve 1,100 lbs of nitrogen per acre by using an agency-approved, wood-based, organic amendment. This organic matter would be mixed into the top 12 inches of reclamation material.
- The Agencies would perform a field review of previously reclaimed areas to determine if areas need additional cover materials, revegetation, or reseeded. Any additional seeding would include the provision that seed sources for native plant species should be from northwestern Montana, if they are available at the time of reclamation.
- On the portal patios, growth medium from the mine and mill area would be used first, and then if needed, rocky glacial material from the borrow area east of the impoundment would be used for the balance of soil. All covered areas would be seeded with an agency-approved native seed mix.
- On the tailings impoundment surface, the stockpiled lacustrine and volcanic ash-derived soil material next to the toe ponds would be used first, then if needed, the borrow area east of the impoundment would be used for the balance of soil. Soil would be placed in one 18-inch lift to prevent compaction, and the soil would be ripped before seeding. Any materials originating in borrow pits to be used in reclamation would meet the Agencies' growth media specifications.
- If available at the time of reclamation, seed sources for native plant species should be from northwestern Montana.

- To prevent the spread of rush skeletonweed, the USFS borrow area would not be used. KNF would be responsible to reclaim this borrow area.
- In order to maintain existing geochemical conditions, the tailings impoundment decant ponds would not be reclaimed to a wetland habitat (**Section 3.18.5.3**).
- Monitoring of revegetation efforts would continue until bond release and would include long-term monitoring of noxious weeds, such as meadow knapweed and rush skeletonweed.
- Any existing surface subsidence feature that does not achieve a level of stability and utility comparable to the pre-disturbance condition would be reclaimed. The reclamation bond would be increased to address the possibility of future subsidence and would include surface subsidence occurring on steep slopes.
- All disturbed ground at the mine and mill site would be covered with an agency-approved mulch.
- Twenty-five tons/acre of coarse woody debris (greater than 3 inches in diameter) would be scattered across reclaimed areas both at the mine portals and at the mill.
- If available, plants would be inoculated with mychorrhizal fungi appropriate to the species.

Reclamation Materials

The Agency-Mitigated Alternative would use the stockpiled lacustrine and volcanic ash-derived soil materials west of the toe ponds to cover the tailings facility. The lowest portion of the vegetated outer slopes of the stockpile would be maintained to minimize water runoff and to prevent sediment from leaving the majority of the disturbed stockpile surface. The soil would be removed in a manner that would prevent soil from spilling towards Lake Creek or the toe ponds and that would protect the western toad (see **Section 3.18.5.10**). A field review of existing reclamation would be conducted to determine if additional soil would need to be spread on the embankment face and benches where soil is thin and revegetation is not adequate.

If needed for the tailings impoundment surface, additional growth medium would be salvaged from the borrow sites adjacent to the tailings impoundment (**Figure 2-1**). Borrow areas would be reclaimed to a 3H:1V slope. Salvaged growth medium would be spread over the area to be reclaimed, seeded, and revegetated. Growth medium would be placed in one lift to prevent compaction and ripped to loosen soil before seeding takes place. Materials used from borrow pits would comply with the Agencies' growth media specifications for coarse fragment content.

At the mill site, the Agency-Mitigated Alternative growth medium soil would be the same as in the Proposed Action. Twelve inches of fill material from regrading the mill area would be used, but the USFS borrow area material would not be used because of the presence of rush skeletonweed. If additional growth medium is needed, material would be obtained from agency-approved borrow materials from the impoundment area. All areas would be ripped before seeding.

Both the North and South portal patios would be covered with growth medium from the mine and mill areas; a 12-inch layer would be placed over regraded areas; and all areas would be ripped before seeding.

Geotechnical monitoring of the tailings embankment would be the same as under the Proposed Action, including annual inspections for a minimum of five years after closure. Verification of embankment stability by a qualified professional engineer would be required post-closure, and the Agencies would be consulted before monitoring ceases.

Subsidence

The existing surface subsidence feature that has not achieved a level of stability and utility comparable to the pre-disturbance condition would be reclaimed post-closure. The reclamation bond would be increased to address the possibility of future subsidence on potentially steep terrain.

Revegetation

Plant species selection for revegetation under the Agency-Mitigated Alternative would be based on the goal of re-establishing native species-dominated vegetation communities. Seed sources for native plant species should be from northwestern Montana to the extent that these species are commercially available at the time of reclamation. Overall, the species mix would be dominated by species native to northwestern Montana. Specific species mixes would be adjusted to account for site-specific conditions. For harsher growing conditions, such as south-facing slopes, more drought-tolerant plant species would be used. For moist conditions, appropriate species would also be used. Prior to reclamation, a final revegetation plan would document components of both the primary seed mixtures and of alternate seed mixtures if invasive species dominate the originally planned revegetation. This plan would be submitted to the Agencies for review and approval. Based on availability of species, KNF may adjust seed mixtures as appropriate for site conditions.

The Agencies would perform a field review of previously reclaimed areas to determine if areas need additional cover materials, revegetation, or reseeded. Any additional seeding would include the provision that seed sources for native plant species be from northwestern Montana, if available at the time of reclamation.

Infrastructure

Road reclamation for the Agency-Mitigated Alternative is described in **Table 2-1**, Lines 50 through 65. Berms and guardrails would be removed from inactive NFSRs.

The Agency-Mitigated Alternative differs from the Proposed Action in the following ways:

- The gunite liner would be removed from the existing collection/diversion ditches, and the surface would be regraded to slope towards a ditch on the uphill side of the access road that would route water to the large drainage that crosses the mill site. An approved SWPPP would be required for all reclamation activities. Appropriate BMPs would be used to control erosion, and temporary BMPs would be removed when no longer needed.
- All demolition materials, whether originating above or below ground, would be disposed of off NFSL in appropriate disposal areas to comply with the Montana Solid Waste Act.
- Water diversion culverts at the mill site would have both ends plugged with concrete, and culverts under roads would be left in place.

- The water tank would be removed from site.
- When no longer needed for mine closure, any water supply lines would be removed from NFSL.
- If needed, the domestic water well located southeast of the tailings impoundment would be used for irrigation during the first three growing seasons; after which time, the well would be plugged and abandoned as required by ARM 36.21.810.
- The reclaim water pond liner would be buried in place with three feet of soil.
- The fence surrounding the USFS borrow area would be left in place to avoid use and subsequent spreading of rush skeletonweed.
- Asphalt from the parking lots and other paved areas would be crushed and used for road gravel on NFSR 4626 or hauled to an approved landfill off NFSL.
- The Stanley Creek Bridge on NFSL would be left in good condition, would meet current safety standards, and would be capable of supporting legal highway loads. Approximately 300 feet of asphalt would be repaired and maintained on the Stanley Creek bridge approaches.
- The tailings irrigation system would be removed from the site after reclamation irrigation is no longer needed.

Topography

The Agency-Mitigated Alternative differs from the Proposed Action in several areas, including:

- Development rock at the portal patio would be used to plug the South Adit. The South Adit plug would extend approximately 130 feet into the adit, rather than the 30 feet as stated in the Proposed Action. Development rock that has accumulated in stream channels adjacent to the mine site would be removed from channels and used to backfill the South and West adits.
- Both the Service Adit and the adjacent Conveyor Adit would be closed with development rock from the portal patio instead of with concrete non-hydraulic plugs. A concrete intake structure would be installed in both the Service and Conveyor adits to route mine water to pipelines (see **Appendix G**). Closure devices would be placed in both adits to provide access for cleaning out the intake structures to the pipelines.
- All drainage channels would be constructed from imported non-mineralized rock rather than from mine development rock to minimize the potential for metal leaching. Alignment of the larger drainage channel would be down the angle-of-repose mill fill slope. A third channel would be designed from the Service and Conveyor adits to connect with the mill site drainage channels for overflow from the adits if the design capacities are ever exceeded (see **Appendix E**).
- The final permitted elevation of the tailings is 2,420 for Cells 1, 2, and 3. A berm would be created to prevent storm water runoff from the impoundment surface from draining directly to the decant ponds.
- The decant ponds would be maintained as deep ponds in order to maintain existing geochemical conditions (10 to 15 feet deep and approximately 4 acres in size with a divider berm to provide for periodic cleanout of the ponds).
- A qualified engineer would annually monitor and verify the stability of the embankment for a minimum of five years after reclamation is completed. The engineer's report would be submitted to the Agencies.

- All eroded or bare areas on the embankment would be repaired by spreading 12 inches of the stockpiled growth medium. These areas would be seeded and/or planted with agency-approved seed and plant mixes.
- FWP would survey the toe ponds for non-native fish species and determine whether removal of the fish is recommended; if so, the FWP would issue a permit for this activity.
- To prevent the spread of rush skeletonweed, the USFS borrow area would not be used. KNF would be responsible to reclaim this borrow area. The fence surrounding the USFS borrow site would stay in place to help prevent the spread of rush skeletonweed.
- The other borrow sites would be graded to 3H:1V slopes, and the upper layers of soil would be salvaged and stockpiled. Once the borrow site is used, the salvaged soils would be replaced and seeded or revegetated. Troy Mine, Inc. would provide the Agencies with an estimate of the volume of borrow to be removed and would specify location(s) for the soil stockpile(s).
- To protect bull trout rearing habitat in Lake Creek, sediment-generating activities occurring within Riparian Habitat Conservation Areas (RHCA) in Ross and Stanley creeks and the upper Lake Creek subwatershed would not occur before July 15th or after October 15th unless activities are upstream of dry channel segments and cannot deliver sediment downstream. Regrading work at the tailings impoundment would be excepted because appropriate BMPs would be installed to prevent sediment delivery to Lake Creek.

2.4.3.3 Additional Considerations

Underground Equipment

The Agency-Mitigated Alternative would include a final agency inspection of the underground mine prior to mine flooding and would cover the following modifications to the Proposed Action:

- All mobile equipment would be removed from the mine, if possible. If equipment is abandoned in place, all fluids would be drained and would be disposed of properly.
- Jaw crusher components on NFSL would be removed; other components would be removed as necessary to close the adits and any remaining equipment would be abandoned in place or removed from the mine.
- Conveyor components on or that extend onto NFSL would be removed from the mine.
- Any ventilation system components at the surface and at least 100 feet back into adits would be removed from the mine.

Libby Concentrate Loadout

The former concentrate loadout facility burned down in February of 2010. A temporary outdoor facility in Libby was used until a new facility was constructed and approved in 2011. Cleanup of the former loadout would occur per the approved reclamation plan. Any monitoring wells would be plugged and abandoned per ARM 36.21.810.

2.5 Mitigation and Monitoring Measures Common to All Alternatives

The No Action Alternative does not address many of the issues that are addressed by the other alternatives. The Proposed Action and Agency-Mitigated Alternative have the following common mitigations:

- The surface diesel fuel tank and the two large and numerous small propane tanks would be removed from the site.
- The large-capacity make-up wells near Stanley Creek would be abandoned per ARM 36.21.810.
- The small pump building and surge pond would be reclaimed.
- Monitoring wells would remain as long as needed and then plugged and abandoned per ARM 36.21.810.
- The mill site and office/shop areas would be planted with upper elevation forest plant mix.
- The East Impoundment, North East Impoundment, and Cell 3 borrow areas would be planted with lower elevation forest type vegetation.
- Small disturbed areas (such as the tailings pipeline, reclaim line, roads, power line corridors, storage areas) would be planted with grassland mix on the assumption that woody species would establish naturally.
- The reclaim pump station site would be revegetated to grassland and would rely on natural establishment of woody species.
- The current system which uses Enviro-pump S-1 to convey groundwater seepage to toe pond 2 and pump snowmelt or runoff from toe ponds 2, 3, 4 to the impoundment would be maintained.

In addition, the Proposed Action and the Agency-Mitigated Alternative have the same following design features in common:

- The Quonset Hut (located on private land) would be left in place for storage and office space.
- Northern Lights Inc. would have the final decision on removing or preserving all or portions of the 115-kV power line; although, it would be maintained until it was no longer needed for reclamation and monitoring activities.
- The substation would be left in place for future use by Northern Lights.

2.6 Alternatives Considered but Eliminated from Detailed Study

Federal agencies are required by NEPA to explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Likewise, state agencies are required to investigate an alternative approach or course of action that would accomplish the same objectives or results as the Proposed Action. DEQ is required to consider only alternatives that are realistic, technologically available, and that represent a course of action that has a logical relationship to the proposal being evaluated (ARM 17.4.603(2)(b)).

One complete alternative, along with several components of alternatives, were analyzed and subsequently eliminated. These are identified in this section.

Issues were identified through the agency and public scoping process, through agency review of the *2006 Revised Reclamation Plan*, and through interagency discussions on development of alternatives. Several issues were eliminated from further consideration because they were either outside the scope of the analysis; already decided by law, regulation, Forest Plan, or other higher level decision; irrelevant to the decision to be made; or they were conjectural and not supported by scientific or factual evidence. These issues are described in **Section 2.3.2** and include fate and transport of iron; the stability of the impoundment; the potential effects of continued discharge of mine water; bond requirements; potential hazards from buried drums; replicating the decant ponds at the mill site; the potential for contamination from Troy Mine operations upon the Northern Lights Dam; and leaving the area as-is for an educational/tourist attraction.

The No Action Alternative, Proposed Action, and Agency-Mitigated Alternative were assessed on the basis the major issues developed during the scoping process. Major issues were defined in **Section 2.3.1** as those for which:

- there may be potentially significant impacts;
- there is a concern about potential effects directly or indirectly resulting from implementation of the Proposed Action; or
- there is a concern about the effectiveness of proposed mitigation measures.

The alternative descriptions include details on the issues that were carried forward from the public scoping process as described earlier in this chapter. These issues include:

Water Management

- Adit Closure and Mine Water Distribution;
- Water Treatment and Disposal;
- Groundwater Quality;
- Surface Water Quality; and
- Long-Term Monitoring of Water Quality

Reclamation

- Reclamation Materials;
- Subsidence;
- Revegetation;
- Infrastructure (buildings and other structural materials and how they will be removed or reclaimed); and
- Topography (disturbed areas)

The No Action Alternative, which consists of the reclamation plan provided by ASARCO in 1978 and reclamation work that has been completed through August of 2010 by Genesis (now Troy Mine, Inc.), does not address the measures needed to treat mine water prior to distribution to Stanley Creek. Mine water that would be allowed to flow directly to surface water would not meet current water quality and

human health standards set forth by Montana Law. In addition, the No Action Alternative does not address several other reclamation components, as shown in **Table 2-1**. Due to the violation of state water quality standards and incompleteness of the No Action Alternative, the No Action Alternative would not be feasible. It is carried forward into Chapter 3 as a baseline for comparison.

Several mitigation options were presented and discarded throughout the development of this EIS. Specific mitigation measures and reasons for their elimination are listed below:

- Constructing an additional decant pond was discussed but eliminated. The IDT team evaluated the potential need for and sizing of an additional decant pond and decided that existing decant ponds would have the capacity to infiltrate the mine water. Storm water would be kept out of the ponds in the Agency-Mitigated Alternative. In addition, the ponds would be divided into two cells so that one can be cleaned out periodically to maintain infiltration capacity and geochemical conditions that are conducive to copper attenuation. A bond would be held for periodic cleaning of the pond cells.
- A detention pond at the Service Adit was discussed but eliminated. The IDT team evaluated the need for storage of mine outflow water and determined that the pipes used to convey water from the mine to the impoundment area could be designed to accommodate the expected mine drainage volume.
- Constructing a wastewater treatment system was considered but eliminated. Water quality studies were done on the attenuation of metals in mine water. These studies showed that the natural attenuation process is sufficient and that active water treatment would not be necessary (see **Section 3.9.4.2** and **Appendix D**). Construction and operation of a wastewater treatment system would require installation of additional infrastructure and would also include additional costs to operate and maintain the system. Moreover, a wastewater treatment facility would create additional waste close to the treatment facility that would also need to be treated or hauled away from the site.
- The concept of installing hydraulic plugs was discussed but eliminated. Hydraulic plugs in the mine adits have the potential to stop water discharge from the adits, but they add the uncertainty of where water might then discharge and create the risk of adding mine water directly to Stanley Creek from seeps and springs. Overall, this alternative would be impracticable.