Montana Department of
ENVIRONMENTAL QUALITY

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November 4, 2010

Dear Reader:

Enclosed for your review and comment is a Draft Environmental Assessment (EA) for an amendment to Operating Permit 00065 requested by Golden Sunlight Mines (GSM) located in Jefferson County approximately 5 miles northeast of Whitehall, MT.

GSM submitted an application for an amendment to the permit on May 4, 2010. The proposed amendment would allow construction of an open pit (East Area Pit) of about 24 acres, having a maximum depth of about 300 feet. Approximately 1.73 million tons of ore would be extracted and 2.31 million tons of waste rock would be generated.

The East Area Pit would be located directly northeast of the facilities area. The location has been previously disturbed but not mined. The pit would be about 1500 feet long and 700 feet wide. The pit floor is designed to remain above the groundwater level. Under the proposed reclamation plan, the East Pit highwall would be sloped to between 2H:1V and 3H:1V and be free-draining. Material from the highwall would partially fill the pit. Resloped areas would be capped with a non-reactive growth medium, and revegetated.

In addition, the proposed amendment would raise Tailings Impoundment No. 2 to its ultimate design elevation of 4770 feet, from the currently approved height of 4750 feet. The additional elevation provides for the deposit of 15.9 million tons of additional tailings from various sources, including custom milling. The 28-acre increase in area resulting from the raise in elevation would be reclaimed using the approved reclamation plan.

In addition, the proposed amendment would allow haul roads to be constructed to haul ore to the primary crusher and waste rock to a waste rock dump.

This Draft EA evaluates the potential impacts from this operation. The Montana Department of Environmental Quality (DEQ) must decide whether to approve the amendment as proposed, deny the request, or approve the amendment with modifications. The Draft EA addresses issues and concerns raised during public involvement and from agency scoping. The agencies have decided to approve the amendment with agency modifications as the preliminary preferred alternative. This is not a final decision. This conclusion may change based on comments received from the public on this Draft EA, new information, or new analysis that may be needed in preparing the Final EA.

Copies of the Draft EA can be obtained by writing DEQ, Environmental Management Bureau, PO Box 200901, Helena, MT 59620, c/o Herb Rolfes, or calling (406)444-3841; or sending email addressed to hrolfes@mt.gov. The Draft EA will also be posted on the DEQ web page: http://www.deq.mt.gov/ea/hardrock.mcpx. Public comments concerning the adequacy and accuracy of the Draft CEA will be accepted until November 19, 2010.

Since the Final EA may only contain public comments and responses, and a list of changes to the Draft EA, please keep this Draft EA for future reference.

Warren D. McCullough

Warren D. McCullough, Chief
Environmental Management Bureau

11/4/10

Date

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DRAFT ENVIRONMENTAL ASSESSMENT
FOR THE EAST PIT PROJECT AND TAILINGS IMPOUNDMENT RAISE

GOLDEN SUNLIGHT MINES, INC.

APPLICATION FOR AMENDMENT 014
TO OPERATING PERMIT 00065

Prepared by

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

ENVIRONMENTAL MANAGEMENT BUREAU

and the

USDI BUREAU OF LAND MANAGEMENT

November 2010

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CHAPTER 1
INTRODUCTION/PURPOSE AND NEED

1.0 INTRODUCTION OF PROPOSED ACTION

On May 4, 2010, Golden Sunlight Mines, Inc (GSM) submitted a request to the Montana Department of Environmental Quality (DEQ) and the Bureau of Land Management (BLM) for Amendment 014 to DEQ Operating Permit 00065 (GSM 2010a). The amendment would allow a new mine pit, called the East Area Pit Project, an increase in the height of Tailings Impoundment 2 to accommodate additional tailings, and an increase in waste rock deposited in the East Buttress Dump Extension Waste Rock Dump. The East Area Pit would be approximately 24 acres in size and would produce about 1.7 million tons of ore and 2.3 million tons of waste rock. The East Area Pit would be about 1,500 feet long and about 700 feet wide. The northeast highwall of the pit would be about 75 feet deep. The west and northwest highwalls would be up to about 300 feet deep. The south highwall would be about 200 feet deep. The pit floor is designed to remain above both the Rattlesnake Block landslide slip surface and the ground water level. Figure 1 is a general location map indicating the location of the proposed East Area Pit project with respect to the locations of other facilities at the mine (AMEC 2010b).

Reclamation postmining would include resloping, soiling, and revegetating the pit highwalls. Material from the highwalls would partially fill in the pit, with the floor of the pit sloping at about a one percent grade towards the south end. The existing drainage channel near the south end of the proposed East Area Pit would be cut deeper, which would allow the final pit configuration to be free draining. The ditch would be lined with a geosynthetic material to prevent seepage. The pit would be resloped to fill it to a depth of approximately 40 to 50 feet with material that is less reactive than the ore that would be removed from this portion of the deposit.

The Amendment 014 plan also includes raising the level of the tailings in Tailings Impoundment 2 (TI2) from the approved elevation of 4,750 feet to its ultimate design elevation of 4,770 feet, in part to hold the 1.7 million tons of processed ore (*i.e.,* tailings) from the East Area Pit.

The 2.3 million tons of waste rock would be hauled to the East Buttress Dump Extension (EBDE) waste rock dump. The EBDE has more than sufficient permitted capacity for the 2.3 million tons of waste rock material from the East Area Pit project. Portions of access and haul roads would be constructed to transport ore to the primary crusher, waste rock to the EBDE, and growth medium from soil stockpiles and approved borrow sources.

DEQ must review the proposed amendment, evaluate the potential impacts, and decide if Amendment 014 complies with the Montana Metal Mine Reclamation Act (MMRA) requirements for major amendments in sections 82-4-337 and 342, Montana Code Annotated (MCA), and in the Administrative Rules of Montana (ARM) 17.24.119. The BLM will review the amendment to see if it complies with 43 Code of Federal Regulations 3809. DEQ must evaluate reasonable alternatives to the Proposed Action, including the No Action Alternative, under the Montana Environmental Policy Act (MEPA) and the National Environmental Policy Act (NEPA) respectively.

The proposed changes to the operating permit are largely on private land. A small area of BLM land is located about 500 feet south of the proposed pit. Mine permitting and compliance activities on private and public land within the State of Montana fall under the jurisdiction of DEQ, principally under the provisions of the MMRA. DEQ has reviewed the proposed application in consultation with the BLM. The BLM has reviewed the Proposed Action for compliance with the Federal Land Policy Management Act and NEPA.

This EA describes the proposed plan of operations and reclamation plan. This joint agency Environmental Assessment (EA) evaluates the potential impacts of the Proposed Action pursuant to MEPA and NEPA. The EA also looks at the consequences of two alternatives to the Proposed Action: 1) the No Action Alternative (denying the Proposed Action) and 2) Agency Modifications to the Proposed Action.

Chapter 1 describes the purpose of and need for this action, the role of DEQ and the BLM, and concerns and issues. Chapter 2 provides a summary of mining and milling at the site, and a description of the Proposed Action and alternatives. Chapter 3 describes the affected environment. Chapter 4 analyzes potential direct, indirect, and cumulative effects associated with the Proposed Action. Chapter 5 identifies the coordination with state and federal agencies that occurred during preparation of this EA and contains a list of those who prepared the EA. Chapter 6 contains a list of references cited in developing the EA.

1.1 PURPOSE AND NEED FOR PROPOSED ACTION

Mining of ore at GSM is on hold waiting for stripping of waste rock to be completed in the Mineral Hill Stage 5B Optimized Pit ($5B_{OP}$). The GSM mill has been shut down since June 2009. GSM has proposed the East Area Pit Project to recover gold-bearing ore from a satellite pit while the Stage $5B_{OP}$ waste rock stripping is completed. Once the Mineral Hill Pit waste rock stripping is completed, the East Area Pit Project would be put on hold, unless already completed, until the Stage $5B_{OP}$ mining is completed. The East Area Pit Project would then be completed. GSM estimates that the Stage $5B_{OP}$ waste rock stripping would be completed by mid-summer of 2011.

1.2 AUTHORIZING ACTIONS

An application for a permit or major amendment submitted to DEQ may be approved only after a review of the proposal with respect to the reclamation and closure plan as required by MMRA and after an environmental analysis is completed as required by MEPA. DEQ is responsible for protecting air quality under the Clean Air Act of Montana and water quality under the Montana Water Quality Act. DEQ decision options upon completion of the EA include: (1) denying the application, which is the No Action Alternative, if the proposed operation would violate MMRA, the Clean Air Act, or the Water Quality Act; (2) approving the Proposed Action as submitted; (3) approving the Proposed Action with agency modifications or stipulations designed to mitigate identified environmental impacts or 4) requiring an environmental impact statement (EIS) to be completed to disclose and analyze potentially significant impacts.

DEQ and the BLM would jointly calculate the amount of a reclamation performance bond if any option other than (1) of the previous paragraph is chosen. The purpose of the bond is to ensure fulfillment of obligations under mining reclamation laws and to ensure the availability of funds in the event of a default by the operator. The posting of the performance bond payable jointly to the State of Montana and BLM is a precondition to issuing the proposed Amendment 014, if approved. The amount of bond would be based upon the estimated cost of reclaiming the disturbed land, abating pollution, and completing any other work described in the reclamation plan. DEQ would review the bond annually per MMRA requirements. DEQ is required to thoroughly review the bond every 5 years under MMRA (82-4-338, MCA). The BLM would consult on the bond reviews.

This document tiers off of previous environmental impact statements (EISs) and environmental assessments (EAs) which have been conducted for major and minor amendments at the Golden Sunlight Mine. The most extensive analyses were conducted for the Draft and Final EIS for Amendment 010 (DEQ and BLM, 1997 and 1998) and the Draft and Final SEIS for Amendment 011 (DEQ and BLM, 2004 and 2007). The East Area Pit Project area is located above the Upper Primary Pit Flowpath, which is the primary ground water flowpath for water that would discharge from the Mineral Hill Stage 5B Optimized Pit if the water level beneath the pit were allowed to rebound (which is not allowed under the current permit). Ground water flowpaths from the Mineral Hill Pit and the East Waste Rock Dump Complex (EWRDC) were analyzed in the SEIS for Amendment 011 (DEQ and BLM 2007). An EA for the EWRDC reclamation cover systems was completed in 2003. An EA for the reconfigured EBDE Waste Rock Dump in Amendment 012 was completed in 2010. An EA for a minor amendment for construction of a concentrator plant was completed in 2010. In addition, an internal analysis of potential environmental effects from activities at the site has been conducted with each minor revision.

1.3 RELATIONSHIP TO DEQ POLICIES, PLANS, AND PROGRAMS

The Proposed Action has been reviewed for compliance with DEQ policies, plans, and programs. The Proposed Action has been reviewed for compliance with BLM policies, plans, and programs. The proposal conforms to the Minerals Decision in the Record of Decision, Butte Resource Management Plan, approved in 2009. The application has been reviewed by DEQ and the BLM for deficiencies and completeness. The application is now complete.

1.4 ISSUES STUDIED IN DETAIL

The issues studied in detail concern the specific environmental changes that would result from the Proposed Action.

1) Geologic Hazards - Would mining the East Area Pit Project affect the stability of the Rattlesnake and Sunlight structural blocks and the Mill Complex? Would the TI2 raise affect the stability of the tailings impoundment? Would the additional waste rock affect the stability of the EBDE?

2) Ground and Surface Water Quality Impacts - Would mining the East Area Pit Project affect the quantity of ground water in the flow paths from the EWRDC and the Mineral Hill Pit?

3) Visuals – How would the East Area Pit, TI2 Raise, and waste rock addition to the East Buttress Dump Extension Waste Rock Dump affect the visual resources in the area?

4) Socio-Economics – Would the East Area Pit Project affect socio-economics in the area?

1.5 ISSUES CONSIDERED BUT DISMISSED

DEQ has identified resources that would not be affected by the Proposed Action and issues that were considered and eliminated from further review.

1.5.1 SOIL RESOURCES

The East Area Pit area is 24 acres in size and most of the area has already been disturbed. The west side of the existing disturbance area contains crusher reject material from the mill. The East Area Pit would be constructed in unconsolidated sediments. Due to the ubiquitous mineralized (*i.e.*, iron- and sulfate-rich) nature of the waste rock and ore to be removed, no soils would be salvaged from the East Pit Area for reclamation growth medium, but would be hauled to the EBDE. About three of the 24 acres of the East Area site currently have a soil cover. When and where possible, GSM would place low permeability and less reactive waste rock along the top and slopes of the EBDE.

GSM has excess growth media that can be salvaged from existing soil stockpiles and approved borrow sources east of the proposed East Area Pit Project. GSM has successfully reclaimed over 250 acres of acid-producing waste rock in the EWRDC using material from these borrow sources. The use of this borrow material was analyzed in an EA for the EWRDC reclamation cover systems that was completed in 2003 (DEQ 2003). Growth medium is also available for the additional disturbance resulting from the TI2 raise. There are no special reclamation considerations.

1.5.2 VEGETATION

Minimal new impacts would occur to vegetation in the proposed disturbance areas. All but about three acres of the East Area Pit's proposed 24 acres have been previously disturbed. The East Area Pit highwall would be sloped to between 2H:1V and 3H:1V depending on conditions at the highwall crest. Resloped areas would be capped with 31 inches of non-reactive growth medium while non-acid forming portions of the resloped pit areas, as based on acid base accounting (ABA) methodology, would be capped with 12 inches of plant growth medium. The entire 24-acre pit would be seeded with the steep, south-facing slope mixture used on the West Waste Rock Dump Complex.

The EBDE Waste Rock Dump would not be expanded by the addition of the waste rock to the dump. No new vegetation would be disturbed and the existing approved reclamation plan would not change.

The TI2 disturbance would increase from 277 to 305 acres. This is within previously disturbed areas and no new disturbance of vegetation would occur. The disturbed acres would be reclaimed using the currently approved reclamation plan for those facilities.

Approximately 10 acres of new access and haul roads would be required to haul ore and waste rock from the East Area Pit and to haul growth medium from stockpiles and borrow sources. The new roads would be constructed on areas already disturbed. These roads would be reclaimed per approved reclamation plans. If haul roads are acid-producing they would receive the same cover soil system as EWRDC. If haul roads are not acid-producing they would be covered with 12 inches of approved soil or borrow materials for a growth medium.

Similar types of impacts within the permit area have been reviewed and approved. There are no known rare or sensitive plant species in the proposed disturbance area. Invasive non-native noxious weeds would continue to be controlled using GSM's approved weed control plan.

While most of the proposed areas have already been disturbed, some remaining remnants of vegetation in the East Area Project area would be impacted by construction of the pit, haul roads, and tailings impoundment raise. No plant species of concern were identified within the permit boundary during vegetation inventories conducted during 1988-1995. The Montana Natural Heritage Program (MNHP) database was searched for all sensitive plant species within approximately 10 miles of the permit area, and for all current plant element occurrences in Jefferson County. None of the potentially sensitive plants in the MNHP database was found during the 1988-1995 inventories.

No plant species listed or proposed for listing as endangered under the Federal Endangered Species Act of 1973 (or their critical habitats), as reviewed in 2009, are known to reside within the permit area.

All of the acres to be disturbed are already permitted for disturbance, and all but three acres are already disturbed and lack soil and vegetation. Disturbance resulting from the East Pit Project would remove some remnant native plant communities. There would be a reduction in the diversity of the native plant communities in the area due to the proposed disturbance, competitiveness of invasive non-native species, and use of weed control chemicals. This is an irreversible and unavoidable impact of disturbance.

1.5.3 WILDLIFE

An inventory of wildlife and birds was conducted in the early 1990s. As reviewed in 2009, the inventory shows no species listed or proposed for listing as endangered under the Federal Endangered Species Act of 1973. No critical habitats for these species are known to be located within the permit area. Bald eagles, a listed threatened species, pass through the area and occasionally nest near the mine pit. No grizzly bear sightings on the property have been reported; however, grizzly bears inhabit areas near the mine site and could potentially pass through the mine site.

Minimal impacts to wildlife are anticipated. Site-wide impacts to wildlife were previously analyzed in Amendment 010. Given the disturbed nature of the proposed East Area Pit it is likely there would be minimal impacts to wildlife beyond those already analyzed and permitted.

No aquatic habitat exists within the boundaries of the East Area Project.

1.5.4 WETLANDS

Wetlands in the Operating Permit area were analyzed in previous environmental documents. There are no jurisdictional waters associated with the East Pit amendment application. The last action by the US Army Corps of Engineers was for Amendment 12, in which it was determined that the drainage features affected by the east buttress dump extension were not jurisdictional (COE 2009). The East Area site is located upgradient of the buttress dump.

1.5.5 CULTURAL RESOURCES

A review of historical and archaeological resources in the operating permit area was completed in previous environmental documents. Several cultural resource surveys have been completed in the area of the proposed East Area Project and are listed in Appendix OP-4-13 of the GSM Operating and Reclamation Plan (GSM 2010b). Based on the surveys and in concurrence with the State Historic Preservation Office (SHPO), no significant ("eligible") sites within this area were proposed for national listing. In the unlikely event a significant cultural or paleontological resource site is identified, it would be avoided. If avoidance is not possible, the BLM and SHPO would be immediately notified, and the adverse effects to the site would be mitigated.

1.5.6 LIGHT AND NOISE

The Golden Sunlight Mine has been operating in the area for over 25 years. Heavy equipment use and blasting have occurred regularly during that time. Nighttime lighting has been used regularly. Compared to the existing light and noise levels at the mine, mill, and tailings impoundment facilities, light and noise level increases should be minimal. Due to the unconsolidated nature of the sediments in the proposed East Area Pit, blasting may not be needed.

1.5.7 ENERGY SUPPLY AND SOURCE

No additional demands on energy resources were identified beyond those already analyzed in previous environmental documents. The new activities proposed would simply use the same energy for a longer period of time.

1.5.8 SOLID WASTE DISPOSAL

No additional demands on environmental resources were identified beyond those already analyzed in previous environmental documents. GSM disposes of approved classes of solid waste as permitted under the operating permit.

1.5.9 AIR QUALITY

GSM operates the Golden Sunlight Mine under Air Quality Permit No. 1689-06. The proposed East Area Project would not change the rate of mining or ore processing as currently permitted under GSM's Air Quality Permit. While additional particulates and pollutants would be produced, no modifications to the air quality permit are necessary. Fugitive dust control best management practices would reduce emissions associated with traffic on roads and blowing tailings off TI2 in the East Area Project and maintain them at current operational levels. All existing air quality controls as described in the approved Air Quality Permit would be applicable to the activities proposed in this permit amendment.

1.5.10 WATER SUPPLY SYSTEM

GSM has an approved water supply system at the mine. The proposed Amendment 014 would not increase water needs beyond those already analyzed.

1.5.11 HAZARDOUS MATERIALS AND WASTES

The proposed Amendment 014 would not increase hazardous materials and waste at GSM beyond those already analyzed.

1.5.12 SPILL PREVENTION, CONTROL, AND COUNTERMEASURE PLAN

Amendment 014 would result in changes to water management and routing in the area of the proposed East Area Pit (See Section 1.5.13 for a description of the proposed changes). The water management and routing changes would not change the current Spill Prevention, Control, and Countermeasure Plan.

1.5.13 WATER MANAGEMENT AND ROUTING

The lined pond used to collect water from the Midas Seep and the Mineral Hill Pit underground sump would be removed. The lined pond would not be replaced; instead direct pipelines would be installed to route flows from the Midas Seep to TI2. The Mineral Hill Pit water would be piped to either the existing water treatment plant or the tailings slurry pipeline at Drop Tower #1.

1.5.14 OTHER CONCERNS

The proposed project would not affect Native American religious concerns or environmental justice. The proposed project would not disturb any floodplain or wild and scenic river. The proposed disturbance areas have been previously analyzed for Areas of Critical Environmental Concern in Amendment 010.

CHAPTER 2
HISTORICAL MINING, DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 THE NO ACTION ALTERNATIVE

If the proposed East Area Pit Project Amendment is denied and the No Action Alternative is selected, the site would remain in its current condition as described in the following sections.

2.1.1 LOCATION AND LAND USE

The Golden Sunlight Mine is located in Jefferson County approximately five miles northeast of Whitehall, MT in all or portions of sections 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32 and 33 of Township 2 North, Range 3 West; sections 4, 5 and 6 in Township 1 North, Range 3 West; and sections 1, 13, 24, 25 and 36 in Township 2 North, Range 4 West (Figure 1). If the No Action Alternative is selected, the mine would remain in its current permitted condition within the existing permit boundary.

Land use in the area was historically hard rock mining, wildlife habitat, and rangeland used by local ranchers for cattle grazing. After mining and reclamation of the proposed East Area Pit is completed, the site would return to these uses. Some portions of GSM property and some of the existing mine building infrastructure would be left for use by the Jefferson County Land Development Corporation for postmine industrial use. Land use in the area during and after mining would not change.

2.1.2 MINERAL AND SURFACE OWNERSHIP

The Golden Sunlight Mine is located on federal, state, and private land. GSM mines and processes gold-bearing ore using facilities located on private lands (both fee simple and patented mining claims) controlled by GSM, on unpatented mining claims located on federal lands administered by BLM, and on Montana state school trust land under mineral lease by GSM from the Montana Department of Natural Resources and Conservation. Mineral and surface ownership would not change.

2.1.3 GEOLOGICAL SETTING

The main ore body mined in the Mineral Hill Pit at GSM is a breccia pipe in Precambrian host rocks (DEQ and BLM, 2004). In the mid-Tertiary, Bull Mountain was uplifted by block faulting. During the uplift, faulting created smaller blocks of rock, including the Rattlesnake, Swimming Pool, and Golden Sunlight blocks. Debris flows and landslides occurred in the Late Tertiary on top of the Bozeman Group. A portion of the main ore body was separated from the breccia pipe and transported downslope during ancient debris flows. The gold ore transported downslope was deposited in depressions in the Bozeman Group and Footwall Sulfide Zone.

The ore proposed to be mined from the East Area Pit is unconsolidated, although large boulders may be present in debris flow and landslide material. The proposed East Area Pit is located between the Range Front Fault to the west and the Rattlesnake Fault to the east (Figure 2, AMEC 2010b). The pit walls would not intercept either fault zone. If the No Action Alternative is selected, the East Area Pit would not be developed and the Mineral Hill Pit would be the only pit approved for development.

2.1.4. MINING AND MILLING OPERATIONS

Modern mining within this historic mining district began in the 1970s with exploration and predevelopment activities culminating in GSM receiving Operating Permit No. 00065 on June 27, 1975. An EIS was prepared in 1981 for a major expansion of the mine that led to construction of the open Mineral Hill Pit, mill, Tailings Impoundment No. 1, and a cyanide vat leach facility. The operating permit has been revised and amended numerous times since 1981, increasing the size of the Mineral Hill Pit and waste rock dump complexes and approving the development of TI2. TI2 is permitted to a maximum elevation of 4,750 feet, but as of the beginning of 2010, was only constructed to elevation 4,730.

GSM is a conventional truck and shovel open pit mine. Approximately a sixth of the excavated material is ore and five sixths is waste rock. The ore is milled using a vat cyanide leach process at the mine site, while the waste rock is disposed of in large waste rock dump complexes. Following processing, the mill slurry goes to TI2 where tailings settle out and the free-standing tailings water is pumped back and reused in the process circuit.

The GSM Mineral Hill Pit extends below the natural water table. The workings are kept dry by pumping out groundwater and storm water that enter the pit. Two bedrock wells are installed within the perimeter of the pit to intercept groundwater and assist in dewatering. The collected water, which is naturally acidic and increases in acidity by contact with sulfide rock in the pit, is pumped to an on-site treatment facility where the acidity is neutralized and metals are removed before the water is used in the milling process. The approved closure plan for the Mineral Hill Pit requires that water will continue to be pumped from the underground workings beneath the pit, such that a cone of depression is maintained and groundwater affected by the pit does not enter the Primary Pit Flowpath (DEQ and BLM, 2007).

If the No Action Alternative is selected, the East Area Pit would not be developed, the TI2 raise would not be completed, and the waste rock would not be added to the East Buttress Dump Extension Waste Rock Dump. GSM could mine until the Mineral Hill Pit reserves are depleted. There would be no changes to TI2 or the waste rock dump complexes. Processing of ore from off-site, including scheduled reprocessing of the McLaren tailings from the New World District may be precluded if the tailings impoundment is not expanded.

2.1.5 SOCIO-ECONOMICS

The manner of mining would not change in the No Action Alternative, including operation of the existing mill facility; delivery, storage, consumption and disposal of materials associated with the current mine and mill operations; operation of air emission controls on mine equipment, most

fugitive dust sources along haul and access roads and from TI2, and milling equipment; and maintenance and monitoring functions.

Currently, mill personnel are engaged in removal of waste rock from the Mineral Hill Pit highwall setback under the Stage 5B Optimization mining plan. In the No Action Alternative, the mill workers would continue in these efforts until the ore is exposed and the mill can be reopened. If the No Action Alternative is selected, the mill is scheduled to open in August 2011, the mill workers would continue with the Stage $5B_{OP,}$ and there would be no changes in employment or other socio-economic conditions at GSM.

2.2 PROPOSED ACTION ALTERNATIVE

GSM submitted an application for Amendment 014 to Operating Permit 00065 received May 4, 2010 (GSM 2010a). The agencies sent a deficiency letter on July 2, 2010. GSM responded on July 14, 2010. On August 11, 2010, the agencies declared the application complete and started the environmental analysis (EA) process. GSM submitted additional information as the EA was being prepared to address the agencies' need for analysis information (GSM 2010c). The application, GSM's responses to the deficiency letter, and additional information are the Proposed Action described in this chapter.

2.2.1 LOCATION AND LAND USE

The proposed East Area Pit Project would be located immediately east of the Mineral Hill Pit and north of the GSM mill in portions of sections 19 and 20, Township 2 North, Range 3 West. The TI2 Raise would be located in sections 28, 29, 32 and 33, Township 2 North, Range 3 West. The East Buttress Dump Extension is located in sections 28 and 29, Township 2 North, Range 3 West (see Figure 2).

All disturbance associated with proposed Amendment 014 would be within the existing 3,102-acre permitted disturbance boundary. The proposed Amendment 014 would not increase the 6,125-acre mine area permit boundary. The proposed East Area Pit footprint has been previously disturbed. The area currently includes coarse reject ore, the man tunnel, and a lined pond. GSM is currently bonded for 2,319 acres of disturbance. The reclamation bond totals $83,756,978. The reclamation performance bond would be increased if Amendment 014 is approved.

2.2.2 MINERAL AND SURFACE OWNERSHIP

The Proposed Action Alternative would not change mineral and surface ownership in the GSM operating permit area.

2.2.3 GEOLOGICAL SETTING

As mentioned in Section 2.1.3, debris flows and landslides occurred in the Late Tertiary. A portion of the main ore body was separated from the breccia pipe and transported downslope during ancient debris flows. Gold ore was deposited in depressions in the Bozeman Group and

Footwall Sulfide Zone. The East Area Pit is proposed to mine this unconsolidated debris flow deposit.

As the East Area Pit would be constructed in unconsolidated sediments, the pit walls would be less steep than those of the Mineral Hill Pit. The majority of the pit would be developed within gravels and sand and gravel lenses overlying the ferruginous Tertiary debris flow and landslide deposits to provide access to the ore.

2.2.4. MINING AND MILLING OPERATIONS

2.2.4.1 East Area Pit

Approximately 2,283 of the 3,102 acres permitted for disturbance have been disturbed to date. Construction of the East Area Pit would require removal or relocation of several pipelines and facilities including: waste rock; coarse ore reject and coarse ore piles; the wash bay; Conveyor No. 3 "Man Tunnel;" the lined pond for the collection of Midas Seep, Mineral Hill Pit underground water, and storm water; and portions of the crushing circuit. The lined pond would not be replaced. Instead pipelines would be installed to route flows from the Midas Seep to TI2. Storm water accumulating in the East Area Pit would be routed with Mineral Hill Pit water directly to the treatment plant in the mill with a potential bypass to TI2. The bypass would be utilized if the volume of storm water pumped from the proposed East Area Pit plus the Mineral Hill Pit were to exceed water treatment plant capacity.

Operationally and prior to reclamation, no free-standing water would accumulate in the East Area Pit. Any storm water runoff and or groundwater would be pumped out as it accumulates. Depending upon the quality of the pit water, it would be routed to the treatment plant, or with agency approval, to the Land Application Disposal (LAD) area. The water treatment plant can treat 125 to 300 gallons per minute (gpm) depending upon treatment requirements. The water treatment plant neutralizes acidity and removes metals. If, due to periods of high precipitation, the capacity of the water treatment plant would be exceeded, untreated pit water would be routed through a bypass pipeline to TI2. The treated water would be dosed with additional lime in the treatment plant to neutralize untreated bypassed water for metals from the mine pits and routed to TI2. Upon closure, storm water run-on would be routed around the East Area Pit and discharge into natural drainages.

The East Area Pit highwalls would be sloped at closure to between 2H:1V to 3H:1V (see Figures 3 and 4, AMEC 2010b). All resloped areas and the pit bottom would be soiled and revegetated. The resloped pit would be capped with 31 inches of non-reactive growth medium per the approved waste rock dump reclamation plan. Test results to date show that materials from the area of the proposed East Area Pit highwalls are non-acid generating based on ABA methodology, and the resloped highwalls would be capped with 12 inches of reclamation material. A sampling and analysis plan would be submitted to the agencies for review and approval within 90 days after approval of the amendment.

While the acid-base potential of the East Area Pit sediments indicates portions of the material may be suitable for salvage, GSM is concerned there may be free acidity and soluble heavy metals in the sediments from jarosite and other sulfate minerals. All soil and waste rock would be deposited in the EBDE rather than stockpiled for reclamation cover material. All of the 2.3 million tons of clayey low potential reactivity waste rock from the East Area Pit would be placed, when possible, along the top and slopes of the EBDE as low permeability material beneath the soil cover.

The East Area Pit walls would be resloped to enhance stability and to achieve the final design slopes for reclamation. In-pit lined diversion ditches would direct runoff from the upper reclaimed slopes to a low point within the southeast end of the pit at closure. The final design of the pit floor would slope to the southeast at about a one percent grade, to direct any runoff out of the pit via a lined ditch. In this manner the pit would be free-draining.

The mining and milling of the ore from the East Area Pit would utilize methods described in the existing permit with the following exceptions:

- Development of the East Area Pit may be contract mined with smaller equipment than GSM typically uses for mining;
- Since the East Area Pit would be, for the most part, developed in unconsolidated material, blasting may not be necessary for the bulk of the deposit;
- Accumulated water either from precipitation or drainage from pore water storage would be pumped from the pit at sumps constructed in the active mining benches; and
- Due to the oxidized nature of the ore, reagent dosing in the mill would be in the upper ranges of that specified in the permit.

Other mine operations would not change, including operation of the existing mill facility; delivery, storage, consumption, and disposal of materials associated with the current mine and mill operations; operation of air emission controls on mine equipment, fugitive dust sources, and milling equipment; and maintenance and resource monitoring functions.

2.2.4.2 Tailings Impoundment 2 Raise

TI2 is permitted to a maximum elevation of 4,750 feet. Under the Proposed Action, GSM would raise TI2 to its capacity elevation of 4,770 feet (Figure 5, AMEC 2010b). This additional capacity would include the proposed development of the East Area Pit, and previously approved tailings produced by unscheduled Mineral Hill Pit production prior to mill shut down in 2009, the Stage 5B Optimization project, and custom milling of ore from off-site such as the McLaren Tailings from the New World Mining District near Cooke City.

Currently, TI2 is permitted to the 4,750 elevation, but as of the beginning of 2010, was only constructed to the 4,730 elevation. Under the Proposed Action, TI2 would be constructed from the 4,730 to the 4,770 elevation in as many as five lifts.

A conceptual configuration for TI2 is shown in Figure 5. A slope stability analysis for the 4,770-foot configuration was performed (AMEC 2010a). More detailed engineering would be completed as each lift is constructed.

The TI2 footprint would increase from about 277 acres to about 305 acres. The 28-acre increase would be due to the natural slope of the ground on the north side of the impoundment, which would allow expansion in that direction. This area has been previously disturbed. The wing walls (east and west) would be downstream construction at 2:1 slopes. Therefore each foot of vertical lift pushes the toes of the wing walls out two feet. The wing walls would be constructed on areas that have been previously disturbed. The approved reclamation plan for the tailings impoundment would not change.

2.2.4.3 Access and Haul Roads

Access and haul roads would be needed to haul waste rock from the East Area Pit during mining. These roads would be also be used for reclamation of the East Area Pit. New roads constructed under the Proposed Action would be built on previously disturbed areas already permitted for disturbance. New haul roads outside the footprint of the East Area Pit and dumps would be constructed of non-reactive material from the borrow area or native in-place material. It is estimated that the new access and haul roads would require about ten acres of land.

2.2.4.4 Storm Water Handling Facilities

Operationally and prior to reclamation, storm water collecting in the pit would be pumped out as it accumulates. The water would be directed to the water treatment plant, TI2, or the LAD depending on water quality. Water would not be sent to the LAD without prior approval by DEQ and BLM.

Upon closure of the East Area Pit, storm water would be routed off the reclaimed pit walls via diversions. The diversions would be designed for a 100-year storm event, similar to the storm water management plan for the adjacent East Waste Rock Dump. Direct precipitation that falls below these diversions would either be absorbed by soils and vegetation, or if there is excess runoff, would drain out of the pit through a lined channel.

2.2.5 RESOURCE MONITORING

2.2.5.1 Air Quality

The proposed East Area Pit Project would not change the rate of mining or ore processing as currently permitted under GSM's Air Quality Permit (No. 1689-06). All existing air quality controls as described in the approved Air Quality Permit would be applicable to the activities proposed in operating permit Amendment 014.

2.2.5.2 Water Quality

Hydrogeology of the East Area Pit area was initially investigated by GSM during exploration activities in the early 1990s (Truckle 1991, 1992). The East Area was evaluated in the 2007 Supplemental Environmental Impact Statement (SEIS) and identified as the upper portion of the "Primary Pit Flowpath" in that assessment. Existing information and data from new monitoring wells and drillholes were utilized to evaluate hydrogeological conditions specific to the East Area Pit (SPSI 2010).

A number of monitoring wells were constructed in the area in the early 1990s and the early 2000s. All but PW-64 were screened in the shallower Tertiary debris flow and landslide (Tdf/ls) deposits. PW-64 is screened in Precambrian bedrock in the Range Front Fault Zone. Two new monitoring wells were constructed in 2009, one in the shallower Tdf/ls deposits (09R-12) and one in the Bozeman Group sands (09R-13). Two piezometers were constructed in exploration drill holes including 09R-05 in the Footwall Sulfide Zone (FSZ) and 09R-07 (Tdf/ls).

Geochemical testing of East Area Pit sediments was conducted to determine their suitability for reclamation materials. Very little soil material remains in the East Area, and GSM considers the overburden material to be of marginal quality compared with material from nearby permitted borrow sources; therefore, all soil and overburden would be hauled to the EBDE. ABA methodology was used to determine whether the soil materials were acid-producing.

During the initial East Area Pit exploration activities in the early 1990s, ABA testing was done on 18 drill samples. According to Truckle (1992), "...ABA values ranged from -170 for one hematitic landslide sample to +156 for Bozeman clay. In general, the hematitic and footwall sulfide samples returned negative ABA values, the upper gravel and sand units returned neutral ABA values, and the upper gravel and sand units returned neutral or positive results."

While the acid-base potential of the East Area Pit sediments indicated portions of the soil and waste rock may be suitable for salvage, GSM is concerned there may be free acidity and soluble heavy metals in the sediments from jarosite and other sulfate minerals. All soil and waste rock from the East Area would be deposited in the EBDE Waste Rock Dump rather than stockpiled for reclamation cover material. GSM has committed to following all recommendations from HSI and SPSI (GSM 2010c).

2.2.6 SOCIO-ECONOMICS

It is anticipated that the Proposed Action would have minimal additional demands, beyond those already analyzed, on socio-economics including duration of mining and employment.

2.2.6.1 Duration of Mining

Life of the East Area Pit Project is estimated to be up to 18 months. The East Area Pit project would allow startup of mining and milling six to nine months prior to completion of concurrent stripping of waste rock for the approved Mineral Hill Stage $5B_{OP}$. Once the Mineral Hill Pit waste rock has been removed, mining would resume in that area and be suspended at the East Area Pit. After mining ends in the Mineral Hill Pit several years later, mining would resume at

the East Area Pit for an additional three to six months. The East Area Pit project may also be completed before the pit layback is completed at the Mineral Hill Pit.

2.2.6.2 Employment

Currently, mill personnel are engaged in waste rock stripping operations for the Mineral Hill Pit Stage $5B_{OP}$. The mill workers would continue in these efforts until ore could be run through the mill from the proposed East Area Pit. Continuation of work on the Mineral Hill Pit highwall would provide temporary employment for about 20 people for about nine months, replacing the mill workers as they returned to working in the mill. The East Area Pit would be contract mined, employing about 25 people.

2.2.7 RECLAMATION

2.2.7.1 Introduction

Following is a comparison of Operating Permit 00065 current conditions with proposed Amendment 014.

	Current Conditions (acres)	Proposed Amendment 014 (acres)
Permit Area	6,125	6,125
Permitted Disturbance	3,102	3,102
Bonded Acres	2,319	2,319

	Proposed Acres to be Disturbed or Redisturbed for Amendment 014 (acres)
East Pit	24
Access and Haul Roads	10
TI2 Raise	28
EBDE	0
Total	62

2.2.7.2 East Area Pit

The East Area Pit would be constructed in unconsolidated sediments. Pit highwalls would be constructed at a shallower angle than those of the Mineral Hill Pit (nominal 35°). At mine closure, the East Area Pit highwalls would be sloped to between 2H:1V and 3H:1V depending on conditions at the crest. Resloped areas would be capped with 31 inches of non-reactive growth medium from an approved borrow source. Sufficient material is available from the borrow source for reclamation of the 24-acre pit. It may be possible to demonstrate that some portions of the East Area Pit resloped highwalls are non-acid generating. The portions of the highwalls tested as non-acid generating would, with approval from the agencies, be capped with 12 inches of reclamation material. The East Area Pit would be regraded to enhance stability, achieve the

slope design for reclamation, and create a lined channel to drain the pit. The constructed channel would direct storm water into a natural drainage channel.

2.2.7.3 Tailings Impoundment 2 Raise

The 28-acre increase in area from the raise in TI2 would be reclaimed using the approved reclamation plan. The tailings would be covered with two feet of subsoil and two feet of topsoil. The source of this subsoil and topsoil is from stockpiles and non-reactive borrow material from approved borrow sources.

2.2.7.4 East Buttress Dump Extension Waste Rock Dump Changes

The EBDE is permitted to hold 42 million tons of waste material from the Mineral Hill Pit Stage $5B_{OP}$. About 20.4 million tons of additional capacity was provided in revisions to the South Intra-Dump design in 2008 and 2009 (MR08-010 and MR09-002). The EBDE has more than sufficient permitted capacity for the 2.3 million tons of waste material from the proposed East Area Pit. Construction methods for the EBDE were previously described (GSM 2007 and Golder 2010a).

Due to geochemical concerns, GSM would not segregate any soil or waste rock for reclamation growth medium from the East Area Pit. All 2.3 million tons of waste rock would be hauled to the EBDE Dump. When possible, the 2.3 million tons of clayey low potential reactivity waste rock from the East Area Pit would be placed along the top and slopes of the EBDE as low permeability material beneath the growth medium.

2.2.7.5 Revegetation

The East Area Pit and EBDE Waste Rock Dump would be seeded with the predominantly native species mixture approved for use on steep, south-facing slopes of the East Waste Rock Dump Complex or other approved seed mixtures at the time of reseeding. The TI2 raise would be seeded with the approved tailings impoundment seed mixture. Seed mixtures are provided in GSM's 2010 Operating and Reclamation Plan.

The 24-acre East Area Pit would be located within the currently approved permitted disturbance area. The pit is in an area which has been almost entirely disturbed, except for about three acres that remain vegetated. The waste rock in the EBDE would not increase the approved EBDE permitted disturbance footprint. The TI2 raise would disturb 28 acres of land that has already been disturbed. The access and haul roads needed for the entire project would require up to ten acres, which also have been previously disturbed.

2.2.7.6 Human Health and Safety

Human health and safety at the Golden Sunlight Mine would continue to be regulated under the Mine Safety and Health Administration (MSHA).

The East Area Pit is undergoing an intensive geotechnical review to ensure that mining can be conducted in the area in a responsible and safe manner. GSM has committed to implement all recommendations that would be made by the geotechnical engineering firm conducting this review (GSM 2010c).

2.3 AGENCY MODIFICATIONS TO THE PROPOSED ACTION ALTERNATIVE

Section 4.3 lists and describes recommended Agency Modifications to the Proposed Action. Under the Agency-Modified Alternative, DEQ would approve the Golden Sunlight Mine Amendment 014 with those modifications.

Additional agency modifications may be developed in response to substantive issues and concerns identified following publication and agency review of the permit application. Agency modifications would be intended to eliminate or minimize potential impacts associated with the Proposed Action.

CHAPTER 3
AFFECTED ENVIRONMENT

3.0 INTRODUCTION

Chapter 3 describes only the resources that could be affected by the Proposed Action. Resources that either would not be affected by the Proposed Action or are not present in the Golden Sunlight Mine area were discussed in Section 1.5.

3.1 POTENTIALLY AFFECTED RESOURCES

3.1.1 Ground Water Quality and Quantity

The primary hydrostratigraphic units in the area consist of a shallower unit comprised of Tertiary debris flow/landslide (Tdf/ls) deposits and deeper sandy units in the Tertiary Bozeman Group. The Tdf/ls units are gravelly clays and clayey gravels and are heterogeneous with hydraulic conductivity values in the range of 10^{-3} to 10^{-4} cm/sec or less. The overlying Quaternary sediments are dry.

A widespread pyritic heavy clay separates the shallower hydrostratigraphic units from the Bozeman Group in the East Area. This unit, the Footwall Sulfide Zone (FSZ), is a confining layer and, based on monitoring well 09-R13, the underlying Bozeman Group water-bearing sands exhibit artesian (confined) conditions beneath the FSZ in the East Area. The static water level in well 09-R13 is at the approximate elevation of 5,090 feet, or about 40 feet higher than the deepest portion of the proposed East Area Pit. The fact that the overlying Tdf/ls units are not also saturated to this elevation indicates that the FSZ confining layer is continuous and does not allow substantial upward migration of groundwater into the Tdf/ls units. Well 09-R13 is not located within the deepest portion of the proposed pit, but rather is within a proposed highwall where the post-mining surface elevation would be 5,130 feet (HSI 2010).

HydroSolutions, Inc. states, "As discussed in the SPSI (2010) report, GSM's proposed pit grade stays above the water table in the Tdf/ls aquifer and does not intend to penetrate either the FSZ confining unit or the Tb aquifer beneath. Thus, GSM anticipates there will not be ground water inflow into the pit" (HSI 2010). "The FSZ thins and is absent beneath a portion of the southeast flank of the proposed pit. Thus, if artesian conditions exist in the Tb aquifer, there is a potential for upward seepage into the pit..." And, "Groundwater quality of the Tb aquifer is better (and lower in ARD indicators) than that of the Tdf/ls aquifer. If upward seepage occurs from the Tb aquifer into the reclaimed pit, it would not introduce groundwater of lower quality" (HSI 2010).

The proposed East Area Pit is bounded on the west by the Range Front Fault and on the east by the Rattlesnake Fault. These faults may convey more flow than the clayey Tdf/ls units. None of the hydrostratigraphic units in the proposed East Area Pit produces much flow from individual wells. The well completed in the Bozeman Group produced only one gpm and production from wells in the Tdf/ls deposits ranges from <1 gpm to 3 gpm. Throughflow in the upper Tdf/ls unit was estimated at 34 gpm (DEQ and BLM, 2007).

Recharge to the area is from direct precipitation. HydroSolutions, Inc. stated in their report that "Removal of up to 300 feet of overburden in the proposed pit area would reduce the thickness of unsaturated material, which would reduce the water storage potential and could shorten the lag time of infiltration to reach the water table. However, the long term amount of recharge would not likely be affected, and other factors discussed below will have a larger bearing on whether a change in the groundwater recharge rate could be anticipated over the proposed East Area as a result of [the implementation of] GSM's proposed amendment" (HSI 2010).

HydroSolutions, Inc. lists the other factors affecting the groundwater recharge rate. The current high infiltration rate in the East Area is due to a largely unvegetated footprint. The proposed reclamation plan would cover this area with at least 31 inches of non-acid generating growth medium and revegetate it. With no vegetation and no overburden storage, precipitation readily infiltrates in disturbed areas. "The current infiltration rate and potential groundwater recharge rate over the proposed pit footprint is likely larger than will be the post-reclamation infiltration and recharge rate" (HSI 2010). "Uptake of precipitation and soil moisture by vegetation leaves less available for groundwater recharge. After establishment, GSM's revegetation as demonstrated on the EWRDC appears to be denser and more vigorous than the existing vegetation, which would increase the evapotranspiration demand over the current condition. This would result in an overall net decrease in recharge rate. The increase in the reclaimed slopes (2H:1V to 3H:1V) over the current topographic slopes along with lined storm water diversion channels would also tend to increase runoff and decrease infiltration related to large precipitation or snowmelt events over the proposed pit area. These several factors reducing groundwater recharge potential will more than offset the removal of the overburden and reduction in thickness of the unsaturated zone...and would still be less than the range used in the SEIS DSM" (HSI 2010).

Based on observations in the field and from monitoring well records, the Tdf/ls sediments do not produce much flow. In the vicinity of the proposed East Area Pit, the Range Front and Rattlesnake faults may be more important conduits for water than this lower hydraulic conductivity hydrostratigraphic unit. Prior to dewatering the Mineral Hill Pit, the Corridor Fault acted as a conduit for groundwater. Additionally, the Rattlesnake drainage interception well system may have contributed to dewatering the area.

The Rattlesnake Spring only produces about 0.3 gpm. This spring issues from an adit and appears to have been disrupted by exploration borehole plugging activities. Recent field surveys show water may be ponding below the spring. Until flow to this spring is re-established, wildlife drinking water would be trucked to the area and conveyed to a livestock trough.

3.1.2 Visuals

The proposed changes as part of Amendment 014 would be briefly visible to highway and interstate traffic from Interstate 90, Montana Highway 2 East, and Montana Highway 69. The East Area Pit area is in a disturbed drainage with the unvegetated Mineral Hill Pit highwall and partially vegetated EWRDC in the background. GSM proposes to reslope and revegetate all disturbances when mining is completed at the East Area Pit.

3.1.3 Geologic Hazards

The Mineral Hill Pit, the mill area, the EWRDC, and the tailings impoundments have all been impacted by the mass movement that occurred in the area in the early 1990s. All permitted disturbance areas have been analyzed for stability and measures have been taken to stabilize the Rattlesnake, Sunlight, and Swimming Pool blocks. GSM continues to monitor mass movement using inclinometers around the affected areas. Little movement has been documented since stabilization measures were implemented. Amendment 014 would be located within the previously permitted disturbance area.

The East Area Pit and TI2 raise also have been analyzed for stability. GSM has committed to implement all recommendations from the geotechnical engineering firm that prepared the studies.

3.1.4 Socio-economics

Currently, GSM has 173 employees and 78 contractors working at the mine. Since the mill shutdown in 2009, mill workers have been cross-trained and are removing waste rock from the Mineral Hill Pit. GSM estimates that milling operations would continue through the first quarter of 2015. Reclamation activities would continue beyond that date.

CHAPTER 4

CONSEQUENCES OF PROPOSED ACTION AND ALTERNATIVES

4.0 INTRODUCTION

Consequences of the No Action Alternative, Proposed Action, and Agency Modifications to the Proposed Action are identified, described, and analyzed in this chapter. Agency Modifications to the Proposed Action have been identified by DEQ and the BLM in Section 4.3 for the potentially impacted resources described in this chapter.

4.1. NO ACTION ALTERNATIVE

For the No Action Alternative the existing site would remain as is. There would be no changes to ground water quality and quantity, visual resources, and geologic hazards. The East Area Pit would not be mined so mining would cease earlier than with the Proposed Action. No additional jobs would be created. Processing of ore from off-site, including reprocessing of the McLaren tailings may be precluded if the tailings impoundment is not expanded.

4.2 PROPOSED ACTION ALTERNATIVE

4.2.1 GROUND WATER QUALITY AND QUANTITY

The main Mineral Hill Pit is located to the west of the Range Front Fault. The proposed East Area Pit would be located on the north end of the Rattlesnake Block between the Range Front Fault on the west and the Rattlesnake Fault on the east. These faults may convey more ground water flow than the clayey Tertiary debris and landslide deposits.

The proposed East Area Pit disturbance area would have an elliptical configuration. The pit wall height would vary from 75 to 300 feet. The proposed East Area Pit floor would not intercept ground water, or the Rattlesnake block slip surface. The pit walls would be resloped to fill the bottom of the pit to a depth of 40 to 50 feet, which would allow the pit to be free-draining.

It is not anticipated that groundwater inflow would occur in the pit. Because the pit would be developed above the Bozeman Group sediments and the confining layer of the FSZ, as well as being free-draining, impacts to water quality beneath the pit bottom are unlikely. As indicated by monitoring well 09-R13, groundwater in the Bozeman Group aquifer is under artesian pressure beneath the FSZ, with a static water level about 50 feet higher than the top of the Tbf at this location. However, because the pit excavation will not penetrate the FSZ, upward movement of groundwater from the Tbf into the Tdf/ls, if any such flow presently occurs, is not expected to be altered by development of the East Area Pit (HSI, 2010).

Recharge during active mining is expected to be reduced by pumping collected storm water from the East Area Pit area. Approximately 15 gpm of recharge would be captured from the pit, based on a pit area of 24 acres and 12 inches annually of rain without evaporation. Because of high

evaporation rates at the site, the actual volume of storm water is expected to be much lower. GSM would meter water pumped from the pit sump during operations.

No impacts to agricultural use of the Jefferson River Slough are expected from the proposed project. Groundwater flow rates in the flowpath associated with the Rattlesnake drainage are already low and are largely intercepted by the Rattlesnake drainage interception wells.

GSM has not proposed operational diversion of storm water around the pit. Operationally, and prior to reclamation, any groundwater and runoff collected in the pit would be pumped out as it accumulates. The water would be incorporated into the milling circuit and would offset freshwater makeup demand. Any excess water would be routed directly to TI2. Treated water from the water treatment plant in the mill would be supplemented with additional lime to treat excess water routed to TI2 during operations. Prior to closure, GSM has proposed to pump and, if needed, treat East Area Pit storm water. Alternately, GSM could route higher quality water, if approved by the agencies, to the LAD area.

Upon closure of the East Area Pit, storm water runon would be routed around the East Area Pit using berms and/or infiltration basins designed for the 100-year storm event. Within the East Area Pit, lined diversions would be constructed on reclaimed slopes to route storm water runoff off these slopes. The diversions would tie into the existing storm water diversion system for the mine site. The lowest portion of the pit below the diversions would receive direct precipitation that capping and revegetation should absorb. Precipitation that is not absorbed would flow along the sloped surface of the East Area Pit and drain out through a lined drainage channel. The East Area Pit would not significantly change the volume of water reporting to the primary groundwater flowpaths from the Mineral Hill Pit and the EWRDC (HSI, 2010). The analysis of the project conducted by HydroSolutions concluded that reclamation of the East Pit would slightly reduce infiltration to groundwater compared with the area's current condition; however, the current condition is largely disturbed and unvegetated. These lands would be reclaimed during closure of the Golden Sunlight mine regardless of whether or not the East Pit is developed; consequently, infiltration would be reduced compared to current conditions in either case.

Resloping the East Area Pit walls and filling the bottom of the pit to a depth of 40 to 50 feet would not impact water quality as backfilling the Mineral Hill Pit would. This is because the Mineral Hill Pit has been excavated below the water table whereas the East Area Pit would not be. Also, the fill material in the East Area Pit bottom would be derived from overburden exposed in the upper pit walls and/or material from previously approved borrow areas. These sources of fill would be less geochemically reactive than the material which would be removed from the deepest portions of the East Area Pit during mining; thus, contaminant loading would be similar to, or less than, the natural pre-mining condition (HSI, 2010). Reclamation of the Mineral Hill Pit in a similar manner would not be possible because the volume of material that would be necessary to backfill that pit to a free-draining condition would greatly exceed the available quantity of non-reactive waste rock and on-site borrow material (DEQ and BLM, 2007).

In summary, effects on groundwater quantity and quality resulting from development and reclamation of the East Pit are predicted to be minor. Collection of storm water in the pit sump during operations, and subsequent reclamation of the pit area are both predicted to slightly reduce local recharge to groundwater compared with current conditions. Downgradient of these wells, no changes in groundwater availability are predicted. Removal of waste rock material currently located on the land surface at the East Pit site, and removal of ore from the pit followed by partial filling of the pit with material having a lower potential to generate acid and release metals, would result in slight improvements in local groundwater quality compared with current conditions. Implementation of the project would not alter water quality and quantity predictions associated with the approved closure plan for the Mineral Hill pit that involves maintenance of a dewatered underground sump beneath that pit (HSI, 2010).

4.2.2 VISUALS

The proposed East Area Pit would encompass 24 acres of previously disturbed ground east of the Mineral Hill Pit and north of the plant site. The acreage permitted for disturbance at GSM is 3,101 acres. At final build-out, the Mineral Hill Pit will have a maximum disturbance of 311 acres. In comparison, the East Area Pit would create a feature less than 8 percent of the size of the Mineral Hill Pit, in a lower and less prominent topographic area.

The proposed East Area Pit would be briefly visible from Interstate 90, Montana Highway 2 East, and Montana Highway 69. The proposed East Area Pit would be located in a disturbed drainage. The pit would be partially filled, regraded, and revegetated. When fully revegetated, the pit would still resemble a man-made feature covered with grass rather than a natural landscape covered with grass, forbs, and dominated visually by trees and shrubs. However, approximately 90% of the location proposed for the East Area Pit is currently disturbed and not vegetated. Plant productivity and cover would return but native plant species diversity would not.

The 20-foot raise on TI2 would result in minimal changes to the final reclaimed topography on TI2 . The additional waste rock placed in the EBDE Waste Rock Dump would not be noticeable to travelers on local highways.

The excavation of the proposed pit and the 20-foot TI2 raise would not change the overall visual quality in the area as the viewshed is dominated by the Mineral Hill Pit and East Waste Rock Dump Complex. Overall, additional visual impacts would be minimal.

4.2.3 GEOLOGIC HAZARDS

4.2.3.1 Stability Analyses of the East Area Pit and Surrounding Area

A geotechnical evaluation of the East Area Pit was conducted in 2010 by Golder Associates (Golder 2010b). Golder evaluated three cases:

- Case 1 – Conditions in 1994 at the time when earth block displacements were initially recognized. The ground surface profile for this case is based on topography after

excavation of the North Borrow Area, and prior to construction of the existing Buttress Dump (back analysis);

- Case 2 – Existing conditions, including the existing Buttress Dump, but prior to excavation of the East Area Pit (back analysis); and

- Case 3 – Conditions after excavation of the East Area Pit.

As a result of these analyses Golder concluded that excavation of the proposed-pit would have a neutral effect on the global stability of the Rattlesnake Block. Golder stated "*Briefly, the Sunlight and Rattlesnake Blocks are interlocked along the Rattlesnake Fault, and displacement of the Sunlight Block in 1994 initiated the displacement of the Rattlesnake Block. In turn, displacement of the Rattlesnake Block reduced confinement of the toe of the Swimming Pool Block, which allowed that block to move. Combined with other factors, these interactions suggest the following:*

- *Continued displacement of the Sunlight Block would result in displacement of the Rattlesnake Block, with or without the proposed[East Area] pit.*

- *The Buttress Dump that is under construction at the toe of the Sunlight Block is intended to improve the stability of that block, and this should indirectly improve the stability of the Rattlesnake Block.*

- *Although the Swimming Pool Block has not been monitored with inclinometers, it is understood that GSM have observed no indications of significant displacement of this block since the 1994-1995 timeframe (ground cracks, toe heaves, etc.). This despite steady, albeit slow displacement of the Rattlesnake Block. Although stability of the Swimming Pool Block has not been a significant issue since 1994-1995, Sunlight Block Buttress Dump construction, by improving the stability of the Rattlesnake Block, should also improve the stability of the Swimming Pool Block."*

A separate evaluation focusing on local pit wall stability, stability of the mill complex foundations, and Swimming Pool Block stability is currently being conducted. This report will include recommendations for monitoring the Rattlesnake Block and recommendations for emergency actions if excessive displacements were observed. GSM has committed to comply with all recommendations made by the geotechnical engineers for the East Area Pit design.

4.2.3.2 Stability Analyses of the Tailings Impoundment 2 Raise

The proposed plan would raise the level of the tailings in TI2 from the approved elevation of 4,750 feet to ultimate design elevation of 4,770 feet. A slope stability analysis was performed (AMEC, 2010). The results indicate that the proposed tailings impoundment raise would not adversely impact the stability of TI2.

In addition, a geotechnical report (Golder 2010c) notes that stability analysis indicates that there is no significant possibility of localized slope failures associated with pre-sheared surfaces in the

upper part of the fluvial Bozeman Group (Tbf), or flow landslides of the impounded tailings. Furthermore, large, earth block movements, over and downslope of the tailings impoundments (comparable to the Sunlight and Rattlesnake block landslides) are not kinematically possible.

4.2.3.3 Stability of East Buttress Dump Extension

No new waste rock dump acreage would be required by the East Area Pit. Waste rock from the East Area Pit would be placed in the EBDE. It was noted in the Draft EA for Amendment 012 that "GSM proposes to increase the thickness of the EBDE from 150-200 feet to approximately 380 feet, however the actual height of the dump would only be increased by 50 feet due to the configuration of the land beneath the proposed dump area" (GSM 2009) The EBDE was designed to contain additional capacity. There are no proposed changes to the EBDE as approved by the agencies on February 17, 2010.

Geotechnical analyses submitted by GSM evaluated the waste rock dump (Golder, 2010d). Analyses indicated that the proposed EBDE would increase global stability of the Sunlight Block, with a resultant change in the Factor of Safety (FOS) from 1.05 to 1.28 based on 3-D analyses.

GSM committed to further analyze the final natural regrade designs to ensure that waste rock dump stability objectives are obtained. GSM has also agreed to implement all stability and monitoring recommendations made by Golder Associates (Golder 2009).

Golder analyzed the potential for a structural block similar to the Sunlight Block to impact TI2. Concerns had been raised that activities at GSM could initiate the movement of such a structural block, causing it to slide against and override or otherwise disrupt TI2. The report qualified the type and magnitude of such movement by stating that this type of movement "would involve shearing along a continuous horizon within the Bozeman Formation at the top of the alluvial facies. This horizon daylights to topography south of the East Dump, but well north of TSF #2 [TI2]. Therefore, if construction of the East Dump caused displacement of this block, the movement would not impact TSF#2 [TI2]" (Golder 2010e).

A separate Golder report (Golder 2010f) analyzed the stability of the East Dump during an earthquake of a specified (design) magnitude. The EWRDC is topographically upslope of the proposed East Area Pit. Golder concluded that should such an earthquake occur, "Based on the analyses for Section 1, estimated permanent displacements during the design seismic event are between 2 and 6 feet. These results indicate that large-scale failure of the East Dump, with debris reporting to areas outside of the immediate footprint area, is unlikely." The report also notes, "Permanent displacements are likely for the Sunlight Block under the design seismic event, even after buttress construction. However, buttress construction would significantly reduce permanent displacements compared to the existing conditions. After buttress construction, estimated average permanent displacements are 4 to 6.5 feet."

Golder was asked to analyze the stability of the Sunlight Block and the EBDE after reclamation. The report also notes "The FOS for internal stability of the proposed Buttress Dump at a reclaimed slope of 2.5H:1V is approximately 1.96. The FOS for local stability of the Buttress

Dump, which involves potential failure surfaces controlled in part along the existing Sunlight Block slip surface, are comparable to the FOS for global stability of the Sunlight Block after Buttress Dump construction (Golder 2010f)."

4.2.4 SOCIO-ECONOMICS

Development of the East Area Pit mineral resource in 2010/2011 would bring taxable revenue to GSM six to nine months earlier than without the project. Further, the applicant states that the East Area Pit Project would generate the following additional tax revenue: $759,000 in local taxes and $528,000 in state taxes. These benefits would be important to the local school districts (GSM 2010d).

Maintaining high levels of waste rock haulage for the Mineral Hill Pit Stage $5B_{OP}$ concurrent with both mining and mill operations for the East Area Pit would provide temporary employment benefits and benefits to contractors. The East Area Pit project is not expected to impact the requirements for housing mine employees above the current levels.

An early mill start-up using the ore produced from the East Area Pit would provide for the processing of off-site ores six to nine months sooner than without the project. This timing is critical to several projects, including the McLaren Tailings Project.

Currently, mill personnel are engaged in efforts to lay back the Mineral Hill Pit highwall. The mill workers would continue in these efforts until ore can be run through the mill from the proposed East Area Pit. Continuation of work laying back the Mineral Hill Pit highwall would provide temporary employment for about 20 people for about nine months, replacing the mill workers as they returned to working in the mill. The East Area Pit would be contract mined, with about 25 people being employed.

Overall, socio-economic impacts would be relatively minor and benefits would be short-lived but important to the local economy.

4.3 AGENCY MODIFICATIONS TO THE PROPOSED ACTION

The agencies would require GSM to monitor the East Area Pit water quality and volume during operations and to treat the water at the water treatment plant if necessary.

The agencies would review the geotechnical engineers' final stability report when completed. GSM would have to commit to implement the engineers' recommendations as well as agency measures identified in the review.

4.4 CUMULATIVE IMPACTS

There are no other proposals in the area that would add to the cumulative effects from this proposal. The inactive Montana Tunnels Mine and the approved-but-not-permitted Elkhorn Golden Dream Project could have cumulative impacts on Jefferson County employment and taxes. No major changes are proposed for the Montana Resources Mine in Butte.

4.5 UNAVOIDABLE ADVERSE EFFECTS

There would be no significant impacts associated with this proposal. As noted, there would be minimal impacts to geology and water quality and quantity with implementation of the mitigations required by the agencies. Disturbance, competitiveness of invasive non-native species, as well as weed control efforts would reduce native plant diversity in the area. This is an irreversible and unavoidable adverse impact.

4.6 NEED FOR FURTHER ANALYSIS

DEQ has concluded from the analysis in this EA that the Proposed Action with agency mitigations would not cause significant impacts to the human environment, therefore, an EA is the appropriate level of analysis, and no further analysis is needed. DEQ proposes to permit the Proposed Action with agency mitigations. This decision could change after consideration of any substantive comments received on the EA.

CHAPTER 5

CONSULTATION AND COORDINATION

5.0 CONSULTATION AND COORDINATION

DEQ and the BLM published a legal notice and press release about the application for amendment of Operating Permit 00065 in the Whitehall *Ledger*, Helena *Independent Record*, Missoula *Missoulian*, Billings *Gazette* and Great Falls *Tribune* starting in May, 2010 for three successive weeks. No comments were received. The agencies sent a deficiency letter on the application in July 2, 2010. The application was determined to be complete on August 11, 2010. Additional information was subsequently submitted during the preparation of the EA. Another legal notice and press release will be issued with the Draft EA.

EA reviewers and preparers

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R David Williams, BS, Geology; MS, Metamorphic and Igneous Petrology

Montana Department of Environmental Quality

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Jim Castro, BS, Chemistry; MS, Physical Chemistry; PhD, Geochemistry

Charles Freshman, BS, Geology; BS, Civil/Environmental Engineering; MS Geological Engineering; PE

Wayne Jepson, BS, Earth Sciences; MS, Geology

Warren McCullough, BA, Anthropology; MS, Geology

Patrick Plantenberg, BS, Agricultural Science/Recreation Area Management; MS, Range Science/Reclamation Research

Herb Rolfes, AAS, Chemical Engineering; BA, Earth/Space Science; MS, Land Rehabilitation

CHAPTER 6

REFERENCES

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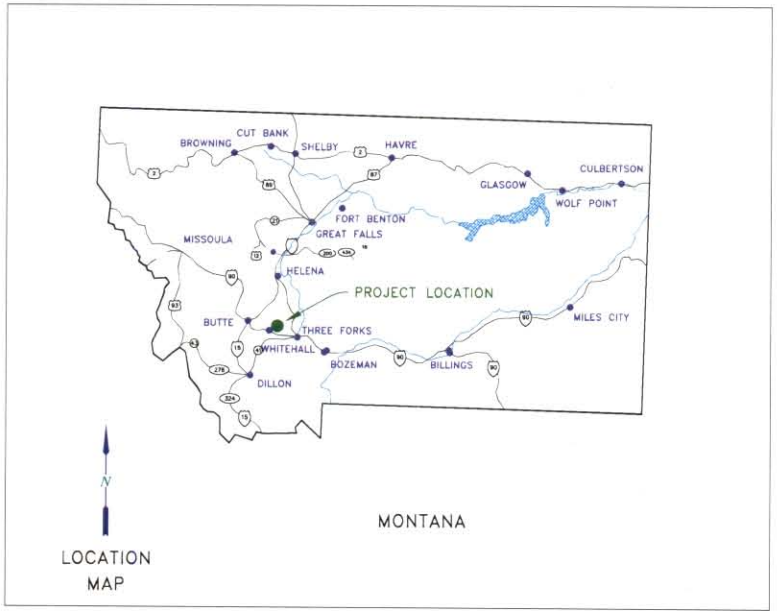
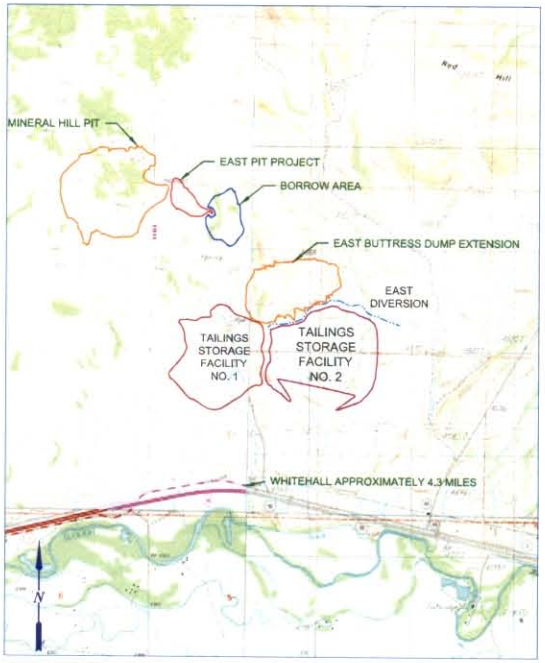
BARRICK
GOLDEN SUNLIGHT



VICINITY MAP



MAP REFERENCES:
USGS TOPOGRAPHIC MAPS OF THE DOHERTY MOUNTAIN, MT (1987), BLACK BUTTE, MT (1963), JEFFERSON ISLAND, MT (1987), AND WHITEHALL, MT (1963) QUADRANGLES.

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DATE	10/2010
SCALE	graphical

FIGURE 1
GENERAL LOCATION MAP
MINE FACILITY EXPANSION
BARRICK GOLDEN SUNLIGHT MINE
JEFFERSON COUNTY, MONTANA

AMEC DRAWING NO: 9417000889Sheet1.dwg

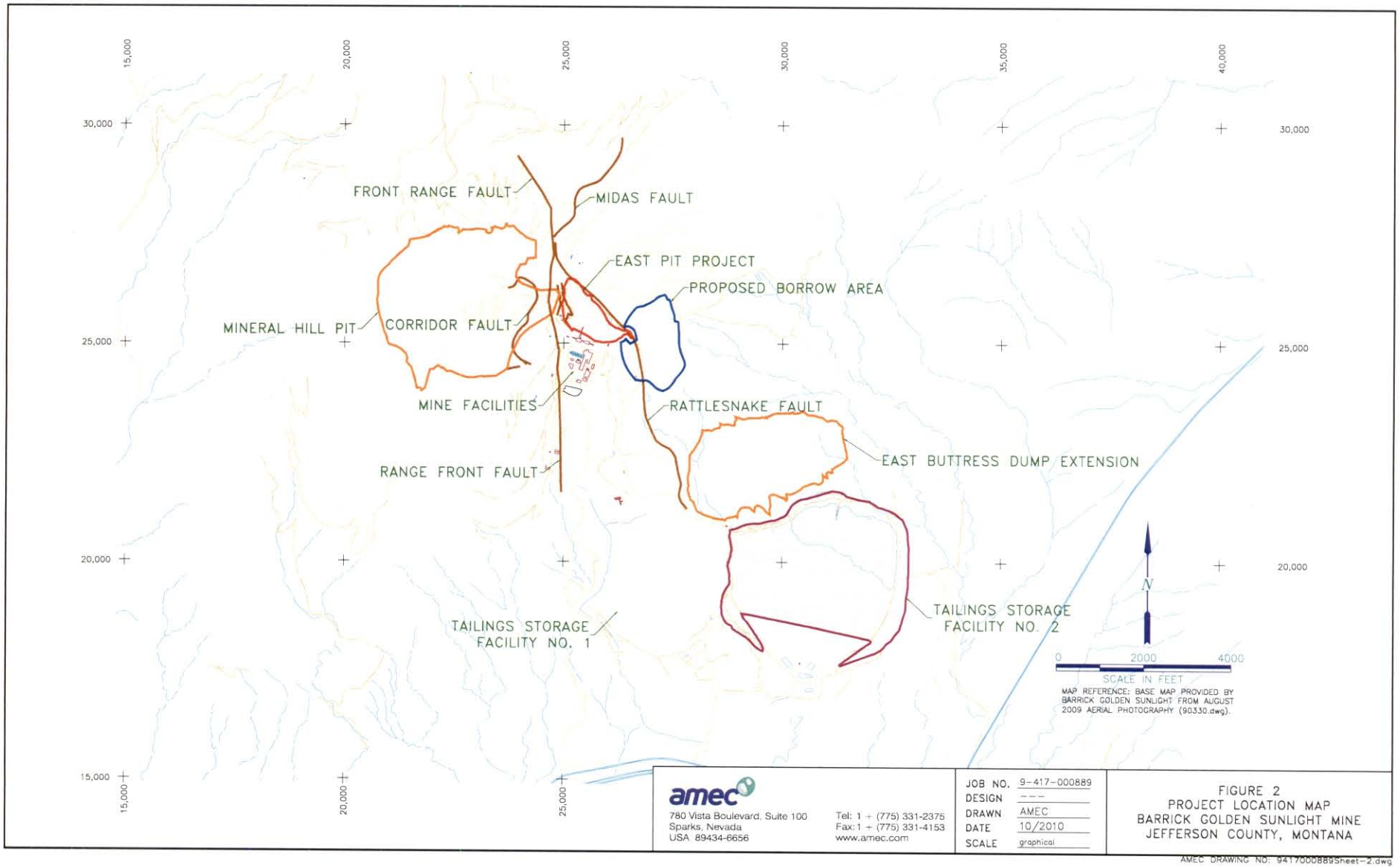

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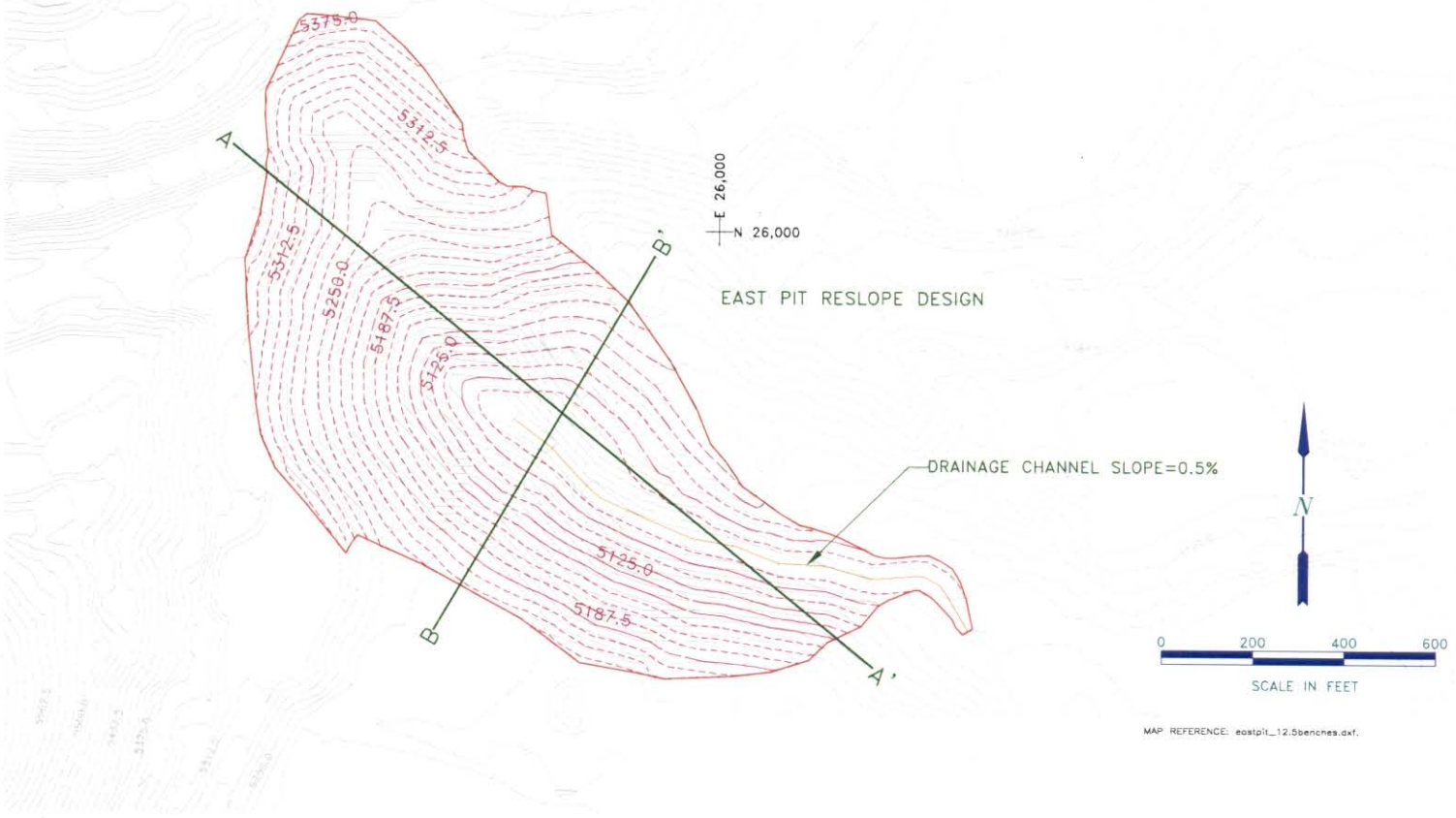
FIGURE 2
PROJECT LOCATION MAP
BARRICK GOLDEN SUNLIGHT MINE
JEFFERSON COUNTY, MONTANA

AMEC DRAWING NO: 9417000889Sheet-2.dwg



MAP REFERENCE: eastpit_12.5benches.dxf.

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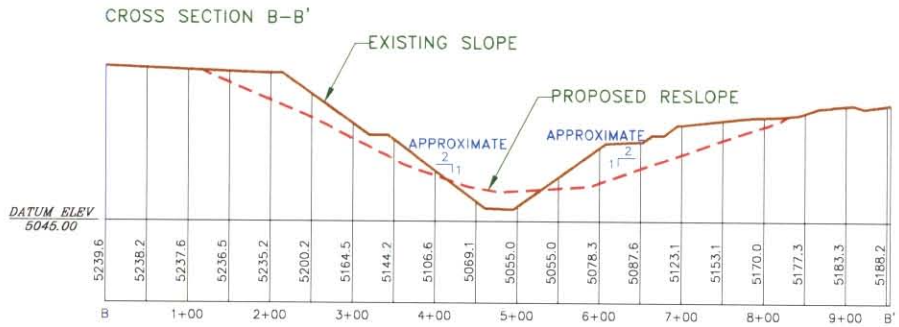
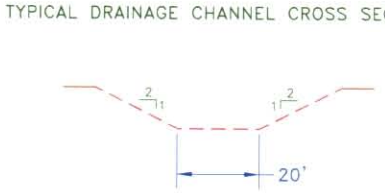
FIGURE 3
EAST PIT RESLOPE DESIGN
EAST AREA PROJECT
BARRICK GOLDEN SUNLIGHT MINE
JEFFERSON COUNTY, MONTANA

AMEC DRAWING NO: 941700889Sheet-3.dwg





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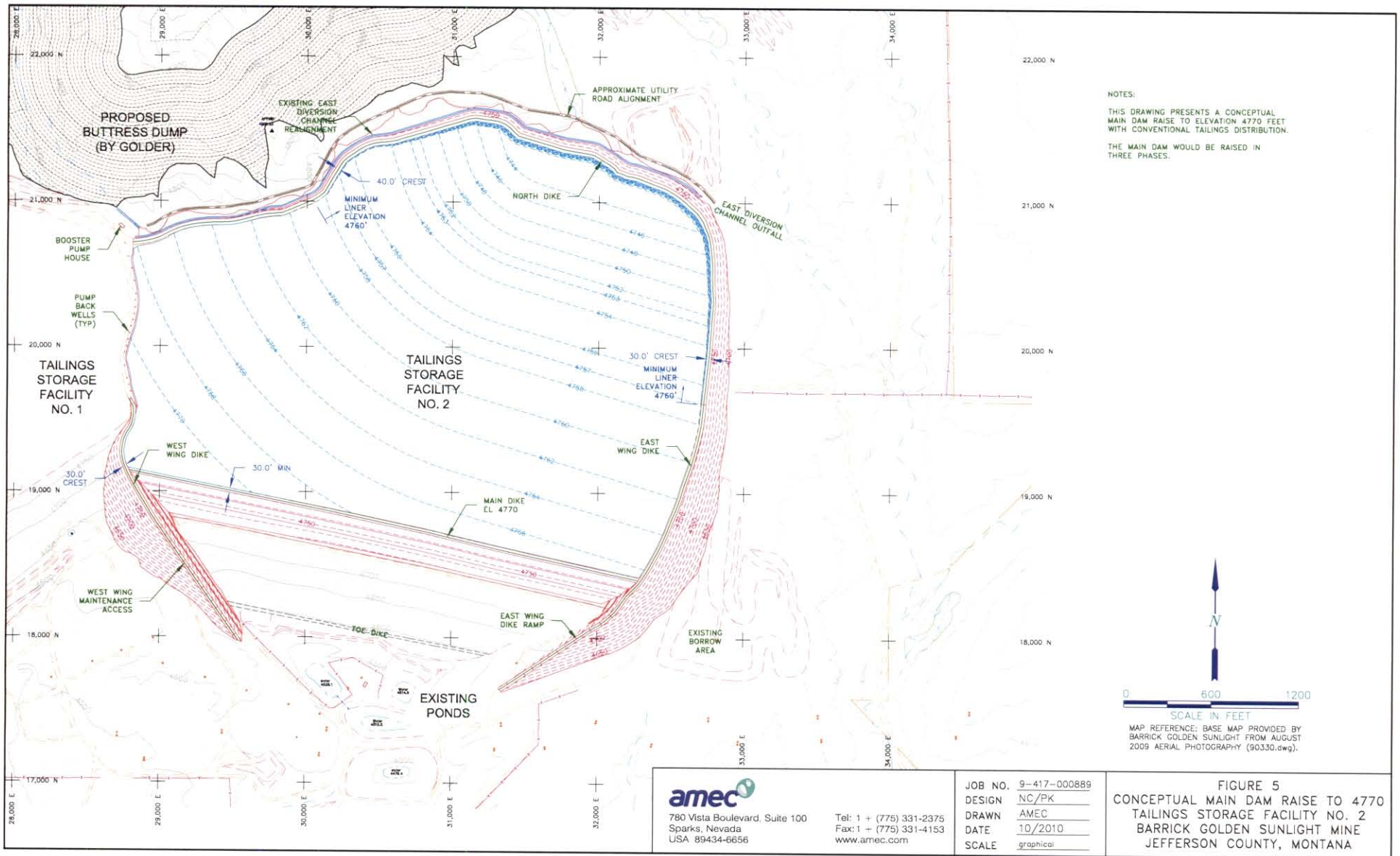
SCALE	graphical

FIGURE 4
EAST PIT RESLOPE CROSS SECTIONS
EAST AREA PROJECT
BARRICK GOLDEN SUNLIGHT MINE
JEFFERSON COUNTY, MONTANA

AMEC DRAWING NO: 9417000889Sheet-4.dwg



NOTES:

THIS DRAWING PRESENTS A CONCEPTUAL MAIN DAM RAISE TO ELEVATION 4770 FEET WITH CONVENTIONAL TAILINGS DISTRIBUTION.

THE MAIN DAM WOULD BE RAISED IN THREE PHASES.

MAP REFERENCE: BASE MAP PROVIDED BY BARRICK GOLDEN SUNLIGHT FROM AUGUST 2009 AERIAL PHOTOGRAPHY (90330.dwg).

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FIGURE 5
CONCEPTUAL MAIN DAM RAISE TO 4770
TAILINGS STORAGE FACILITY NO. 2
BARRICK GOLDEN SUNLIGHT MINE
JEFFERSON COUNTY, MONTANA

AMEC DRAWING NO: 9417000889SHEET-5.dwg