Final Environmental Impact Statement for the Bald Mountain Mine North Operations Area Project

August 2009

U.S. Department of the Interior
Bureau of Land Management
Ely District Office
Nevada

Cooperating Agency: Nevada Department of Wildlife

BLM

BLM Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM/NV/EL/ES-GI08/05+1793

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Egan Field Office
HC33 Box 33500 (702 N. Industrial Way)
Ely, Nevada 89301-9408
http://www.blm.gov/nv/st/en/fo/ely_field_office.html

In Reply Refer To:
380910 NVL0100
N82888

Dear Interested Public:

Please find enclosed one copy of the Bald Mountain Mine, North Operations Area Project Final Environmental Impact Statement (FEIS), dated August 2009. This EIS evaluates the environmental impacts that would result from expanding and combining the existing Bald Mountain and Mooney Basin mines operated by Barrick Gold U.S. Inc. The project is located on public lands managed by the Egan Field Office, Ely District Bureau of Land Management (BLM) in northeast Nevada, approximately 65 miles northwest of Ely, White Pine County, Nevada. This document provides an evaluation of this proposed project in accordance with the National Environmental Policy Act of 1969 and associated regulations. The purpose of this document is to help the BLM Ely District Office and the cooperating agencies in their decision-making process.

The Proposed Action would result in combining the Bald Mountain Mine and Mooney Basin Plan of Operations boundaries to become the North Operations Area Project. The Proposed Action would result in an increase of disturbances from 4,160 acres to 8,085 acres. Existing facilities, including pits, rock disposal areas, heap leach pads, processing facilities, and interpit areas are proposed for expansion. New facilities under the Proposed Action would include one new pit, four new rock disposal areas, associated haul roads, topsoil stockpiles, and a remote truck shop facility.

Alternatives that were analyzed in this FEIS include the Proposed Action, No Action Alternative, Partial Backfill Alternative, and the Mooney Basin Heap Leach Pad Alternative. The Ely District's preferred alternative is the Partial Backfill Alternative because it meets the purpose and need while reducing environmental impacts.

The BLM compiled a Draft EIS that was issued to the public on December 19, 2008 with publication of the Notice of Availability (NOA) in the *Federal Register*. The NOA initiated a public comment period that ended on February 2, 2009. Public meetings were held on the Draft EIS in January 6-8, 2009 in Ely, Elko, and Eureka, Nevada. Individuals, public agencies, and non-profit organizations submitted 17 letters containing comments on the DEIS. The comments received and responses to these comments are contained in Appendix C of the FEIS. Some comments resulted in modifications to the EIS.

The publication of the NOA for the Final EIS in the Federal Register initiates a 30-day availability period. Following the 30-day availability period, the BLM may issue one or more Records of Decision based on the Final EIS. Persons wishing to provide BLM with comments

Lynn Bjorklund
Bureau of Land Management
Ely District Office
HC 33 Box 33500
Ely, Nevada 89301-9408

Email lynn_bjorklund@nv.blm.gov

Comments, including name and street addresses of respondents, will be available for public review at the Ely District Office during the regular business hours of 7:30 a.m. through 4:30 p.m., Monday through Friday, except holidays. You may request confidentiality if you are commenting as an individual, but you must state this prominently at the beginning of your written comments. Such requests will be honored to the extent allowed by law. Anonymous or illegible comments will not be considered. All submissions from organizations and businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be available for public inspection in their entirety.

If you have additional questions you can call Lynn Bjorklund at 775 289-1893.

Sincerely,

Jeffrey A. Weeks
Field Manager
Egan Field Office

FINAL ENVIRONMENTAL IMPACT STATEMENT
BALD MOUNTAIN MINE
NORTH OPERATIONS AREA PROJECT

LEAD AGENCY:	U.S. Department of the Interior, Bureau of Land Management
COOPERATING AGENCIES:	Nevada Department of Wildlife
JURISDICTION:	White Pine County, Nevada
CONTACT INFORMATION:	Correspondence on this Final Environmental Impact Statement should be directed to:

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ABSTRACT

This Final Environmental Impact Statement (EIS) evaluates the impacts on the environment that would result from the expansion of current mining operations at the Bald Mountain Mine. The proposed project would be located on public land located in White Pine County, Nevada, approximately 65 miles northwest of Ely, Nevada. The Proposed Action would include expansion of open pits, rock disposal facilities, heap leach facilities, and haul roads. The Proposed Action would also include development of one new pit and associated rock disposal facility, a truck shop, and top soil stockpiles. In addition, the Proposed Action would combine the existing Bald Mountain Mine Plan of Operations boundary and the Mooney Basin Operations Area boundary into one Plan of Operations, called the Bald Mountain Mine North Operations Area Project. This combined boundary would encompass 16,465 acres (approximately 16,392 acres are public land and approximately 73 acres are private land). The Proposed Action would result in an additional 3,920 acres of disturbance for a total of 8,085 acres of disturbance within the new Plan of Operations boundary.

Three alternatives were carried through in the analysis and include the No Action Alternative, Partial Backfill Alternative, and Mooney Basin Heap Leach Pad Alternative. The Ely District's preferred alternative is the Partial Backfill Alternative because it meets the purpose and need while reducing environmental impacts.

The BLM is responsible for administering mineral rights access on certain federal lands as authorized by the General Mining Law of 1872. The BLM Egan Field Office has the responsibility and authority to manage the surface and subsurface resources on public lands located within this division of the Ely District. The BLM must review the Plan of Operations to ensure use of public land in the Egan Resource Area is in conformance with BLM's Surface Management Regulations (43 Code of Federal Regulations 3809) and other applicable statutes, including the Mining and Mineral Policy Act of 1970 (as amended) and Federal Land Policy and Management Act of 1976 (as amended). This Final EIS satisfied the National Environmental Policy Act, which mandates that federal agencies analyze the environmental consequences of major undertakings.

Official Responsible for the Environmental Impact Statement:

Jeffrey A. Weeks
Field Manager, Egan Field Office

July 15, 2009
Date

BALD MOUNTAIN MINE
NORTH OPERATIONS AREA PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

SUMMARY

Barrick Gold U.S., Inc. (Barrick) proposes to expand current mining operations at several existing pits, rock disposal areas, heap leach pads, processing facilities, and interpit areas. The expansion would combine the existing Bald Mountain Mine (BMM) Plan of Operations boundary and the Mooney Basin Operations Area boundary into one Plan of Operations, called the BMM North Operations Area Project. In addition, new facilities under the Proposed Action would include a pit, rock disposal areas, haul roads, topsoil stockpiles, and a truck shop. The BMM North Operations Area Project is located in northeast Nevada, approximately 65 miles northwest of Ely, White Pine County, Nevada.

Barrick proposes to mine additional ore by expanding the existing pits, rock disposal areas, and associated facilities. New features include one additional pit, a remote truck shop, and an additional power line. All waste rock would be placed in expanded or new rock disposal areas. All ore would be trucked to one of two existing heap leach facilities for processing. Both heap leach facilities would be expanded under the Proposed Action.

The combined North Operations Area Project boundary would encompass 16,465 acres (approximately 16,392 acres are public land and approximately 73 acres are private land). Combining the two Plan of Operations boundaries would increase the existing plan boundaries by 3,738 acres. The current authorized disturbances for the BMM and Mooney Basin Operation Area projects are 3,418 acres and 742 acres, respectively. The Proposed Action would result in an additional 3,920 acres of disturbance for a total of 8,085 acres of disturbance within the new Plan of Operations boundary. All of the non-private land disturbed by the current project and proposed under the BMM North Operations Area Project is administered by the Bureau of Land Management (BLM).

Nine alternatives to the Proposed Action were identified and considered during the scoping process. Three of the nine identified alternatives were carried through the analysis. The six alternatives not carried through the analysis were eliminated because they did not meet the Purpose and Need, were not feasible, and/or did not provide an environmental benefit. The three alternatives carried through in the analysis included the Partial Backfill Alternative, the Mooney Basin Heap Leach Pad Alternative, and the No Action Alternative.

The Partial Backfill Alternative (Alternative A, BLM Preferred Alternative) would include partial backfill of up to six open pits. This would result in smaller rock disposal areas by reducing the quantity of material they would contain. All other operations would remain the same as identified in the proposed Plan of Operations Action. The Mooney Basin Heap Leach Pad Alternative (Alternative B) would include a redesign of the Mooney Basin leach pad to reduce the disturbance footprint. To accommodate the smaller footprint, the BMM pad would be modified to facilitate additional ore. All other operations under the proposed Plan of Operations Action would be the same. The No Action Alternative would result in operations continuing under the existing approved Plans of Operations. Under the current approved Plan of Operations, it is anticipated that activities would be completed in 2009 for both the BMM and Mooney Basin Operations Area.

The resources addressed in this Final Environmental Impact Statement (FEIS) are identified in the following sections, which include a summary of the important issues and impact conclusions for each resource. Additional details are provided in Chapters 3.0 and 4.0.

Water Resources

Surface Water

Surface water is limited in the Proposed Action area due to the lack of seeps and springs, low precipitation, and high evaporation rates. There are no perennial drainages within the Proposed Action boundary. All the drainages are ephemeral. In general, established background water quality levels are good with the exception of arsenic, which exceeds the 0.05 mg/l Nevada water quality standard.

Issues:

- Increases in wind and water erosion from disturbed areas leading to increased sedimentation of drainages;
- Potential drainage from rock disposal areas;
- Spring recharge reduction; and
- Contamination of surface water from chemical spills.

Conclusion:

Implementation of appropriate Best Management Practices such as interim seeding of stockpiles, diversion channels, straw bales, silt fences, and sediment ponds would eliminate or minimize the potential impacts associated with increasing sedimentation to the ephemeral drainages in the Proposed Action area.

The Proposed Action would include expansion of existing pits, with one new pit planned. Since the Proposed Action is primarily an expansion of existing pits, waste rock is expected to be similar in nature to waste rock that has previously been encountered. Ongoing monitoring under the existing Water Pollution Control Permit would continue to be used to characterize the waste rock from the open pits. Based on current testing, no impacts from water with low pH and/or high metals content seeping from the rock disposal areas are anticipated.

A decrease in recharge to one spring located within the Plan of Operations boundary may occur due to the placement of waste rock. A portion of the recharge area for Cherry Spring would be covered with waste rock. This may result in a reduction in the amount of recharge to Cherry Spring due to water entrained within the rock. This may lower the water level of the local aquifer feeding the spring. It is noted that recently no water has emanated from Cherry Spring and recent monitoring from a development pipe indicates water is well below the surface.

Current chemical handling practices used by Barrick would continue to be followed to assure proper handling of solvents, fuels, and other chemicals. In the event of a spill, the Spill Prevention Control and Countermeasures Plan would be followed to address emergency response, notifications, and cleanup of spilled material.

Groundwater

Two groundwater systems have been identified by Mine Mappers (2007): a local groundwater system including deep bedrock zones and an alluvial fill groundwater system located in the valleys. The groundwater quality is generally good with arsenic levels generally at or near applicable Nevada standards.

Issues:

- Increased withdrawal of groundwater for processing;
- Intersection of local groundwater by open pits; and
- Degradation of groundwater quality.

Conclusion:
The Proposed Action would result in an increase in the current groundwater production rates to meet the demand for processing water. The anticipated increase is approximately 250 acre-feet per year, for a total of approximately 550 acre-feet per year. The estimated radii of the cones of depression for the BMM and Mooney Basin wells are 202 feet and 138 feet, respectively. There are no other water users, seeps and springs, or other water features within the cones of depression for the water production wells; thus no impacts to other groundwater users would result from the proposed increase in water production. No impacts to groundwater associated with the Ruby Lake National Wildlife Refuge would occur as a result of the Proposed Action.

Interception of the deeper groundwater aquifer is not anticipated since the bottom of the open pits would lie above the identified potentiometric surface. The pits may encounter isolated occurrences of saturated material, but the amount of water is anticipated to be small. Characterization of pit wall rock has indicated that degradation of water contacting this wall rock would not occur. If water is encountered in saturated zones, the water would be pumped out of the pit and handled in a manner consistent with the Water Pollution Control Permit.

No impacts to water quality from the heap leach pads are anticipated as they are double lined with leak detection systems. Operations of the leach pads would be similar to current operations although the leach pads would be expanded.

Geology and Minerals
Mining has occurred in the Bald Mountain Area since the late 1800s. Minerals recovered include copper, antimony, silver, and gold. Most of the early mining occurred next to a small granitic intrusion south of Big Bald Mountain. Large-scale commercial gold mining began in the area in 1976 at the Alligator Ridge Mine. Previous and current mining operations have occurred in five areas resulting in 26 open pits, 30 rock disposal areas, 10 heap leach pads, and seven process ponds. Sedimentary rock in the Proposed Action area consists of Paleozoic limestone, dolomite, shale, quartzite, siltstone, and sandstone. These have been intruded by Mesozoic age granitic porphyry, which is directly associated with the districts wide alteration.

Issues:

- Removal of ore and waste rock; and
- Future availability of mineral resource.

Conclusion:
Approximately 200 million tons of ore and 830 million tons of waste rock would be removed during the expansion of the existing pits and creation of one new pit and the known gold reserve would be depleted. Waste rock would be permanently placed in one of the existing (expanded) or proposed new rock disposal areas or used to backfill portions of one or more of the open pits. The ore material would be permanently removed and placed on one of the two existing but expanded heap leach pads. The rock disposal areas and heap leach pads would be reclaimed following cessation of mining and processing operations.

Paleontology
No fossils have been identified in the BMM or Mooney Basin areas that have been classified as rare or important. The presence of fossils is uncommon in the vicinity of the Proposed Action

area, most likely due to the regional metamorphic activity. Fossils that have been discovered primarily include algae and invertebrates from the Cambrian period. Fossils in other period rocks include waterfleas, echinoderms, bryozoans, foraminiferans, and algae.

Issues:
- Loss of paleontological resources by removing rock containing fossils.

Conclusion:
No impacts to significant or critical fossil resources that require protection are anticipated with implementation of the Proposed Action, as none are known to exist in the area of the Proposed Action.

Soils
There are 16 soil associations present within the Proposed Action area, based on the Natural Resource Conservation Service Soil Survey of Western White Pine County (NRCS, 1998). The physical and chemical properties of the soils were evaluated to identify factors that may limit successful reclamation. It is estimated that 7.3 to 11.7 million cubic yards of growth medium would be available for salvage in the 3,920 acres to be disturbed under the Proposed Action.

Issues:
- Loss of productive topsoil in disturbed areas;
- Increased erosion from wind and water; and
- Contamination of soil from chemical spills.

Conclusion:
Approximately 3,920 acres of disturbance to soils would occur with approval of the Proposed Action. This disturbance would include removal of the salvageable growth medium, resulting in impedance of soil development and reduction or elimination of biological activity during stockpiling of the material. After placement of the salvaged soil during reclamation, soil biological activity would slowly increase to pre-disturbance levels. The original soil structure would be permanently altered; however, new soil profiles would develop over time.

Removal of soil and stockpiling the soil for use during reclamation would result in an increased risk of wind and water erosion. Use of appropriate Best Management Practices such as revegetation of stockpiles, silt fences, straw bales, and sediment basins would minimize soil losses from water and wind erosion. In addition, use of water or binding agents on disturbed areas (roads, rock disposal areas, etc.) would be used to minimize dust generation and off-site deposition.

Current chemical handling practices used by Barrick would continue to be followed to assure proper handling of solvents, fuels, and other chemicals. In the event of a spill, the Spill Contingency Plans and Emergency Response Plans would be followed to address emergency response, notifications, and cleanup of spilled material.

Vegetation Resources
Four vegetation community types were identified within the BMM North Operations Area Project boundary: pinyon-juniper woodland, big sagebrush, low sagebrush, and mountain brush. The most abundant communities within the plan of operations boundary are the pinyon-juniper (7,482 acres) and big sagebrush (7,940 acres). Approximately 2,131 acres of the plan of operations boundary has burned within the last eight years. No individuals or habitat for threatened, endangered, or sensitive plant species were identified in the Proposed Action area.

Issues:

- Removal of vegetation;
- Increase of vegetation diversity following reclamation;
- Increased potential for establishment of non-native invasive species;
- Short-term loss of forage for wildlife and livestock; and
- Increased potential for soil erosion.

Conclusion:
Direct impacts to vegetation would include the removal of approximately 3,920 acres of vegetation including 1,712 acres of pinyon-juniper woodland, 1,917 acres of big sagebrush, 72 acres of low sagebrush, and 219 acres of mountain brush. A majority of the disturbance area, with the exception of the pit disturbance (540 acres), would be reclaimed including seeding with the approved seed mix. With successful revegetation, the habitat diversity would increase since much of the reclaimed areas would be dominated by grasses and shrubs.

Indirect impacts associated with vegetation removal include the potential establishment of noxious and, non-native invasive species, short-term loss of forage for wildlife and livestock, and a potential increase in soil erosion.

Non-Native Invasive Species
Both noxious weeds and non-native invasive species are present within the Proposed Action area. Eight noxious weed species are currently present in and around the Proposed Action area. One species, spotted knapweed (*Centaurea stoebe*), is classified as a Class A species, for which the State of Nevada emphasizes complete control. Three species - musk thistle (*Carduus nutans*), Russian knapweed (*Acroptilon repens*), and Scotch thistle (*Onopordum acanthium*) - have a Class B rating, and the State of Nevada emphasizes control of population spread and decreased population size. Four species - black henbane (*Hyoscyamus niger*), salt cedar (*Tamarix* spp.), hoary cress (*Lepidium draba*), and Canada thistle (*Cirsium arvense*) - are Class C species, for which the State of Nevada emphasizes management to control population size. Non-native invasive species identified within the Proposed Action area include cheatgrass (*Bromus tectorum*), bull thistle (*Cirsium vulgare*), and Russian thistle (*Salsola kali*).

Issues:

- Increased potential for establishment of noxious weeds and non-native invasive species.

Conclusion:
The Proposed Action would increase the potential for noxious and non-native invasive weeds to become established in disturbed areas and eventually spread into undisturbed areas within the Proposed Action area. Impacts are anticipated to be negligible with continued implementation of applicant-committed environmental protection measures identified in Chapter 2.

Wildlife Resources
Wildlife present in the Proposed Action area is typical of species in the northern part of the Basin and Range physiographic province. Big game species are represented by mule deer, elk, and antelope, with mule deer the most abundant of the three. Game birds are represented by sage grouse, chukar, gray partridge, and mourning doves. There are numerous other species present in the area including a variety of birds, mammals, and reptiles. Although some amphibians may be present, habitat for amphibians is limited due to limited water resources.

Numerous migratory birds utilize habitat within the Proposed Action area. The avian composition and density varies with season and habitat type, with the highest density and diversity occurring in the spring and early summer.

No federally listed species are known to occur in the Proposed Action area. There are a number of state-protected and BLM sensitive species that have the potential to occur in the Proposed Action area. These include a variety of raptors and bats, pygmy rabbits, sage grouse, two reptile species, and a variety of other birds.

Issues:

- Loss of habitat;
- Injury or mortality from land-clearing activities and increased traffic;
- Displacement from habitat due to human activity;
- Hindrance to deer migration;
- Bird nests and or young being destroyed; and
- Creation of habitat (steep cliffs as a result of open pits) that is currently limited and conversion of habitat.

Conclusion:
Direct impacts to wildlife resources would include loss of habitat as a result of disturbance to an additional 3,920 acres. The majority of this disturbance would occur in the pinyon-juniper woodland and big sagebrush community types. Approximately 219 acres of mountain brush habitat, which is good deer-foraging and cover habitat, would be impacted by the project. Land-clearing activities could result in the mortality of smaller and less mobile animals. Indirect effects would include some species being forced to adjacent areas due to human presence and disturbance, thus increasing competition for resources in these areas.

The Nevada Department of Wildlife (NDOW) has expressed concern that the Proposed Action may restrict deer movement in the Ruby Mountains by constricting the migration corridor. This constriction would have the greatest potential to occur during winters with heavy snow accumulation, when deer move to wintering grounds in the Little Antelope Summit area. To date, no obvious barriers to deer movement have been observed during the current operations.

Conversion of pinyon-juniper habitat to grass-shrub habitat after reclamation would provide better forage habitat for some species of wildlife.

The Proposed Action would result in the loss of 3,920 acres of vegetation that would be unavailable to nesting birds during operation. Reclamation of disturbed areas would return the area to productive nesting habitat. To avoid direct impacts to migratory birds, Barrick would conduct land-clearing activities outside of the avian breeding season or conduct nesting bird surveys immediately prior to land-clearing activities. If occupied nests are identified, disturbance would be avoided or a buffer zone around the nest would be established until the young have fledged.

Because no threatened or endangered animal species, or habitat for these species, have been identified in the Proposed Action area, no impacts are anticipated. There are a number of Nevada state-protected animal species and BLM sensitive animal species that have potential to occur within the Proposed Action area. The majority of these species are bats and birds, including all raptors (eagles, hawks, and owls). Other sensitive species include the pygmy rabbit (*Brachylagus idahoensis*) and sage-grouse (*Centrocercus urophasianus*).

The Proposed Action could result in the loss of foraging habitat and roosting habitat for tree-roosting bats, some of which are listed by the State as protected or by the BLM as sensitive. Underground workings, as well as cliffs, are limited in the Proposed Action area, but several bats such as the pallid bat (*Antrozous pallidus*) and Townsend's big-eared bat (*Corynorhinus townsendii*), which are strong fliers, may lose a limited amount of foraging habitat. No raptor

nests were identified in the Proposed Action area; thus impacts to diurnal raptors, owls, and turkey vultures would be limited to the loss of foraging grounds due to land-clearing activities and the presence of humans. Following cessation of mining activities, pit highwalls would provide nesting habitat for some raptors and roosting habitat for bats.

Potential habitat for pygmy rabbits, a BLM-sensitive species, exists primarily in the western part of the Proposed Action area, which has been previously disturbed by the BMM Heap Leach Pad and processing facilities. Additional disturbance would occur in pygmy rabbit habitat near the existing 2/3 Heap Leach Pad. Areas with pygmy rabbit habitat would be surveyed prior to disturbance. The BLM sensitive species ferruginous hawk (*Buteo regalis*) and burrowing owl (*Speotyto (Athene) cunicularia*) are known to nest in the vicinity but not within the Proposed Action area. Vegetation removal would reduce the foraging habitat for these species. The removal of pinyon-juniper trees would also reduce the nesting habitat for the pinyon jay (*Gymnorhinus cyanocephalus*), juniper titmouse (*Baeolophus ridgwayi*), and other woodland-dependent and cavity-nesting species.

Steep hillsides and cliffs are limited in the area, thus limiting nesting and roosting habitat for a number of bird species and bats. The creation of pits during mining would increase the availability of steep slopes and cliffs in the Proposed Action area.

Wetlands, Riparian Zones, and Waters of the U.S.
There are few small isolated wetland areas that are associated with seeps and springs within and near the Proposed Action area. No riparian zones or jurisdictional waters of the U.S. (including jurisdictional wetlands) were identified within the Proposed Action area. Therefore, no impacts would occur to riparian zones and waters of the U.S.

Issues:
- Potential destruction of isolated wetlands;
- Increase sedimentation from erosion; and
- Alteration of recharge areas to wetland areas.

Conclusion:
Disturbance to all seeps and springs identified in the Proposed Action area would be avoided by design; thus no direct disturbance to wetlands would occur with implementation of the Proposed Action. Land-disturbing activities upgradient of wetland areas would use proper Best Management Practices such as sediment traps, straw bales, or silt fences to minimize sedimentation to downgradient areas.

Alteration of recharge areas is discussed in the water resources section. Since wetlands do not exist at the Cherry Spring site, no impacts would occur to wetland areas as a result of alterations to this recharge area.

Range Resources
The Proposed Action area lies wholly within the existing Warm Springs livestock grazing allotment. The existing Warm Springs allotment is 330,966 acres in size. The allotment is currently categorized as “I,” which indicates “improve the current unsatisfactory condition.” The Warm Springs Allotment is managed for an active grazing preference of 7,709 animal unit months. Successful reclamation would result in improved forage areas as much of the area would be reclaimed to grass and shrub vegetation.

Issues:
- Loss of forage;

- Restricted access; and
- Improved forage following reclamation.

Conclusion:
Disturbance of 3,920 acres of the allotment would result in a temporary loss of 98 animal unit months. This represents less than two percent of the active grazing preference of the Warm Springs Allotment. With reclamation, a permanent loss of 28 animal unit months would result from the expansion of the pits and pit berms.

Wild Horses
The Proposed Action area lies within the Triple B Herd Management Area. Wild horses generally use the Buck and Bald mountains as summer range while moving into Newark, Long, and Huntington valleys during the winter months.

Issues:
- Loss of forage;
- Displacement as a result of human activity;
- Mortalities due to collision with vehicles; and
- Improved forage following reclamation.

Conclusion:
Impacts to wild horses in the Buck and Bald Herd Management Area are expected to be minimal. Approximately 3,920 acres would be disturbed with implementation of the Proposed Action. This loss of forage would occur during the life of the project. Successful reclamation would result in improved forage areas as much of the area would be reclaimed to grass and shrub vegetation. Short-term displacement of horses would occur in the vicinity of Proposed Action as a result of human activity. It is likely that wild horses would become accustomed to the activity prior to cessation of operations. Mortalities due to collisions with vehicles may also occur. Vehicular impacts with wild horses should be minimal with enforced speed limits and minimized traffic through the use of buses to transport mine employees.

Land Use and Access
Land uses in and around the Proposed Action area consist primarily of ranching (livestock grazing), wildlife habitat, mineral exploration, mining, and recreation (hunting, etc.). There are several rights-of-way for power lines, roads, and pipelines in the area. The White Pine County Land Use Plan, the purpose of which is to coordinate planning on public lands with federal land management agencies, specifically encourages mineral exploration and development on public lands.

Issues:
- Conflicts with existing land use authorizations;
- Restricted access; and
- Increased traffic on roads.

Conclusion:
The Proposed Action would result in combining and expanding the existing BMM and Mooney Basin Operations Plans of Operations boundaries by 3,738 acres, thus potentially removing the land from public use during active mining and reclamation. There are existing land use authorizations including rights-of-way, roads, communications sites, oil and gas leases, and water facilities (troughs, pipelines, storage tanks) within the Proposed Action area. Conflicts with existing land use authorizations would be resolved through consultation with the holders of those land use authorizations.

Public access would be restricted in areas of active mining and processing for the life of the mine. Access to all areas, except the 540 acres associated with the open pits, would be restored following completion of reclamation. Effects associated with increased traffic are expected to be minimal as Barrick buses most employees to the mine site. Barrick anticipates that only one additional bus would be needed to accommodate the additional workers under the Proposed Action. It is anticipated that additional deliveries would be needed to supply the expanded activities. With the increase in deliveries, an estimated 1,500 trips per year would occur, which is a 10 to 15 percent increase from current deliveries.

It is anticipated that this slight increase in traffic on the access roads would have only a minimal impact on the condition of the state and county roads. Barrick proposes to continue its program of maintenance of unpaved access roads for the life of the mine.

Recreation

For the fiscal year ending September 30, 2007, there was an estimated 297,895 visitor days to public land in the BLM Ely District. Most recreational activities consist of dispersed uses such as off-highway vehicle use, hunting, fishing, camping, cross country skiing, horseback riding, caving, rock climbing, and mountain biking. Recreational usage of public lands in the BLM Ely District has been increasing, partly because of population growth in both the BLM district and in Las Vegas.

Issues:

- Restricted access.

Conclusion:

The existing Plans of Operations area would expand from 12,727 acres to 16,465 acres. This would result in restricted access for hunting and other recreation activities from active mining acres for the life of the mine. This restriction is expected to have negligible adverse impact to recreation activities because current levels of recreation in the area are low and there is an abundant amount of open public land in the BLM Ely District. No impacts would occur to access to facilities around the Proposed Action area such as Ruby Lake National Wildlife Refuge.

Air Quality

The direct impact analysis area for air quality includes a zone around the current and proposed mining activity defined by a 12-mile radius and a 200-yard-wide corridor along the primary access routes to the Proposed Action area. The entire analysis area is currently in attainment or unclassified for all criteria air pollutants. The closest sensitive receptor to the Proposed Action area is the Ruby Lake National Wildlife Refuge, which is approximately 25 miles north of the Proposed Action area. Current operations and emissions qualify the facility as a Nevada Class II source. The nearest Class I airshed is the Jarbidge Wilderness area, which is 130 miles to the north near the Idaho border. The existing BMM is operated as a Class II source with emissions below the Prevention of Significant Deterioration major source threshold.

Issues:

- Impacts to air quality.

Conclusion:

With implementation of the Proposed Action, emissions from the operations would remain a Class II source with emissions below the Prevention of Significant Deterioration major source threshold. Based on the potential to emit values from the stationary sources, the Proposed Action would qualify as a Nevada Class II source. Dispersion modeling was conducted for the four criteria air pollutants (PM_{10}, carbon monoxide, nitrogen oxide, and sulfur dioxide) to

determine the dispersion of these pollutants and potential impacts beyond the Proposed Action area. The dispersion model indicated that all predicted maximum impacts would occur within the Proposed Action area, miles short of the nearest residence or area of regular human activity. In addition, the furthest extent of significant contributions from the Proposed Action ended well short of the Jarbidge Wilderness and all other Class I areas.

Mercury emissions would result from fugitive dust generated during mining and processing activities and through thermal sources, primarily from the two refining processes. Mercury emissions would continue to be controlled as required by the Nevada Mercury Control Program. The mine's estimated mercury emissions from the existing thermal sources are 57.7 pounds per year. Annual mercury emission from fugitive dust is estimated at 0.27 pound per year.

Impacts to air quality from operational activities are expected to be similar to those of the existing operations. There would be a slight change in the location of activity and emissions across the mine property. Ambient air quality standards would be met everywhere at and beyond the project ambient air boundary. Additional supply vehicles could result in slight increases in tailpipe emissions of organic volatile compounds, carbon monoxide, and nitrogen oxide.

Visual Resources

The Proposed Action area is bound by Newark Valley and Huntington Valley on the west and by Long Valley on the east. Vegetation consists primarily of gray-green sagebrush in the low elevations and dark green (pinyon-juniper woodland) vegetation in the higher elevations. Past mining activity in the area has created areas of contrast to the surrounding landscape with disturbance visible from valleys to the east and west of the existing operation.

Four Key Observation Points were identified to determine the visual impact from the Proposed Action: (1) the intersection of the Pony Express Trail with State Route 892 (west of the Proposed Action), (2) near the Pony Express Trail north of the slopes of Big Bald Mountain approximately three miles from the Proposed Action, (3) Ruby Marsh Road approximately 2.2 miles east of the Proposed Action, and (4) Ruby Marsh Road inside the eastern boundary of the Proposed Action near the existing Mooney Basin Heap Leach Pad.

Issues:

- Changes in line, form, color, and texture from mine-related disturbance.

Conclusion:

During active mining, views from all Key Observation Points would not meet management objectives because of moderate contrast with the existing landscape. Following successful reclamation, contrast would be reduced, disturbed areas would not attract the attention of viewers, and management goals would be met.

Noise and Vibration

The primary natural noise source in the area of the Proposed Action is wind. This noise, with the addition of the man-made noise associated with the current mining operation, constitutes the baseline condition. There are few receptors within audible range of the existing mine. Intermittent blasting is typically the only noise that can be faintly heard by the closest human receptors at residences.

Issues:

- Increased noise and vibration from earth moving, blasting, drilling, and increased traffic.

Conclusion:
Noise from construction and operational activities is not expected to differ significantly from existing operations. The Proposed Action would result in a minimally different noise profile from current on-site activities. The noise profile would be expected to be unnoticeable or minor at the closest residence as a result of the distance from the mine.

Socioeconomics
The three primary areas identified for the socioeconomic analyses are White Pine, Elko, and Eureka counties, all of which are predominantly rural and without large urban centers. The economies of these counties tend to follow the cycle of the precious metal mining industry. Elko is the largest with regard to land and population of the three counties. Employees at the existing operation live primarily in the towns of Elko, Ely, and Eureka.

Issues:
- Changes in employment;
- Changes in income; and
- Increased demand for housing and services.

Conclusion:
The staffing level of the Proposed Action is expected to increase to a maximum of about 325 employees, which represents a 50 percent increase over current employment. White Pine County would be the recipient of the mine's ad valorem tax payments and would receive a share of the net proceeds tax. This additional source of income would assist White Pine County in stabilizing its finances. All three counties (White Pine, Eureka, and Elko) would benefit from local spending by residents employed by the mine. Modeling indicates that with 110 additional employees, an additional 33 indirect and 50 induced jobs would be created in the three-county area. The model indicates that the value of the direct, indirect, and induced annual labor income would be $9.9 million in 2006 dollars.

New employees are assumed to be distributed among the three closest cities (Ely, Eureka, and Elko) depending mainly on the availability of housing. If all 110 new employees came from outside the three counties, which is unlikely, the population could increase by approximately 330 persons. Because few new employees are likely to find housing in Eureka, the majority of the new employees would reside in either Ely or Elko. It is anticipated that the majority of employees from outside the area would likely reside in Elko. With this scenario, the effect on housing and county infrastructure demand would be manageable.

Environmental Justice
Analysis of the minority population and low-income population indicate that there is no meaningful difference between these populations in the three counties (White Pine, Eureka, and Elko) and the State of Nevada.

Issues:
- Disproportionate effect on minorities and low income populations; and
- Undue burden on children.

Conclusion:
Initial analysis of the potential effects of the Proposed Action would not be expected to have a disproportionate effect on any particular population nor place any undue burden on children. In addition, no traditional cultural properties or sites meeting the criteria of Executive Order 13007 (Indian Sacred Sites) were identified in the Proposed Action area.

Cultural Resources (Prehistoric and Historic)
A Programmatic Agreement was developed to assist BMM, the BLM, and the Nevada State Historic Preservation Office with identifying, evaluating, and treating cultural resources when necessary. Of the proposed 3,920 acres of new disturbance, the location for 100 acres of exploration disturbance has not been identified, leaving a total of 3,820 acres of identified disturbance. Of these 3,820 acres, only 503 acres remain unevaluated, while 2,198 acres were surveyed within the last ten years and 1,119 acres were surveyed more than ten years ago.

Previous surveys have identified 270 prehistoric sites within the Proposed Action area with 95 of those sites within the proposed disturbance area of the Proposed Action. Previous surveys also identified 109 historic sites within the Proposed Action area with 30 of those sites within the proposed disturbance area of the Proposed Action.

Issues:
- Disturbance to both prehistoric and historic sites leading to loss of cultural resources.

Conclusion:
All eligible sites that would be impacted by the Proposed Action would be treated in accordance with the Programmatic Agreement between the BMM, BLM Egan Field Office, and Nevada State Historic Preservation Office.

Native American Religious Concerns
No traditional cultural properties or sites meeting the definition identified in Executive Order 13007 (Executive Order on the Indian Sacred Sites) have been identified within the Proposed Action area. Therefore, no impacts affecting Native American Religious concerns are anticipated from implementation of the Proposed Action.

Hazardous and Solid Waste/Hazardous Materials
A number of fuels and reagents are transported to the site, stored on site, and used on-site for mining and processing ore. These include diesel fuel, ethylene glycol, methanol, propane, sodium cyanide, ammonium nitrate, fuel oil, sodium hydroxide, calcium oxide, and hydrochloric acid. Transport, storage, and use of these chemicals are regulated by federal, state, and local laws and statutes. As part of the current operations, BMM has existing Spill Contingency Plans and Emergency Response Plans that address response to hazardous material spills, notification procedures, and spill cleanup procedures. Previous spills at the BMM and Mooney Basin Operations Area have been reported to the appropriate regulatory agencies and properly cleaned up as per the Emergency Response Plans, Spill Contingency Plans, and other requirements from the regulatory agencies.

Non-hazardous, solid waste is currently managed on-site in a Class III–waivered landfill. This facility was constructed and is managed in accordance with all applicable state regulatory requirements. A new Class III–waivered landfill would be constructed on a portion of the Saga rock disposal area.

Issues:
- Accidental release during on-site storage, use, or transportation to or from the site.

Potential resources that could be affected by an accidental spill of hazardous materials or solid and hazardous waste include air, water, soil, and biological resources. The chemicals currently being used at the existing operation are the same as those identified to be used with the Proposed Action. Deliveries of the chemical materials and waste would primarily be via State

Route 278 from Carlin to Eureka, to U.S. Highway 50 to State Route 892, or U.S. Highway 50 to Ruby Marsh Road.

The existing Class III–waivered landfill would continue to be used with a second Class III landfill proposed in the Mooney Basin area. Class III–waivered landfills can accept only non-hazardous waste generated by the mine. All other waste would be recycled off-site or disposed of at a licensed facility.

Conclusion:
The probability of an accident involving hazardous materials or hazardous waste was calculated using the national accident statistics for truck shipments of hazardous materials, haul distances, and the number of deliveries per year. The probability of an accident is as follows: sodium cyanide – 44.5 in 1,000; diesel fuel – 162.6 in 1,000; hydrochloric acid – 0.4 in 1,000. These numbers represent the number of spills estimated per 1,000 deliveries. These results indicate a low probability of an accidental release during transport of these materials during the life of the Proposed Action. There is a limited distance along the transportation route (approximately one mile) of sensitive receptors (wetlands, streams, etc.); thus a release into these areas is not likely. The environmental effects of a release would depend on the substance, quantity, timing, and location. The range of effects would be minor for a spill at the project site (equipment immediately available to limit spill) to a large spill during transport that could immediately impact water quality and aquatic life, if spilled into a flowing stream. Considering the transport routes and their limited extent within range of sensitive receptors, the likelihood of a major spill into a flowing stream is considered low.

BLM Preferred Alternative
The BLM's preferred alternative, based on the information from the scoping process and information contained within this FEIS, is the Partial Backfill Alternative (Alternative A) as described in Section 2.5.2. The selection of this alternative is the one that the BLM believes best fulfills the agency's statutory requirements and responsibilities. The selection of this alternative takes into consideration environmental, economic, and technical factors.

BALD MOUNTAIN MINE
NORTH OPERATIONS AREA PROJECT
FINAL ENVIRONMENTAL IMPACT STATEMENT

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Chapter 1
Introduction

1.1 Overview

A Plan of Operations for the proposed Bald Mountain Mine - North Operations Area Project has been submitted by Barrick Gold U.S., Inc. (Barrick) to the Bureau of Land Management (BLM) Egan Field Office, in compliance with 43 Code of Federal Regulations Subpart 3809. The Plan of Operations details the proposed expansion of the existing Bald Mountain Mine (hereafter referred to as BMM) and Mooney Basin operations including the expansion of six open pits, the addition of rock disposal areas, a truck shop, and growth medium stockpiles. In addition, the Plan of Operations proposes to combine the existing Plans of Operations for the BMM and the Mooney Basin Operations Areas. The BMM and Mooney Basin Operations Areas are located approximately 65 air miles northwest of the town of Ely, Nevada, in White Pine County (Figure 1-1). The Proposed Action area encompasses portions of Townships 23 and 24 North, Ranges 56, 57, and 58 East.

This Environmental Impact Statement (EIS) is being prepared in compliance with the National Environmental Policy Act of 1969 (NEPA) and the Council on Environmental Quality regulations for implementing NEPA (40 Code of Federal Regulations 1500 – 1508) and in accordance with the BLM NEPA Handbook H-1790-1 (BLM, 2008) and applicable instruction memoranda.

Chapter 1 explains the Purpose and Need for the Proposed Action, the issues surrounding the action, and other introductory information. It also discusses how the project relates to the *Ely District Record of Decision and Approved Resource Management Plan* (BLM, 2008), NEPA, and the authorities guiding the EIS process. **Chapter 2** describes the Proposed Action and alternatives including the No Action Alternative. The No Action Alternative would continue the management direction established by the *Bald Mountain Mine Expansion Project Final Environmental Impact Statement* prepared in September 1995 (BLM, 1995a) and subsequent approved Record of Decision (BLM, 1995b), as well as final Environmental Assessments for expansions of Mooney Basin (BLM, 2003a) and BMM (BLM, 2005b). **Chapter 3** describes the affected environment and predicts the direct and indirect environmental consequences of the Proposed Action and each management alternative that are likely to occur. Cumulative impacts are described in **Chapter 4**. **Chapter 5** provides the consultation and coordination information used in preparation of this document, as well as a list of FEIS preparers. **Chapter 6** contains the list of references cited, abbreviations, and acronyms. **Appendices** include Appendix A - a list of relevant plans, statutes, regulations, executive orders, and management plans; Appendix B - public scoping documents; Appendix C – Public Comments and Response to Comments; Appendices D - Standard Bureau of Land Management Best Management Practices; Appendices E through I - supporting analysis information; Appendix J - Programmatic Agreement for Cultural Resource Protection at Mine Sites.

This FEIS describes the environmental consequences of implementing the Proposed Action and the identified alternatives.

1.2 Project History

Between 1869 and 1956 the Bald Mountain Mining District produced gold, silver, copper, antimony, and tungsten. Larger scale exploration and mining activities began in the 1970s within the BMM area and Mooney Basin Operations Area. In 1976, Placer Dome U.S. acquired an option on claims within the Bald Mountain Mining District and initiated exploration for

precious metals. A pilot-scale heap leach project was initiated at BMM in 1983 and was upgraded to a commercial heap leach facility in 1985. Large scale activities at BMM have been expanded periodically since the commercial processing facility was initiated. In September 1995, the BMM EIS was finalized for the expansion of pits, rocks disposal areas, roads, and ore-processing facilities (BLM, 1995a). Approved Plan of Operations amendments during the period from 1997 to 2005 included new/expanded pits, rock disposal areas, haul roads, and the Top Area underground facilities (Table 1-1).

The original Plan of Operations for the Mooney Basin Operations Area was submitted to the BLM in March 1994 and approved in 1995 (BLM, 1995a). Approved facilities include a heap leach pad and process facilities, rock disposal areas, pits, haul roads, and exploration disturbance. Several amendments were completed during the period from 1998 to 2005, including a 2005 Mooney Basin amendment for an expansion and modification to the heap leach facility and haul roads (Table 1-1).

TABLE 1-1 PROJECT NEPA HISTORY

PROJECT	3809/NEPA ACTIONS ENVIRONMENTAL ASSESSMENTS/EIS	APPROVAL DATE	NEPA DOCUMENT NO.
Bald Mountain (N-68193)	Bald Mountain Mine Expansion Project EIS	September 1995	NV-040-1995 FEIS
	1995 Plan of Operations (LJ Ridge)	March 1997	NV-040-97-12
	2005 Bald Mountain Mine Expansion Environmental Assessment	November 2005	NV-040-006-005 N-78825
Mooney Basin (N-78822)	Bald Mountain Mine Expansion Project EIS	September 1995	NV-040-1995 FEIS
	2003 Mooney Basin Expansion Environmental Assessment	March 2004	NV40-03-032
	2005 Plan of Operations and Reclamation Permit Amendment	March 2005	N-78822

The existing BMM and Mooney Basin Operations Area projects have been previously analyzed under the BMM EIS (BLM, 1995a), the *Mooney Basin Expansion Project Environmental Assessment* (BLM, 2003a), the *Final Bald Mountain Mine 2005 Expansion Environmental Assessment*, and a 2005 Plan of Operations and Reclamation Permit Amendment (Table 1-1). Previous NEPA actions authorized the disturbance of 3,418 acres within the BMM Plan of Operations boundary and 747 acres within the Mooney Basin Operations Area Plan of Operations boundary (a total of approximately 4,165 acres). Figure 1-2 shows the BMM and Mooney Basin Operations Area Plans of Operations boundaries and existing approved facilities.

1.3 Purpose and Need for Action

1.3.1 Introduction

Council on Environmental Quality regulations state that the document shall briefly specify the underlying purpose and need to which the agency is responding. The applicant's purpose and need must not be confused with the BLM purpose and need for the action. The PURPOSE is the goal or objective that would be achieved through the Proposed Action or alternatives. The NEED is the underlying problem or opportunity.

1.3.2 BLM's Purpose and Need

The BLM is responsible for authorizing mineral rights access on certain federal lands as authorized by the General Mining Law of 1872 as amended. The BLM also has the responsibility to protect surface resources of BLM-administered lands to the extent practicable.

Figure 1-1 General Location

Figure 1-2 Existing and Previously Authorized BMM and Mooney Basin Operations Area Facilities

BLM Surface Management Regulations state that "Anyone intending to develop mineral resources [authorized by the mining laws] on the public lands must prevent unnecessary or undue degradation of the land and reclaim disturbed areas" (43 Code of Federal Regulations Subpart 3809.1).

The BLM's Purpose for the proposed BMM North Operations Area Project is to authorize a legitimate use of the public lands which would allow Barrick to continue to profitably recover gold resources from federal mining claims in the Proposed Action area. The BLM would strive to balance the financial and social benefits from this Proposed Action while preventing unnecessary or undue degradation of public lands and ensuring future post-mining land use. The BLM would then meet its mission statement to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

The BLM's Need is to respond to Barrick's Plan of Operations in compliance with the 43 CFR 3809 regulations and other statutes.

1.3.3 Barrick's Purpose and Need

The purpose of Barrick's Plan of Operations for the BMM North Operations Area Project is to expand mining opportunities at the BMM and Mooney Basin Operation, while consolidating these two mines into one new Plan of Operations called North Operations Area. The need is to continue to profitably recover gold resources from federal mining claims within the Proposed Action area.

1.4 Proposed Action

To meet the purpose and need, Barrick has submitted a proposal to the BLM Egan Field Office to expand and consolidate the Plans of Operations for the BMM and Mooney Basin Operations Areas. The Proposed Action would consolidate the existing BMM (N-68193) and Mooney Basin Operations Area (N-78822) Plans of Operations into one unified Plan of Operations identified as the proposed BMM North Operations Area Project.

The Proposed Action consists of expanding existing open pits, rock disposal areas, and heap leach facilities and constructing a new truck shop, as well as continuing the operation, reclamation, and closure of the consolidated BMM and Mooney Basin Operations Area (including mine offices, truck shops/warehouse, haul roads, ore stockpiles, access roads, diversion ditches, power transmission lines, water wells and pipelines, process solution pipelines, and a landfill). The proposed expansion would be primarily on unpatented mining claims on BLM-administered land. Project access would continue to be via existing public roads. The life of the existing mine operation (currently estimated to end in mid to late 2009) would increase by approximately 10 years under the Proposed Action. The Proposed Action includes 3,920 acres of new disturbance. A total of 4,165 acres of disturbance has been previously authorized. If the Proposed Action was implemented, the authorized disturbance footprint would increase to 8,085 acres. The Proposed Action also includes reclamation of disturbance.

Combining the Mooney Basin Operations Area and the BMM into one project area would result in the new BMM North Operations Area Project Plan of Operations boundary being expanded to include an additional 3,738 acres of public land. The original operational boundaries of the two mines encompassed 12,727 acres of public and private land. The Proposed Action area boundary for the BMM North Operations Area Project would encompass a total of 16,465 acres of public and private land, although only 8,085 acres within this boundary would be disturbed. The new proposed consolidated Plan of Operations boundary is shown on Figure 1-3.

Nearly all of the proposed mining activities are located on public land and are therefore subject to review and approval by the BLM pursuant to the Federal Land Policy and Management Act of 1976, as amended, and corresponding surface management regulations (43 Code of Federal Regulations Subpart 3809). These activities and their approval by the BLM pursuant to the Federal Land Policy and Management Act constitute a federal action and are thus subject to NEPA. The BLM has determined that the Proposed Action constitutes a major federal action and that an EIS must be prepared to fulfill the requirements of NEPA.

The Proposed Action is discussed in further detail in Chapter 2.

1.5 Existing Analysis Documents Used for This Statement

This FEIS incorporates by reference the following existing environmental analyses:

Bureau of Land Management (BLM). 1995. *Bald Mountain Mine Expansion Project Final Environmental Impact Statement*. U.S. Department of the Interior, Bureau of Land Management, September 1995.

_____. 2003. *Mooney Basin Expansion Project Environmental Assessment* (NV040-03-032), December 2003.

_____. 2004. *Bald Mountain Mine Exploration Program Programmatic Environmental Assessment* (NV040-04-023), October 2004.

_____. 2005. *Bald Mountain Mine 2005 Expansion Environmental Assessment* (NV040-006-005), November 2005.

_____. 2006. *Placer Dome U.S., Inc. Bald Mountain Mine, Little Bald Mountain Mine, Underground Mining and Haul Road Environmental Assessment* (NV040-06-035), September 2006.

These documents are included in the Administrative Record and are available for review at the BLM Egan Field Office.

1.6 Relationship to Agency and Other Policies and Plans

The BLM is responsible for administering mineral rights access on certain federal lands as authorized by the General Mining Law of 1872. Under the law, qualified prospectors are entitled to reasonable access to mineral deposits on public domain lands that have not been withdrawn from mineral entry.

The BLM Ely District has the responsibility and authority to manage the surface and subsurface resources on public lands located within the Ely District. Barrick's use of public land in the Ely District requires compliance with BLM's Surface Management Regulations (43 Code of Federal Regulations 3809) and other applicable statutes, including the Mining and Mineral Policy Act of 1970 (as amended) and Federal Land Policy and Management Act of 1976 (as amended). The BLM must review Barrick's plan for mining and development to ensure the following:

- Adequate provisions are included to prevent unnecessary or undue degradation of federal lands and to protect the non-mineral resources of the federal lands;

Figure 1-3 Proposed North Operations Area Project Facilities

- Measures are included to provide for reclamation of disturbed areas; and
- Compliance with applicable state and federal laws is achieved.

In accordance with Section 202 of Federal Land Policy and Management Act of 1976 (as amended), the Proposed Action and alternatives are in conformance with the Ely District Record of Decision and Approved Resource Management Plan (BLM, 2008). The objective for minerals in the Ely Resource Management Plan is, "To provide for the responsible development of mineral resources to meet local, regional, and national needs, while providing for the protection of other resources and uses." The Management Action for locatable minerals is to, "Allow locatable minerals development on approximately 9.9 million acres of Federal mineral estate, subject to the prevention of unnecessary or undue degradation of public lands." The location of the Proposed Action is within the 9.9 million acres open to locatable minerals. The Proposed Action and alternatives have also been analyzed within the scope of other relevant plans, statutes, regulations, executive orders, and manuals listed in Appendix A.

The Proposed Action and alternatives are also consistent with the *White Pine County Public Land Use Plan* (White Pine County, 1998b), which specifically recognizes that development of mineral resources is desirable and necessary to the State and the nation. The Plan also states that it is the policy of White Pine County to encourage mineral exploration and development.

The BMM EIS (BLM, 1995a) and the supporting cumulative impacts analysis in Appendix B of the EIS were also used to the extent practicable in the preparation of this document.

1.7 Authorizing Actions

The BLM is the lead agency for this EIS. The BLM Ely District Manager is the official responsible for preparation of this FEIS. The Nevada Department of Wildlife (NDOW) is serving as a cooperating agency for preparation and review of this FEIS. NDOW is the State agency directly responsible for managing fish and wildlife resources in Nevada. The BLM is responsible for the analysis of the Proposed Action and alternatives, document preparation, and public review and comment. Implementing the Proposed Action or the alternatives would require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the Proposed Action. Table 1-2 lists all the required state and federal permits or approvals and the responsible agencies. Barrick is responsible for applying for and acquiring the permits listed. Most of the permits are already in place for the existing BMM and Mooney Basin Operations Area projects, and only modifications would be required for the existing permits.

TABLE 1-2 REQUIRED PERMITS

AUTHORIZING ACTION / PERMIT	AGENCY
43 Code of Federal Regulations 3809 Plan of Operations Authorization	BLM
Air Quality Operating Permit	Nevada Division of Environmental Protection, Bureau of Air Pollution Control
Hazardous Materials Storage Permit	Nevada State Fire Marshal
Explosives Permit	U.S. Department of the Treasury, Bureau of Alcohol, Tobacco, and Firearms
Water Pollution Control Permit and Reclamation Permit	Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation

AUTHORIZING ACTION / PERMIT	AGENCY
General Permit for Storm Water Discharges Associated with Industrial Activity from Metals Mining	Nevada Division of Environmental Protection, Bureau of Water Pollution Control
General Permit to Operate Septic Systems	Nevada Division of Environmental Protection, Bureau of Water Pollution Control
Jurisdictional Delineation Report Concurrence	U.S. Army Corps of Engineers
Permit to Appropriate Water	Nevada Division of Water Resources
Solid Waste Class III Wavered Landfill Authorization	Nevada Division of Environmental Protection, Bureau of Waste Management
EPA ID Number (RCRA)	U.S. Environmental Protection Agency
County Special Use Permit	White Pine County
Hazardous Materials Transportation Permit	Nevada Department of Transportation.
Public Water System Permit	Nevada Division of Environmental Protection, Bureau of Safe Drinking Water
Industrial Artificial Pond Permit	Nevada Department of Wildlife

1.8 Summary of Public Scoping Process

A Notice of Intent to prepare an EIS for the BMM North Operations Area Project was published in the Federal Register on March 30, 2007. The Notice of Intent announced scoping meetings to be held in the neighboring communities of Ely, Elko, and Eureka, Nevada, and invited scoping comments to be submitted to the BLM. The duration of the public scoping period was 56 days, closing on May 25, 2007 (Appendix B).

The original project mailing list (Appendix B) for this was generated by the BLM Egan Field Office in March 2007, and represented individuals, agencies, or organizations who had expressed interest in similar projects. A scoping letter was prepared and sent to all parties on the mailing list. This letter provided an overview of the Proposed Action; identification of preliminary issues; the times, dates, and locations of public scoping meetings; a request for written comments; directions on how to submit scoping comments; and identification of BLM contacts (Appendix B).

A legal notice of the Proposed Action was prepared by the BLM and published in the *Elko Daily Free Press* and *Ely Daily Times* and distributed to public posting locations in Ely, Elko, and Eureka. A news release was also distributed to the local media. The legal notice and each news release informed the public of BLM's intention to prepare the BMM North Operations Area Project EIS, a description of the Proposed Action, the dates and times of the three scoping meetings, and methods for providing comments (Appendix B).

Scoping meetings were held in Elko, Ely, and Eureka, Nevada, on May 7, 8, and 9, 2007, respectively. The meetings were informal and held in an open-house format where information on the NEPA process and project specifics was displayed with posters, handouts, and presentations. Representatives of BLM, NDOW, and Barrick attended the meetings. Public attendees at the meetings were asked to sign a register and invited to provide scoping comments. These were made part of the administrative record, which is available at the BLM Egan Field Office.

1.9 Issues

Issues were raised both internally (see Chapter 2 for discussion of internally generated issues) and externally. All comments received during public scoping were recorded. Issues and concerns that were raised included potential impacts on Ruby Valley and the Ruby Lake National Wildlife Refuge, located approximately seven air miles north of the Proposed Action area. Additional comments included concerns about increased traffic, increased vehicle speed, increased water use, loss of wildlife habitat (mule deer winter range in particular), air quality, land use access, visual aesthetics, potential economic impacts, and mercury deposition. Table 1-3 provides a list of the individuals who provided comments during the public scoping period for the Proposed Action including these comments and concerns. Although these were considered during the NEPA process, not all concerns warrant analysis in the EIS. Key issues of analysis that came from the internal and external scoping process are the potential changes to groundwater quality and quantity, change in water discharge and recharge that may affects seeps and springs, loss of cultural resources, the potential for increased mercury and particulate pollutants in the air, the potential for spread of non-native invasive species, the potential effect on pygmy rabbit and sage grouse habitat, the reduction of transitional wildlife habitat, specifically mule deer, and the potential for mine activities and structures to adversely affect migratory deer movement. These and other issues for analysis are summarized in the Summary under each resource.

TABLE 1-3 PUBLIC COMMENT INFORMATION

NAME	ORGANIZATION	COMMENT
Martha Collins	Refuge Manager, Ruby Lake National Wildlife Refuge	- Increased traffic through Ruby Valley and refuge. Safety concern. - Hearing rumors of paving Ruby Valley Road (not in favor). - Increased use of water. Concern with pumping and effect on refuge habitat.
Tom Bath	Bath Lumber Co.	Meetings were very informative. Fully supports project.
George Fennemore	Barrick Gold Corporation Cortez Gold Mines	Please consider the socioeconomic value of high wage mining jobs for the workforces in Elko, Spring Creek, Ely, Eureka, and other communities in northeast Nevada.
Don Harris	Midway Gold Corp.	- Bald Mtn has been an excellent neighbor especially w/blading main road between Jiggs and Mine. - Concern over wildlife habitat loss, especially mule deer which use the south Rubies as winter range. - Fugitive Dust - Increased water use with expansion in a dry area.
Anonymous		- Main concern with more vehicles on road and speed they travel. Sees traffic speeding on road. - Worried about the environment, wildlife, air quality, aesthetics, land use access.
Anonymous		- Increased dust particulates. - Potential mercury deposition (effects on refuge wildlife). - Generally, please thoroughly discuss impact of expanded operations on the refuge. - Does increased area mean increased mining activity?

NAME	ORGANIZATION	COMMENT
Jeanne Geselbracht	Environmental Protection Agency	Environmental Protection Agency's recommendations for inclusion in this EIS. - Purpose and Need Statement - Alternatives Analysis - Water Resources - Air Quality - Hazardous Air Pollutants - Vegetation and Wildlife - Mining Waste Management and Land Reclamation - Environmental Justice - Government to Government Consultation - Land Use - Pollution Prevention - Cumulative Impacts
Gosia Sylwestrzak	Nevada State Clearinghouse	- Indicating the Division of Water Resources supports the proposal as written.

1.10 Summary of DEIS Public Comment Period

The BMM North Operations Area Project Draft Environmental Impact Statement (DEIS) was made available for public comment on December 19, 2009. The public comment period lasted 45 days from December 19, 2009 until February 2, 2009. Three public comment meetings were held during the public comment period. These meetings were held in Ely, Nevada on January 6, 2009; Elko, Nevada on January 7, 2009; and in Eureka, Nevada on January 8, 2009. Project information was presented in an open-house format at these meetings with BLM and Barrick representatives present to discuss concerns and answer questions.

Individuals, public agencies, and non-profit organizations submitted 17 letters containing comments on the DEIS. The comments received and responses to these comments are contained in Appendix C. Additional information about public scoping is presented in Chapter 5 Consultation and Coordination.

Chapter 2
Existing Operations, Proposed Action, and Alternatives

2.1 Introduction

This chapter describes and compares the Proposed Action, two action alternatives, and the No Action Alternative, as required by 40 Code of Federal Regulations 1502.15 (d). Alternatives are in comparative form to inform the public and other agencies and to provide a basis for a decision by the responsible official (40 CFR 1502.14). For a complete discussion of the effects used to compare alternatives, consult Chapter 3, "Affected Environment and Environmental Consequences."

Each component or area of expansion is described in sufficient detail to facilitate understanding of the Proposed Action and alternatives. Figures that clearly show the current operations and proposed expansion of the facilities are included.

In addition to the Proposed Action, three alternatives are analyzed in the FEIS. The two action alternatives are based upon issues identified by the BLM, Barrick, and public comments received during the public scoping process. These alternatives are intended to reduce or minimize potential impacts associated with the Proposed Action and be responsive to the key issues. Descriptions of additional alternatives that were initially considered are provided, as well as the rationale for why they were eliminated from detailed analysis. A No Action alternative is also analyzed.

A description of existing operations at the BMM and Mooney Basin Operations Area is provided to facilitate a better understanding of the Proposed Action, as the Proposed Action is primarily an expansion of existing facilities including pits, waste dumps, and processing components. This chapter is organized to provide a description of the existing operations first, followed by a description of the Proposed Action, and, finally, a description of the alternatives, including those carried forward in the analysis and those that were eliminated from detailed analysis.

2.2 Existing Operations

This section describes the existing and authorized mining, processing, and exploration operations in the BMM and Mooney Basin Operations Area Plans of Operations. Section 2.2.1 describes the BMM, and Section 2.2.2 describes the Mooney Basin Operations Area. Existing and authorized disturbance totals are shown in Table 2-1. The content of this section is presented only as background information. Existing and previously authorized disturbance is not part of the Proposed Action, nor is it being analyzed in this FEIS.

TABLE 2-1 SURFACE DISTURBANCE SUMMARY

MINE	AUTHORIZED[1] (ACRES)	EXISTING[2] (ACRES)
Bald Mountain[3]	3,418	3,058
Mooney Basin[4]	747	510
Total	**4,165**	**3,568**

Sources: Enviroscientists, 2006; BLM, 2005b; BLM, 2005c; BLM, 1995a; BMM, 2009.
[1] Includes authorized exploration.
[2] Includes exploration and reclaimed acres that have not yet been released from bond requirements.
[3] Authorized acres per 2006 BMM North Area Amendment to Plan and Three-Year Reclamation Bond Update. Existing acres are bonded acres from the 2006 BMM North Area Amendment to Plan and Three-Year Reclamation Bond Update.
[4] Disturbance at Saga and Belmont facilities has been authorized, but facilities have not been fully constructed. 2005 proposed acres not included in existing disturbance.

2.2.1 Bald Mountain Mine

The existing BMM facilities include open pits, rock disposal areas, roads, an administrative/shop complex, and process facilities including heap leach pads, ponds, and associated buildings. The BLM has authorized approximately 3,418 acres of disturbance associated with these facilities (Table 2-2). Although authorized, the mill and tailings facilities have not been constructed. The current BMM operation, as shown on Figure 1-2, consists of four general areas: the Process Area, the North Area Complex, the Top/Sage Area, and the Rat/RBM Area. The existing and approved activities associated with these areas, as well as exploration activities, are described in this section.

TABLE 2-2 BALD MOUNTAIN MINE AUTHORIZED DISTURBANCE

PROJECT COMPONENT		AUTHORIZED DISTURBANCE IN MAY 2006 (ACRES)
Pits and Related Disturbance		
	North Pit 1 (1, 2, 3, and 5)	159
	North Pit 2 (LJ Ridge)	52
	RBM	55
	Rat	116
	Top/Sage Complex (Top and Sage Flats Combined)	263
	Top Underground	0
	Subtotal	**645**
Ore and Process Facilities		
	Pad #1	65
	2/3 Pad	229
	BMM Process	114
	Tailings & Leach Pad Expansion[1]	333
	Subtotal	**741**
Rock Disposal Areas		
	North 1 (One, Two, Three, Five, West Combined)	343
	North 4 (Formerly LJ Ridge)	60
	Rat East[2]	180
	Rat West	51
	RBM North	133
	RBM South	30
	East Sage	250
	South Water Canyon (formerly Top)	263
	Subtotal	**1,310**

PROJECT COMPONENT		AUTHORIZED DISTURBANCE IN MAY 2006 (ACRES)
Support Facilities		
	Soil Stockpiles	47
	Ancillary Facilities/Roads	50
	Haul Roads	233
	Interpit Areas	78
	Subtotal	**408**
Total Mine and Process Area Disturbance		**3,104**
Other Areas of the Project		
	Exploration	314
	Subtotal	**314**
Total BMM Area Disturbance		**3,418**

Source: BMM, 2009.
[1] Acres removed from 1995 tailings expansion authorization and placed into proposed 2/3 Pad Expansion (BLM, 1995a).
[2] Pit Expansion removes 15.6 acres of reclaimed rock disposal area.

Process Area

The existing process area at BMM consists of two heap leach facilities, process ponds, process and administrative buildings, utilities, and support facilities. The existing and authorized disturbance for the process area is shown on Figures 1-2, 2-1, and 2-2. Heap Leach Pad No.1 has been closed and reclaimed and is currently under post-closure monitoring. Leaching activities are ongoing at the 2/3 Heap Leach Pad. In addition, the BMM EIS (BLM, 1995a) analyzed a new ore process facility within the Plan of Operations boundary on the east side of the 2/3 Heap Leach Pad. The facility included milling facilities, an expanded heap leach pad, a tailings impoundment, haulage and access corridors, and other support facility disturbance. The milling facilities, expanded heap leach pad, and tailings impoundment have not been constructed.

North Area Complex

The existing and authorized facilities in the North Area Complex include the West Rock Disposal Area, 1/5 Rock Disposal Area, LJ Ridge Rock Disposal Area, six open pit areas, an interpit area (i.e., the area around pits and dumps with intermittent disturbance for access roads, safety berms, etc.), haul roads, exploration roads, secondary roads, and growth medium stockpiles. These facilities are shown on Figure 2-3. In May 2006, the BLM authorized expansion of the North 2/3 Pit to the east and west. The BLM also authorized expansion and combining of the North 1 Rock Disposal Area and the 2/3 Rock Disposal Area to form the West Rock Disposal Area, and development of interpit road areas at the North A Pit (BLM, 2005b). The North Area Complex is not currently being mined although exploration activity continues in this area. The LJ Ridge area is located east of Heap Leach Pad No. 2/3 (Figure 1-3) and consists of the LJ Ridge Pit, South Ridge Pit, Banghart Pit, LJ Ridge Rock Disposal Area, and a haul road. The LJ Ridge area is currently inactive.

Top/Sage Flat Area

The Top/Sage Flat Area includes the Top Pit, Sage Flat Pit, South Water Canyon Rock Disposal Area, East Sage Rock Disposal Area, and various haul roads and exploration disturbance. Existing and authorized activities are shown on Figure 2-4. The Top Pit and South Water Canyon Rock Disposal Area were approved as described in the BMM EIS (BLM, 1995a). The East Sage Rock Disposal Area has been authorized as described in the approval of the Amendment to the BMM Plan of Operations (BLM, 2005b). All waste rock has been placed in the South Water Canyon Rock Disposal Area. Associated haul roads are included in the Top/Sage Flat Area disturbance.

The Top Underground project has been authorized through approval of an Environmental Assessment (BLM, 2006c). To date, no underground mining activities have been initiated.

Rat/RBM Area

The Rat/RBM Area consists of an open pit, interpit areas, rock disposal areas, and haul roads as authorized by the BLM (BLM, 1992a). Existing and authorized disturbance is shown on Figure 2-5. The rock disposal areas are located east and west of the pits. The Rat Pit haul road intersects the Top Pit haul road in order to access support and process facilities.

Expansion of the Rat Pit to the north, south, east, and west, as well as at depth, has been previously authorized, as well as moving a portion of the reclaimed Rat East Rock Disposal Area to the east to accommodate the pit expansion. The reclaimed area shown on Figure 2-5 has not been released from bonding requirements. Currently, Barrick is conducting activities under the 2005 authorization.

The RBM Area is located northeast of the office complex and is also currently active. The RBM Area consists of a pit, two rock disposal areas, a haul road, and exploration disturbance. The current RBM Pit and the RBM North Rock Disposal Area were previously authorized by the BLM (BLM, 1992a). The rock disposal area has been authorized to disturb 68 acres of previously reclaimed area, which has not been released from bonding requirements. Interpit disturbance areas have been authorized between the RBM Pit and associated rock disposal areas (BLM, 2005b).

Exploration Areas

Exploration areas are widely distributed throughout the existing Plan of Operations boundary, with highest densities proximal to proposed or active pits. Barrick maintains an ongoing effort to reclaim inactive exploration roads and sites within the Plan of Operations boundary. Up to 314 acres of exploration disturbance are authorized within the BMM Plan of Operations (BLM, 1995a).

Roads

As previously authorized the Elko public access road would be re-routed to follow the western boundary of the existing BMM process and ancillary disturbance area shown in Figure 1-3. The current running width of 25 feet would be maintained with an average proposed disturbance width of 50 feet. The additional disturbance width would be used for berms, stormwater diversion ditches, and road cuts, where required by existing topography.

2.2.2 Mooney Basin Operations Area

As shown on Figure 1-2, the Mooney Basin Operations Area is located approximately two miles east of the current BMM Plan of Operations boundary. The BLM has authorized approximately 747 acres of disturbance associated with pits, rock disposal areas, heap leach and recovery facilities, roads, growth medium stockpiles, utilities, and support facility disturbance (Table 2-3). Existing and authorized facilities are shown in Figure 2-6. Operational pit areas include the Bida and Belmont pits, Galaxy Pit, Horseshoe Pit, and Saga Pit. Barrick has previously mined from the Galaxy and Horseshoe pits, and mining is currently active in both the Bida and Belmont pits and the Saga Pit. Waste rock is stored in the Horseshoe, Saga, Bida, and Galaxy rock disposal areas, and ore is hauled to the Mooney Basin Heap Leach Pad from these pits. Partial backfill of the Horseshoe Pit has also been completed.

In 2005, the existing Mooney Basin Heap Leach Pad was approved for a 56.2-acre expansion to the south of the existing facility. A new haul road from the Galaxy Pit to the Top Pit (BLM, 2003a) and a leach pad expansion that covered part of the Horseshoe and Saga haul roads

Figure 2-1 BMM Process and Administration Area Detail

Figure 2-2 Mooney Basin Detail

Figure 2-3 North Area Complex Detail

Figure 2-4 Top/Sage Flat Area Detail

Figure 2-5 Rat/RBM Area Detail

Figure 2-6 Mooney Basin Operation Detail

were also approved and constructed. Other changes to the heap leach facilities included adding a stormwater diversion ditch and a stormwater/freshwater pond.

Exploration activities are also ongoing within the existing Mooney Basin Operations Area Plan of Operations boundary.

TABLE 2-3 MOONEY BASIN AUTHORIZED DISTURBANCE

PROJECT COMPONENT		AUTHORIZED DISTURBANCE IN 2005 (ACRES)
Pits and Related Disturbance		
	Horseshoe	33.0
	East Bida	34.8
	Galaxy and Galaxy II	31.2
	Saga	70.0
	Belmont (1, 2, 3)	11.6
	Subtotal	**180.6**
Ore and Process Facilities		
	Pad	137.2
	Process	11.8
	Subtotal	**149.0**
Rock Disposal Facilities		
	Horseshoe	24.9
	Galaxy	29.9
	Saga	98.5
	Belmont[1]	42.7
	Subtotal	**196.0**
Support Facilities		
	Soil Stockpiles	15.5
	Interpit Areas	0
	Existing Ancillary Facilities	28.6
	Water Well #3	1.1
	Leach Pad Diversion Ditch	1.4
	Galaxy Pit Shortcut	2.8
	All Haul Roads	121.8
	Secondary Roads/Pit Ramps/ Floors[2]	11.2
	Landfill	0
	Power Line to Top/Sage Complex[3]	0
	Borrow Pits[4]	5.7
	Subtotal	**188.1**
Total Mine and Process Area Disturbance		**713.7**
Other Areas of the Project		
	Exploration	33.6
	Subtotal	**33.6**
Total Mooney Basin Area Disturbance		**747.3**

Source: BMM, 2009.

[1] The Belmont Pit 2 expansion removes 3.7 acres of previously authorized rock disturbance area.

[2] Secondary roads category was moved to the Interpit Areas category.

[3] Total power line length is 34,157 feet, of which 9,035 feet is on previously authorized disturbance. Disturbance width is 25 feet.

[4] Borrow pits and landfills were removed by the Mooney Basin Heap Leach Pad Expansion.

2.3 Proposed Action

The Proposed Action would unify the BMM and Mooney Basin Plans of Operations into one Plan of Operations entitled *Bald Mountain Mine - North Operations Area*. Barrick proposes to expand the existing gold mining and recovery operations, as well as develop new gold mining and recovery operations and continue exploration within a unified BMM North Operations Area Project Plan of Operations boundary, hereafter referred to as the Proposed Action area. The Proposed Action area encompasses 16,465 acres, of which 8,085 acres would be disturbed. The proposed disturbance is shown on Figure 2-7. The BLM has previously authorized the disturbance of 3,418 acres within the BMM Plan of Operations boundary and 747 acres within the Mooney Basin Operations Area boundary for a total of approximately 4,165 acres, also shown on Figure 2-7. As stated earlier in this chapter, the proposed disturbance is associated with pits, rock disposal areas, heap leach and recovery facilities, roads, growth medium stockpiles, and exploration (Table 2-4). Table 2-4 provides the authorized disturbance acreage for each facility and the Proposed Action disturbance acreage with the expansion of the facilities and development of the new facilities. This FEIS analyzes only the effects of the Proposed Action and does not address previously authorized actions (the existing BMM and Mooney Basin operations).

TABLE 2-4 SUMMARY OF PROPOSED DISTURBANCE WITHIN THE PLAN OF OPERATIONS BOUNDARY

COMPONENT	AUTHORIZED DISTURBANCE (ACRES)	PROPOSED ACTION DISTURBANCE (ACRES)	TOTAL DISTURBANCE (ACRES)[1]
Open Pits			
North Pit 1 (combines existing North 1, 2/3, and 5 pits)	159	171.5	330.5
North Pit 2 (existing LJ Ridge)	52	21.4	73.4
North Pit 3 (existing South Ridge)	--	20.8	20.8
RBM	55	--	55
Rat	116	76.8	192.8
Top/Sage Flat Pit Complex	263	173	436
Horseshoe	33	--	33
East Bida	34.8	4.3	39.1
Galaxy and Galaxy II	31.2	--	31.2
Saga	70	60.1	130.1
Belmont (1,2, and 3)	11.6	12.6	24.2
Total Pit Disturbance	**825.6**	**540.5**	**1366.1**
Process Facilities[2]			
Leach Pad 1	65	--	65
Leach Pad 2/3	229	121.3	350.3
Mooney Basin Pad	137.2	272.1	409.3
BMM Process	114	16	130
Mooney Basin Process	11.8	32.9	44.7
Tailings and/or Leach Pad	333	-63.1[4]	269.9
Total Process Disturbance	**890**	**379.2**	**1269.2**
Rock Disposal Areas			
North 1 (One, Two, Three, Five, West Combined	343	333.9	676.9
North 2	--	90.4	90.4
North 3	--	97.4	97.4
North 4 (formerly LJ Ridge)	60	41.4	101.4

COMPONENT	AUTHORIZED DISTURBANCE (ACRES)	PROPOSED ACTION DISTURBANCE (ACRES)	TOTAL DISTURBANCE (ACRES)[1]
North 5	--	141.1	141.1
Rat East	180	-15.6[4]	164.4
Rat West	51	299.5	350.5
RBM North	133	--	133
RBM South	30	--	30
East Sage	250	646.8	896.8
Sage Flat	--	259.1	259.1
South Water Canyon (formerly Top)	263	206.3	469.3
Horseshoe	24.9	--	24.9
Galaxy	29.9	--	29.9
Saga	98.5	121.4	219.9
Belmont	42.7	-3.7[4]	39
Total Rock Disposal Area Disturbance	**1056**	**2218**	**3724**
Support Facilities[3]			
Soil Stockpiles	62.5	93.7	156.2
Ancillary Facilities	78.6	12	90.6
Haul Roads	354.8	159.3	514.1
Interpit Areas	78	420.1	498.1
Water Well #3	1.1	--	1.1
Leach Pad Diversion Ditch	1.4	--	1.4
Galaxy Pit Shortcut	2.8	--	2.8
Secondary Roads/Pit Ramps/Floors	11.2	-11.2[4]	0
Borrow Pits	5.7	-5.7[4]	0
Power Line to Top/Sage Complex	0	14.4	14.4
Landfill	0	0	0
Total Support Facility Disturbance	**596.1**	**682.6**	**1278.7**
Exploration			
Exploration	347.6	100	447.6
Total Exploration Disturbance	**347.6**	**100**	**447.6**
Total Disturbance	**4,165.3**	**3,920.3**	**8,085.6**

[1] Includes BMM and Mooney Basin.
[2] Includes heap leach facilities and process facilities.
[3] Includes interpit areas, temporary roads within the interpit areas, stormwater controls, secondary roads, haul roads, growth medium stockpiles, borrow pits, landfills, power lines, fresh water lines, wells, etc.
[4] Negative numbers indicate that proposed disturbance would take place in an area already authorized to be disturbed; therefore, there would be no net increase in total disturbance for these categories as a result of the Proposed Action.

The following sections describe the components of the Proposed Action. The proposed disturbance areas are designed to accommodate projected disturbance related to the existing operations and the proposed expansions, as well as potential variations resulting from design modifications (i.e., engineering adjustments to the open pit perimeter, haul/access road realignments, and growth medium stockpiles).

The expected mine life for the proposed expansion is approximately 10 years (current operations estimated to end in 2009). Ore processing would continue for approximately three years after active mining operations cease. Reclamation, site closure activities, and post-

closure fluid monitoring would continue for a minimum of five years for each closed component. Reclamation monitoring would be conducted for a minimum of three years for each reclaimed area or until vegetative stability is established.

2.3.1 Access

As shown on Figure 1-1, there are three main access routes to the BMM North Operations Area Project:

- From Elko via State Highway 228 (Jiggs Highway) south;
- From Ely and Eureka via U.S. Highway 50 to State Highway 892 (Strawberry Highway); and
- From U.S. Highway 50 to Long Valley Road.

2.3.2 Proposed Action Area

The Proposed Action would unify the BMM and Mooney Basin Plans of Operations Area. The individual Plan of Operations boundaries would be expanded in several directions to accommodate the proposed expansion and associated development of facilities. As shown on Figures 1-2 and 1-3, the two Plans of Operations boundaries would merge where existing haul roads currently connect the BMM and Mooney Basin Operations Area.

The previously authorized Plans of Operations boundaries for both the BMM and Mooney Basin Operation Area encompass 12,727 acres. Expanding and merging the Plans of Operations boundaries would increase the authorized Plan of Operations area by 3,738 acres for a new BMM North Operations Area Project Plan of Operations boundary encompassing 16,465 acres. The total authorized disturbance within this new Plan of Operations boundary would be 8,085 acres (Table 2-4).

2.3.3 Open Pits

Conventional open pit mining methods (truck and shovel/loader) would continue to be used to extract ore and waste from the proposed open pit expansions. Rock would be drilled and blasted using ammonium nitrate and fuel oil or other appropriate blasting agents as determined by the rock characteristics. All explosives would be handled in accordance with Mine Safety and Health Administration and Bureau of Alcohol, Tobacco, and Firearms regulations. It is anticipated that one blast in each of the active pits would occur each day. The amount of explosive used would vary depending on the size of the working face of the pit. Barrick anticipates two or three pits would be active at any one time.

Trucks would be used to haul ore to the heap leach facilities and waste rock to the rock disposal areas. Low-grade ore material may also be temporarily staged on a selected portion of the rock disposal areas for later transport and processing.

Mining would be conducted 24 hours per day, 7 days per week, as with current operations. A list of the anticipated mining equipment requirements at peak operations within the proposed Plan of Operations boundary is provided in Table 2-5. The equipment indicated in Table 2-5 is an increase from the equipment currently being used.

Geological, geotechnical, and safety constraints have and would continue to dictate the ultimate pit designs. Overall pit slope angles in the existing pits range from approximately 38 degrees to 56 degrees but may vary with pit location and the individual geotechnical and safety constraints for each pit. Based on exploration drilling, no new geologic formations are expected to be encountered under the Proposed Action. Slope angles for the expanded portions of the pits are expected to remain within the same range as the current pit angles. Barrick proposes to mine pits on benches 20 to 25 feet high; however, bench heights may vary based upon mining

Figure 2-7 Existing/Approved and Proposed Disturbance

requirements or rock geotechnical properties. The Top/Sage Flat Pit Complex benches would be approximately 50 feet high but may also vary depending upon mining requirements or rock geotechnical properties. Pit bench widths and intervals would vary by pit and would be dependent upon local geology and rock geotechnical properties. Catch-bench intervals are nominally two bench heights, which may be increased or decreased depending upon mining requirements or rock geotechnical properties. A summary of basic design parameters and dimensions for the pits within the Proposed Action area is shown in Table 2-6. Detailed design parameters for each pit are discussed in the following sections.

TABLE 2-5 LIST OF PROPOSED MOBILE SURFACE EQUIPMENT

UNIT	QUANTITY
Electric Wire Rope Shovels	2
Hydraulic Shovel	2
Wheel Loaders	2
Haul Trucks (150- to 240-ton class)	17
Production Drills	2
Pre-Split Drills	2
Track Dozers	4
Wheel Dozers	1
Graders	3
Trackhoe	1
Water Trucks	3

Open pit design is based on review of previous pit mining data combined with the results of geotechnical testing and surface mining industry/Mine Safety and Health Administration standards. Barrick would continue to monitor wall stability throughout the active life of each open pit according to the parameters set forth by the licensed professional engineer providing pit slope stability design. Monitoring generally includes periodic surveying of pit wall surfaces to identify movement or deflection relative to benchmarks set outside the geotechnical influence of the pit.

TABLE 2-6 PIT DESIGN PARAMETERS AND DIMENSIONS SUMMARY

OPEN PIT	SLOPES (DEGREES)	LENGTH (FEET)	WIDTH (FEET)	DEPTH (FEET)	PIT BOTTOM ELEVATION (FEET ABOVE MEAN SEA LEVEL)
North Pit 1	40 – 50	6,620	3,500	1,100	6,625
North Pit 2	40 – 50	2,460	1,790	775	7,775
North Pit 3	40 – 50	1,130	1,010	625	7,750
Rat	50	4,930	2,190	650	7,625
Top Pit	38 – 56	3,880	3,740	1,725	6,500
Sage Pit	38 – 56	2,445	2,140	1,075	7,150
East Bida	50	1,875	1,190	450	7,150
Belmont Pit 2	50	835	715	275	7,050
Belmont Pit 3	50	665	575	275	6,925
Saga	50	3,000	2,465	700	6,425

Based on extensive area drilling information, Barrick does not anticipate intercepting the groundwater table while mining in the pits located within the Proposed Action area, and no dewatering activities are planned. As is the case with current operations, if any isolated,

perched saturated zones are encountered, diversion ditches and sumps would be installed as necessary to maintain safe operating conditions within the pit.

A summary of the mine ore and waste production amounts is presented in Table 2-7. Mined material is currently evaluated, and would continue to be, through quarterly sampling under Nevada Division of Environmental Protection Water Pollution Control Permit requirements. No new rock types or sulfide deposits are anticipated as part of the pit expansions under this Proposed Action. Barrick proposes to continue the current approved waste rock management practice of commingling all waste rock material due to the lack of sulfide content and leachable metalloid and metal contents (BMM, 2009).

TABLE 2-7 ESTIMATED PRODUCTION SUMMARY BY OPERATION AREA

MINE AREA	ORE (MILLION TONS)	WASTE (MILLION TONS)	TOTAL (MILLION TONS)
BMM	130	784	914
Mooney Basin	70	46	116
Total	**200**	**830**	**1,030**

Under the Proposed Action (and as authorized by the State General Stormwater Permit), stormwater would be diverted around the pits, rock disposal areas, and growth medium stockpiles and returned to natural drainages. Stormwater collection trenches would direct stormwater from disturbed areas to collection ponds where stormwater would be evaporated or used in process or mining activities.

North Pits

Exploration is currently the only activity in the vicinity of the proposed North Pit 1. The proposed pit expansion (approximately 172 acres) would merge the existing pits (2/3 Pit, North Pit, and 5 Pit) as shown on Figure 2-3 and described below. Ore would be hauled to the BMM process facilities, and waste rock would be hauled to one of the nearby proposed rock disposal area expansions.

North Pit 2 (formerly the LJ Ridge Pit) would be expanded by approximately 21 acres as shown on Figure 2-3. A typical pit cross-section for the North Pit 2 is shown in Figure 2-8. Ore would be hauled to the BMM process facilities, and waste rock would be hauled to a nearby proposed rock disposal area expansion.

North Pit 3 (formerly the South Ridge Pit) would be expanded by approximately 21 acres as shown on Figure 2-3. Approximately 1.6 acres of the existing LJ Ridge Rock Disposal Area (shown as the North 4 Rock Disposal Area) would be relocated with the proposed pit expansion, and approximately 5.6 acres of existing haul road would be excavated with the proposed pit expansion. Ore would be hauled on the existing haul road to the BMM process facilities, and waste rock would be hauled on the existing haul road to a nearby proposed rock disposal area expansion.

Top and Sage Flat Pit Complex

The Top and Sage Flat pits are currently being actively mined. The Top Pit would be expanded by approximately 173 acres and would merge with the proposed pit limits for the Sage Flat Pit as shown on Figure 2-4. The Sage Flat Pit would also be expanded as shown on Figure 2-4. As in current operations, ore would continue to be hauled to the Mooney Basin process facilities, and waste rock would be hauled to one of the nearby proposed rock disposal area expansions. Weather and/or processing capacity considerations could necessitate periodic

Figure 2-8 Open Pit Cross-Section LJ Pit

deliveries of ore from Top and Sage Pit Complex to the BMM process facility. A typical pit cross-section for the Top Pit is shown in Figure 2-9.

Rat Pit
Current activities in the Rat Pit vicinity include mining of the pit and depositing of waste rock into the Rat West and Rat East rock disposal areas. The proposed Rat Pit boundary expands the previously authorized pit boundary by approximately 77 acres as shown on Figure 2-5. As is the case with current operations, ore would continue to be hauled to the BMM process facilities, and waste rock would be hauled to either the Rat East Rock Disposal Area or the proposed Rat West Rock Disposal Area. A typical pit cross-section for the Rat Pit is shown in Figure 2-10.

East Bida Pit
The East Bida Pit is currently an active mining area. The proposed design would expand the pit by approximately four acres as shown in Figure 2-6. As is the case with current operations, ore would continue to be hauled to the Mooney Basin process facilities and waste rock would be hauled to adjacent rock disposal areas.

Belmont Pits
The Belmont Pits are currently an active mining area. The Belmont Pit 2 would expand and the Belmont Pit 3 would be created as shown in Figure 2-6. No expansion of the previously authorized Belmont 1 pit is proposed. Ore is proposed to be hauled to the Mooney Basin process facilities, and waste rock would be hauled to a nearby rock disposal area.

Saga Pit
The Saga Pit is currently and active mining area. The proposed pit design would expand the authorized pit limits by approximately 60 acres as shown in Figure 2-6. Ore would be hauled to the Mooney Basin process facilities, and waste rock would be hauled to the proposed Saga Rock Disposal Area. A typical pit cross-section for the Saga Pit is shown in Figure 2-11.

2.3.4 Rock Disposal Areas

Four new rock disposal areas (North 2, North 3, North 5, and Sage Flat rock disposal areas) would be constructed and would result in approximately 588 acres of new disturbance. The six existing rock disposal areas (North 1, North 4, Rat West, South Water Canyon, East Sage, and Saga rock disposal areas) would be expanded and would result in approximately 1,649 acres of new disturbance. These rock disposal areas would be used to store waste rock generated by the proposed mining activities. The new and expanded rock disposal areas would be constructed by end-dumping from haul trucks. In general, and as per current practice, rock disposal areas would be developed and reclaimed to an overall slope of 2.5 Horizontal:1 Vertical or 3 Horizontal:1 Vertical.

The North 2, North 3, and North 4 rock disposal areas (Figure 2-3) and the South Water Canyon Rock Disposal Area (Figure 2-4) are located in steeper terrain, and thus portions would be reclaimed to an approximate 2.5 Horizontal:1 Vertical slope. The Saga, Bida, and Top rock disposal areas would also be constructed to a 2.5 Horizontal:1 Vertical slope to limit the potential infiltration of meteoric water. The rock disposal areas would be built as benched structures to facilitate recontouring and reclamation. Each bench would be designed approximately 100 feet high, with an offset for each bench to provide for overall final regrade lines, except in areas of steeper terrain. Lift heights may be as high as 200 feet in steep terrain. Benches would generally be completed by starting at the base of the slope and working upward. The outside slopes of the final rock disposal area would be constructed such that variable topography would result during reclamation sloping. Basic rock disposal area design parameters

are summarized in Table 2-8, and additional design details are discussed in the following sections.

Waste rock would be hauled to either the proposed expanded rock disposal areas or to the proposed new rock disposal areas near the pit locations. Figure 1-3 shows the locations of the proposed existing/expanded and new rock disposal areas.

As with current operations, stormwater run-on from undisturbed areas upgradient of disturbed areas would be diverted around the rock disposal areas and returned to natural drainages during operations. Stormwater run-off from disturbed areas would continue to be collected in diversion channels and routed to stormwater collection ponds, where applicable. The diversions would be designed to handle the 100-year, 24-hour storm event. Upon rock disposal area reclamation, diversions may be maintained to provide erosional stability. Rock disposal areas would not be located on any seeps or springs.

TABLE 2-8 ROCK DISPOSAL AREA DESIGN PARAMETERS SUMMARY

ROCK DISPOSAL AREA	HEIGHT (FEET)	CREST ELEVATION (FEET ABOVE MEAN SEA LEVEL)	INCREMENTAL CAPACITY (MILLION TONS)
North 1	575	7,275	344
North 2	545	7,700	
North 3	670	8,225	
North 4	985	8,335	
North 5	485	7,300	
Rat West	645	7,500	96
South Water Canyon	750	8,175	95
East Sage	1,100	8,100	605
Sage Flat	540	8,000	40
Saga	340	7,000	50

Note: Capacity is incremental capacity for rock disposal area expansions.

Prior to use, the proposed rock disposal area footprints would be cleared of vegetation, and growth medium would be salvaged and placed in proposed or existing growth medium stockpiles. Growth medium includes all salvaged material to be used for covering facilities during reclamation. To facilitate concurrent reclamation, salvageable growth medium would be stockpiled as close to the place of use as possible, including direct placement on top of rock disposal areas. Proposed and existing growth medium stockpile locations are shown in Figure 2-7.

Rock disposal area material would be managed in accordance with the Waste Rock Management Plan (BMM, 2009). Barrick would continue to conduct quarterly geochemical evaluations of the waste rock in accordance with the approved Waste Rock Management Plan and applicable Water Pollution Control Permits. The geochemical characterization program provides representative information from the Meteoric Water Mobility Procedure, total sulfur, and acid base accounting analyses to evaluate the potential to degrade waters of the State.

No new rock types or sulfide deposits are anticipated to be excavated as part of this Proposed Action, and Barrick proposes to continue the current approved waste rock management practice of comingling all waste rock material. Should any unanticipated sulfide/acid-generating material be encountered late in a mining sequence that would limit or preclude effective comingling, neutralizing waste rock from another mining area would be rehandled as necessary and placed both beneath and over the sulfide material in a minimum 50-foot thickness.

Figure 2-9 Open Pit Cross-Section Top Pit

Figure 2-10 Open Pit Cross-Section Rat Pit

Figure 2-11 Open Pit Cross-Section Saga Pit

North 1, 2, 3, 4, 5
The authorized West Rock Disposal Area would be expanded to the north and west and renamed the North 1 Rock Disposal Area. The North 4 Rock Disposal Area (formerly LJ Ridge Rock Disposal Area) would expand laterally to the west and vertically (Figure 2-3). Waste rock placement on the North 4 Rock Disposal Area would be completed with bench heights of 100 to 200 feet and horizontal offsets to provide for a final constructed average slope of approximately 2.5 Horizontal:1 Vertical.

Proposed rock disposal areas include North 2 Rock Disposal Area, North 3 Rock Disposal Area, and North 5 Rock Disposal Area. Figure 2-3 shows the proposed rock disposal area expansions and locations of proposed new rock disposal areas. Due to the steep terrain, North 2 Rock Disposal Area and North 3 Rock Disposal Area would have final reclaimed slopes of approximately 2.5 Horizontal:1 Vertical.

East Sage
The current East Sage Rock Disposal Area was authorized by a Decision Record/Finding of No Significant Impact for the BMM 2005 Expansion Environmental Assessment (BLM, 2005b). Barrick proposes to further expand the rock disposal area both laterally and vertically as shown on Figure 2-4.

Sage Flat
The proposed Sage Flat Rock Disposal Area would be located south of the proposed East Sage Rock Disposal Area expansion as shown on Figure 2-4. The proposed haul road, shown on Figure 2-4, would connect the proposed Top/Sage Flat Pit Complex with the Sage Flat Rock Disposal Area.

Rat East
The Rat East Rock Disposal Area, which was authorized by the November 1995 Record of Decision for the BMM EIS (BLM, 1995a), would not be expanded under the Proposed Action; however, a portion of Rat East would be excavated by the proposed expansion of the Rat Pit.

Rat West
The Rat West Rock Disposal Area, previously authorized under the November 1995 Record of Decision for the BMM EIS (BLM, 1995a), would be expanded as shown on Figure 2-5.

South Water Canyon
The South Water Canyon Rock Disposal Area, which was authorized by the November 1995 Record of Decision for the BMM EIS (BLM, 1995a), would be expanded as shown on Figure 2-5. Proposed haul roads and interpit areas would connect the Top/Sage Flat Pit Complex to the South Water Canyon Rock Disposal Area. Due to the steep terrain, the South Water Canyon Rock Disposal Area would be reclaimed to final reclamation slopes of approximately 2.5 Horizontal:1 Vertical.

Saga
The Saga Rock Disposal Area, which was authorized by the November 1995 Record of Decision for the BMM (BLM, 1995a), would be expanded as shown on Figure 2-6.

2.3.5 Heap Leach Facilities
The currently authorized 2/3 Heap Leach Pad would be expanded by approximately 121 acres and the currently authorized Mooney Basin Heap Leach Pad would be expanded by approximately 272 acres. Figure 2-7 shows locations of the existing facilities and proposed heap leach expansions. Leach pad and facility footprints would be cleared of vegetation, and

growth medium would be salvaged and placed in growth medium stockpiles as close to the place of use as possible.

In general, ore would be end-dumped by haul trucks on the leach pads in 10- to 30-foot lifts. If conditions warrant, leach material may also be crushed followed by placement of the ore on the heaps using conveyors and a radial stacker. The need for crushing the ore would be based on future material testing. Seismic analysis and engineering principles would determine the appropriate placement of leach pad catch benches, lift height, maximum heap height, and overall foundation and pad slopes as per State of Nevada requirements. To maintain the reclaimed pad within the perimeter berm, the design would incorporate the principle of constructing the heap leach benches and setbacks or bench widths at an overall angle of 3 Horizontal:1 Vertical. Basic heap design parameters are consistent with existing, approved operations and are shown in Table 2-9. Detailed heap leach facility design is discussed in the following sections.

TABLE 2-9 HEAP LEACH PAD DESIGN PARAMETERS SUMMARY

LEACH PAD	HEAP HEIGHT (FEET)	CREST ELEVATION (FEET ABOVE MEAN SEA LEVEL)	INCREMENTAL CAPACITY (MILLION TONS)
BMM (2, 3, 4, 5)	250	6,810	94
Mooney Basin	250	7,195	124

2/3 Heap Leach Pad

The currently active 2/3 Heap Leach Pad was authorized by the November 1995 Record of Decision for the BMM EIS (BLM, 1995a) for 229 acres of disturbance. The proposed expansion of approximately 121 acres is shown in Figure 1-3.

Approximately 333 acres of disturbance was authorized by the Record of Decision for the 1995 BMM EIS (BLM, 1995a) for development of a tailings storage facility near the 2/3 leach pad. Although the tailings facility was never constructed, the disturbance has been authorized. The proposed expansion of the 2/3 leach pad would disturb approximately 63 acres of this previously authorized disturbance. Thus, Table 2-4 indicates a reduction in total acreage of leach pad disturbance under the Proposed Action.

Mooney Basin Heap Leach Pad

The Mooney Basin Heap Leach Pad and process facilities are currently authorized for 149 acres of disturbance. The proposed expansion of the currently authorized Mooney Basin Heap Leach Pad would disturb approximately 272 acres in the area shown in Figure 2-6. Final design of the proposed process components would be similar to that currently used for the existing leach pads and in accordance with State of Nevada Water Pollution Control Permit requirements.

Design and Operation

The expanded heap leach facilities would be designed to contain leach material and solution in accordance with Nevada Administrative Code 445A.432. Facilities would employ the design principle of 100 percent containment (zero-discharge design) under both normal operating and specific emergency conditions. Solution ponds are ponds that contain the barren and pregnant (gold-bearing) cyanide solution. As with existing facilities, new solution ponds and collection ditches would be double-lined with synthetic liners and would incorporate continuous leak collection and recovery systems between the liners. The solution ponds would be sized and operated to withstand and fully contain all process fluids as well as projected accumulations from a 25-year, 24-hour storm event and sustained power outage. Solution that could be toxic

to wildlife and domestic animals would be fenced and covered to prevent access, as required by the NDOW Industrial Artificial Pond Permit.

Before placement on the heap, ore would be amended with lime for pH control as necessary. Either dilute sodium cyanide or dilute calcium cyanide solution would be applied to the ore on the pad. Solution would percolate through the ore to the synthetic liner, flowing via pipes and ditches to a lined pregnant solution pond. The pregnant solution would then be recovered and pumped through carbon columns to load gold onto carbon. Cyanide would be added to the barren solution, which would be re-circulated back to the heap to continue the leaching process.

Loaded carbon would be managed at either BMM or Mooney Basin process facilities or transported to off-site refining facilities. On-site refining entails stripping gold from the carbon in pressure strip vessels and then washing the stripped carbon with acid prior to reactivation in a kiln. The stripped gold is plated onto cathodes in electrowinning cells and these cathodes are placed into a doré furnace. The molten metal is poured into gold doré bars, which are shipped off-site for further refining.

2.3.6 Monitoring Wells

BMM currently has six monitoring wells Bald 1, Bald 2, MWW 1, MWW 1R, MWW 2, and MWW 3. An additional eight wells are proposed to monitor groundwater quality around the site. This includes three wells at proposed Mooney Basin Heap Leach Pad, two wells at Saga rock disposal area, one well at East Sage rock disposal area, and two wells at North 1 rock disposal area. The locations of the existing and proposed monitoring wells are shown on Figure 2-12.

2.3.7 Roads

Roads within the Proposed Action area include existing and proposed haul roads and access roads as shown on Figure 1-3. Roads used for exploration activities have been previously authorized by the BLM, and new exploration access roads within the Proposed Action boundary would continue to be evaluated for potential site specific impacts on cultural resources, wildlife resources, and noxious weeds as they are proposed. Some existing exploration roads would be incorporated into proposed pit expansions; thus there would be a reduction in secondary road disturbance of 11.2 acres, as indicated in Table 2-4. Stormwater and erosion control features for proposed roads would be implemented in accordance with the Stormwater Pollution Prevention Plan (BMM, 2009) that has been prepared in compliance with the Nevada Mining General Stormwater Permit, NVR300000. See Table 2-13 for design features (applicant-committed environmental protection measures).

Public Access

Barrick would restrict public access on existing roads that cross active mining areas in the Proposed Action area, as per Mine Safety and Health Administration requirements. The Proposed Action area would encompass 16,465 acres, an expansion of 3,738 acres from the current BMM and Mooney Basin Plans of Operation boundaries. Public access would be controlled through the guard shack, with fences and locked gates or other physical methods. Once reclamation is complete, public access roads would be re-established for general use.

Haul Roads

The Proposed Action includes widening existing haul roads and developing new haul roads within the Plan of Operations boundary, as shown in Figure 1-3. Maximum running widths (road utilization) would be 110 feet with average total surface disturbance widths of approximately 165 feet. The actual road disturbance width (running width plus berms and cut-fill areas) would vary depending on topography. Approximately 159 acres of disturbance would result from

construction of new haul roads and expansion of existing haul roads. Haul road berms would be designed to facilitate mule deer migration, as identified as a key issue for wildlife.

Haul roads that are shown in interpit areas have been included with the surface disturbance associated with those facilities. Portions of the existing haul road, such as that between the North 1 Pit and the heap leach facilities, would become part of proposed rock disposal area disturbance (Figure 1-3). Haul roads that cross rock disposal areas, or are ultimately covered by reclaimed rock disposal areas, are included in the rock disposal area surface disturbance acreage.

2.3.8 Employment

Barrick presently employs approximately 180 to 210 full-time and 50 to 100 contract employees at the BMM. This Barrick staffing level is expected to increase approximately 50 percent under the Proposed Action with only a minor increase in contract employees (5 to 10). The total work force under the Proposed Action would be approximately 275 to 325 at peak levels.

2.3.9 Transportation

Employees would continue to be transported in buses and/or vans to the mining areas from Elko, Ely, and Eureka via the access routes shown in Figure 1-1. It is anticipated that one bus would be added to the fleet of two buses currently used. The additional bus would likely be added to the Elko route. The mine's Employee Handbook strongly encourages employees to use company-provided transportation to the mine instead of personal vehicles. In practice, employees rarely use personal vehicles unless they miss the bus or van. The high cost of personal transportation is a strong incentive to use company-provided transportation.

Bulk chemicals and supplies would typically be transported to the site on trucks via one of the following access routes:

- From Ely or Eureka via U.S. Highway 50 to State Highway 892 (Strawberry Highway) to the BMM operations; or
- From Ely via U.S. Highway 50 to Long Valley Road to the Mooney Basin Operations Area.

Bulk chemicals and supplies are not typically transported from Elko via Highway 228. There are no current restrictions on delivery times, and no restrictions are proposed. It is estimated that deliveries would increase 10 to 15 percent, to 1,500 trips per year.

2.3.10 Support Facilities

Surfaces for the support facilities described below would be grubbed (removal of vegetation) and cleared. Salvageable growth medium would be stockpiled in nearby existing or proposed stockpiles for use in reclamation when the facilities are no longer needed.

Power Lines and Substations

A new power line is proposed from the substation near the Mooney Basin process facilities to the Top/Sage Pit Complex area (Figure 1-3), resulting in 14.4 acres of disturbance. A substation would be located near the Top Pit haul road intersection, and line power would be run to the Top/Sage Pit Complex for mining/equipment needs and the proposed maintenance shop.

Freshwater Supply

BMM would continue to utilize existing water wells (Figure 1-2) located on-site for fresh and potable water supplies. BMM would install a treatment system to treat groundwater produced

Figure 2-12 Monitoring Well Locations

from an existing well in order to provide drinking water for the site. There would be an increase of approximately 250 acre-feet per year of ground water pumping.

Additional permits for water systems would be acquired, as needed, for supply and distribution systems that meet or exceed State standards for the number of users or number of connections. Depending on existing well productivity, new wells could be developed to insure adequate supply for site operations.

Growth Medium Stockpiles
Where possible, growth medium stockpiles would be located within interpit areas or on the top of existing rock disposal areas. Alternatively, stockpiles could be located at the base of proposed rock disposal areas and heaps as shown on Figure 1-3.

Yards (Shop Areas and Storage Areas)
A shop area is proposed within the existing East Sage Rock Disposal Area boundary on the southern edge; thus, no new disturbance would result. The shop would accommodate three to four large pieces of equipment and include an oil/lube storage area and fuel island. Existing shop facilities at BMM would also be expanded or modified to accommodate new equipment sizes.

2.3.11 Hazardous Materials

This section describes the quantities of additional mine process chemicals and fuel, transportation of these materials, and on-site storage. Emergency response procedures for transport accidents and for release from storage and processing facilities are also discussed. Types, quantities, and disposal methods for hazardous materials and other wastes that would be generated under the Proposed Action are expected to be similar to current amounts and procedures.

Chemical Transportation and Storage
As described in the draft Spill Contingency Plan (BMM, 2009), the primary chemicals and fuels to be used as part of the Proposed Action consist of sodium or calcium cyanide, diesel fuel, ammonium nitrate, sodium hydroxide, propane, lime, gasoline, carbon, and anti-scalant. These chemicals do not differ in type from those currently utilized at the existing operations, but there would be larger quantities (Table 3-34). Trucks transport chemicals to the BMM and Mooney Basin Operations Area sites on an as-needed basis.

The transportation routes for chemicals and petroleum products to the BMM North Operations Area Project would remain unchanged from current delivery routes, which are identified in Section 2.3.9.

Currently approved staging facilities, safety measures, transportation, and handling requirements that are already in use would continue to be utilized. Any new storage areas would be constructed as authorized with 110 percent secondary containment, where appropriate. Sodium cyanide is and would continue to be stored in areas that are physically separated from acid storage areas. Chemical storage areas are shown on Figure 2-1. Blasting agents and explosives would continue to be stored and used on-site in accordance with Mine Safety and Health Administration (30 Code of Federal Regulation 56E) and Bureau of Alcohol, Tobacco, and Firearms regulations.

Emergency Planning and Response
The transportation, storage, and use of fuels, explosives, and reagents require adherence to applicable regulations and guidelines established and enforced by the Nevada Division of

Environmental Protection, U.S. Department of Transportation, Nevada Department of Transportation, Bureau of Alcohol, Tobacco, and Firearms, Department of Homeland Security, and Mine Safety and Health Administration. The site Emergency Response Plan (BMM, 2009) has been updated for the existing approved plans for the BMM and Mooney Basin Operations Area. The purpose of an Emergency Response Plan is to establish responsibilities and guidelines for actions to be taken by mine personnel in the event of an emergency at the mine. The plan identifies potential sources of spills, establishes measures of prevention, and defines control, cleanup, and reporting procedures in the event of a hazardous material spill, petroleum release, or natural disaster. The plan contains procedures for response to on- and off-site incidents.

A fluid management plan is required by the Nevada Division of Environmental Protection for each Water Pollution Control Permit. This plan provides designs and operational descriptions of the fluid management systems in place for process facilities that provide containment of process fluids during normal and unusual natural or operational events. These plans are currently in place and would be updated as part of the Nevada Division of Environmental Protection permitting process for any new process components associated with the Proposed Action.

Reporting and Notification

BMM and Mooney Basin Operations Areas have currently approved Emergency Response Plans. The updated site plan would be submitted to the applicable agencies for approval prior to commencement of expanded process operations. With an approved plan, state and federal reporting requirements for qualifying releases consist of notification by telephone no later than 5 p.m. of the next regular work day from the time of the incident to:

- Nevada Division of Environmental Protection's 24-hour emergency notification number at 888-331-6337;
- Nevada Division of Emergency Management at 775-687-4240 during normal working hours or at 775-687-5300 after hours;
- Local Emergency Planning; and
- National Response Center at 800-424-8802.

Waste Management

No change to the existing non-hazardous solid waste streams (types and sources of non-hazardous waste) would occur as a result of the Proposed Action. The currently authorized BMM Class III waivered landfill location would continue to be utilized for the Proposed Action, and an additional landfill site may be developed in the Mooney Basin Operations Area to accommodate expanded operations. The new landfill location is in a previously disturbed area associated with the Saga rock disposal area and is shown on Figure 2-6. When an appropriate site has been finalized, a permit application for the landfill would be submitted for approval by the Nevada Division of Environmental Protection. The landfills can accept approved non-hazardous wastes including glass, plastics, waste paper, wood, scrap metal, used tires, and non-hazardous laboratory wastes. An approved management plan for the landfill lists the allowable materials types, weekly maintenance programs, inspection programs, and closure requirements. Maintenance activities include weekly cover of the waste material. Inspections are conducted weekly to insure adequate cover placement, containment of waste material, and control of stormwater.

The Nevada Division of Environmental Protection, Bureau of Waste Management regulates the hazardous waste program in the State of Nevada. Its role, as defined in Nevada Revised Statutes 459.400, is "to protect human health, public safety and the environment from the effects of improper, inadequate or unsound management of hazardous waste; establish a program for regulation of the storage, generation, transportation, treatment and disposal of hazardous waste; and ensure safe and adequate management of hazardous waste." The Nevada Division of Environmental Protection hazardous waste program is responsible for permitting and inspecting hazardous waste generators and disposal, transfer, storage, and recycling facilities. It is also responsible for enforcing State hazardous waste statutes and regulations and is authorized to enforce Federal hazardous waste regulations in lieu of the Environmental Protection Agency. The State of Nevada has adopted by reference, with certain modifications, the Federal hazardous waste regulations.

Hazardous waste management is subject to specific requirements that are dependent upon the amount of hazardous waste produced at a facility in a calendar month. The BMM and Mooney Basin Operations Areas are currently classified as a Small Quantity Generator of hazardous waste as defined by the Resource Conservation and Recovery Act. Facilities with this classification generate less than 1,000 kilograms (2,200 pounds) of hazardous waste in a month. No change in classification is expected due to the Proposed Action.

No new hazardous waste streams would be generated as part of the Proposed Action. The practice of recycling used oil, antifreeze, solvents, and batteries would continue under the Proposed Action. Currently authorized temporary on-site hazardous waste storage areas would be utilized for any hazardous waste generated under the Proposed Action. All off-site, manifested transfers to treatment, storage, and disposal facilities would continue in accordance with the Resource Conservation and Recovery Act, Nevada Division of Environmental Protection, and Nevada Department of Transportation regulations.

2.3.12 Public Safety

The Proposed Action boundary is only partially fenced due to existing topography and the size of the Proposed Action area. Barrick currently utilizes and will continue to provide public safety controls for the mine site to limit public access to the extent possible. Public safety measures used at the facility include security fences located at the two entrances to the mine site, fencing around potentially hazardous areas such as the heap leach pads, process ponds, and process buildings, and construction of berms along haul roads to prevent access to these roads. All chemicals on-site are stored in secure buildings at locations throughout the mine site.

Other general safety measures used at the mine site include the following:

- Speed limits are posted and enforced on access routes and on roads throughout the project site;
- Warning signs are posted in areas where flammable materials and hazardous materials are stored and in areas where conditions warrant posting of signs;
- Training is conducted for all employees as required by the Mine Safety and Health Administration;
- All other Mine Safety and Health Administration training and safety requirements are followed and enforced by Barrick.

2.3.13 Building Inventory

There are numerous buildings associated with the existing operation. These buildings would remain in place and be used for the same purposes as with the existing operation. Only one new structure is planned with the Proposed Action. As part of the Proposed Action, a new vehicle maintenance building would be constructed in the Top Pit area. In addition, the maintenance building at BMM would be expanded to allow maintenance of the larger equipment planned under the Proposed Action. The following provides a list of the current structures at the site.

Bald Mountain Buildings

- Main Office
- EHS Office
- Geology Office
- Truck Shop/Warehouse
- Main Process
- Process Trailer #1
- Process Trailer #2
- Mine Operations Office
- Geology/Core Shed
- Guard Shack/Ambulance Bay
- Assay Lab
- Wash Bay
- Tire Pad/Shop
- Electrical Shop
- Mobile Storage Trailers (10 total)

Mooney Basin Buildings

- Main Process
- Mooney Process Trailer #1
- Mooney Process Trailer #2
- Communications Center

All of these structures meet the “Reasonably Incident” definition in 43 CFR 3715.0 – 5, and the activities that are the reason for occupancy as specified in 43 CFR 3715.2.

2.3.14 Reclamation Plan

Reclamation activities described in this section would be implemented for the facilities or disturbance associated with the Proposed Action. Reclamation of current or existing facilities has been addressed and approved under the previously approved Plans of Operations and reclamation permit. Reclamation of disturbed areas resulting from activities associated with the Proposed Action would be completed in accordance with BLM and Nevada Division of Environmental Protection regulations. BLM Surface Management Regulations, 43 Code of Federal Regulation 3809, establish procedures and standards for prevention of unnecessary or undue degradation of public lands by operations authorized by the mining laws and provide for the maximum possible coordination with appropriate State agencies to avoid duplication. The State of Nevada requires that a reclamation plan be developed for any new mining projects or expansion of existing operations (Nevada Revised Statute 519A). The BMM North Operations Area Project Reclamation Plan (BMM, 2009) incorporates previously authorized reclamation plans and addresses activities associated with the Proposed Action.

The objectives of the proposed reclamation program are as follows:

- To provide a stable post-mining landform that supports defined land uses;
- To minimize erosion damage and protect water resources through control of water run-off and stabilization of components;
- To establish post-reclamation surface soil conditions conducive to the regeneration of a stable plant community through stripping, stockpiling, and reapplication of soil material;
- To revegetate disturbed areas with a diverse mixture of plant species in order to establish productive plant communities compatible with existing land uses;
- To maintain public safety by stabilizing or limiting access to mine features that could constitute a public hazard; and
- To minimize impacts to visual resources.

Schedule

Under the Proposed Action, the BMM North Operations Area Project would be active for approximately 10 years. The combined life of the current and Proposed Actions, including mining, ore processing, and most reclamation, is estimated to extend to the year 2020. Closure activities, final reclamation, and post-closure monitoring may extend several years beyond that date. The projected reclamation schedule is provided in the BMM Plan of Operations (BMM, 2009).

Concurrent reclamation would occur when practical and safe. Concurrent reclamation would involve contouring and revegetating the permanently inactive areas during operations. Upon completion of mining, final recontouring and seeding would be completed pursuant to the Reclamation Plan and Final Permanent Closure Plan as approved by the Nevada Division of Environmental Protection and BLM.

Post-Mining Land Use

The post-mining land use would be consistent with pre-mining land uses, including mineral exploration and development, livestock grazing, wildlife habitat, and dispersed recreation. Barrick would work with the agencies and local governments to evaluate alternative land uses that could provide other socioeconomic benefits from the mine infrastructure. The proposed reclamation activities and post-mining land uses are designed to be in conformance with the approved Ely District Record of Decision and Approved Resource Management Plan (BLM, 2008) and with White Pine County zoning ordinances.

Post-Mining Topography

Large constructed topographic features, such as rock disposal areas and heap leach pads, may have rounded crests and variable slope angles to resemble natural landforms, as well as interspersed rock piles or rock features. The final reclamation configuration would provide a stable post-mining landform as determined by both seismic and erosional performance (Figure 2-13). Slopes would be regraded to either 2.5 Horizontal:1 Vertical (in select cases) or 3 Horizontal:1 Vertical or shallower. To limit erosion, growth medium would be placed on the regraded surface and the surface would be seeded. The open pits would remain as open pits with safety berms to preclude vehicular access to the pits. Post-reclamation topography is provided in the BMM (2009) Plan of Operations.

Growth Medium Management

Growth medium would be salvaged prior to construction of any proposed mine component, including pits. The growth medium would be recovered where available, targeting minimum reclamation cover volumes for nearby components. The targeted depth of growth medium on reclaimed surface will be dependent on the specific component. Minimum depths for growth medium placed on reclaimed surfaces range from six (six to 12 inches on waste rock areas) to 24 (heap leach pads) inches. It is anticipated that all areas affected by the Proposed Action, except areas limited by topography, would have available growth medium removed and placed into stockpiles. All salvageable growth medium would be removed from these areas. The growth medium would be placed in segregated stockpiles located near the components for which the material would be used and in such a manner as to reduce degradation of the material by wind and water erosion. Stockpiles that would remain in place throughout a growing season would be seeded with an interim seed mixture (Table 2-10) to help stabilize the material and minimize non-native species establishment.

TABLE 2-10 INTERIM SEED MIXTURE FOR GROWTH MEDIUM STOCKPILES

SPECIES	COMMON NAME	PURE LIVE SEED (POUNDS PER ACRE)
Agropyron smithii	Western wheatgrass	3.0
Elymus trachycaulus ssp.	Slender wheatgrass	1.0
Melilotus officinalis	Yellow sweetclover	3.0
Onobrychis viciifolia	Remont sainfoin	1.0
	Total	**8.0**

Revegetation

Reclaimed surfaces would be revegetated to reduce run-off and erosion, provide forage for wildlife and livestock, control invasive weeds, and reduce visual impacts. Seed would be applied with a rangeland drill, hydroseeder, or mechanical broadcaster and harrow, depending upon accessibility. Seedbed preparation and seeding would typically take place between the BLM-recommended dates of October 1 and March 15 of each year after grading and growth medium placement activities are complete. Seeding outside these dates may occur depending on weather conditions.

Two reclamation seed mixtures and application rates have been approved by the BLM for the authorized facilities: one for elevations above 7,000 feet and a second for elevations below 7,000 feet, as shown in Tables 2-11 and 2-12. The plant species in these seed mixtures have the ability to grow within the constraints of the low annual precipitation experienced in the region and are suitable for the site elevation, soil types, and aspects. The plants also provide erosion protection as well as forage and cover characteristics similar to the pre-disturbance conditions, thus facilitating post-mining land use.

The proposed seed mixtures and application rates would be subject to modification based upon the actual results of concurrent reclamation within the Proposed Action area, revegetation test plots, or changes by the BLM to the seed mix recommendations.

Revegetation monitoring has been ongoing at the existing, authorized facilities to evaluate and select successful, site-specific reclamation measures that would achieve the reclamation standards or to demonstrate the need to plant species mixes that would be adaptable to different geomorphic settings expected within the reclaimed Proposed Action area, including different aspects and soil or growth medium amendments. Various surface preparation techniques would continue to be evaluated for their success in promoting plant establishment and resistance to soil erosion. This program has been implemented in the past in coordination

Figure 2-13 Post Mining Reclamation Topography

with BLM and Nevada Division of Environmental Protection, and results from this program would be used in determining proper revegetation methods for approved and proposed disturbance.

TABLE 2-11 RECOMMENDED SEED MIXTURE BELOW 7,000 FEET

SPECIES	COMMON NAME	PURE LIVE SEED (POUNDS PER ACRE)
Pseudoroegneria spicata spp. spicata	Bluebunch wheatgrass	1.0
Agropyron smithii	Western wheatgrass	1.5
Leymus cinereus	Great Basin wildrye	1.0
Achnatherum hymenoides	Indian ricegrass	0.5
Elymus lanceolatus spp. lanceolatus	Thickspike wheatgrass	1.0
Elymus elymoides	Bottlebrush squirreltail	0.5
Poa secunda	Sandberg's bluegrass	0.1
Linum lewisii	Appar blue (Lewis') flax	0.5
Onobrychis viciifolia	Remont sainfoin	2.0
Penstemon palmeri	Palmer's penstemon	0.1
Atriplex confertifolia	Shadscale	1.0
Atriplex canescens	Fourwing saltbush	1.0
Chrysothamnus viscidiflorus	Douglas' rabbitbrush	0.1

Note: The above is a list of BLM-approved reclamation species; the actual seed mix would vary from one area to another. BLM and NDOW would approve the actual seed mix before seeding of a particular area.

TABLE 2-12 RECOMMENDED SEED MIXTURE ABOVE 7,000 FEET

SPECIES	COMMON NAME	PURE LIVE SEED (POUNDS PER ACRE)
Artemisia tridentata ssp. *vaseyana*	Mountain big sagebrush	0.1
Purshia tridentata	Antelope bitterbrush	0.5
Linum lewisii	Appar blue (Lewis') flax	0.1
Balsamorhiza sagittata	Arrowleaf balsamroot	0.5
Penstemon palmeri	Palmer's penstemon	0.1
Pseudoroegneria spicata spp. spicata	Bluebunch wheatgrass	2.0
Elymus trachycaulus ssp.	Slender wheatgrass	1.0
Elymus lanceolatus ssp. *lanceolatus*	Thickspike wheatgrass	1.0
Poa canbyi	Canby's bluegrass	0.1
Leymus cinereus	Great Basin wildrye	1.0
Achnatherum hymenoides	Indian ricegrass	0.5
Elymus elymoides	Bottlebrush squirreltail	0.5

Note: The above is a list of BLM-approved reclamation species; the actual seed mix would vary from one area to another. BLM and NDOW would approve the actual seed mix before seeding of a particular area.

Revegetation efforts would be determined to be successful and complete upon demonstrating compliance with Nevada Guidelines for Successful Reclamation (NDEP, 1998) and upon approval by the BLM and Nevada Division of Environmental Protection. The results of revegetation monitoring would be used in conjunction with these guidelines to determine applicable vegetation release criteria under the Proposed Action.

Surface Water and Sediment Control
Surface water would be diverted around mine features through primary stormwater diversions, culverts, and secondary perimeter berms and/or ditches. Silt fences, sediment traps, and/or other erosion control measures would be used to prevent migration of sediment from disturbed areas until reclaimed slopes and exposed surfaces are stabilized. A preliminary Stormwater Pollution Prevention Plan has been prepared and is part of the Proposed Action. This draft plan is based on existing stormwater controls and outlines potential sources of stormwater pollution and erosion control measures that may be used during operations.

Open Pits
Mining would result in excavations to varying depths. Overall, pit slopes would range from approximately 38 degrees to 56 degrees, depending on rock type and geotechnical considerations. Ongoing geotechnical and slope movement monitoring studies would be used to evaluate the safety of open pit slopes. During final reclamation, a berm would be constructed along open pit crest areas to control and prevent access by people and livestock.

Rock Disposal Areas
The rock disposal areas would be reclaimed to meet certain objectives including reduced slope erosion, mass stability, rounded edges, revegetated surfaces, reducing meteoric infiltration, and rates of soil loss consistent with the surrounding topographic features. The final slopes of the reclaimed rock disposal areas would vary, with slopes of 2.5 Horizontal:1 Vertical or shallower and slight benches remaining at required intervals to reduce surface water flow velocities and erosion. As shown in the Revised Universal Soil Loss Equation analyses (BMM, 2009), reducing the slope length by providing a horizontal catch bench results in significantly less potential erosion from rock disposal area surfaces. The tops of the Saga, Bida and Top rock disposal areas would be rounded to promote meteoric water run-off and eliminate large, flat surfaces which could allow water to pond and infiltrate.

As the rock disposal areas reach their ultimate configurations and become inactive, the face would be regraded. Once regraded, the surface would be covered with stockpiled growth medium. The targeted depth for growth medium on the rock disposal areas is between six and 12 inches. Depending upon location, the area would then be seeded with the seed mixture shown in either Table 2-11 or Table 2-12 or as determined at the time of closure through consultation with the BLM and Nevada Division of Environmental Protection. This method has proven successful at BMM over the past several years on existing rock disposal areas.

In addition to the general description of the reclamation for the rock disposal areas, additional reclamation measures for the specific rock disposal areas include the following:

- The reclamation for the Saga, Bida, and Top rock disposal areas would include placement of adequate material at closure so the top of each rock disposal area would be “rounded” to promote surface run-off from the top of the rock disposal area.

- After final grading of the Saga and Bida rock disposal areas during reclamation, there would be six to 12 inches of growth media (depending on availability) placed on the rock disposal areas prior to seeding with the approved BLM seed mixture. This soil/vegetative cover would reduce the infiltration of meteoric water and enhance evapo-transpiration.

- The side slopes of the Saga, Bida, and Top rock disposal areas would be graded to a nominal 2.5 horizontal to 1 vertical. This change will reduce the residence time of water

on the rock disposal area face and increase the run-off rate, further reducing the potential for infiltration.

- The engineering design for the drainage channel network for the Saga, Bida, and Top rock disposal areas would be modified to account for the slightly higher flow rates resulting from the steepening of the side slopes and to prevent erosion.

Heap Leach Pads

The heap leach facilities would be decommissioned in accordance with Nevada Division of Environmental Protection regulations and guidelines for closure. A Tentative Plan for Permanent Closure, as required by Nevada Administrative Code 445A.398, is already included within the current Water Pollution Control Permit applications for existing leach facilities. A Final Plan for Permanent Closure, to include proposed expansion components, would be prepared and submitted to Nevada Division of Environmental Protection and BLM two years prior to the termination of each heap leach facility operation, as per Nevada Administrative Code 445A.447. Final closure plans for both the 2/3 Heap Leach Pad and Mooney Basin Heap Leach Pad are anticipated to follow those of other pad closures already evaluated and successfully completed within the BMM district (Alligator Ridge, Yankee, Little Bald Mountain, and BMM Pad 1).

Chemical stabilization of heap leach pads is required to obtain permanent closure. Nevada Administrative Code 445A.379 defines *stabilized* as "the condition which results when contaminants in a material are bound or contained so as to prevent them from degrading the waters of the State under the environmental conditions that may reasonably be expected to exist at a site."

Geochemical investigations and empirical monitoring that have been conducted at the existing closed facilities such as Yankee and BMM Pad No. 1 (SRK, 2001; Geomega, 2000) indicate that there is no additional benefit in recirculation of process solution within the heap or rinsing with fresh water beyond the point in time where economic gold recovery is no longer achieved. Further, the evapo-concentration of salts and metals resulting from extended recirculation may slow chemical stabilization. Therefore, rinsing is not expected to be beneficial or required to stabilize the heaps associated with this ore type.

Following cessation of active leaching, solution from both currently active heap leach pads would be managed through recirculation and active evaporation until draindown from the pads can be managed long-term through the use of evapo-transpiration cells. Recirculation would occur until the existing process ponds have sufficient capacity to contain 24-hours of draindown from the leach pads. Active evaporation would be used to reduce the volume of process solution through the use of sprinklers, snow makers, or other devices. This active evaporation would occur until the volume of draindown is sufficient to be managed with the evapo-transpiration cells.

The heap leach pads would be constructed in lifts ranging in thickness of 10 to 30 feet (design benches of 25 feet), depending upon operational considerations. Heaps would be constructed in lifts set on a 3 Horizontal:1 Vertical balance line to ensure ease of final reclamation to a 3 Horizontal:1 Vertical slope. As with previous heap leach closures within the mining district, each bench would be regraded to the final configuration with overall slopes of 3 Horizontal:1 Vertical. When no longer required for evaporation of fluids, the surface solution circulation piping would be removed or buried within the leach facility, and the perimeter ditches would be filled with a protective layer and clean growth medium and/or barren rock. Side-slopes would then be regraded to match closely with the crest of the perimeter collection ditches in preparation for the placement of soil cover. The BMM leach pad closure studies (Brown and Caldwell, 1997, 1998,

2000; Geomega, 2000; SRK, 2001) indicate the benefit of placement of 18 to 36 inches of growth medium on the reclaimed heaps as this provides for a stable post-closure landform and reduces the infiltration of meteoric waters. A thicker cover on the heap leach pad as compared with other facilities (e.g., waste rock facilities) would allow retention of water in the cover material during snow melt and precipitation events and make this water readily available for uptake by plants. By retaining the water in the cover material, the amount of water infiltrating is reduced, thus minimizing the draindown solution that would be handled by the evapo-transpiration cells during closure and post-closure.

The recontoured heap leach pads would be covered with 24 inches of growth medium, which will act as an evapo-transpiration cover to reduce meteoric water infiltration into the heap leach pad. The depth of the evapo-transpiration cover is based on studies conducted to analyze infiltration at differing depths of cover (from 18 inches to 36 inches) (Brown and Caldwell, 1997, 1998, 2000; Geomega, 2000; SRK, 2001), and on information and past success at other closed facilities at this mine site. If future studies for any individual pad indicate a need for greater cover, this information would be provided to the Nevada Division of Environmental Protection and BLM, and the reclamation plan would be adjusted accordingly. Revegetation of the heaps would be carried out following growth medium placement.

Stormwater diversion structures would be constructed upgradient of the heaps to prevent impacts from stormwater run-on. These structures would not be reclaimed but would be retained to minimize erosion over the long-term.

As the heaps are stabilized and closed, the long-term heap drainage would be routed to evapo-transpiration cells or evaporation cells to further reduce or eliminate the discharge from the system. Long-term heap drainage refers to drainage from the heap leach pad after active evaporation is no longer needed to reduce the draindown and the draindown is solely managed through the evapo-transpiration or evaporation cells. This time period varies with each leach pad but typically ranges from several years to 20 years. The evapo-transpiration cells or evaporation cells are typically constructed by converting the existing solution ponds. Evapo-transpiration cells use plants to evapo-transpire solution while evaporation cells rely strictly on evaporation to eliminate draindown solution. Initial heap water balances and empirical evapo-transpiration cell data from other closed facilities at this site indicate that site evaporation and transpiration can be employed to result in zero-discharge stability at the site. Barrick proposes to pursue this long-term zero-discharge option as a primary goal for closure.

Site-specific data would be collected for each proposed heap and submitted as part of the Final Plan for Permanent Closure at least two years prior to the closure of each heap. Information from the site closure studies conducted for the five closed heaps within the mining district indicated no long-term potential to degrade waters of the State. Where data do not support the implementation of evapo-transportation cells or evaporation cells, alternative removal, use, or treatment of the fluids may be required. A final permanent closure plan would be developed with the Nevada Division of Environmental Protection.

Solution Ponds

Solids would be present in some quantity in most of the ponds at the time of closure. Representative samples would be obtained to determine the chemical characteristics of the pond solids. Depending on the results of the characterization testing, the solids would either be left in the ponds with the pond liners (liners would be folded over and buried in place), removed and placed on the heap prior to regrading and covering, removed and sold for metal recovery, or removed and placed in an approved landfill.

Where the ponds may be converted into a passive post-closure fluid management evapo-transpiration cell or evaporation cell, the liners would be inspected and repaired as necessary. The pond liners would be protected with a specified two-foot overliner layer or other suitable protective layer and then backfilled with alluvium with a fluid conveyance/distribution system. The surface would be graded to prevent accumulation of water and to blend with the surrounding topography. A growth medium cover of six to 12 inches would be placed over the resulting evapo-transpiration cell. Evaporation cells would be left open, if used (generally based on geochemical considerations and biological risk evaluation), resulting in a lined pond.

The liners for ponds not designated as part of the closure fluid management system would be cut, folded, and left in the pond bottoms prior to backfill and reclamation of the pond. The pond would be returned to a landform that is free-draining and supports post-closure revegetation through placement of an average of six to 12 inches of growth medium.

Roads

The Proposed Action area encompasses terrain from nearly flat to upwards of 30 percent slopes. Haul and access roads would be constructed in a wide variety of terrain within the Proposed Action area. Reclamation of roads in very steep terrain may not allow original topography to be attained. In this case, the cross-section would be blended to ensure no steeper than 2.5 Horizontal:1 Vertical slopes except where cut banks are on the inside of the road and located generally in bedrock. Those cuts in bedrock may remain as permanent features similar to a cliff or rock outcrop.

Within the Proposed Action area, roads and safety berms would be recontoured or regraded to the approximate original topography. Where the road is located on fill, the side slopes would be rounded and regraded to 3 Horizontal:1 Vertical. Finished slopes would be relatively similar to the surrounding topography. Compacted road surfaces would be ripped, covered with soil/growth medium from the safety berms or road fill if required, and revegetated. Dikes and ditches that would no longer be required would be regraded. Where the fill portion of the road would be largely removed, ripping would be performed only where the original roadbed would otherwise be left in place.

Some roads would be needed during closure activities to access monitoring points. Any remaining roads would be recontoured and revegetated when no longer needed.

Disposition of Structures, Equipment, and Materials

As stated in the current reclamation plan for existing facilities, during final mine closure buildings and structures would be dismantled and materials would be salvaged or moved to the site landfill or other appropriate disposal site. Concrete foundations and slabs would be broken up using a track-hoe mounted hydraulic hammer or similar methods and buried in place under approximately three feet of material in such a manner to prevent ponding and to allow vegetation growth. After demolition and salvage operations are complete, the disturbed areas would be covered with growth medium and revegetated.

Reagents and explosives would be removed for use as product at other mines, or appropriately disposed of off-site. Any surface pipelines would be removed, typically for salvage. Underground pipeline ends would be capped/plugged and left in place. Unneeded utility poles would be cut off at ground level and removed.

Drill Hole Plugging

All mineral exploration and development drill holes and monitoring, production, and dewatering wells that are subject to Nevada Division of Water Resources regulations would be abandoned

in accordance with applicable rules and regulations (Nevada Administrative Codes 534.420 through 534.430). Boreholes would be sealed to prevent cross contamination between aquifers, and the required shallow seal would be placed to prevent contamination by surface access.

Monitoring wells associated with the processing facilities would be maintained until BMM is released of this requirement by the Nevada Division of Environmental Protection. These wells would then be plugged and abandoned according to the requirements of the Nevada State Engineer.

Post-Closure Monitoring

Monitoring of water quality, stability, and revegetation would occur in compliance with existing regulations, permits, and approvals. Monitoring for stability, focusing on erosion of reclaimed areas and stability of the pit high walls, would be conducted after completion of earthworks associated with reclamation. The monitoring would be conducted for a minimum of two years or in accordance with the reclamation permit. Monitoring of stormwater controls and stability would also be conducted as required under the Nevada General Stormwater Permit.

Revegetation monitoring would be conducted for a minimum of three years following completion of seeding of reclaimed areas. This monitoring would be conducted to determine if revegetation meets the requirements of the Attachment B, Nevada Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the BLM, and the U.S. Department of Agriculture Forest Service (NDEP, 1998).

Water quality monitoring would be conducted in accordance with the Water Pollution Control Permit issued by the Nevada Division of Environmental Protection. Sampling locations and monitoring frequency are identified in this permit. Post-closure monitoring would continue for a minimum of five years following complete closure of the heap leach pads (draindown managed by the evapo-transpiration cells) and reclamation of waste rock areas. Existing and proposed water monitoring locations are shown on Figure 2-12.

2.4 Design Features (Applicant-Committed Environmental Protection Measures)

Design Features (Applicant-committed environmental protection measures) have been developed as a way of minimizing or avoiding environmental impacts. Table 2-13 provides the Design Features (applicant-committed environmental protection measures) that would be implemented by Barrick for the Proposed Action. They have been organized by the primary resource the protection measures would benefit or protect. Potential impacts are also provided. The operator would comply with performance standards in 43 CFR 3809.420 as well as appropriate BLM Best Management Practices found in Appendix D.

TABLE 2-13 DESIGN FEATURES (APPLICANT-COMMITTED ENVIRONMENTAL PROTECTION MEASURES)

RESOURCE	POTENTIAL IMPACTS	ACTIONS TO MINIMIZE OR AVOID IMPACTS
Water Resources	• Erosion (water) • Impacts to groundwater	• Construct access roads to BLM road standards. • Close surface drill holes per Nevada Revised Statute 534. • Install erosion control berms, silt fence, straw bales, detention basins or other features as necessary in areas prone to erosion. • Install wells to monitor water quality
Geology and Minerals	• Removal of mineral resources	• Pits with remaining resources would not be backfilled
Paleontology	• Impacts to paleontological resources of scientific interest	• If paleontological resources of potential scientific interest are encountered (including all vertebrate fossils and deposits of petrified wood), leave them intact and immediately bring them to the attention of the BLM Authorized Officer.
Soils	• Soil erosion (wind and water)	• When preparing the site for reclamation, include appropriate Best Management Practices as determined appropriate for site-specific conditions. • Use existing roads as much as possible. • Store growth media in stockpiles. • Upon completion or temporary suspension of mining operations, backfill all holes and trenches and re-contour area to the approximate natural slope with slopes at 3 Horizontal to 1 Vertical or to the original topography, whichever is less. • If stockpiles would remain over a growing season, seed with interim seed mix.
Vegetation	• Loss of native vegetation	• Where seeding is required, use appropriate seed mixture and seeding techniques approved by the BLM Authorized Officer. • Reclaim with interim and final seed mixes. • Generally, conduct reclamation with native seeds that are representative of the indigenous species present in the adjacent habitat. Possible exceptions would include use of non-native species for a temporary cover crop to out-compete weeds. In all cases, ensure seed mixes are approved by the BLM Authorized Officer prior to planting. • Reclamation goals would be to satisfactorily reclaim disturbed areas in accordance with the approved reclamation plan. Disturbance would be recontoured to blend with the natural topography, erosion stabilized, and an acceptable vegetative cover established in accordance with Nevada Guidelines for Successful Revegetation prepared by the Nevada Division of Environmental Protection, the BLM, and the U.S. Department of Agriculture Forest Service. • Curl-leaf mountain mahogany (*Cercocarpus ledifolius* Nutt.), single-leaf pinyon pine (*Pinus monophylla*) and juniper (*Juniperus osteosperma)* trees would be removed only as necessary in proposed disturbance areas.
Non-Native Invasive Species	• Increasing weed infestation from existing local sources • Introduction of new weed infestations by importing new seed sources on equipment	• Barrick would continue to work with the BLM, the Tri-County Weed District, and the Newark Valley/Long Valley Cooperative Weed Management Area to prevent the spread of invasive, nonnative species in the area affected by the expansion. • Prior to project approval a site-specific weed survey would occur and a weed risk assessment would be completed. Monitoring would be conducted for a period no shorter than the life of the permit or until bond release and monitoring reports would be provided to the BLM. If the spread of noxious weeds is noted, appropriated weed control procedures would be determined in consultation with BLM personnel and would

RESOURCE	POTENTIAL IMPACTS	ACTIONS TO MINIMIZE OR AVOID IMPACTS
	• Herbicide application • Inspection of source sites such as borrow pits, fill sources, or gravel pits used to supply inorganic materials • Construction site management	be in compliance with BLM Handbook H-9011, H-9011-1 Chemical Pest Control, H-9014 Use of Biological Control Agents of Pests on Public Lands, and H-9015 Integrated Pest Management. Should chemical methods be approved, the lessee must submit a Pesticide Use Proposal to the Authorized Officer 60 days prior to the planned application date. A pesticide Application Report must be submitted to the Authorized Officer by the end of the fiscal year follow chemical application. • Barrick would continue existing measures to survey for and treat noxious weeds. • Areas of concern would be identified and flagged in the field by a weed scientist or qualified biologist. The flagging would alert personnel or participants to avoid areas of concern. These sites would be recorded using global positioning systems or other BLM Ely District Office approved equipment and provided to the Field Office Weed Coordinator or designated contact person. • Segregate growth media that may contain noxious weed seeds away from growth media not containing noxious weed seeds. • The contractor, operator, or permit holder would provide information and training regarding noxious weed management and identification to all personnel who would be affiliated with the implementation and maintenance phases of the project. • To eliminate the transport of vehicle-borne weed seeds, roots, or rhizomes all vehicles used on the site would be free of soil and debris capable of transporting weed propagules. All such vehicles and equipment would be cleaned with power or high pressure equipment prior to entering or leaving the work site or project area. Vehicles used for emergency fire suppression would be cleaned as a part of check-in and demobilization procedures. Cleaning efforts would concentrate on tracks, feet and tires, and on the undercarriage. Vehicle cabs would be swept out and refuse would be disposed of in waste receptacles. Cleaning sites would be recorded using global positioning systems or other mutually acceptable equipment and provided to the BLM Ely District Office Weed Coordinator or designated contact person. • To eliminate the introduction of noxious weed seeds, roots, or rhizomes all interim and final seed mixes, hay, straw, hay/straw, or other organic products used for reclamation or stabilization activities, feed, bedding would be certified free of plant species listed on the Nevada noxious weed list or specifically identified by the BLM Ely District Office. • To eliminate the introduction of noxious weed seeds, roots, or rhizomes all source sites such as borrow pits, fill sources, or gravel pits used to supply inorganic materials used for construction, maintenance, or reclamation would be inspected and found to be free of plant species listed on the Nevada noxious weed list or specifically identified by the BLM Ely District Office. Inspections would be conducted by a weed scientist of qualified biologist. • Removal and disturbance of vegetation would be kept to a minimum through construction site management (e.g. using previously disturbed areas and existing easements, limiting equipment/materials storage and staging area sites, etc.). • Reclamation would normally be accomplished with native seeds only. These would be representative of the indigenous species present in the adjacent habitat. Possible exceptions would include use of non-native species for a temporary cover crop to out-compete weeds. Where large acreages are burned by fires and seeding is required for erosion control, all native species could be cost prohibitive and/or unavailable. In all cases, seed mixes would be approved by the BLM Authorized Officer prior to application. • Mixing of herbicides and rinsing of herbicide containers and spray equipment would be conducted only in

RESOURCE	POTENTIAL IMPACTS	ACTIONS TO MINIMIZE OR AVOID IMPACTS
		areas that are safe distance from environmentally sensitive areas and points of entry to bodies of water (storm drains, irrigation ditches, streams, lakes, or wells). • Methods used to accomplish weed objectives would consider seasonal distribution of large wildlife species. • No noxious weeds would be allowed on the site at the time of reclamation release. Any noxious weeds that become established would be controlled.
Wildlife	• Active raptor nests • Mule deer migration • Bat hibernacula	• Protect active raptor nests in undisturbed areas within 0.25 mile of areas proposed for vegetation conversion using species-specific protection measures. Inventory areas containing suitable nesting habitat for active raptor nests prior to the initiation of any project. • Consider seasonal distribution of large wildlife species when determining methods used to accomplish weed and insect control objectives. • Reclaim as soon as activities are complete. • Do not disturb bats while they are hibernating. • Gaps in haul road berms for ease of deer crossings
Migratory Birds	• Migratory bird nesting	• Conduct nesting surveys if disturbance needs to occur between April 15 and July 15. • Comply with Suggested Practices for Raptor Protection on Power Lines – The State of the Art in 2006 (Edison Electric Institute/Raptor Research Foundation).
Special Status Animal Species[1]	• Herbicides application in areas of special status species • Sage grouse leks • Utilities in sage grouse lek areas • Ferruginous hawk nests • Non-native invasive species control in special status species areas • Pygmy rabbits and pygmy rabbit habitat • Special status bat species	• When managing weeds in areas of special status species, carefully consider the impacts of the treatment on such species. Wherever possible, hand spraying of herbicides is preferred over other methods. • Avoid line-of-sight views between power line poles and sage grouse leks, whenever feasible. • Determine location of active sage grouse leks and avoid during strutting season. • Avoid ferruginous hawk nests. • Do not conduct noxious and invasive weed control within 0.5 mile of nesting and brood rearing areas for special status species during the nesting and brood rearing season. • Identify pygmy rabbit habitat, and avoid pygmy rabbits, if encountered. • Conduct bat surveys, where appropriate.
Wetlands	• Disruption of wetlands • Loss of spring recharge	• Avoidance of disturbance in wetlands (identified in Section 3.9.1). • Hydrology studies to determine potential impacts.
Range Resources	• Loss of forage	• Reclaim as soon as activities are complete.
Wild Horses	• Traffic around wild horses • Loss of forage	• If a project involves heavy or sustained traffic, require road signs for safety and protection of wild horses. • Reclaim as soon as activities are complete.
Land Use and Access	• Post-mining configuration of access roads	• BMM would establish post-mining access in conjunction with BLM travel management plan. • Traffic control measures would be used during operations.

RESOURCE	POTENTIAL IMPACTS	ACTIONS TO MINIMIZE OR AVOID IMPACTS
	• Public safety	
Recreation	• Potential restriction of recreation use	Reclaim as soon as activities are complete.
Air Quality	• Fugitive dust from roads and loading/dumping • Exhaust emissions • Reduction of airborne fugitive dust • Fugitive dust during mining activities	• Use dust abatement techniques on unpaved, unvegetated surfaces to minimize airborne dust. • Conduct maintenance on equipment to ensure proper function. • Post and enforce speed limits (e.g., 25 miles per hour). • Use dust abatement techniques before and during surface clearing, excavation, or blasting activities. • Compliance with NDEP air permit.
Visual Resources	• Light pollution • Viewshed protection	• At industrial facilities authorized by the BLM Ely District Office, utilize anti-glare light fixtures to limit light pollution. • Reclaim as soon as activities are complete.
Cultural Resources	• Cultural resource protection	• Ensure that all activities associated with the undertaking, within 100 meters of the discovery, are halted and the discovery is appropriately protected, until the BLM authorized officer issues a Notice to Proceed. • BLM would determine level of inventory needed (Class I, II, or III, reconnaissance or none). • Prior to surface disturbing activities, inventories would be conducted by permitted archeologist for unsurveyed sites or those not evaluated within the past 10 years. • All historic properties and cultural resources would be avoided if possible. • If avoidance is not possible, develop treatment plan for the historic properties affected by the proposed disturbance. • Submit all cultural reports to the BLM. • The applicant would inform all persons associated with the project that knowingly disturbing cultural resources (historic or archaeological) or collecting artifacts is illegal. • Perform viewshed reclamation when the setting of a site contributes to the significance of the property.
Native American Religious Concerns	• Native American concerns	• BLM to consult with potentially affected Native American tribes.

RESOURCE	POTENTIAL IMPACTS	ACTIONS TO MINIMIZE OR AVOID IMPACTS
Hazardous and Solid Waste/Hazardous Materials	• Disposal of toxic and hazardous materials, and solid wastes • Herbicide applications • Accidental spills of hydrocarbons that could contaminate water, soil, and vegetation • Storage of hazardous materials • Handling of hazardous and solid wastes • Transporting hazardous materials • Potential of public mine site accidents	• Properly dispose of all tailings, dumps, and deleterious materials or substances. Take measures to isolate, control, and properly dispose of toxic and hazardous materials. • Remove and properly dispose of all trash, garbage, debris, and foreign matter. Maintain the disposal site and leave it in a clean and safe condition. Do not allow burning at the site without prior approval. • Prior to commencing any chemical control program, and on a daily basis for the duration of the project, the certified applicator would provide a suitable safety briefing to all personnel working with or in the vicinity of the herbicide application. This briefing would include safe handling, spill prevention, cleanup, and first aid procedures. • Do not drain oil or lubricants onto the ground surface. Immediately clean up any spills under 25 gallons; clean up spills over 25 gallons as soon as possible and report the incident to the BLM Authorized Officer and Nevada Division of Environmental Protection. • Containerize petroleum products such as gasoline, diesel fuel, and lubricants in approved containers. • Properly store hazardous materials in separate containers to prevent mixing, drainage, or accidents. • Clean up spills in accordance with Nevada Division of Environmental Protection guidelines • Follow BMM and contractor Standard Operating Procedures for handling hazardous and solid waste • Restrict public access locally during active mining.

[1]U.S. Fish and Wildlife Service Threatened, Endangered, Candidate, and Proposed Species; State Protected Species; BLM Sensitive Species

2.5 Alternatives to the Proposed Action

Several alternatives were identified during the scoping process and during preparation of this FEIS: partial or full pit backfill, less mining, underground mining, Mooney Basin Heap Leach Pad, putting in conveyors, off-site ore processing, and changing pit geometry. Three specific criteria were determined necessary for an alternative to be carried forward in the FEIS:

- Does the alternative meet the Purpose and Need?
- Is the alternative practical or feasible from a technical and economic standpoint and using common sense rather than simply desirable from the standpoint of the applicant? and
- Does the alternative provide an environmental benefit?

Based on these criteria, two action alternatives to the Proposed Action were identified through consultation with BLM, NDOW, and BMM with input taken from public scoping comments in addition to the No Action Alternative. These alternatives are intended to reduce or minimize potential impacts associated with the Proposed Action and be responsive to scoping issues. The three alternatives identified and discussed further in this FEIS include the No Action Alternative, Partial Backfill Alternative (Alternative A), and the Mooney Basin Heap Leach Pad Alternative (Alternative B). An alternatives matrix was used to determine action alternatives that met the criteria (Table 2-14). Alternatives considered, but eliminated from detailed analysis with the reasons for their elimination, are described in Section 2.6.

TABLE 2-14 ACTION ALTERNATIVES CONSIDERED IN THE ANALYSIS

ALTERNATIVES	MEETS PURPOSE & NEED	FEASIBLE	ENVIRONMENTAL BENEFIT	CARRIED FORWARD FOR ANALYSIS
Partial Backfill	Y	Y	Y	Y
Full Pit Backfill	N	N	Y	N
Less Mining	N	Y	Y	N
Underground Mining	Y	N	Y	N
Mooney Basin Heap Leach Pad	Y	Y	Y	Y
Conveyor Rather Than Haul Road	Y	Y	N	N
Hauling Ore for Off-site Processing	N	Y	N	N
Pit Geometry	N	Y	Y	N

2.5.1 No Action Alternative

Under the No Action Alternative, gold mining activities would continue under the current authorizations for the BMM and Mooney Basin Operations Area as established by the Record of Decision for the BMM EIS (BLM, 1995a) and subsequent Environmental Assessments. Activities associated with the Proposed Action would not occur. The two existing mine plan areas would not be joined into one Plan of Operations, and the expansion activities associated with the Proposed Action would not occur. Mineral resources in these areas of expansion would remain undeveloped. It is anticipated that activities currently authorized would be completed in 2009 for both BMM and Mooney Basin Operations Area.

2.5.2 Partial Backfill Alternative (Alternative A)

The Partial Backfill Alternative is a modification of the Proposed Action to partially backfill up to six open pits as described below; other features of the Proposed Action would remain as

described above. The purpose is to reduce the footprint of the rock disposal areas by reducing the quantity of material they would contain. Table 2-15 provides the volumes of backfill for each pit and associated reduction in volume and surface disturbance for each rock disposal area. Figures 2-14, 2-15, and 2-16 show the reduction area in the rock disposal areas with this alternative. There would be a 434-acre reduction in the amount of disturbance compared to the Proposed Action, resulting in a total disturbance of 3,486 acres.

TABLE 2-15 ALTERNATIVE A – PARTIAL BACKFILL DETAILS

BACKFILL LOCATION	BACKFILL AMOUNT (MILLION TONS)	ROCK DISPOSAL AREA REDUCTION (MILLION TONS)	ROCK DISPOSAL AREA REDUCTION (ACRES)
East Bida Pit	6.6	9.8 (Saga)	35.6 (Saga)[1]
Belmont Pit 2	3.2		
North 1 Pit	25.4	63.4 (North 1, 2, 5)	280.2 (North 1, 2, 5)
RBM Pit	38.0		
Saga Pit Area 1	6.1	8.3 (Saga)	35.6 (Saga)[1]
Saga Pit Area 2	2.2		
Sage Flat Pit	117.5	117.5 (East Sage North and South, Sage Flat)	118.6 (East Sage North and South, Sage Flat)
Totals	**199**	**199**	**434[1]**

1 The total reduction of the Saga Rock Disposal Area is 35.6 acres, with backfill of east Bida Pit, Belmont Pit 2, and Sage Pit 1 and 2 all contributing to the reduction in the Saga Rock Disposal Area.

2.5.3 Mooney Basin Heap Leach Pad Alternative (Alternative B)

The Mooney Basin Heap Leach Pad Alternative would modify the Proposed Action by changing the design of the proposed Mooney Basin and BMM heap leach expansions in order to reduce the footprint of disturbance (Figures 2-17 and 2-18). Other features of the Proposed Action would remain as described above. In order to limit the footprint of the Mooney Basin heap leach facility, the BMM 2/3 heap leach facility design must be modified to accommodate the leach material produced in the Proposed Action. The total production of heap material for the Proposed Action is approximately 200 million tons.

Figure 2-18 shows the capacity and footprint of the currently proposed Mooney Basin heap leach facility in comparison with the redesigned facilities under this alternative with the subsequent capacity and footprint. This modification to the heap leach pad designs would result in a reduction of 96 acres to the Mooney Basin Heap Leach Pad and associated facilities. The reduction would be by removing a section of the proposed power line and reducing the size of the heap leach and process areas (Figures 2-14 and 2-18). The power line would be reduced by 8,106 (9 acres) feet for a total reduction of 105 acres. This alternative would result in an increase of approximately 14 acres of disturbance to the BMM 2/3 heap leach pad process facilities from what is currently authorized.

The reconfiguration of the BMM heap leach facility would also affect the placement of growth medium stockpiles, process facilities, and ponds. Additional surface disturbance is also incurred due to the establishment of ancillary disturbance between heaps, process facilities, and existing roads. Additional surface disturbance for the growth medium stockpiles would be 12.3 acres, and additional surface disturbance for ancillary and process facilities would be 19.7 acres. The overall disturbance increase to the BMM heap leach facility would be approximately 14 acres beyond what is currently authorized. The total disturbance under Alternative B would be 3,815 acres.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

As discussed in Section 2.5, several alternatives were identified and proposed by BLM, NDOW, and BMM but were eliminated from further analysis, as indicated in Table 2-14. These included full backfill of pits, less mining, underground mining, installation of conveyors to transport ore, hauling ore for off-site processing, and altering pit configuration or geometry. Each of these alternatives was considered to determine if it met the criteria identified in Section 2.6. Table 2-14 lists each alternative that was considered and identifies whether the alternative met the criteria for carrying the alternatives forward in the analyses.

Full Pit Backfill

Complete backfill of all pits was considered but not deemed a viable alternative. While there would be similar environmental benefits as those discussed for the Partial Backfill Alternative, significant double handling of waste rock would be required, rendering the overall project economically infeasible as well as not meeting stated purpose and need. Additionally, complete pit backfill would significantly restrict or eliminate further mineral access in these areas, should different technologies or economic conditions develop in the future.

Less Mining

Less mining was determined not to meet the Purpose and Need statement of this EIS. The purpose of Barrick's Plan of Operations for the BMM North Operations Area Project is to expand mining opportunities at the BMM and Mooney Basin Operations Area, while consolidating these two mines into one new Plan of Operations called North Operations Area. The need is to continue to profitably recover gold resources from federal mining claims within the Proposed Action area. Because conducting less mining does not meet the Purpose and Need for this project, it was not carried forward in the analysis.

Underground Mining

Underground mining of the ore deposit was once believed to be feasible, as indicated with limited underground mining being previously approved by the BLM (BLM, 1995a). The original plan for underground mining was based on limited exploration drilling in the area at the time the decision was made. Underground mining of concentrated deposits would have extended the life of the mine for a short period. Since that time, BMM has conducted extensive additional drilling in the area and has determined that a larger, low-concentration dispersed deposit is present. Therefore, conducting underground mining is no longer considered feasible.

Conveyors to Transport Ore

A conveyor between the Top Pit and BMM processing facilities was mentioned in the 1995 EIS as a reasonably foreseeable, interrelated project. However, the conveyor was not part of the Proposed Action or alternatives that were analyzed or approved in that EIS. The use of conveyors (in lieu of haul roads) was determined to be feasible during scoping for this EIS. The discussion included whether the conveyor was a means and method best determined by the proponent or whether there was an environmental benefit to the use of conveyors over the use of haul roads. It was determined that disturbance associated with conveyors would be the same as or greater than the Proposed Action and therefore did not offer a benefit. It was also determined that the use of conveyors would still require a maintenance road to service the conveyor and existing roads could not be eliminated as they also served as transport avenues for workers and delivery of materials to various components of the Proposed Action. Vehicles would still need to be used with this operation to transport ore from open pits to the base of the conveyor for further transporting. In addition, conveyor systems are not designed to convey run-of-mine ore because of the size of the material. Barrick would need to install a crusher at a centralized location and haul material to the crusher prior to conveyance to the heap leach pad.

Figure 2-14 Alternative A Part 1 Saga and Belmont, Alternative B Mooney Basin Pad Reduction

Figure 2-15 Alternative A Part II North Area Complex Rock Disposal Area

Figure 2-16 Alternative A Part III Sage Flat

Figure 2-17 Alternative A Part IV RBM Rock Disposal Area, Alternative B Heap 2/3 Expansion at Bale Mountain Mine

Figure 2-18 Mooney Basin Alternative B

Installation of a crusher system would require a significant increase in electrical use and would increase fugitive emissions. Based on no perceived environmental benefit, potentially even greater environmental impacts (additional disturbance, fugitive emissions, and increase electrical power), and the continued use of mine vehicles, conveyors were not carried forward in the EIS for analysis.

Hauling Ore for Off-Site Processing

Hauling ore off-site was determined not to meet the Purpose and Need statement of this EIS. The purpose of Barrick's Plan of Operations for the BMM North Operations Area Project is to expand mining opportunities at the BMM and Mooney Basin Operations Area while consolidating these two mines into one new Plan of Operations called North Operations Area. The need is to continue to profitably recover gold resources from federal mining claims within the Proposed Action area. Barrick has other mines in northern Nevada that employ similar processing methods that could be utilized in the recovery of precious metals. The nearest Barrick operation potentially suitable for processing ore from the Proposed Action is the Ruby Hill Mine, west of Eureka. While an adequate public road network is in place that could be used to transport ore to Ruby Hill, the average grade of gold ore and haul costs over the approximately 70-mile distance to the processing site would not allow Barrick to meet the need to profitably recover gold resources. Because hauling ore off-site does not meet the Purpose and Need for this Proposed Action, it was not carried forward in the analysis.

Alternate Pit Geometry

Alternate pit geometry (steeper pit wall slopes with smaller pit footprints) was considered but determined to not be feasible or meet the purpose and need. Pit wall slopes are based on safety constraints and the need to access the ore reserve. Proposed pit designs will optimize recovery of the ore consistent with geotechnical and pit wall stability criteria. Steeper pit walls would not meet those criteria. Because alternate pit geometry would not be optimal, it does not meet the Purpose and Need for this Proposed Action and was not carried forward in the analysis.

2.7 Comparative Analysis of Alternatives

A comparison of the environmental impacts between the Proposed Action and the alternatives including the No Action Alternative was completed with a summary of the results provided in Table 2-16. This comparison of environmental impacts was based on implementation of the Design Features identified in Table 2-13 and BLM Best Management Practices provided in Appendix D. A detailed description of the environmental impacts for each resource is provided in Chapter 3.0.

2.8 BLM Preferred Alternative

The BLM's preferred alternative, based on the information from the scoping process and information contained within this FEIS, is the Partial Backfill Alternative as described in Section 2.5.2. The selection of this alternative is the one that the BLM believes best fulfills the agency's statutory requirements and responsibilities. The selection of this alternative takes into consideration environmental, economic, and technical factors.

The Partial Backfill Alternative (Alternative A) would have a reduction in the footprint of the rock disposal areas, return some of the open pits to pre-mining land use, and be economically feasible for the operator. There could be some risk of covering potential ore reserves, depending on future technologies and the price of gold. This would be minimized through

careful exploration and planning by the operator. Pits not backfilled would either have potential future reserves or would not be economically feasible for backfilling.

Consideration was given to the Proposed Action and the other alternatives. The Proposed Action would have the same beneficial economic and social benefits associated with continued mining but would result in more disturbance and less land returned to post-mining land use than the Partial Backfill Alternative. Both the Proposed Action and the Mooney Basin Heap Leach Pad Alternative have less potential for reducing environmental impacts and surface disturbance. Under the No Action Alternative, there would be no additional surface disturbance, but the identified mineral resource would remain undeveloped and unrecovered. The economic and social benefits from continued mining would also not be met under the No Action Alternative. The BLM strives to achieve a balance between land use and resource protection, and this balance appears to be best reached with the Partial Backfill Alternative.

TABLE 2-16 SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION AND OTHER ALTERNATIVES

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
Water Resources (Surface Water)	Increase in sedimentation and erosion	Disturbance of area and creation of waste rock dumps may lead to increased sedimentation in ephemeral drainages.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Water quality impacts from rock disposal areas or other facilities	No water quality impacts are anticipated as a result of drainage from the waste rock or other sources.	No anticipated impacts to water quality are anticipated because of smaller footprint of waste rock facility and no anticipated impacts to water quality.	Same as Proposed Action.	No impacts other than those already authorized.
	Reduction in spring recharge	Waste rock placed in the Cherry Creek recharge area may reduce or delay recharge to the local aquifer.	The reduction of the size of the Sage Flat RDA would result in less waste rock within the Cherry Spring recharge area, thus reducing the potential impact	Same as Proposed Action.	No impacts other than those already authorized.
	Fuel or chemical spills to drainages	Appropriate handling procedures would be used to minimize the risk of chemical spills during transporting and loading/unloading and discharging to drainages.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
Water Resources (Groundwater)	Increase groundwater withdrawal by approximately 250 acre-feet per year	No impacts are anticipated from greater groundwater usage as there are no other users within the anticipated cone of depression.	Same as Proposed Action.	Less water needs at Mooney Basin but greater water needs at BMM. The total groundwater withdraw would be the same as the Proposed Action as the same amount of ore would be processed. No impacts to current users of the alluvial aquifer are anticipated.	No impacts other than those already authorized.
	Intersection of local groundwater by open pits	Local saturated zones may be intercepted but the deeper bedrock aquifer would not be intercepted by the pits. Water encountered from isolated saturated material during excavation would be handled as per the Water Pollution Control Permit.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
	Changes in groundwater quality	Heap leach pads and process ponds would be double-lined and operated in accordance with the Water Pollution Control Permit thus minimizing the risk of process solution impacting groundwater.	Same as Proposed Action.	Smaller pad at the Mooney Basin but larger pad at BMM, however, there would be no anticipated impacts to groundwater quality.	No impacts other than those already authorized.
Water Resources (Drinking Water)	Additional use of groundwater as a drinking water source	Installation of a treatment system for use of groundwater as a drinking water source. Would not significantly increase the consumption of groundwater.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
Geology and Minerals	Ore extraction and waste rock placement	Removal of approximately 200 million tons of ore and 830 million tons of waste rock. Expansion of two heap leach facilities with the 200 million tons of ore.	Total tonnage of material mined would remain the same as Proposed Action, but the location of disposal, rock disposal area, and backfill is the only difference from the Proposed Acton.	Same as Proposed Action. The only difference would be the location where the ore is processed.	No impacts other than those already authorized.
	Limitation on the future availability of mineral resources	No impacts identified.	Backfill of several of the pits is not expected to impact any future precious metal resources as they will be fully explored prior to completing backfill activities	Same as Proposed Action	No impacts other than those already authorized.
Paleontology	Loss of paleontological resources	No paleontological resources within the project area appear to have scientific or educational value	Same as Proposed Action	Same as Proposed Action	No impacts other than those already authorized.
Soils	Loss of productive topsoil in disturbed areas (soil development and biological activity)	Approximately 3,920 acres of soils representing 16 soil associations would be permanently disturbed. Between 7.3 and 11.7 million cubic yards of soil would be salvaged and used during reclamation.	Impacts would be the same as Proposed Action, but approximately 434 less acres of disturbance would occur.	Impacts would be the same as Proposed Action, but approximately 105 less acres of disturbance would occur.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
	Increased soil erosion due to wind and water resulting in off-site deposition	Environmental controls including use of proper Best Management Practices for erosion and dust control would minimize impacts associated with erosion and off-site deposition.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Contamination of soil from chemical spills	Continued adherence to chemical handling practices would minimize the risk of chemical spills. Emergency response procedures and Spill Contingency Plan would be followed for notification and cleanup procedures.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
Vegetation	Removal of vegetation	Approximately 3,920 acres of vegetation would be removed during construction and operation of the Proposed Action. Of the 3,920 acres to be disturbed, approximately 540 acres of vegetation would be permanently removed as a result of pit expansion. Reclamation of the remainder of the disturbed acreage would result in established suitable vegetation for post-mining land use.	Impacts associated with this alternative would be similar however, removal of 434 acres less vegetation than the Proposed Action.	Impacts associated with this alternative would be similar however, removal of 105 acres less vegetation than the Proposed Action.	No impacts other than those already authorized.
	Increase in vegetation diversity following reclamation	Reclamation of the disturbed areas to a grass and shrub community would increase the diversity of the vegetation communities resulting in better forage.	Same as Proposed Action, but for a smaller area.	Same as the Proposed Action, but for a smaller area.	No removal of vegetation other than what was previously authorized.
	Increased potential for establishment of non-native species	Removal of vegetation will allow non-native species to become established. Control of non-native species through a weed management program will minimize this risk.	Same as Proposed Action with fewer acres of disturbance.	Same as Proposed Action with few acres of disturbance.	No additional impacts would occur.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
	Short-term loss of forage for wildlife and livestock	Approximately 3,920 acres of vegetation will be lost for available forage for wildlife and livestock. Reclamation would restore all but 540 acres of the forage that is currently available.	Same as Proposed Action with fewer acres of disturbance.	Same as Proposed Action with few acres of disturbance.	No additional impacts would occur.
	Increased potential for soil erosion in disturbed areas	Approximately 3,920 acres of disturbance would occur, thus increasing the risk of soil erosion in these areas. Best Management Practices for controlling erosion will be implemented to minimize soil loss.	Same as Proposed Action.	Same as Proposed Action.	No additional impacts would occur.
Non-Native Invasive Species	Establishment of non-native and Invasive species in disturbed areas as a result of vegetation removal	With the disturbance of 3,920 acres, the potential of non-native invasive, and/or noxious weed establishment will increase. Appropriate control measures including spraying and seeding will minimize the establishment of these species.	Same as the Proposed Action, but 435 less acres of disturbance.	Same as the Proposed Action, but 105 less acres of disturbance.	No impacts other than those already authorized.
Wildlife (Including Migratory Birds)	Interference with deer migration and mortalities due to increased traffic	Potential to interfere with north-south deer migration during winter months due to disturbance such as road and other potential barriers. Deer mortalities have been extremely low over the past 12 years. Mitigation, such as gaps in berms would minimize the impacts.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Loss of deer habitat including winter range	Approximately 219 acres of mountain brush habitat (preferred deer habitat) would be removed. Additional winter range habitat would be lost along the flanks of the mountain range in the Mooney Basin area.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
	Conversion of habitat	Approximately 1,712 acres of pinyon juniper habitat would be converted to grass and shrub habitat. This would likely benefit wildlife, especially grazing and browsing by providing good forage. In addition pit highwalls would be habitat roosting bats and for nesting raptors. Other existing habitats (big sagebrush and mountain brush) would be restored through reclamation.	Approximately 1,522 acres of pinyon-juniper habitat would be converted to grass and shrub habitat. This would likely benefit wildlife, especially grazer, by providing good forage.	Approximately 1,652 acres of pinyon juniper habitat would be converted to grass and shrub habitat. This would likely benefit wildlife, especially grazers, by providing good forage.	No impacts other than those already authorized.
	Mortalities due to land clearing activity, increased traffic and chemical exposure	Small less mobile animals would likely be destroyed during land clearing activities. Increased risks of wildlife injury or mortality by collisions with vehicles as a result of an increase in traffic on mine access roads. Cyanide and other chemicals used on site could result in wildlife mortalities. Environmental controls such as fencing and floating HDPE balls are designed to prevent access to chemical laden waters.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Displacement from existing habitat	Displacement of wildlife into adjacent undisturbed area could increase competition for resources resulting in higher mortality for some species.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
	Migratory birds - loss of habitat, displacement from human activity, potential nest and young destruction	Reduction of pinyon-juniper habitat would alter local bird species composition. Disturbance of vegetation during the bird breeding season could result in destruction of nest and young birds. Environmental controls including performing land – clearing activities outside of the avian breeding season (April 15 to July 15) and conducting bird nesting surveys prior to disturbance during avian breeding season would minimize the potential loss of nests and young.	Same as proposed action, with a reduction of approximately 434 acres of disturbance.	Same as Proposed Action, with a reduction of approximately 105 acres of disturbance.	No impacts other than those already authorized.
Wetlands, Riparian Zones, Waters of the U.S.	Disturbance and Destruction to isolated wetlands	All wetlands would be avoided by design.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Increase in sedimentation from erosion	Appropriate Best Management Practices for erosion control would be implemented to minimize water and wind erosion, resulting in sedimentation to isolated wetlands.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Alteration of Cherry Spring recharge area	A portion of the Cherry Spring recharge area would be covered with a waste rock disposal area. This could potentially reduce or slow recharge to the spring. Cherry Spring over the recent past as had no or very limited flow.	A significant reduction in the size of the Sage Flat Rock Disposal Area of within the Cherry Spring recharge area would occur reducing the potential impact to the recharge area.	Same as Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
Range	Loss of forage during operation and improved forage after reclamation	Short-term loss of approximately 98 animal unit months with removal of 3,920 acres of vegetation and a permanent loss of 98 animal unit months associated with pit disturbance. Reclamation would convert approximately 1,712 acres of pinyon juniper habitat to grass and shrub habitat providing additional forage.	Short-term loss of 87 animal unit months and the same permanent loss of animal unit months as the Proposed Action.	Short-term loss of 95 animal unit months and the same permanent loss of animal unit months as the Proposed Action.	No impacts other than those already authorized.
	Restricted Access	At a minimum, an additional 3,920 acres of land would be temporarily restricted from livestock access as a result of expansion of the Plan of Operations boundary. An additional 540 acres (expanded area of pits) of public land would be removed permanently from livestock access.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
Wild Horses	Vehicle collisions, human disturbance	Short-term potential for vehicle collisions and avoidance of active mining areas.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Loss of forage during operation, improved forage after reclamation, and displacement	Short-term loss of approximately 3,920 acres of vegetation and a permanent loss of 540 acres of vegetation associated with pit disturbance. Reclamation would convert approximately 1,712 acres of pinyon juniper habitat to grass and shrub habitat providing additional forage.	Same as Proposed Action with a reduction of approximately 434 acres of disturbance..	Same as Proposed Action with a reduction of approximately 105 acres of disturbance.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
Land Use and Access	Restricted access	At a minimum, an additional 3,738 acres of land would be temporarily restricted from public access as a result of expansion of the Plan of Operations boundary. An additional 540 acres (expanded area of pits) of public land would be removed permanently from public access.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Conflicts with existing land use authorizations	Conflicts with existing land use authorizations would be negotiated with the owner of holder of that land use authorization.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Increased traffic	The increase in traffic is anticipated to be minimal as only one additional bus is expected to be put into use.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
Recreation	Restricted public access	At a minimum, an additional 3,738 acres of land would be temporarily restricted from public access and recreation activity such as hunting, trapping, hiking, etc. as a result of expansion of the Plan of Operations boundary.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
Air Quality	Impacts to air quality	Increase in air emissions from mobile sources and fugitive dust during construction of the facilities. This would be a slight increase over existing operations due to the additional equipment used during the construction period. All other emission would be similar to current operations. Mercury emissions are expected to decrease by 75 percent with the installation of	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
		mercury emission controls installed in 2008 and 2009.			
Visual	VRM Objectives (changes in line, form, color, and texture)	High contrast with surrounding undisturbed areas would result in objectives of the Visual Resource Measurements not being met during operation but with successful reclamation, Visual Resource Measurement objectives would be met.	Slight changes in disturbance from the Key Observations Points but result in the same conclusion as the Proposed Action.	Slight changes in disturbance from the Key Observations Points but result in the same conclusion as the Proposed Action.	No impacts other than those already authorized.
Noise and Vibration	Increase in noise	The level of mining activity would increase slightly but no significant increase in noise levels is expected over the current noise level with the existing operation. A slight increase in traffic along the access route may slightly increase the noise level in those areas.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
Socioeconomics	Work force increase	There would be an increase of approximately 110 employees at the mine which modeling indicates could result in an additional 33 indirect and 50 induced jobs. These would be divided between the three counties.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Labor Income	Modeling estimates that the value of direct, indirect, and induced annual labor income would be $9.9 million in 2006 dollars.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Increased demand on county and city infrastructure	Housing limitations in Ely and Eureka would like result in new employees finding housing in Elko. This trend may shift in the long-term as additional housing is constructed in the other	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
		communities. If all the new employees were to find housing in Elko, this would only represent 0.4 percent of the current civilian labor force. It is anticipated that the existing city and county infrastructure (schools, utilities, fire protection, law enforcement, etc.) would be adequate.			
Environmental Justice	Impact on minority or low income populations	None identified.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
	Undue burden to children	None identified.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
Cultural Resources (Prehistoric)	Site disturbance	Seven prehistoric period archaeological sites have been identified as eligible for the National Register of Historic Places. Approximately 503 acres of the Proposed Action Area has not been surveyed. Any eligible sites that would be impacted by the Proposed Action would be handled in accordance with the programmatic agreement between Barrick, the BLM, and the State Historic Preservation Office.	With the reduction in disturbance, three non-eligible sites would be eliminated from potential impacts. Sites impacted by Alternative A would be in accordance with the programmatic agreement.	With the reduction in disturbance, one eligible site and two identified non eligible site would be outside the disturbance footprint, and one site that has not yet been evaluated. Sites impacted by Alternative B would be treated in accordance to the programmatic agreement.	No impacts other than those already authorized.
Cultural Resources (Historic)	Site disturbance	Twenty-nine historic period archeological sites have been identified with only one site deemed eligible for the National Register of Historic Places. Only one non-eligible site has been disturbed to date. Any eligible sites that would be impacted would be treated in accordance with the Programmatic Agreement.	With the reduction in disturbance, two non-eligible sites would be outside of the proposed disturbance footprint. Sites impacted by Alternative A would be treated in accordance with the programmatic agreement.	No non-eligible nor eligible historic sites are located in the reduced disturbance area associated with Mooney Leach Pad, thus impacts would be the same as the Proposed Action.	No impacts other than those already authorized.

RESOURCE	POTENTIAL IMPACT	PROPOSED ACTION	ALTERNATIVE A PARTIAL PIT BACKFILL	ALTERNATIVE B MOONEY BASIN LEACH PAD	NO ACTION ALTERNATIVE
Native American Religious Concerns	None Identified	None identified.	Same as Proposed Action.	Same as Proposed Action.	No impacts other than those already authorized.
Hazardous and Solid Waste/Hazardous Materials	Spills during transportation	Chemical spills during transportation could occur but the probability of a spill is expected to be very low. The probability of a spill in a sensitive area such as a population center or ecologically sensitive area is extremely low and not anticipated.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.
	Spills during storage or use	Some spills of chemicals and fuel could occur during operations. Handling, storage and use of chemicals and fuels would be conducted in accordance with the Hazardous Materials Spill and Emergency Response Plan, which would ensure the impacts from spills would be minimized and the spilled material contained and removed.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts other than those already authorized.

Chapter 3
Affected Environment and Environmental Consequences

3.1 Introduction

This chapter combines descriptions of the environment that would be affected and discussions of the anticipated direct and indirect impacts of the Proposed Action, the No Action Alternative, and two action alternatives. Cumulative effects are discussed in Chapter 4. The two action alternatives include the Partial Backfill Alternative (i.e., up to six open pits) and the modified Mooney Basin Heap Leach Pad Alternative. The baseline information summarized in this chapter was obtained from published and unpublished materials; interviews with local, state, and federal agencies; and field and laboratory studies conducted in the Proposed Action area. The affected environment for individual resources was delineated based on the area of potential direct and indirect environmental impacts for the Proposed Action.

The analysis of potential impacts from the Proposed Action includes implementation of appropriate Best Management Practices developed by the BLM (Appendix D) and Design Features selected by Barrick (Table 2-13), which include many of BLM's Best Management Practices. The Design Features are part of the Proposed Action and were specifically selected in response to potential impacts for individual resources and are applicant committed environmental protection measures. The terms effects and impacts are used synonymous. This chapter also identifies any residual adverse impacts, which are impacts that would remain after mitigation measures have been implemented. "Short-term" is defined as the life of the Proposed Action through closure and reclamation (2020). "Long-term" is defined as the future beyond reclamation.

3.1.1 Supplemental Authorities

Nevada Instruction Memorandum 2009-30 Supplemental Authorities to Consider in National Environmental Policy Act Documents encourages the consideration of the following due to requirements specified in statute, regulation, or executive order:

- Air Quality
- Areas of Critical Environmental Concern
- Cultural Resources
- Farm Lands (Prime or Unique)
- Forests
- Environmental Justice
- Floodplains
- Non-Native, Invasive Species
- Migratory Birds
- Native American Religious Concerns
- Federally Listed Threatened, Endangered and Proposed Species
- Hazardous and Solid Wastes/Hazardous Material
- Water Quality Surface-Ground
- Wetlands and Riparian Zones
- Wild and Scenic Rivers
- Wilderness

Of the Supplemental Authorities listed above, the following are not present or not expected to be directly or indirectly impacted by the Proposed Action or alternatives and are therefore not

affected by the Proposed Action or alternatives as described in this FEIS. Therefore, analyses of these resources are not carried forward in this FEIS:

- Floodplains
- Farm Lands (Prime and Unique)
- Areas of Critical Environmental Concern
- Wild and Scenic Rivers
- Wilderness

The remainder of the Supplemental Authorities are considered in this FEIS and described and analyzed further in the following sections.

3.1.2 Other Resources and Uses

In addition to the Supplemental Authorities of the human environment, the BLM considers other resources and uses that occur on public lands and the issues that may result from the implementation of the Proposed Action or alternatives. The potential resources and uses or non-critical elements that may be affected are as follows:

- Geology and Minerals
- Paleontology
- Soils
- Vegetation
- Wildlife
- Sensitive Species
- Range Resources
- Wild Horses
- Land Use and Access
- Recreation
- Visual Resources
- Noise and Vibration
- Socioeconomics

These non-critical elements that are considered in this FEIS are described and analyzed further in the following sections.

3.1.3 Potentially Affected Supplemental Authorities and Other Resources

Based on the review of existing baseline data and surveys conducted in preparation of this FEIS, BLM specialists have identified the following supplemental elements and other resources as potentially affected. This is the combined list from Sections 3.1.1 and 3.1.2 and the order in which they will be presented in this document.

- Water Resources (Water Quality and Rights)
- Geology and Minerals
- Paleontology
- Soils
- Vegetation
- Non-Native Invasive Species
- Special Status Species (Federally Listed Threatened, Endangered, Proposed, and Sensitive)
- Wildlife
- Migratory Birds
- Wetlands and Riparian Zones

- Range Resources
- Wild Horses
- Land Use and Access
- Recreation
- Air Quality
- Visual Resources
- Noise and Vibration
- Socioeconomics
- Environmental Justice
- Cultural Resources
- Native American Religious Concerns
- Hazardous and Solid Waste/Hazardous Materials

3.1.4 Assumptions for Analysis

The following general assumptions apply to all resources included in the analysis:

- Earth-moving activities would take place 24 hours a day, 365 days a year.
- Waste rock that would be encountered under the Proposed Action is similar to waste rock currently being mined.
- Baseline studies fully and accurately depict conditions in the Proposed Action area.
- For the purposes of this analysis and under federal regulations, “impacts” and “effects” are assumed to have the same meaning and are interchangeable.
- It is assumed that unpaved road travel for employee and delivery truck travel is 40 miles per day one way (80 miles round trip per day).

If applicable, other resource assumptions will be included at the beginning of each resource section. If none are included, the general assumptions apply.

3.2 Water Resources

The water resources study area associated with the proposed BMM North Operations Area Project includes portions of four hydrographic basins: Newark Valley, Long Valley, Huntington Valley, and Ruby Valley (Figure 3-1). Huntington Valley is the only valley that is not considered a topographically closed basin. Surface water from Huntington Valley flows north into the Humboldt River.

Surface water in the Proposed Action area consists primarily of ephemeral drainages and isolated springs. A survey of the drainages in the Proposed Action area did not identify any drainages that have a defined channel connection or significant connection to known waters of the U.S. The survey has been submitted to the U.S. Army Corps of Engineers for concurrence and approval. There typically is minimal surface water in the Proposed Action area. When year-round water is observed, it typically is confined to small seeps or springs and does not occur as stream flow.

The local groundwater system consists of two primary components: (1) a deep regional bedrock-hosted system with groundwater present in fractures and in localized perched water within clay layers and (2) a sediment-based system comprising valley-fill alluvial material. The following sections discuss the surface and groundwater characteristics, including quantity and

quality, as well as any anticipated impacts on the water resources due to the Proposed Action and alternatives.

3.2.1 Surface Water Affected Environment

There are few surface water resources within the Plan of Operations boundary. Surface water within the Proposed Action area is limited to isolated springs and ephemeral drainages that flow in response to storm events and spring runoff. Figure 3-2 shows the locations of seeps and springs in and around the Proposed Action area. Post-mining topography demonstrating proposed surface drainages within the Proposed Action area is provided in the BMM North Operations Area Project Plan of Operations (BMM, 2009).

Assumptions for Analysis

Assumptions made for the surface water analysis include the following:

- There are no springs within the Proposed Action area other than the springs identified by Simon Hydro-Search (1994b) and Tetra Tech (2007).
- Water sources would be avoided by design.

Surface Water Quantity

Surface water is limited due to low precipitation (9 to 14 inches per year at lower elevations and up to 21 inches per year at higher elevations) and high evaporation (approximately 51 inches per year) (WRCC, 2007). Spring runoff contributes to the flow in ephemeral drainages and provides water that infiltrates through faults and fractures to the bedrock system or isolated perched water confined by clay lenses. Some of this flow is then expressed at the surface as isolated springs, which is confirmed through mapping of the potentiometric surface (Mine Mappers, 2007). Flow rates from springs in the area were measured by Simon Hydro-Search (1994a) and supplemented by Tetra Tech (2007). Most drainage channels are dry for the majority of the year, except during spring runoff and significant storm events. Flow rates in the drainages within and near the Proposed Action area have not been measured because of the ephemeral nature of the drainages.

Springs in and near the Proposed Action area are typically found near the uppermost reaches of canyons or in the bottoms of canyons that are above 6,200 feet in elevation. Local springs include upper and lower Mill Spring, South Water Canyon Spring, Cherry Spring, and Bourne Tunnel Spring. Most springs are dry by summer; however, the Cracker Johnson #1 and #2 springs, which lie north of the Proposed Action area, and the South Water Canyon Spring typically flow until late summer or early fall. Flow in these springs averages between one and six gallons per minute (Table 3-1). There are no springs in the northern portions of Mooney Basin. There are three springs located east of the Proposed Action in the Maverick Springs Range (Willow Springs, Twin Springs, and Tognini Spring). These springs flow primarily during the spring, with recorded flows ranging from six gallons per minute at Tognini Spring to large wet spots observed at Twin Springs that could not be sampled (Table 3-1).

Surface Water Quality

The chemical quality of the baseline surface water flow is dependent upon the quality of the water being emitted from the springs, which is in turn dependent upon the chemistry of the rocks through which the water has infiltrated. The surface water chemistry is also dependent upon rainfall chemistry and erosion of soils. Simon Hydro-Search (1994b) categorized the springs in the area as perched, local, or regional, depending on the length of the flow path from the infiltration point to the point where the spring reaches the surface (i.e., daylights). There are five main rock types that contribute to the composition of the surface water chemistry in the

Figure 3-1 Hydrographic Basins

Figure 3-2 Seep and Spring Locations

TABLE 3-1 WATER QUALITY OF SPRINGS

Parameter (mg/l unless otherwise noted)	Nevada Water Quality Standard	Bourne Tunnel Spring	Cherry Spring				Cracker Johnson Spring #1			
		1994[1]	1989[2]	3Q 2006[3]	1Q 2007[3]	2Q 2007[3]	1994[1]	2Q 2006[3]	3Q 2006[3]	2Q 2007[3]
Easting		622,420 m E	626,445 m E	626,445 m E	626,445 m E	626,445 m E	620,275 m E	620,275 m E	620,275 m E	620,275 m E
Northing		4,418,400 m N	4,421,120 m N	4,421,120 m N	4,421,120 m N	4,421,120 m N	4,428,969 m N	4,428,969 m N	4,428,969 m N	4,428,969 m N
Flow (gpm)								~1	<1	<1
TDS	500-1,000	265	81	177		113	405	450		346
Temp (˚F)			34	67.46	62.24	71.96		72.32		59.9
pH	6.5-8.5	7.81	7.6	7.8		7.37	8.18	8.07		8.31
Alkalinity				81		68		266		222
Ca			5.6	27.9		16		61		37.3
Mg	125-150	20.9				5	34.5	35.1		31.8
Na			1.4	20.4		13		46.1		40.1
K						<0.5				
HCO_3			130	98		83				266
CO_3			0	0		0		0		3
SO_4	250-500	11.5				14	36	71		47
Cl	250-400	2.5	5.3	20		6	32.9	41		32
F	2.0-4.0	0.1	10	<0.1		0.1	0.13	0.1		0.2
SiO_2				14		13		22.8		17.6
Fe	0.3-0.6	<0.05	1.1				5.1	0.95	2.8	<0.01
Mn	0.05-0.10	<0.01		0.006			325	0.286		0.006
Al	0.05-0.2					0.05	0.18			
Sb	0.006		31	<0.001		<0.001		0.008		0.001
As	0.05	<0.01		0.01		0.006	0.02	0.022		0.016
Ba	2.0	0.02		0.097		0.058	0.33	0.446		0.175
Be	0.004		1.54	<0.001		<0.001		<0.001		<0.001
B						<0.007				0.1
Cd	0.005	<0.01	0.05	<0.001		<0.001	<0.01	<0.001	0.05	<0.001
Cr	0.1	<0.01		<0.001		<0.001	<0.01	<0.001		<0.001
Cu	1.3	<0.01		0.001		<0.001	<0.01	0.011		0.002
Pb	0.015	<0.01				<0.001	<0.01	0.008		
Hg	0.002	0		<0.0005		<0.0005	0	0.0008		<0.005
Ni			0.04	<0.001		<0.001	0.14	<0.001		<0.001
Se	0.05	<0.01		0.001		<0.001	<0.01	<0.001		0.001
Ag	0.1	<0.01		<0.001		<0.001	<0.01	<0.001		<0.001
Tl	0.002			<0.0005		<0.0005		<0.0005		<0.0005
Zn	5.0	<0.01	<0.001			<0.01	<0.01	0.06	<0.001	
NO_3-N	10	1.03				1.1	2.69	1.7		0.8

Notes: Samples taken in 2005 and 2006 were analyzed for total metals.
Samples taken in 2007 were analyzed for dissolved metals.
˚F = Degrees Fahrenheit
[1] Date of sampling was not specified (Simon Hydro-Search, 1994b)
[2] Date of sampling was not specified (Pupacko et al., 1989) <0.01 <0.01
[3] Tetra Tech, 2007

Parameter (mg/l unless otherwise noted)	Cracker Johnson Spring #2					Lower Mill Spring				Upper Mill Spring	
	1986[1]	2Q 2006[2]	3Q 2006[2]	1Q 2007[2]	2Q 2007[2]	3Q 2005	1Q 2006	3Q 2006	2Q 2007	1989[3]	4Q 2005[2]
Easting	623,325 m E	623,325 m E	623,325 m E	623,325 m E	623,325 m E	620,516 m E	620,516 m E	620,516 m E	620,516 m E	621,357 m E	621,357 m E
Northing	4,430,047 m N	4,430,047 m N	4,430,047 m N	4,430,047 m N	4,430,047 m N	4,423,191 m N	4,423,191 m N	4,423,191 m N	4,423,191 m N	4,423,159 m N	4,423,159 m N
Flow (gpm)		<1	<1	<<1	<<1	2	5.7	1.5	1.15		1.5
TDS	400	1290		453	655	366	353	394	341	297	347
Temp (°F)	35	72.59		72.68	59	54.86	42.62	71.78	59.72		55.94
pH	7.9	7.77		8.39	7.94	7.85	7.79	7.21	7.35	8.2	8.14
Alkalinity		470		274	450	268	260	260	255		175
Ca	55	390		29	42.9	98.1	93.9	108	86		73.9
Mg	11	70.6		26	25.6	14.5	12.6	14.8	12	11	24.2
Na	60	141		83	134	16.1	12.8	17.5	14	272	18.7
K	1.8	34.1		13	20.3	1.4	1.5	1.9	2	15	1.1
HCO_3	250	573		327	549	326	318	317	311	90	214
CO_3	0	0		4	0	<1	<1	<1	<1	8	0
SO_4	55	167		66	38	20	24	24	23	43	21
Cl	46	1047[4]		43	73	17	16	26	14	2475[4]	63
F		2.1		1.6	2.1	0.2	0.2	0.2	0.2	0.9	0.2
SiO_2	43	97.6		26.7	47.2	29.0	29.2	34.1	29.6		20
Fe		27.6		0.07	0.31	<0.01	<0.01	<0.01	<0.01		<0.01
Mn		4.45		0.003	0.091	0.001	<0.001	0.001	<0.001		<0.001
Al				0.08	0.28	<0.01	<0.01	<0.01	<0.01		<0.01
Sb		<0.001		0.002	0.002	0.001	<0.001	<0.001	0.001		0.001
As		0.34		0.087	0.192	0.012	0.011	0.012	0.012		0.007
Ba		3.16		0.08	0.201	0.117	0.110	0.123	0.107		0.102
Be		0.01		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
B	69	0.985		0.5	0.8	0.08	0.084	0.10	<0.007		0.08
Cd		<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	0.001		<0.001
Cr		0.071		<0.001	0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Cu		0.098		0.004	0.005	0.001	0.001	<0.001	<0.001		<0.001
Pb		0.066		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Hg		0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005		<0.0005
Ni		0.106		0.002	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Se		<0.001		0.002	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Ag		<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Tl		<0.0005		<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.005		<0.0005
Zn		0.46		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01
NO_3-N		<0.1		<0.1	<0.1	1.9	2.1	2.6	1.9		4.6

Notes: Samples taken in 2005 and 2006 were analyzed for total metals.

Samples taken in 2007 were analyzed for dissolved metals.

[1] Date of sampling was not specified (Welch and Williams, 1986)
[2] Tetra Tech, 2007
[3] Date of sampling was not specified (Pupacko et al., 1989)
[4] Values are reported in Table 3-1 as indicated in original reference. These values appear to be anomalous as they do not coincide with the TDS value reported for the sample.

Parameter (mg/l unless otherwise noted)	Tognini Spring					South Water Canyon Spring							Willow Springs (North)
	4Q 2005	2Q 2006	3Q 2006	1Q 2007	2Q 2007	1989[1]	1989[1]	1989[1]	4Q 2005[2]	2Q 2006[2]	1Q 2007[2]	2Q 2007[2]	4Q 2005
Easting	635,133 m E	635,133 m E	635,133 m E	635,133 m E	635,133 m E	621,684 m E	621,684 m E	621,684 m E	621,684 m E	621,684 m E	621,684 m E	621,684 m E	631,524 m E
Northing	4,422,196 m N	4,422,196 m N	4,422,196 m N	4,422,196 m N	4,422,196 m N	4,422,480 m N	4,422,480 m N	4,422,480 m N	4,422,480 m N	4,422,480 m N	4,422,480 m N	4,422,480 m N	4,419,477 m N
Flow (gpm)	2	6.1	0.46						10	6			2
TDS	248	252	273	257	259	278			279	284		252	249
Temp (˚F)	59.54	57.92	62.42	61.16	62.96	54	64	66	54.68	53.6	54.32	62.42	56.12
pH	8.09	7.78	7.79	7.71	7.59	7.6	7.9	7.3	8.3	8.27		7.68	8.04
Alkalinity	180	176	190	188	190				205	166		202	160
Ca	71.3	65.5	79.5	75.8	71	18.4			69.9	61		62	61
Mg	6.2	5.5	6.6	6	6		4.7	1.3	12	13.5		10	5.5
Na	12.9	13.8	14.1	13	12	2.9	15.5	13.6	12.4	17		11	21.5
K	0.9	1.0	1.1	<0.5	1				2.3	1.4		2	0.8
HCO_3	220	215	231	230	232	209			246	203		246	195
CO_3	<1	<1	<1	<1	<1	0			3	0		0	<1
SO_4	21	28	21	22	22	9			15	29		14	28
Cl	9	9	11	9	8	12.6	3.9	2.7	17	34		6	15
F	0.2	0.1	0.1	0.2	0.2		0.2		0.2	0.2		0.2	0.2
SiO_2	14.3	14.0	15.5	13.9	15.3				25.3	26.8		24.2	17.0
Fe	<0.01	<0.01	<0.01	<0.01	<0.01				0.26	1.52		0.02	<0.01
Mn	<0.001	<0.001	0.002	<0.001	<0.001				0.046	0.07		0.011	<0.001
Al	<0.01	0.20	<0.01	<0.01	<0.01				0.06	1.47		<0.01	<0.01
Sb	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	0.006		<0.001	<0.001
As	0.002	0.002	0.002	0.002	0.002				0.031	0.026		0.024	0.003
Ba	0.048	0.048	0.049	0.043	0.046				0.111	0.137		0.094	0.185
Be	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		<0.001	<0.001
B	0.07	0.089	0.08	<0.007	<0.007				0.07	0.112		<0.007	0.10
Cd	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		<0.001	<0.001
Cr	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		<0.001	<0.001
Cu	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		<0.001	<0.001
Pb	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	0.002		<0.001	<0.001
Hg	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.0005	0.0008		<0.0005	<0.0005
Ni	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	0.004		<0.001	<0.001
Se	<0.001	0.001	<0.001	<0.001	<0.001					<0.001		<0.001	0.002
Ag	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		<0.001	<0.001
Tl	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005				<0.0005	<0.0005		<0.0005	<0.0005
Zn	<0.01	<0.01	<0.01	<0.01	<0.01				<0.01	0.03		<0.01	<0.01
NO_3-N	0.9	2.2	2.3	2.1	2.3			<0.001	0.3	0.5		0.3	1.0

Notes: Samples taken in 2005 and 2006 were analyzed for total metals.
Samples taken in 2007 were analyzed for dissolved metals.
[1] Date of sampling was not specified (Pupacko et al., 1989)
[2] Tetra Tech, 2007

Proposed Action area: carbonate rocks, shales, volcanic rocks, intrusive granitic rocks, and alluvial valley fill.

Table 3-1 summarizes water quality data measured in the springs within and near the Proposed Action area. With the exception of arsenic, baseline water quality measurements demonstrate that water quality is generally good and is predominantly calcium or calcium/sodium bicarbonate water. Analytical results are generally within the Nevada water quality standards with the exception of arsenic. Most springs have demonstrated background arsenic levels near or above the 0.05 micrograms per liter Nevada water quality standards. Elevated arsenic in surface water and groundwater is commonly found in mineralized areas (USGS, 2004; Welch, 1988, 2000).

The body of surface water closest to the Proposed Action area is Ruby Lake. The south side of Ruby Lake is located approximately seven miles north of the Proposed Action area at the southern end of Ruby Valley within the Ruby Lake National Wildlife Refuge (Figure 3-1). The lake is fed by numerous springs along the eastern face of the Ruby Mountains and by expressions of near-surface alluvial groundwater in southern Ruby Valley. Virtually all groundwater in Ruby Valley is derived from three sources: precipitation that falls within the Ruby Valley hydrographic basin, infiltration of stream flow from the east side of the southern Ruby Mountains, and subsurface inflow from northern Butte Valley (USGS, 2005a). Evapo-transpiration represents the largest outflow of water from Ruby Valley, the largest component of which occurs from the valley floor. While Ruby Lake is a terminal lake, water quality is good, mainly due to the large inflow from springs and, to a lesser extent, northward flow toward Franklin Lake (USGS, 2005a). Ruby Valley is not hydrologically connected to the springs and other ephemeral surface flow within the Proposed Action area (BLM, 1995a and USGS, 2005a).

3.2.2 Surface Water Environmental Consequences

Proposed Action

Anticipated environmental impacts to surface water resources include possible increases in erosion due to various areas being cleared of native vegetation and local soils being disrupted, potential drainage from rock disposal areas, recharge reduction or relocation due to placement of facilities, and potential impacts to surface waters due to spills of chemicals used on-site. Each of these anticipated impacts is described below.

Erosion potential may be increased under the Proposed Action due to the removal of vegetation, stockpiling of soil, and alteration of the soil structure. New or expanded rock disposal areas, haul roads, and other surface disturbance would be designed to control stormwater flows in a manner similar to what has been successfully implemented for existing operations. Existing Best Management Practices (Appendix D) are effectively managing stormwater flow and controlling erosion at the existing operations. With implementation of the appropriate Design Features (Table 2-13), such as interim seeding, stockpiles, diversion channels, straw bales, silt fences, and sediment ponds, increased sedimentation to drainages would be minimized.

The Proposed Action entails expansions of existing pits. Waste rock from these pits has been characterized to evaluate the potential for acid generation from the rock disposal areas (SRK, 2003; Schafer, 2008 and 2009). Since the Proposed Action would involve expansion of the existing pits, the waste rock that would be encountered is expected to be similar in nature to waste rock that has previously been analyzed. The waste rock at the BMM operation has been undergoing characterization since 1995 and would continue to be evaluated as long as mining occurs. Quarterly sampling is also conducted in compliance with the Water Pollution Control Permit for the BMM. Waste rock has been analyzed for acid base accounting, total sulfur,

Meteoric Water Mobility Procedure, and kinetic testing analyses. The borehole locations sampled during the waste rock characterization are shown on Figures 2-3, 2-4, 2-5, and 2-6. These analyses, along with the geology and mineralogy, were used to determine the potential for acid generation and potential to degrade the waters of the State.

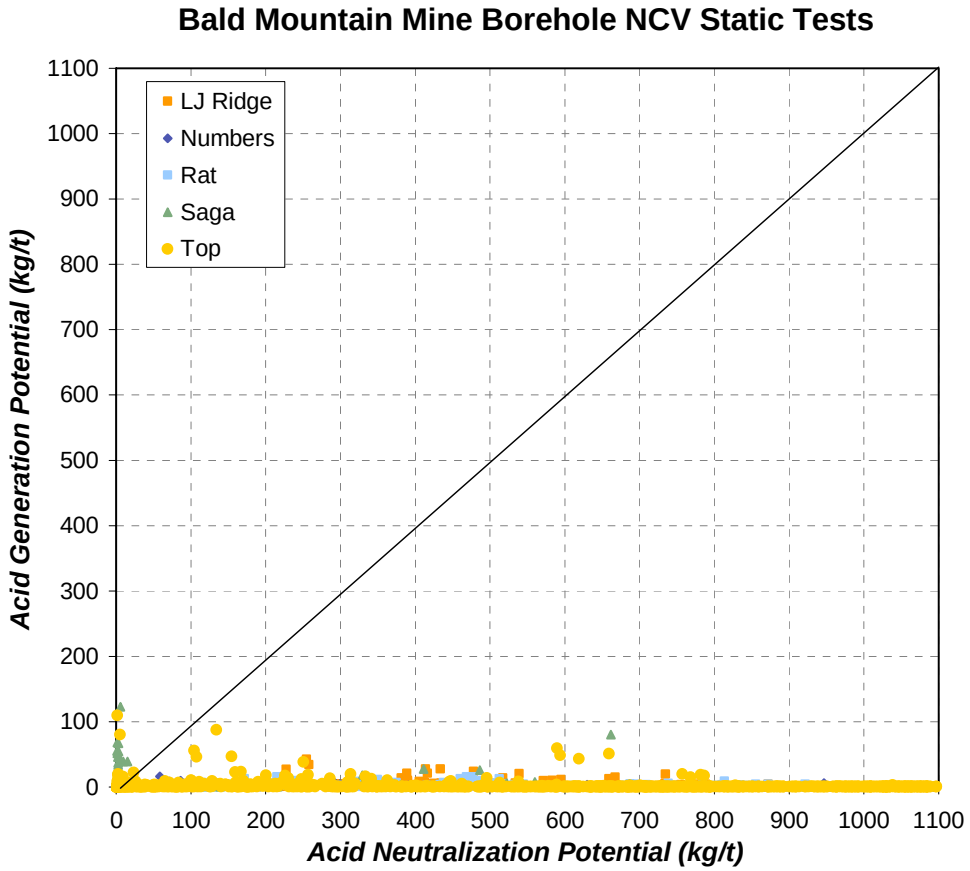
Static acid base accounting testing, Meteoric Water Mobility Procedure analyses, and kinetic testing of materials to be mined as part of the Proposed Action were completed and are reported in SRK Consulting (SRK, 2003; Schafer, 2008 and 2009) and portions of quarterly Water Pollution Control Permit reports submitted by BMM. Waste rock characterization completed for the currently permitted facilities is included in the BMM EIS (BLM, 1995a). The dataset for the BMM includes 144 quarterly waste rock composite samples and 1,556 samples that are 20-foot hole composites taken from exploration drill hole core at LJ Ridge, the Numbers Pits, Top Pit, Sage Flats, Rat, and Saga Pits. The quarterly samples were analyzed for acid drainage risk and metal mobility risk. The exploration samples were analyzed for acid drainage risk, total metals, and metal mobility risk. BLM guidelines state that the acid neutralization potential to acid-generating potential ratio must be greater than three and the acid neutralization potential must be greater than 20 equivalent tons of alkalinity per 1,000 tons of rock to be characterized as non-acid generating. As noted in SRK Consulting (2003), Schafer (2008 and 2009), and observed in more recent quarterly Water Pollution Control Plan compliance sampling, not all of the samples meet these criteria; however, no samples produced a pH below six by Meteoric Water Mobility testing. Quarterly sampling results from the Top, Horsehoe/Bida, Sage Flats, Rat, and Saga Pit areas for 2003 through 2007 are included in Appendix E. Kinetic tests were conducted on ten samples which had negative net neutralizing potential values. The kinetic tests were run for between 20 and 28 weeks. Only one kinetic test showed pH levels below 6, however the leachate in this sample became alkaline later during the test. The kinetic tests also showed metals leached were below detection with the exception of arsenic, antimony, mercury, barium, and iron, which had low measurable values in some samples. The results from the kinetic tests are included in Appendix E.

Chart 1 shows the results of the acid-neutralizing potential and acid-generating potential testing of the bore holes from the Proposed Action (Schafer, 2008). The results indicate that most materials have a higher acid-neutralizing potential than acid-generating potential. A few samples from the Saga and Top areas may have higher acid-generating potentials. The Top Pit and Saga Pit results are due to the silicification of the rock in which the limestone is replaced with silica. This silicification is often associated with the ore body, while surrounding rocks often still contain higher amounts of unaltered limestone. The waste rock from these areas will therefore most likely have higher limestone contents and therefore higher neutralizing potential than the ore bodies themselves.

Figure 35 in the Schafer (2008) report shows the results from the Meteoric Water Mobility testing (Schafer, 2008). Figure 6 in the Schafer (2008) report shows similar published data from other mines in Nevada (Schafer, 2008). These figures shows the total base metals (cadmium, cobalt, copper, lead, nickel, and zinc) leached during the testing as compared with the pH of the leachate. All samples from the Proposed Action had pH values above six. Only three of the 122 samples had total base metal values greater than ten milligrams per liter. The potential for production of acidic waters and mobilization of metals is low at BMM due to low rainfall, pervasive alkaline conditions, and the abundance of iron which increases the tendency for oxyanions, such as arsenic and antimony to adsorb. The rocks in the Bald Mountain area are generally high in carbonates, which have high capacities to neutralize acid, and have been extensively oxidized, which decreases the potential for the material to generate acid. Details of the geology and analytical results for each pit area are included below.

The Horseshoe/Bida/Belmont pits are located in Guilmette limestone and granodiorite porphyry. The acid neutralization potential for this waste rock ranges from less than one to 300 tons alkalinity per 1,000 tons. The highest sulfide-sulfur sample was 0.5 percent sulfide by weight. Approximately 57 percent of the waste would be porphyry material. The highly leached breccia comprises 23 percent of the waste, while the rest includes limestone and alluvium. Waste rock from the Horseshoe Pit is anticipated to be alkaline with slightly elevated levels of arsenic, antimony, and mercury shown in the Meteoric Water Mobility Procedure leachates. Although the acid neutralization potential values for material from the Bida Pit from 2005 through 2007 are below three for most samples, the acid-generating potential values are below 20, which would indicate while the material has little potential to neutralize acid and it also has little potential to generate acid. The leachate results indicate there will be no chemical impacts to surface water quality from the Horseshoe waste rock.

CHART 1 ACID-NEUTRALIZING POTENTIAL AND ACID-GENERATING POTENTIAL FOR BOREHOLE SAMPLES AT THE PROPOSED ACTION



The Top Pit has a more complex geology, and waste rock would include silicified and argillized porphyry with low buffering capacity and trace sulfides, and unmineralized oxide siltstone and limestone. The waste rock is anticipated to be predominantly oxide (less than 0.05 percent sulfide by weight). Although the porphyry may produce some trace elements, the limestone host rock contains significant buffering capacity, which would make the potential overall leachate good quality (946 equivalent tons calcium carbonate per 1,000 tons). The Mahoney Canyon area (Top Pit area) contains mainly granodiorite rock with low buffering potential but also low sulfide content. Meteoric Water Mobility Procedure testing indicates that any potential leachate from waste rock from this pit area may have antimony, arsenic, and mercury

concentrations slightly above Nevada Profile I standards, which is a common geochemical signature in Carlin-type ore bodies. Elevated antimony, arsenic and mercury in surface water base flow are typical features of mineralized areas of Nevada. Evidence of this is indicated in water quality analysis from South Water Canyon Spring (Table 3-1), whose recharge area has not been impacted by mining activities. No seepage or surface flow from the toe of the existing waste rock disposal areas in the Top Pit area has been observed during current operations. Based on current operations and monitoring, no impacts are anticipated to surface water quality from the Top Pit waste rock (Appendix E).

The Sage Flats Pit area geology is similar to that of the adjacent Top Pit area. The area is a skarn zone (i.e., zone of mineral deposit) with traces of minor sulfides and secondary minerals associated with crystallized carbonates. Most of the waste rock in the Sage Flats area shows limited potential for acid generation because of the low sulfide content; however, the low buffering capacity associated with some of the rock types indicates that the acid neutralization potential is less than 20 equivalent tons alkalinity per 1,000 tons of rock. The Meteoric Water Mobility Procedure analyses indicated that the same rock produced a leachate with neutral to alkaline pH and low solute concentrations. These results indicate there would be no chemical impacts to surface water quality from the Sage Flats area rock disposal areas.

Quarterly sampling from the Rat Pit waste rock and geologic cross-sections of the pit indicate the rock would be composed of either dolomite or shale with negligible sulfide values (less than 0.01 percent by weight). The rock shows large buffering capacity due to the dolomite, and little acid-generating potential. Meteoric Water Mobility Procedure results indicate the water would meet Nevada Profile I standards with the exception of slightly elevated antimony. Therefore, there would be no impacts to surface water quality from the Rat Pit waste rock.

Waste rock from the Saga Pit would be comprised of shale and limestone. The rock has been shown to have moderate to high buffering potential (54 to 306 equivalent tons calcium carbonate per 1,000 tons) with limited acid-generating potential. Meteoric Water Mobility Procedure results indicate the water leached from this waste rock would be within Nevada Profile I standards with slightly elevated aluminum, antimony, and arsenic.

A material balance was completed to determine the relative abundance of each lithology in the waste rock at each pit that is planned for expansion under the Proposed Action (Schafer, 2009). Anticipated average values for acid base accounting parameters for each pit are shown in Table 3-2.

TABLE 3-2 ESTIMATE AVERAGE ACID BASE ACCOUNTING VALUES FOR PITS TO BE EXPANED UNDER THE PROPOSED ACTION

AREA/PIT	ACID NEUTRALIZING POTENTIAL	ACID GENERATING POTENTIAL	NET NEUTRALIZING POTENTIAL	RATIO
LJ Ridge	446.1	5.0	440.2	89.2
North Pits 1-3	367.9	2.5	365.4	147.2
Rat	722.3	1.7	720.6	424.9
Top/Sage Flats	686.7	2.4	684.2	286.1
Bida	168.1	14.0	154.1	12.0
Saga	209.6	16.5	193.1	12.7

The acid base accounting and Meteoric Water Mobility Procedure results indicate BMM North Operations Area Project waste rock would be net neutralizing, which means that no acidic waters would be generated from meteoric water leaching through the waste rock. BMM would

continue to sample and monitor waste rock to evaluate any unexpected material. Results of waste rock sampling and analyses during current operations have identified limited insignificant amounts of potential acid-generating material from the existing pits that would be expanded with the Proposed Action. Because similar geologic material would be encountered with the Proposed Action (primarily expansion of existing pits), previous static and kinetic tests are representative. As of May 2009, no seepage has been observed from the existing rock disposal areas (Atiemo, 2009).

The potential of mining activities to reduce recharge areas for Cherry Spring has also been considered. The expansion of the East Sage Rock Disposal Area and construction of the Sage Flat Rock Disposal Area could decrease recharge to Cherry Spring (Figure 3-3). The spring is likely fed by an aquifer that is recharged by infiltration of precipitation in the watershed uphill from the spring. Expansion of the rock disposal area would cover approximately 65.1 acres of the (130.5 acre) recharge area. Rainfall and snowmelt that currently infiltrate into the ground surface within this area would have to percolate through the waste rock before entering the natural ground surface beneath the fill. During its transit through the waste rock, some portion of the infiltrating water would be expected to be stored in the overburden or evapo-transpired, which would reduce the amount of recharge water compared with natural conditions. This reduction in recharge could then reduce the water level of the aquifer and decrease the flow rate from the spring. It is noted that there is currently no flow emanating from Cherry Spring, and recent water levels taken from the development (pipe) at the spring location are well below ground surface. The presence of the development pipe indicates there was flow from this spring in the past. The exact cause of the decrease in the Cherry Spring flow is not known at this time. Depths to water measurements from 2005 for Cherry Spring are shown in Table 3-3.

Upper and lower Mill springs are also located within the Plan of Operations boundary. The recharge area for the Mill Springs is east of the proposed disturbance and would therefore not be impacted by the Proposed Action. There are no facilities planned in the recharge area of the Mill Springs. The Mill Springs are thought to be fed by a local aquifer similar to Cherry Spring.

TABLE 3-3 CHERRY SPRING MONITORING DATA

DATE SAMPLED	DEPTH TO WATER	OTHER OBSERVATIONS
Fourth Quarter 2005	23.0 feet	
First Quarter 2006	NS	
Second Quarter 2006	NS	
Third Quarter 2006	18.3 feet	
Fourth Quarter 2006	NS	
First Quarter 2007	23.86 feet	
Second Quarter 2007	11.14 feet	
08/08/2007	30.2 feet	
12/11/2007	48.4 feet	
12/18/2007	49 feet 5 inches	
03/31/2008	NS	Snow cover, no visual flow
05/15/2008	Surface Flow	Approximately 1 gallon per minute
06/10/2008	4 feet 6 inches	
06/18/2008	7 feet 3 inches	
07/01/2008	15 feet 3 inches	
08/04/2008	22 feet 10inches	
09/08/2009	33 feet 4 inches	
10/01/2008	46 feet 8.5 inches	
11/05/2008	47 feet 1 inches	
12/01/2008	48 feet 7 inches	Damp
01/21/2009	48 feet 8 inches	Dry

DATE SAMPLED	DEPTH TO WATER	OTHER OBSERVATIONS
02/03/2009	NS	Dry
03/01/2009	NS	Snow cover, no visual flow
04/01/2009	24 feet 4 inches	

As Recorded by Vector/Tetra Tech in 2005-2007, and BMM since 12/18/07.
NS = Not Sampled

South Water Canyon Spring and the Bourne Tunnel Spring are located nearly adjacent to the Plan of Operations boundary. These springs are also fed by local aquifer systems. The Bourne Tunnel Spring would not be impacted by the Proposed Action, since the source of recharge is south of the Proposed Action area. No impacts to South Water Canyon Spring by the Proposed Action are anticipated because there is no proposed disturbance in this recharge area. There is no proposed disturbance in this area, and thus no impact is anticipated.

Willow Springs, Twin Springs, and Tognini Spring are located east of the Proposed Action in the Maverick Springs Range. Their recharge sources are located within the Maverick Springs Range. These recharge sources would not be hydrologically linked to the Proposed Action, and there is no disturbance planned for this area. Therefore, there would be no impact to these springs from the Proposed Action.

The BMM North Operations Area Project Plan of Operations (BMM, 2009) for the Proposed Action includes detailed discussion of chemical handling practices that are currently in use and would continue to be used to assure proper handling of solvents, fuels, and any other chemicals in accordance with all applicable state and federal regulations. If spills occur, appropriate emergency procedures, as provided in the Spill Contingency Plan (BMM, 2009), would be used to prevent or minimize impacts to surface water and drainages.

Water quality data shown in Table 3-1 does not indicate any downward trends in surface water quality as a result of current or past mining operations. Potential direct impacts to surface waters in the Proposed Action would be avoided by implementation of Design Features (Table 2-13). Potential indirect impacts of the Proposed Action would include increased erosion due to clearing of vegetation from the proposed disturbance areas, potential drainage from the rock disposal areas, recharge reduction due to the expansion of rock disposal areas, and chemical spills. As discussed above, these indirect impacts would also be avoided by implementation of Design Features (Table 2-13). The recharge area of Cherry Spring could potentially be impacted by the placement of waste rock over the recharge area.

Alternative A – Partial Backfill Alternative

This alternative would not decrease the level of mining. The only difference would be approximately 434 acres less disturbance allocated for rock disposal areas. The backfilled pits would be above the ambient groundwater level. The potential impacts to surface water resources would be less surface disturbance and thus a potential reduction in areas contributing to erosion and sedimentation to drainages. Impacts to surface water quality would be the same as the Proposed Action.

Potential impacts to the Cherry Spring recharge area would be reduced significantly through a reduction in the size of the Sage Flat Rock Disposal Area under Alternative A. The original design of the Sage Flat Rock Disposal Area would have covered approximately 65.1 acres of the Cherry Spring recharge area, which includes the rock disposal area, soil stockpile, and haul road. With the reduced Sage Flat Rock Disposal Area (including the soil stockpile area), the acreage of the Cherry Spring recharge area impacted by the rock disposal area would be

Figure 3-3 Cherry Spring Drainage Area

approximately 9.0 acres. This represents a reduction of 52.1 acres or an 80% reduction in disturbance. Approximately four acres of the recharge area would continue to be impacted by the haul road. However, since precipitation and snow melt would continue to run off the haul road surface, moisture from this area would continue to be a source of recharge for Cherry Spring. With implementation of Alternative A, a reduction of approximately 52.1 acres of disturbance within the Cherry Spring recharge area would be realized. The resulting disturbance (waste rock and road) within the Cherry Spring recharge area would represent less than 10% of the total recharge area. Other impacts to surface water would be as described for the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would include a smaller heap leach pad at Mooney Basin; however, the ore would be hauled to the 2/3 Heap Leach Pad for processing. There would also be a reduction in surface disturbance of approximately 105 acres. The potential impacts to the surface water resources would be as described for the Proposed Action.

No Action Alternative
This alternative would not include any further mining, other than that currently permitted. There would be no impacts to the surface water resources other than that previously disclosed in the 1995 EIS (BLM, 1995a) and subsequent NEPA documents.

3.2.3 Groundwater Affected Environment

Simon Hydro-Search (1994b), in a regional hydrogeologic characterization of the Bald Mountain/Alligator Ridge area, initially described three groundwater systems in the Proposed Action area: a perched groundwater system, a local groundwater system comprising local bedrock flow, and a regional interbasin flow groundwater system. Using additional data from more recent studies, Mine Mappers (2007), in its hydrogeologic characterization report, simplified the recent system into a local groundwater system that includes shallow perched zones and deep bedrock zones and a second groundwater system that is associated with alluvial fill material in the valleys. The alluvial aquifers are surrounded by bedrock and are located in Huntington, Newark, Long, and Ruby valleys. For purposes of this FEIS, the more current Mine Mappers (2007) analysis was used to enhance interpretation of the hydrogeology in and around the Proposed Action area.

Assumptions for Analysis
Assumptions made for groundwater analysis include the following:

- The estimated cones of depression for the production water wells assume a homogeneous and isotropic aquifer; and

- The hydraulic properties assumed in the cone of depression calculations are averages of the production wells.

Groundwater Quantity
The potentiometric surface in and around the Proposed Action area has been mapped using 164 measured points (Figure 3-4). Groundwater level data points were obtained by Mine Mappers (2007) from five primary sources. Mine Mappers (2007) categorized each source by its level of reliability (Table 3-4). The primary sources for determining the potentiometric surface were the BMM water wells, Nevada Division of Water Resources logs, and mine quarterly monitoring points. Drill hole survey data and exploration driller's log data were used only to corroborate trends identified using the primary sources of data.

TABLE 3-4 POTENTIOMETRIC DATA SOURCES AND RELATIVE RELIABILITY

SOURCE	NUMBER OF DATA POINTS	RELATIVE DATA RELIABILITY
BMM Water Wells	6	High
Nevada Division of Water Resources Logs	36	Medium
Mine Quarterly Monitoring Points	13	Medium
Drill Hole Surveys (IDS)	54	Low
Exploration Driller's Logs	54	Low

The potentiometric surface in the bedrock aquifer in and around the Proposed Action area ranges from approximately 6,500 feet above mean sea level to approximately 7,900 feet above mean sea level. The hydraulic gradient is greater in the bedrock aquifers than in the alluvial aquifers, as to be expected in an unconfined aquifer. The potentiometric surface varies in each alluvial valley, depending upon the elevation of the valley floor; however, it usually ranges from approximately 5,900 feet above mean sea level to 6,100 feet above mean sea level. Figure 3-5 and Figure 3-6 show cross-sections of the potentiometric surfaces in and around the Proposed Action area.

The direction of groundwater flow varies across the Proposed Action area, flowing in four directions from a groundwater divide to each of the hydrographic basins located in the Proposed Action area. For example, the groundwater on the west side of the project flows northwest into Huntington Valley, and the water on the northeast side of the project flows north into Ruby Valley. The water is recharged at or near the groundwater divides that separate each hydrographic basin. Research conducted by the U.S. Geological Survey (USGS, 2005a) indicated the recharge rate into Ruby Valley is between 710,000 and 930,000 acre-feet per year. Another recent report by the U.S. Geological Survey (Welch, 2007) discusses the water resources of Newark and Long valleys. The recharge rates for Newark and Long valleys were reported as 21,000 acre-feet per year for Newark Valley and 25,000 acre-feet per year for Long Valley. Neither study broke out the recharge by areas smaller than the hydrographic basin.

Alluvial aquifer properties were obtained from five pump tests at water wells. Detailed information on the pump tests is included in Mine Mappers (2007). Transmissivity ranged from 0.19 square foot per minute to 1.96 square feet per minute while hydraulic conductivity ranged from 0.55 foot per day to 3.82 feet per day. These hydraulic parameter values are consistent with values for silty sand to clean sand (Freeze and Cherry, 1979), which are the most common material types found during drilling activities. These material types were found during drilling activities. The groundwater flow direction at the BMM wells is to the northwest in Huntington Valley. The groundwater flow direction at the Mooney Basin wells is toward the south in Newark Valley. There are no current Barrick production wells in Long Valley or Ruby Valley.

Mine Mappers (2007) also conducted a water balance of the BMM operation. Recharge is predominantly from precipitation at higher elevations (Rush and Everett, 1966). Recharge to the fault-controlled bedrock aquifer system is by infiltration of precipitation and snowmelt. After infiltration, groundwater flows along faults and fractures through the bedrock system toward the alluvial aquifers within the valleys that lie below the mountain ranges. Recharge to the alluvial aquifer system is also by infiltration of precipitation, snowmelt, and runoff. It also includes contribution from the fault-controlled bedrock aquifer system.

Precipitation varies across the Proposed Action area due to the large elevation changes (9 to 14 inches at lower elevations to 21 inches at higher elevations). Mine Mappers (2007) has estimated that the recharge rate in the Proposed Action area averages 1.9 inches per year

Figure 3-4 Potentiometric Surface

Figure 3-5 Potentiometric Surface Cross-Section A

Figure 3-6 Potentiometric Surface Cross-Section B

(19,000 acre-feet per year). This recharge rate is higher than in the valleys due to the larger amount of precipitation that occurs at the higher elevations in the Proposed Action area.

The aquifers discharge by two methods: spring flow and well pumping. Spring flow is primarily associated with the fault-controlled bedrock aquifers. The occurrence of spring flow was discussed in Section 3.2.1. Springs in the Proposed Action area average less than one-gallon-per-minute flow rates, and the flow is usually only active during spring snowmelt with the exception of Cracker Johnson #1 and #2 springs, which typically flow until late summer or early fall.

Production wells already in use with existing operations and also associated with the Proposed Action are the second method of discharge from the alluvial aquifer in and near the Proposed Action area. Well production occurs from the alluvial unconfined aquifers. There are three production wells (Mooney Wells 1, 2, and 3) currently associated with the Mooney Basin process facilities (Figure 3-4). These wells pumped approximately 832 acre-feet of water between January 2003 and December 2006. The static water levels in these three wells have indicated a slight decline (ranging from 8 to 13 feet) in water levels since 2003. This represents approximately one to two percent of the original aquifer thickness (Mine Mappers, 2007). Measurements of the static water levels for the two BMM production wells indicate no change in the static water level since the wells were constructed in 1983 and 1984. As stated in the Mine Mappers (2007) report, this suggests that aquifer recharge exceeds current production from the alluvial aquifer by the BMM wells on the west side.

There are also 36 wells located within and around the Proposed Action area that were reported by Nevada Division of Water Resources (Figure 3-4). There is no pumping data available from the Nevada Division of Water Resources for these wells and limited static water level information available to use in the description of the groundwater system.

The BMM North Operations Area Project is located within four hydrographic basins, and Barrick is the only underground water user within the BMM Plan of Operations boundary. There are three surface water rights located within the Plan of Operations boundary, all of which are stock water usage designations with less than 10 acre-feet annual adjudication. Table 3-5 lists the total adjudicated water rights for each hydrographic basin, as well as BMM's adjudicated water rights.

TABLE 3-5 ADJUDICATED WATER RIGHTS

HYDROGRAPHIC BASIN	BASIN TYPE[1]	TOTAL ADJUDICATED WATER (ACRE-FEET/YEAR)	BMM WATER RIGHTS[2] (ACRE-FEET /YEAR)
47 – Huntington Valley	Designated	24,413.95	559.46
154 – Newark Valley	Non-Designated	59,832.37	0
175 – Long Valley	Non-Designated	5,761.96	2,896.46
176 – Ruby Valley	Designated	499,344.31	0

[1] A designated basin is one in which permitted groundwater rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration.
[2] Water Rights are recorded under Placer Dome U.S., Inc (now owned by Barrick).

Groundwater Quality

Groundwater quality was initially described by Simon Hydro-Search (1994a) and is also described in the BMM EIS (BLM, 1995a). The data were updated with sampling from 2005 through 2007 by Tetra Tech (2007). These data are summarized in Table 3-6. The

TABLE 3-6 WATER QUALITY OF GROUNDWATER WELLS

PARAMETER (MG/L UNLESS OTHERWISE NOTED)	MOONEY BASIN WELL	MOONEY WELL 1				
	Q2 2007	Q4 2005	Q4 2005 (DUP)	Q1 2006	Q2 2006	Q4 2006
Alkalinity	130	103	103	114	112	103
Al	ND	0.01	0.02	0.07	ND	0.01
Sb	ND	ND	ND	<0.001	ND	ND
As	0.004	0.005	0.005	0.004	0.028	0.005
Ba	0.314	0.051	0.048	0.115	0.219	0.049
Be	ND	ND	ND	<0.001	ND	ND
HCO3	155	125	122	140	136	126
B	ND	0.05	0.05	0.058	0.068	0.025
Cd	ND	ND	ND	<0.001	ND	ND
Ca	37	44.3	42.8	42.2	27.3	39
CO3	2	ND	2	<1	ND	ND
Cl	16	21	17	14	14	13
Cr	ND	0.001	0.001	0.001	0.003	0.001
Cu	0.001	ND	ND	<0.001	ND	0.016
Cyanide WAD	ND	ND	ND	<0.005	ND	ND
Fl	0.2	0.2	0.2	0.2	0.1	0.3
Fe	0.02	0.03	0.02	0.18	0.02	0.07
Pb	ND	ND	ND	<0.001	ND	0.001
Mg	14	4.3	4.2	4.1	17.8	4
Mn	0.019	0.002	0.001	0.004	ND	0.007
Hg	ND	ND	ND	<0.0005	ND	ND
Ni	ND	ND	ND	0.002	ND	0.002
NO3-NO2-N	3.1	3.2	3.1	3.1	2.6	3.0
pH	8.32	7.90	8.36	8.29	7.95	7.96
K	6	7.1	6.9	5.7	5.3	7
Se	ND	0.002	0.002	0.003	0.003	0.003
SiO2	46.1	59.4	58.1	54.2	45.4	56.8
Ag	ND	ND	ND	<0.001	ND	ND
Na	9	11.5	11.2	10.1	8.3	10
TDS	227	242	233	231	219	239
SO4	9	18	17	18	22	21
Tl	ND	ND	ND	<0.0005	ND	ND
Zn	0.11	0.01	ND	0.02	ND	0.01

Note: Samples taken in 2005 and 2006 were analyzed for total metals. Samples taken in 2007 were analyzed for dissolved metals.

PARAMETER	MOONEY WELL 2						MOONEY WELL 3				
	Q4 2005	Q1 2006	Q2 2006	Q3 2006	Q4 2006	Q2 2007	Q4 2005	Q2 2006	Q3 2006	Q4 2006	Q2 2007
Alkalinity	130	122	112	127	124	128	120	112	121	124	130
Al	0.02	<0.01	ND	ND	ND	ND	ND	ND	ND	ND	ND
Sb	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
As	0.004	0.003	0.004	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.002
Ba	0.144	0.204	0.148	0.152	0.143	0.145	0.119	0.122	0.126	0.104	0.040
Be	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
HCO3	155	146	136	155	151	156	143	136	147	151	159
B	0.05	0.060	0.074	0.06	0.028	ND	0.05	0.072	0.05	0.032	ND
Cd	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ca	51.0	43.4	43.7	52.8	43	48	49.4	42.5	52.9	42	47
CO3	2	2	ND	ND	ND	ND	2	ND	ND	ND	ND
Cl	14	14	14	13	14	13	17	16	16	15	14
Cr	ND	<0.001	0.001	ND	ND	ND	ND	0.001	ND	ND	ND
Cu	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	0.006	0.002
Cyanide WAD	ND	<0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Fl	0.1	0.1	0.1	0.1	0.2	0.2	0.1	0.1	ND	0.2	0.2
Fe	0.11	0.02	ND	ND	0.02	ND	ND	ND	0.03	3.64	0.19
Pb	0.002	<0.001	ND	ND	ND	ND	ND	ND	ND	0.002	0.008
Mg	6.2	5.2	5.3	6.2	5	5	6.0	5.1	6.1	5	5
Mn	0.008	<0.001	ND	0.002	ND	ND	ND	ND	0.001	0.038	0.006
Hg	ND	<0.0005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ni	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
NO3-NO2-N	3.2	2.9	2.9	3.1	3.1	3.2	3.4	3.3	3.4	1.6	3.2
pH	8.34	8.35	8.03	8.10	8.04	8.00	8.40	8.03	8.02	8.02	7.86
K	5.7	4.8	5.7	5.7	5	5	6.0	6.1	6.1	6	7
Se	ND	<0.001	0.001	ND	ND	ND	ND	0.001	ND	ND	ND
SiO2	51.2	50.8	50.0	56.1	48.9	53.7	53.3	50.1	57.2	45.3	52.1
Ag	ND	<0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND
Na	12.2	11.0	12.1	13.0	10.0	10	12.2	11.6	13.0	11.0	10
TDS	248	229	231	253	247	243	248	237	257	244	247
SO4	16	15	21	16	15	16	17	25	18	18	21
Tl	ND	<0.0005	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zn	0.32	0.07	0.03	0.04	0.03	0.03	ND	ND	ND	ND	ND

Note: Samples taken in 2005 and 2006 were analyzed for total metals. Samples taken in 2007 were analyzed for dissolved metals.

PARAMETER	WELL 1					WELL 2					
	Q4 2005	Q1 2006	Q4 2006	Q4 2006 (DUP)	Q2 2007	Q4 2005	Q1 2006	Q2 2006	Q3 2006	Q4 2006	Q2 2007
Alkalinity	103	104	98	102	106	95	96	92	105	92	107
Al	0.01	<0.01	ND	ND	ND	ND	<0.01	ND	ND	0.02	ND
Sb	ND	<0.001	ND	ND	ND	0.001	0.002	ND	ND	ND	ND
As	0.015	0.018	0.017	0.018	0.017	0.035	0.056	0.003	0.027	0.045	0.015
Ba	0.372	0.398	0.390	0.391	0.393	0.229	0.356	0.169	0.226	0.363	0.171
Be	ND	<0.001	ND	ND	ND	ND	<0.001	ND	ND	ND	ND
HCO3	125	124	119	124	129	116	114	112	128	113	131
B	0.05	0.060	0.025	0.022	ND	ND	0.061	0.070	0.04	0.021	ND
Cd	ND	<0.001	ND	ND	ND	ND	<0.001	ND	ND	ND	ND
Ca	30.1	27.5	27	29	28	25.9	23.4	41.6	31.6	22	33
CO3	ND	2	ND	ND	ND	ND	2	ND	ND	ND	ND
Cl	31	32	31	31	31	28	25	31	32	24	34
Cr	0.002	0.001	0.001	0.002	0.001	0.001	0.001	ND	ND	0.002	0.003
Cu	0.003	0.008	ND	0.001	ND	ND	<0.001	ND	ND	0.023	ND
Cyanide WAD	ND	<0.005	ND	ND	ND	ND	<0.005	ND	ND	ND	ND
Fl	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.3	0.2
Fe	0.26	0.24	0.26	0.26	0.02	0.13	2.67	ND	0.02	3.34	ND
Pb	ND	<0.001	ND	ND	0.003	ND	0.003	ND	ND	0.917	ND
Mg	20.8	17.1	17	18	18	17.5	14.2	5.3	19.8	14	20
Mn	0.004	0.002	0.007	0.004	0.009	0.007	0.058	ND	0.004	0.230	0.001
Hg	ND	<0.0005	ND	ND	ND	ND	<0.0005	ND	ND	ND	ND
Ni	0.001	<0.001	ND	ND	ND	ND	0.001	ND	ND	0.005	ND
NO3-NO2-N	2.9	2.6	2.1	2.6	2.7	2.0	1.6	2.5	2.5	2.6	2.6
pH	7.82	8.38	8.11	8.11	8.13	7.88	8.50	8.03	8.13	8.16	8.05
K	4.8	5.0	5	5	6	5.3	6.3	5.5	5.4	6	5
Se	0.002	0.002	0.002	0.002	0.002	0.002	0.002	ND	ND	ND	0.002
SiO2	47.7	51.4	48.8	51.7	52.6	45.7	53.1	50.6	49.4	48.0	44.7
Ag	ND	<0.001	ND	ND	ND	ND	<0.001	ND	ND	ND	ND
Na	9.8	9.7	9	10	10	7.7	7.2	11.5	9.3	7	11
TDS	233	227	230	232	233	206	202	238	239	210	250
SO4	14	11	11	11	11	10	9	26	17	8	26
Tl	ND	<0.0005	ND	ND	ND	ND	<0.0005	ND	ND	ND	ND
Zn	0.04	0.02	0.02	0.01	0.02	0.02	0.10	0.04	0.02	0.83	0.01

Note: Samples taken in 2005 and 2006 were analyzed for total metals. Samples taken in 2007 were analyzed for dissolved metals.

groundwater is generally of good quality. The background arsenic levels observed in the aquifers are generally at or near applicable Nevada standards.

3.2.4 Groundwater Environmental Consequences

Proposed Action

Anticipated environmental impacts to groundwater resources include increased withdrawal of groundwater for processing and other uses, intersection of the water table by the open pits, and changes in the groundwater quality. Each of these anticipated impacts is described below.

The Proposed Action includes increasing the current groundwater withdrawal rates to accommodate the increased ore process facility capacity. The proposed groundwater withdrawal rates would be approximately 550 acre-feet per year, as compared with the current withdrawal rates of approximately 300 acre-feet per year, an increase of 250 acre-feet per year.

The groundwater at the BMM wells is obtained from an alluvial unconfined aquifer in the extreme southeast corner of Huntington Valley, which is a designated groundwater basin. The Mooney Basin wells obtain groundwater from an alluvial aquifer in Long Valley, which is an undesignated groundwater basin. There are no new production wells proposed in either Ruby or Newark valleys. There are no other permitted groundwater users within approximately five miles of the Proposed Action.

Based on an estimated recharge rate of approximately 19,000 acre-feet per year (Mine Mappers, 2007) to the alluvial aquifers in the Proposed Action area, there would be minimal impact to the aquifers. This conclusion is based on a proposed combined pumping rate of 550 acre-feet per year for the Proposed Action. This equates to approximately 2 percent of the estimated recharge rate to the aquifers in the Proposed Action area. The proposed increase in pumping rate would not impact any other users of the alluvial aquifer.

The area of influence around each production area was evaluated to determine whether the cone of depression for each pumping area would impact other permitted water users. A simulation was run using Darcy's Law and a constant pumping rate under steady-state conditions. The radius of the cone of depression was calculated using known hydrologic parameters for each pumping area. Each area was simulated utilizing only one well pumping at a time to replicate actual field conditions. Table 3-7 includes a list of inputs that went into the calculation along with the results.

TABLE 3-7 CONE OF DEPRESSION INPUTS AND RESULTS

PARAMETER	BMM WELLS	DATA SOURCE	MOONEY BASIN WELLS	DATA SOURCE
Pumping Rate	114 gallons per minute (184 acre-feet per year)	Barrick Staff[1]	228 gallons per minute (368 acre-feet per year)	Barrick Staff[1]
Saturated Aquifer Thickness	553 feet	Average of Bald-1 and Bald-2	496.5 feet	Average of MWW-2 and MW-3
Hydraulic Conductivity	1.56 feet per day	Average of Bald-1 and Bald-2	0.91 foot per day	Average of MWW-2 and MW-3
Hydraulic Gradient	0.02 foot per foot	Measured from Potentiometric Surface Map (Figure 3-4)	0.11 foot per foot	Measured from Potentiometric Surface Map (Figure 3-4)
Radius of Cone of Depression	202 feet	Calculated	138 feet	Calculated

[1] Zietlow, 2007e

As shown in Table 3-7, the radius of the cone of depression for the BMM wells on the west side of the Proposed Action area is approximately 200 feet. Since there are no other permitted water users within 200 feet of the BMM wells, there would be no projected impact to the water levels in nearby wells due to the proposed production on the west side of the property. The cone of depression extends approximately 140 feet from the Mooney Basin production wells on the east side of the property. These wells are also the only wells in the local vicinity; therefore no impacts to local water users are anticipated from the production of the Mooney Basin water wells. The springs in the area would not be impacted by the production at the water wells since they lie outside of the cone of depression. The pre-pumping water levels are also deep enough that impacts to any surface features within the cones of depression, such as surface vegetation, are not anticipated.

Based on groundwater studies, the open pits would not encounter the deeper groundwater aquifer, since the current pit configurations lie above the potentiometric surface (Mine Mappers, 2007). The pits may, however, encounter isolated occurrences of saturated material during excavation near clay zones. The amount of water that may be encountered in this scenario would most likely be minimal, and water would be pumped out of the open pit area as necessary to maintain safe operating conditions. Pumped water would be handled in a manner consistent with the BMM Water Pollution Control Permit. The rock within the open pits has been characterized as part of the on-going waste rock characterization program and has been shown to be primarily neutralizing in nature. The expansion of the open pits is anticipated to encounter the same rock types, and, therefore, no impact is expected from the perched water tables intersecting the open pit walls. Current operations have not indicated any detrimental effects from perched water entering pits.

Environmental impacts to groundwater quality due to the Proposed Action are not anticipated. There have been no impacts under the current operations, and the Proposed Action would include the continuation of mining similar rock types and processing ore in a similar manner, although the heap leach pads would be expanded to accommodate the additional ore. Characterization of the waste rock that has been encountered and is expected to be encountered under the Proposed Action is included in Section 3.2.2. The heap leach pads and process ponds would be double lined with leak detection systems. This would minimize the risk of process solution impacting groundwater. Final closure plans would also be designed and coordinated with the Nevada Division of Environmental Protection such that groundwater would not be impacted. The goal of closure would be no discharge of leach pad draindown fluids towards groundwater, but if this was not consistently achieved, closure plans would need to show that any water discharged would not adversely impact groundwater. This has been achieved at several leach pad closures within the mining district.

The open pits are not projected to impact groundwater quality, since there would be minimal exposed potential acid-generating material to generate acid that would infiltrate into the groundwater. The rock disposal areas are also not anticipated to impact the groundwater quality for the same reasons. BMM has collected and analyzed more that 1,600 waste rock samples for acid producing and metal leaching potential. These samples show due to the high carbonate content and oxidized nature of the rock, the waste rock would not leach waters that are high in acidity or metals content. BMM would continue to sample and monitor waste rock to evaluate if any unexpected material is encountered. No new rock types or sulfide deposits are anticipated as part of this Proposed Action, and Barrick proposes to continue the current approved waste rock management practice of comingling all waste rock material. Should any unanticipated sulfide/acid-generating material be encountered late in a mining sequence that would limit or preclude effective comingling, neutralizing waste rock from another mining area would be rehandled as necessary and placed both beneath and over sulfide material in a

minimum of 50 foot thickness. Reducing or eliminating the exposure of potentially acid-generating material to air and water would minimize the risk of the potentially acid-generating material becoming oxidized, thus producing acid rock drainage. The heap leach facilities are not anticipated to impact groundwater quality, since they are currently double lined and all process fluids are controlled in a zero discharge system. This operation would continue under the Proposed Action. Groundwater quality would continue to be monitored on a routine basis, per the Water Pollution Control Permit, to identify potential changes to the groundwater quality during active operations and closure.

No indirect impacts are anticipated to either groundwater quality or groundwater quantity.

Alternative A – Partial Backfill Alternative
This alternative would include partial backfilling of up to six of the open pits, which reside above ambient groundwater levels. This would result in a reduction in approximately 434 acres of surface disturbance. The waste rock used to backfill the pits would be the same material placed in the rock disposal areas under the Proposed Action. This waste rock has been shown to be primarily neutral to neutralizing material. Any potentially acid-generating material would be encapsulated within the pit backfill, just as it would if it were found and placed on an above-grade rock disposal area. Based on these results, the impacts to groundwater quality and quantity would be the same as with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would decrease groundwater withdrawal on the east side of the property; however, the usage on the west side of the property would increase due to the additional ore being processed on the 2/3 Heap Leach Pad. There would be a reduction in surface disturbance of approximately 105 acres. The total groundwater production (550 acre-feet per year) across the Proposed Action would remain the same since the same amount of ore would be processed. However, under this alternative the water would be pumped from the wells on the west side of the property in Huntington Valley instead of being pumped from Mooney Basin, which is located in Long Valley. Overall, water needs from Long Valley, a non-designated aquifer, would decrease while water needs from Huntington Valley, a designated aquifer, would increase. There would be no anticipated impacts to groundwater quality with implementation of Alternative B. Closure requirements would be the same as for the Proposed Action. The leach pads are designed with leak detection systems and are constructed to have no discharge; therefore, the alternative leach pad scenario would have no impact on groundwater quality.

No Action Alternative
This alternative would result in the cessation of mining in 2009. No additional development of the water resources by Barrick would occur. The impacts to groundwater quantity and quality would be the same as those previously identified in the 1995 EIS and subsequent NEPA documents.

3.3 Geology and Minerals

Mining has occurred in the Bald Mountain area since 1869 (Hose and Blake, 1976). Copper, antimony, silver, and gold ores were mined next to a small granitic intrusion south of Big Bald Mountain. Bulk mineable gold deposits were first discovered in 1976 at the Alligator Ridge mine just south of the Bald Mountain District. Modern exploration in the Bald Mountain Mining District began between 1976 and 1980 and has continued to the present. Two types of gold deposits are recognized: Eocene-aged Carlin-style deposits in Mooney Basin and the Jurassic-aged intrusion-related gold deposits near Bald Mountain. The Mooney Basin gold mineralization is confined to Devonian- through Mississippian-aged carbonate and siliciclastic formations (416

million years to 318 million years before present). Radiometric dating and geologic relationships indicate that Mooney Basin gold mineralization is mid-Eocene in age (40 to 35 million years before present).

The Jurassic intrusion-related gold deposits at the mine site, such as at Top Pit and Sage Flats, are primarily hosted in Middle Cambrian through Ordovician carbonate rocks (510 to 444 million years) and the Jurassic porphyritic dikes, sills, and stocks that intrude them. Radiometric dates on porphyritic intrusions closely associated with gold ore indicate an igneous age of 159 million years. The gold mineralization is most likely slightly younger but still late Jurassic.

Mining within the Bald Mountain Mining District since 1980 has occurred in five areas encompassing 26 open pits, 30 rock disposal areas, 10 heap leach pads, and seven associated process ponds.

Assumptions for Analysis
The assumption made for the geology and minerals analysis is the following:

- Current information accurately describes the geology and ore deposits of the area.

3.3.1 Geologic and Mineral Resources Affected Environment

Regional Geology
During Paleozoic times, the Proposed Action area was covered by a shallow sea that was adjacent to the western margin of the North American plate in early Paleozoic times. Carbonate and siliciclastic sediments were deposited at the bottom of the sea. Folding and faulting of the sediments during the Antler and Sonoma Orogenies were followed by intrusions of igneous rocks and associated volcanic deposits. Low-angle, extensional faulting was followed by high-angle, normal faulting. Mineralization is thought to have occurred along these high angle faults. Following mineralization, the Basin and Range faulting and subsequent erosion have created the land forms currently seen in the area (Stewart, 1980).

Local Geology
The following sections describe the local geologic features. Figure 3-7 shows the surface geology of the Proposed Action area and cumulative effects area.

Stratigraphy
Figure 3-1 of the BMM EIS (BLM, 1995a) summarizes the stratigraphic column for the Proposed Action area. Paleozoic carbonate and siliciclastic sediment rock types in the Proposed Action area include limestone, dolomite, shale, siltstone, and sandstone. These Paleozoic sedimentary rocks were primarily formed in a shelf or shallow marine environment. The Jurassic-aged felsic stocks, dikes, and sills have intruded and locally metamorphosed the Paleozoic sediments. Eocene to Miocene volcanic flows, tuffs, coeval sediments, and occasional dikes are preserved in grabens in and near Mooney Basin. Quaternary alluvial sediments fill the modern valleys and basins.

Mooney Basin gold deposits are typically found in Guilmette Limestone and overlying Pilot Shale. Mineralization is most commonly found along the contact between the two formations, often concentrated in the lower 300 feet of the Pilot Shale.

The Top Pit-Sage Flats and related gold deposits preferentially occur in Cambrian to Ordovician limestone and dolomite, including the Late Cambrian Upper Hamburg and Upper Windfall Formations, and the Ordovician Pogonip Group limestone. Mineralization is closely associated with the Jurassic intrusives.

Figure 3-7 Geologic Map

Figures 2-8, 2-9, 2-10, and 2-11 show schematic cross-sections through most of the open pits in the Proposed Action area.

Structure

Local geologic structure is dominated by post-ore north-south trending Basin and Range normal faults that separate mountain ranges from valleys. Along with the north-south faults, there are several sets of older northwest and north-northeast trending high angle normal faults within the mountain ranges that control Jurassic intrusion patterns and localize gold mineralization.

Paleozoic rocks were folded and faulted during the Antler and Sonoma orogenies. Uplift-related faulting that trended northwest, east-west, and north-northeast followed the folding. Geologic relationships indicate the approximate minimum age of much of the high-angle faulting as Jurassic. The north-trending Basin and Range faults intersect and displace the older faults. Additional discussions on the local geologic and structural setting in the mining district can be found in the BMM EIS (BLM, 1995a).

Mineral Resources

Gold deposits within the BMM and Mooney Basin areas are primarily classified as carbonate, sediment-hosted disseminated gold mineralization with minor amounts of silver. The Mooney Basin gold mineralization is controlled by two major features, the high-angle northwest and northeast trending faults and the contact between Guilmette Limestone and overlying Pilot Shale. The mineralization is, in many instances, concentrated along faults or at the intersections of the faults.

The older intrusion-related gold mineralization in the Top Pit area is hosted by Cambrian to Ordovician limestone and dolomite and is associated with Jurassic felsic intrusions, also favoring sites at intersecting northwest and north-northeast high-angle faults.

The gold deposits throughout the mining district were formed by hydrothermal fluids, which circulated along faults and lithologic contacts. Fluid circulation leached calcite from portions of the Paleozoic carbonate rocks and introduced silica, pyrite, and gold.

In most of the Mooney Basin deposits, gold ore is located within the lower 300 feet of the Pilot Shale and the uppermost portions of the Guilmette Limestone. In the Top Pit area, the ore is located in both the altered felsic intrusions and in the fractured and locally metamorphosed carbonate rocks adjacent to the intrusions. In the Alligator Ridge area, gold mineralization is Eocene in age as it also is likely for many of the Mooney Basin deposits. Gold ore in Top Pit and in the other deposits in the northwest portion of the BMM district is closely associated with Jurassic (159 million years) intrusions that likely predate the gold deposits by a few million years.

From 1980 to 2006, approximately 400 million tons of resource (80 million tons of ore and 320 millions tons of waste) were mined. A total of approximately two million ounces of gold has been produced through August 2007 at the BMM and Mooney Basin Operations Area.

Mineral Material Resources

There are abundant resources of sand and gravel in the alluvium throughout the Proposed Action area.

Oil and Gas Resources

Oil and gas resources have been identified in Newark and Long valleys. Two types of oil and gas targets are found in the area: unconformity targets where a structural trap is sealed by

volcanics, and upper Paleozoic targets where there is a stratigraphic trap between the Diamond Peak Formation and the Chainman Shale. Oil also occurs in the Pilot Formation at the Yankee Mine and in an oil well located in Long Valley. Potential resources are estimated at 97 million barrels of oil and 59 billion cubic feet of gas (BLM, 1995a).

Seismic Activity

The Great Basin is tectonically active, evidenced by recent seismic activity as shown in Figure 3-8. A search was conducted within a 100-mile radius of the Proposed Action area to determine historic earthquakes (UNR, 2007). The strongest reported earthquake in the last 200 years was in 1872 (magnitude 6.0), approximately 82 miles west of the Proposed Action area. The area has been classified as a Zone II seismic risk area (NOAA, 1973). A Zone II classification means that moderate damage is possible from the maximum credible earthquake. Moderate earthquake damage includes damage to masonry, weak chimneys falling, falling plaster, loose bricks, stones, tiles and cornices, and small slides and cave-ins along gravel banks.

Since the above records search was conducted, a 6.0 earthquake occurred on February 21, 2008, with an epicenter located approximately 11 miles southeast of the town of Wells, Nevada, approximately 85 miles north northeast of the Proposed Action. Although the earthquake was felt by some employees, no damage was observed at any of the facilities following thorough inspections by site personnel.

An evaluation of the stability of the 2/3 Heap Leach Pad was conducted by AMEC in 2000 (AMEC, 2000). The analysis indicated that the 2/3 Heap Leach Pad, which is constructed on alluvial material, would safely withstand the operational base earthquake which was assumed to be a 10 percent, 100-year event. The buildings on-site were not designed to a specific seismic standard; however, they are inspected following any seismic event felt at the site.

Existing Surface Disturbance

Existing surface disturbance associated with the BMM is discussed in Section 2.2.

3.3.2 Geologic and Mineral Resources Environmental Consequences

Proposed Action

Direct impacts to geologic and mineral resources from the Proposed Action include removal of ore from the open pits and burial of surficial material under waste dumps and process facilities. No other impacts to geologic resources are anticipated. The Proposed Action would not directly impact any oil and gas resources within or adjacent to the Proposed Action area. The amounts of material to be mined are discussed below. Present occurrences of mineral materials would be removed or buried, but the amount of these lost through the Proposed Action would be inconsequential compared with other available sources. Waste dumps would contain new sources of decorative rock.

Approximately 1,030 million tons of material would be mined under the Proposed Action. Approximately 200 million tons would be ore, and 830 million tons would be waste rock.

Proposed expansion of the existing rock disposal areas and leach pads and development of new rock disposal areas are not anticipated to impact any economically recoverable gold resources. Condemnation drilling would verify that there is no economic resource located beneath proposed facilities. The expansion of the Mooney Basin Heap Leach Pad would also not affect any known recoverable mineral resources.

Figure 3-8 Historic Seismic Activity

Alternative A – Partial Backfill Alternative
This alternative would include partial backfilling of up to six open pits. This would lead to less surface disturbance (approximately 434 acres); however, the impact to mineral resources would remain the same as with the Proposed Action, since the open pits would still be mined to the same configuration. Backfill of some of the pits would not impact future precious metal resources as these would be fully explored before backfill activities. Table 2-15 lists the modifications that would be made to the tonnage of materials moved under the Partial Backfill Alternative. The total tonnage of material mined would remain the same; the location of disposal, rock disposal area, or backfill is the only difference from the Proposed Action. Approximately 434 acres of surficial geologic material would not be covered by waste dumps and leach pads.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would require processing of the ore at the BMM 2/3 heap leach pad. With the Mooney Basin Heap Leach Pad redesigned to a smaller configuration under this alternative (Figure 2-13), the ore would be processed on the existing 2/3 Heap Leach Pad. The 2/3 Heap Leach Pad expansion would result in approximately 14 acres of new disturbance, as described in Section 2.5.3.

The impacts on the geologic and mineral resources would be as described for the Proposed Action, since the level of mining would remain the same; the only difference would be the location where the ore is processed.

No Action Alternative
No impacts other than those already disclosed in the BMM 1995 EIS would occur.

3.4 Paleontology

3.4.1 Paleontology Affected Environment
Although invertebrate fossils (including trilobites) are plentiful in the Ruby Mountains, no fossils have been found in the Proposed Action area that have been classified as rare or important (BLM, 1995a). In fact, the presence of fossils is uncommon in the vicinity of the Proposed Action area, most likely due to the regional metamorphic activity (BLM, 1995a).

The fossils that have been found are generally algae and invertebrates from the Cambrian period (570 to 500 million years before present). Ordovician, Silurian, and Devonian sediments include the Laketown Dolomites, which contain waterflea fossils. Mississippian sediments (Joana Limestone) found on the eastern flank of the Proposed Action area have been discovered to have fragments of echinoderms (marine animals), bryozoans (sea mosses), foraminiferans (one-celled aquatic animals), and algae (Hose and Blake, 1976).

The Mooney Basin area contains older volcanic and sedimentary rocks with ostracods (crustaceans) and freshwater gastropods (terrestrial molluscs) from 53 to 37 million years before present (Eocene age).

3.4.2 Paleontology Environmental Consequences
Proposed Action
No impacts to paleontological resources of scientific or educational value are anticipated as part of the Proposed Action because none are known to be present in the Proposed Action area. One of the project's Design Features (Table 2-13) and a BLM Best Management Practice (Appendix D) is to immediately bring to the attention of the BLM Authorized Officer any paleontological resources of potential scientific interest (including all vertebrate fossils and

deposits of petrified wood) that might be encountered during mine operations. Any direct impacts to paleontological resources would be limited to the areas of disturbance.

Alternative A – Partial Backfill Alternative
This alternative would include partial backfilling of some of the open pits. This would lead to approximately 434 acres less surface disturbance; however, the impact upon the paleontological resources would remain the same as with the Proposed Action, since the open pits would still be mined to the same configuration.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would not impact paleontological resources, since the mining extent would be the same as with the Proposed Action. The only difference under this alternative would be where the ore would be processed and the size of the leach pad, and this would have no effect on paleontological resources.

No Action Alternative
Under this alternative, mining under the current permits would cease in 2009. No impacts other than those already disclosed in the BMM 1995 EIS would occur.

3.5 Soils

Assumptions for Analysis
Assumptions made for the soils analysis include the following:

- Waste rock and salvageable soil material would not be mixed; and
- Depths of suitable growth medium were assumed to be restricted to material above bedrock or duripan layers and to materials not characterized by extremely gravelly, stony, or cobbly soil profiles.

3.5.1 Soils Affected Environment

Based on a Natural Resource Conservation Service Soil Survey, 16 soil associations are present within the Proposed Action area (Figure 3-9). Descriptive and interpretive data for each soil association was derived from the *Soil Survey of Western White Pine County, Nevada* (NRCS, 1998). This information was used in conjunction with the Natural Resource Conservation Service range site descriptions in order to identify and correlate soil associations with vegetation types within the Proposed Action area. The soils data summarized in Table 3-8 include:

- Soil association name and map number;
- Average soil depth ranges for each soil association;
- Average salvageable growth medium depth ranges for each soil association;
- Soil texture in the surface layer;
- Erosion hazard;
- Factors that may limit reclamation potential (e.g., steep slopes, shallow depths to bedrock or duripan, high percentage of coarse fragments near the surface, clay texture, high alkalinity, high erosion hazard); and

Figure 3-9 Soil Map

- Suitability for reclamation.

Soil varies in depth, quality, and quantity across the Proposed Action area. In general, all soils in the Proposed Action area are shallow loams and silty loams with a high coarse fragment percentage (e.g., gravelly, cobbly, stony) throughout the soil profile and occur on moderately steep to steep slopes (8 to 50 percent). The Abgese-Yody-Shablise and Hunnton-Chiara soil associations support the big sagebrush vegetation type dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp*. wyomingensis*). Mountain big sagebrush (*Artemisia tridentata vaseyana*) is more commonly found on Segura, Bobs, Fax, Parisa, and Mclvey soils within the Proposed Action area. The Bobs-Fax-Parisa soil association supports the big sagebrush vegetation type dominated by big basin sagebrush (*Artemisia tridentata* ssp*. tridentata*). The Hutchley soil supports low sagebrush (*Artemisia arbuscula*), and Segura and Tusel soils occur within mixed shrub vegetation. The Grink soil type supports the mountain mahogany vegetation type associated with rock outcrops on summits and mountain side slopes. Pinyon-juniper vegetation communities generally occur on Cavehill, Cropper, and Pioche soils (BLM, 1995a), and the Pookaloo soil supports the pinyon-juniper vegetation type dominated by Utah juniper (*Juniperus osteosperma*).

Suitable growth medium is restricted to material lying above duripan layers, material above bedrock, and material that is not extremely gravelly, stony, or cobbly (BLM, 1995a). Soil suitability evaluations are summarized in Table 3-8 and indicate the average depth of salvageable growth medium that may be encountered for each soil. Salvageable growth medium depths vary by site-specific locations but are generally the average maximum obtainable depths based upon limiting factors in each soil unit. The depth range corresponds to the variability of soil characteristics among the soil series designated for a specific soil association. Depth of salvageable growth medium for reclamation was determined for each soil series within a particular soil association.

The physical and chemical properties of soils were evaluated to identify factors that may limit successful reclamation (BLM, 1995a). The following properties are considered unsuitable criteria when determining what soils are suitable growth medium: greater than 60 percent clay, less than 0.5 percent organic matter content, greater than 35 percent coarse material by volume, salinity values greater than 15 milliohms per centimeter, greater than 15 percent sodium adsorption ratio, pH values less than 4.5 and greater than 9.0, calcium carbonate content greater than 40 percent, and slope steepness greater than 40 percent (USDA, 1993).

Approximately 91 percent of the Proposed Action area contains soil associations characterized as extremely stony, very gravelly, very cobbly, or very stony material. Salvageable soil depths within the Proposed Action area range from 0 to 60 inches, and most soil associations can produce between 4 and 60 inches of salvageable growth medium. With the exception of the gently sloping alluvial fans at the lower elevations, most soils within the Proposed Action area have slopes of 15 percent or greater, which increases the potential for accelerated erosion (see Table 3-8).

3.5.2 Soils Environmental Consequences

Proposed Action

Anticipated environmental impacts to soil resources include the potential loss of productive topsoil in disturbed areas, increased wind and water erosion, and potential of contamination of soils from spills of chemicals during transportation, storage, and use. Anticipated impacts are described below.

The 16 soil associations identified within the Proposed Action boundary are summarized in Table 3-8. Of the 16 soil associations, 14 account for the proposed 3,920 acres of disturbance. Acreages were calculated using the soil map units provided by the Natural Resource Conservation Service (NRCS, 1998). Soil associations located within the Proposed Action boundary that would not be disturbed include the Palinor-Urmafot-Urmafot, very shallow, and the Shabliss-Yody association. Approximately 7.3 to 11.7 million cubic yards of growth medium would be available for salvage from the 3,920 acres of proposed disturbance. This is adequate to cover 3,920 acres of reclamation.

Growth medium would be salvaged wherever possible and reused in the area where it was salvaged. Where sufficient growth medium material is available, a minimum of six inches would be placed during reclamation. However, it is possible that some areas may not contain sufficient amounts of growth medium for reclamation. The volume of salvageable growth medium could be limited by shallow soils or soils with high percentages of coarse fragments and consequently may not provide six inches of growth medium for revegetation as specified in the reclamation plan. In such cases, all available salvaged material would be placed above waste rock and the area ripped to achieve six inches of loosened aggregate material for plant growth. Results from the test plot program would provide a measure of the effectiveness of practices employed during reclamation, including the need for amendments that could be added to growth medium on waste rock areas (BLM, 1995a). To date, Barrick has been successful at concurrent reclamation of facilities using salvaged topsoil methods described above. Successful reclamation practices currently used at the mine would continue to be used for future reclamation.

Construction and mining activities would temporarily impede soil development, including soil structure and horizonization (profile) development. Soil biological activity (especially with mycorrhizea-root association) and nutrient cycling would be substantially reduced or eliminated during stockpiling as a result of anaerobic conditions created in deeper portions of the stockpiles. After soil redistribution, biological activity would slowly increase, eventually reaching pre-salvage levels. Placement of soil over waste rock would change the character and texture of the original soil profiles. As new soil profiles develop over time, the original character of the native soil would be permanently changed (BLM, 1995a).

Reclamation vegetation rooting depth and the soil's available water-holding capacity may be limited in the six inches of growth medium. Ripping or otherwise loosening compacted surfaces prior to placement of growth medium and revegetation, as proposed, would aid in reclamation by reducing the interface between the compacted surface and growth medium, increasing the rooting depth and water-holding capacity of the growth medium at the reclaimed site. For details on reclamation, see the BMM Plan of Operations (BMM, 2009).

Exposure and disturbance of soils could increase the potential for accelerated soil erosion from sites affected by construction. Excavation, transportation, and placement of growth medium also could promote the breakdown of soil aggregates into loose soil particles, increasing the potential for wind and water erosion of stockpiled soils. Blading and/or excavation of remaining subsoil materials to achieve desired grades and soil conditions for the facilities could result in steeper slopes on exposed soils, mixing of soil materials, and the additional breakdown of subsoil aggregates. As proposed in the reclamation plan, and consistent with existing practices at BMM, measures to stabilize and protect growth medium stockpiles and embankments, such as protected stockpile locations and stockpile seeding, would be implemented to minimize soil loss and limit disturbance to soils on-site. Additionally, the establishment of a temporary vegetative cover may aid in reestablishing biological activity in the soil. Reclaimed areas would be susceptible to erosion until the site naturally stabilizes over time.

TABLE 3-8 SUMMARY OF SOILS IN THE PROPOSED ACTION AREA

Soil Map Unit	Soil Assoc.	Soils	Depth to Duripan (in)	Depth to Bedrock (in)	Slope (%)	Surface Layer Rock Fragments (%)	Surface Layer pH	Restrictions[1]	Water Erosion Hazard	Wind Erosion Hazard	Suitability for Reclamation[2]
100	Pookaloo-Cavehill-Rock outcrop assoc.	Pookaloo very gravelly loam		14-20	15-50	0-5	7.9-8.4	Depth to rock, slope	Moderate	Slight	Poor
		Cavehill very gravelly silt loam,		20-40	15-50	0-15	7.9-9.0	Slope, high pH	Slight	Slight	Poor
		Rock outcrop						N/A			Not rated
226	Hutcliney-Tusel-Suak assoc.	Hutcliney very gravelly loam		10-20	15-50	5-15	6.6-7.8	Depth to rock, slope	Slight	Slight	Poor
		Tusel cobbly loam		40-60	15-50	15-35	6.1-7.3	Slope, excess stones	Moderate	Slight	Well suited
		Suak very stony loam		20-40	8-30	40-55	6.6-7.3	Slope, excess stones	Slight	Slight	Poor
291	Urmafot-Borvant-Biken assoc.	Urmafot very gravelly loam	9-20		2-8	0	7.9-8.4	Depth to restrictive layer	Slight	Slight	Poor
		Borvant gravelly loam	10-20		4-15	0-10	7.4-9.0	Depth to restrictive layer, high pH	Slight	Slight	Poor
		Biken very gravelly fine sandy loam	14-20		8-30	0-10	8.5-9.0	Depth to restrictive layer, slope, high pH	Slight	Slight	Poor
292	Palinor-Urmafot-Urmafot assoc.	Palinor gravelly loam	14-20		8-15	0-10	7.9-9.0	Depth to restrictive layer, high pH	Slight	Slight	Poor
		Urmafot very gravelly loam	9-20		2-8	0	7.9-8.4	Depth to restrictive layer	Slight	Slight	Poor
		Urmafot gravelly loam, very shallow	9-20		4-15	0	7.9-8.4	Depth to restrictive layer	Slight	Slight	Poor

Soil Map Unit	Soil Assoc.	Soils	Depth to Duripan (in)	Depth to Bedrock (in)	Slope (%)	Surface Layer Rock Fragments (%)	Surface Layer pH	Restrictions[1]	Water Erosion Hazard	Wind Erosion Hazard	Suitability for Reclamation[2]
450	Shabliss-Yody assoc.	Shabliss gravelly loam	10-20		2-8	0	7.9-8.4	Depth to restrictive layer	Slight	Slight	Poor
		Yody gravelly sandy loam	30-40		2-8	0-5	7.9-8.4	None	Slight	Slight	Suited
480	Pioche-Cropper assoc.	Pioche extremely stony loam			15-50	15-55	6.6-7.8	Depth to rock, slope, excess stones	Moderate	Slight	Poor
		Cropper very cobbly loam	6-15	14-20	15-50	20-40	6.6-7.8	Depth to rock, slope excess stones	Moderate	Slight	Poor
481	Pioche-Segura-Cropper assoc.	Pioche extremely stony loam			15-50	15-55	6.6-7.8	Depth to rock, slope, excess stones	Moderate	Slight	Poor
		Segura very cobbly loam	6-15		8-30	30-45	6.6-8.4	Depth to rock, slope, excess stones,	Slight	Slight	Poor
		Cropper very cobbly loam	7-14	14-20	8-30	20-40	6.6-7.8	Depth to rock, slope, excess stones	Slight	Slight	Poor
500	Segura-McIvey-Hutcliney assoc.	Segura very cobbly loam			15-50	30-45	6.6-8.4	Depth to rock, slope, excess stones	Moderate	Slight	Poor
		McIvey very gravelly loam	7-14	>60	30-50	0-10	6.6-7.3	Slope	Slight	Slight	Poor
		Hutcliney very gravelly loam		10-20	8-30	5-15	6.6-7.8	Depth to rock, slope	Slight	Slight	Poor
510	Onkeyo-Cavehill-Pookaloo assoc.	Onkeyo very gravelly silt loam		14-20	15-50	0-15	7.4-8.4	Depth to rock, slope	Slight	Slight	Poor
		Cavehill very gravelly silt loam		20-40	15-50	0-15	7.9-9.0	Slope, high pH	Moderate	Slight	Poor
		Pookaloo very gravelly loam		14-20	15-50	0-5	7.9-8.4	Depth to rock, slope	Moderate	Slight	Poor

Soil Map Unit	Soil Assoc.	Soils	Depth to Duripan (in)	Depth to Bedrock (in)	Slope (%)	Surface Layer Rock Fragments (%)	Surface Layer pH	Restrictions[1]	Water Erosion Hazard	Wind Erosion Hazard	Suitability for Reclamation[2]
566	McIvey-Segura-Cropper assoc.	McIvey gravelly loam		>62	15-50	0-10	6.6-7.3	Slope	Moderate	Slight	Suited
		Segura very cobbly loam			15-50	30-45	6.6-8.4	Depth to rock, slope, excess stones	Moderate	Slight	Poor
		Cropper very cobbly loam	7-14	14-20	15-50	20-40	6.6-7.8	Depth to rock, slope, excess stones	Moderate	Slight	Poor
670	Cavehill-Grink-rock outcrop assoc.	Cavehill very gravelly silt loam		20-40	15-50	0-15	7.9-9.0	Slope, high pH	Moderate	Slight	Poor
		Grink very stony loam		14-20	15-50	25-50	7.4-8.4	Depth to rock, slope, excess stones	Moderate	Slight	Poor
		Rock outcrop						N/A	Moderate	Slight	Not rated
753	Upatad-Cropper-Atlow assoc.	Upatad very gravelly silt loam		14-20	15-50	0	7.4-7.8	Depth to rock, slope	Moderate	Slight	Poor
		Cropper very cobbly loam		14-20	15-50	20-40	6.6-7.8	Depth to rock, slope, excess rock	Moderate	Slight	Poor
		Atlow very gravelly loam		14-20	15-50	0-15	7.4-8.4	Depth to rock, slope	Moderate	Slight	Poor
920	Abgese-Yody-Shabliss assoc.	Abgese sandy loam		>60	2-4	0-5	7.9-8.4	None	Slight	Slight	Suited
		Yody gravelly sandy loam	30-40		2-4	0-5	7.9-8.4	None	Slight	Slight	Suited
		Shabliss gravelly loam	10-20		2-4	0	7.9-8.4	Depth to restrictive layer	Slight	Slight	Poor
1010	Hunnton-Chiara assoc.	Hunnton silt loam	20-40		2-8	0	7.4-8.4	None	Slight	Slight	Suited
		Chiara silt loam	10-20		2-8	0	6.6-8.4	Depth to restrictive layer	Slight	Slight	Poor

Soil Map Unit	Soil Assoc.	Soils	Depth to Duripan (in)	Depth to Bedrock (in)	Slope (%)	Surface Layer Rock Fragments (%)	Surface Layer pH	Restrictions[1]	Water Erosion Hazard	Wind Erosion Hazard	Suitability for Reclamation[2]
1081	Bobs-Fax-Parisa assoc.	Bobs very gravelly loam	10-20		2-15	0-15	7.9-9.0	Depth to restrictive layer, high pH	Slight	Slight	Poor
		Fax very cobbly coarse sandy loam	20-36		4-15	25-50	7.4-8.4	Excess stones	Slight	Slight	Poor
		Parisa gravelly loam	20-40		2-8	0-10	7.9-9.0	High pH	Slight	Slight	Poor
1372	Wardbay-Hardol-Adobe assoc.	Wardbay very gravelly loam		40-60	15-50	0-15	7.4-8.4	Slope	Slight	Slight	Poor
		Hardol very gravelly silt loam		>60	15-30	10-25	7.4-8.4	Slope	Moderate	Slight	Poor
		Adobe very gravelly silt loam		14-20	15-50	0	7.9-8.4	Depth to rock, slope	Moderate	Slight	Poor

[1] These values apply to salvaged soil.
[2] Based on the requirements of a rangeland seeding.
Source: SRK, 2008.

Although stripping, stockpiling, and redistribution adversely affect soil characteristics, including alterations of soil profiles and soil structures, the benefits of using soil for revegetation outweigh the adverse effects of soil handling. The locations of existing and proposed growth medium stockpiles are shown in Figures 1-1 and 1-3. Reclamation and revegetation efforts would return some areas of soil disturbance to a productive state following construction, thereby reducing the duration and magnitude of impact. Loss of soil or discontinuation of natural soil development, decreased infiltration and percolation rates, decreased available water-holding capacities, breakdown of soil structures, and loss of organic material as a result of the Proposed Action would be lessened by natural soil development over a 200- to 10,000-year period following reclamation (Gerrard, 2000). Loss of soil fertility, soil microorganisms, and vegetative productivity would be minimized after successful reclamation.

Potential indirect effects of soil destabilization and erosion would be dust generation and off-site deposition. Wind erosion of disturbed soils could impact air quality and/or result in deposition of soil particles off-site. Off-site stream sedimentation would be minimized by the use of erosion control practices described in Section 2.4. Increased sediment loads would be minimized through the use of Best Management Practices and deposition in streams below the areas of disturbance are not anticipated, as there are no perennial streams in the vicinity of the new disturbance and sediment catchment basins would be placed around the base of soil stockpile and dump slopes. Other Design Features (Table 2-13) such as interim seeding would be used. Dust generated by vehicular traffic would be reduced by using dust abatement techniques such as the application of wetting and binding agents on haul roads. Erosion from growth medium stockpiles would be kept at a minimum with the practice of interim seeding.

Additionally, direct impacts to soil from the release of mill reagents or leach solutions during operation of the facility would be minimized with the continued use of the spill prevention (Section 2.3.11) and dust control measures (Section 2.4.1) which are currently in place. Reclamation of heap leach pads, as described in Section 2.3.14, includes a greater depth of cover by growth medium (approximately 24 inches) in order to create a stable post-closure landform and reduce infiltration of meteoric water.

Alternative A – Partial Backfill Alternative
With successful reclamation using salvaged growth medium on the backfill area, there would be no difference in the type of impacts to soil resources under this alternative compared with the Proposed Action. The Partial Backfill Alternative would, however, result in approximately 434 fewer acres of disturbance to soils.

Alternative B – Mooney Basin Heap Leach Pad Alternative
With successful reclamation using salvaged growth medium on the backfill area, there would be no difference in the type of impacts to soil resources under this alternative compared with the Proposed Action. However, there would be approximately 105 acres less surface disturbance.

No Action Alternative
Under this alternative, approximately 3,920 acres of disturbance to soil associated with the Proposed Action would not occur. Mining under the current permits would cease in 2009. No impacts would result other than those already authorized.

3.6 Vegetation Resources

3.6.1 Vegetation Affected Environment

Four vegetation community types are present in the Proposed Action area, excluding the wetland/riparian community type. The wetland/riparian community type is discussed in Section

3.9 of this document. Some portions of the Proposed Action area have been disturbed by previous and current mining activities.

Wildland fire management within the Proposed Action area is administered under the *Ely District Managed Natural and Prescribed Fire Plan*. According to the current plan there are no allowable burn acres within the Proposed Action area (BLM, 2000a). Portions of the Proposed Action area have naturally burned in the past. Figure 3-10 shows the areas that were burned by the Water Canyon, Chrome, and Jacob fires. Table 3-9 provides the acreage that each fire burned within the Proposed Action area and the reclamation techniques used for post-fire habitat rehabilitation.

TABLE 3-9 WILDLAND FIRES WITHIN THE PROPOSED ACTION AREA

FIRE	YEAR	ACRES BURNED WITHIN PROPOSED ACTION AREA	RECLAMATION TECHNIQUES
Water Canyon	2001	1,785	Aerial seeding, broadcast seeding, drill seeding, chained and aerial seeded, and some areas left to naturally revegetate (BLM, 2006b)
Chrome	2004	124	Aerial seeded, chained and aerial seeded, with some areas left to naturally revegetate (BLM, 2006b)
Jacob	2000	222	Aerial seeding (BLM, 2000b)

The four vegetation community types present in the Proposed Action area include the pinyon-juniper woodland community, the big sagebrush community, the low sagebrush community, and the mountain brush community. The occurrence of these community types throughout the Proposed Action area is shown on Figure 3-10. The amount of each vegetation type present in the Proposed Action area is included in Table 3-10. Each of the community types is described further in the following sections.

TABLE 3-10 DISTURBANCE BY VEGETATION COMMUNITY TYPE

VEGETATION COMMUNITY TYPE	AREA WITHIN PLAN OF OPERATIONS BOUNDARY (ACRES)	PREVIOUSLY AUTHORIZED (NO ACTION ALTERNATIVE) (ACRES)	PROPOSED ACTION (ACRES)	PARTIAL BACKFILL ALTERNATIVE A (ACRES)	LEACH PAD ALTERNATIVE B (ACRES)
Pinyon-Juniper Community	7,482.0	1,930.0	1,712.0	1,522.0	1,652.0
Big Sagebrush Community	7,941.0	2,087.0	1,917.0	1,1673.0	1,872.0
Low Sagebrush Community	130.0	0.0	72.0	72.0	72.0
Mountain Brush Community	912.0	148.0	219.0	219.0	219.0
Total	**16,465**	**4,165.0**	**3,920.0**	**3,486.0**	**3,815.0**

Pinyon-Juniper Community

The pinyon-juniper community generally occurs on steep hillsides and mountains at all aspects, between 6,200 and 8,600 feet above mean sea level. This vegetation type generally occurs on shallow, loamy soils with high percentages of coarse fragments. Singleleaf pinyon (*Pinus*

Figure 3-10 Vegetation Communities

monophylla) and Utah juniper dominate the overstory. Shrubs present include mountain big sagebrush, bitterbrush (*Purshia tridentata*), snowberry (*Symphoricarpos albus*), and rabbitbrush (*Chrysothamnus viscidiflorus*). Grasses such as Sandberg's bluegrass (*Poa sandbergii*), bottlebrush squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), Great Basin wildrye (*Leymus cinereus*), and bluebunch wheatgrass (*Pseudoroegneria spicatum* ssp. *spicatum*) are present in the generally sparse understory. These woodlands generally occur along the north-south trending mountains below the low sagebrush and above the big sagebrush community types. Isolated areas within the pinyon-juniper community, where rock outcrops occur on summits and side slopes, are dominated by curlleaf mountain mahogany (*Cercocarpus ledifolius*).

Big Sagebrush Community

The big sagebrush community is present on alluvial fans, valley bottoms, and hillsides. This community generally grows on a wide range of soil types and depth, slopes, and aspects and occurs at elevations between 5,700 and 8,600 feet above mean sea level. Depending on the location, big basin sagebrush, Wyoming big sagebrush, or mountain big sagebrush dominate the overstory. Inclusions of black sagebrush (*Artemisia nova*) also occur within this community type, typically on soils derived from limestone. The understory of this community type includes Sandberg's bluegrass, bottlebrush squirreltail, Indian ricegrass, cheatgrass, lupine (*Lupinus*), bluebunch wheatgrass, and crested wheatgrass (*Agropyron cristatum*) in seeded areas.

Low Sagebrush Community

The low sagebrush community is concentrated on the shallow, rocky soils along mountain ridges on gentle to very steep slopes. Low sagebrush (*Artemisia arbuscula*) dominates this low-growing community, which is characterized by low species diversity. Other associated plant species are rabbitbrush, Sandberg's bluegrass, bottlebrush squirreltail, winterfat (*Krascheninnikovia lanata*), and buckwheat (*Eriogonum*). This vegetation type occupies the higher elevation areas (7,500 to 9,300 feet above mean sea level) within the Proposed Action area including Buck Mountain, Big and Little Bald mountains, and the Maverick Springs Range. This vegetation type occurs interspersed with mountain brush and pinyon-juniper communities.

Mountain Brush Community

The mountain brush community generally occurs on the moderately steep to steep slopes of hills and mountains. This community type is commonly found on moist slopes with north and east aspects and elevations ranging from 6,900 to 9,300 feet above mean sea level. These relatively diverse sites are typically supported by shallow to moderately deep, loamy soils. Mountain big sagebrush, snowberry, bitterbrush, and rabbitbrush dominate the shrub cover. Common understory species include needlegrass (*Achnatherum* sp.), bluebunch wheatgrass, mountain brome (*Bromus marginatus*), Sandberg's bluegrass, Great Basin wildrye, sedges (*Cyperaceae* ssp.), balsamroot (*Balsamorhiza* sp.), lupine, bastard toadflax (*Comandra umbellata*), groundsel (*Senecio* sp.), and buckwheat (SRK, 2008).

3.6.2 Vegetation Environmental Consequences

Proposed Action

Direct impacts of the Proposed Action to vegetation would include the removal of approximately 3,920 acres of vegetation within the Proposed Action area. Loss of vegetation would result from the construction of new roads (i.e., re-routing the Elko public access road, construction of new haul roads, and expansion of existing haul roads), pit expansions, rock disposal area expansions and new rock disposal areas, heap leach expansions, growth medium stockpiles, and construction of expanded shop facilities and yards (Table 2-4). Table 3-10 shows the disturbance acreage within each vegetation community type. Once mining has been completed, reclamation activities would include seeding the areas with appropriate seed mixes. The seed

mix used would include both native and non-native species that have been successfully used in reclamation of disturbed areas in the past. The areas where vegetation would be removed under the Proposed Action are shown as proposed disturbance area on Figure 3-10. (Figure 3-10 shows more than just the proposed Action and illustrates the entire disturbance area). Approximately 540 acres of vegetation associated with expansion of the pits would be permanently lost. Although the remainder of the proposed disturbance would be re-seeded during reclamation, vegetation would consist mostly of grasses in the short-term. Native shrubs as well as pinyon pine would increase with time, but these communities would take many years to establish. The diversity of the vegetation community within the Proposed Action area would increase with reclamation and seeding activities.

Indirect impacts of the Proposed Action to vegetation would include the increased potential for non-native invasive species establishment. Other indirect impacts include the short-term loss of forage for wildlife, wild horses, and livestock and a potential increase of the erosion potential to soils. These indirect impacts to other resources are discussed further in the appropriate sections of this FEIS.

Alternative A – Partial Backfill Alternative
Direct and indirect impacts for this alternative would be the same as for the Proposed Action but for a smaller area. The total area of vegetation removal for this alternative is approximately 434 acres less than with the Proposed Action. The reduction in vegetation loss would be a result of smaller waste rock disposal areas, and the impact would vary in accordance with the amount of vegetation type affected. In addition, backfilled pit areas would be re-seeded, further reducing the permanent loss of vegetation. The amount of vegetation to be removed by this alternative is shown by vegetation type in Table 3-10.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Direct and indirect impacts for this alternative would be the same as for the Proposed Action, only for a smaller area. There would be a reduction of 105 acres of surface disturbance (vegetation removal) with this alternative. This alternative is shown by vegetation type in Table 3-10.

No Action Alternative
Impacts resulting from this alternative would consist of the removal of vegetation for previously permitted activities within the Proposed Action area. The amount of vegetation to be removed under this alternative is shown in Table 3-10.

3.6.3 Special Status Plant Species Affected Environment

Federally listed species include endangered or threatened species, or species proposed for listing by the U.S. Fish and Wildlife Service. The status of threatened and endangered species is determined by the U.S. Fish and Wildlife Service under the provisions of the Endangered Species Act of 1973, as amended. Under the Endangered Species Act, endangered species are defined as being in danger of extinction throughout all or a significant portion of their range (USDI, 1973). Threatened species are likely to become endangered in the foreseeable future. The U.S. Fish and Wildlife Service also maintains a listing of species or subspecies (i.e., taxa) that may warrant listing as threatened or endangered, and for which the U.S. Fish and Wildlife Service has sufficient biological information to support a rule to list as threatened or endangered. These species are referred to as candidate species. Proposed species are species (taxa) for which the U.S. Fish and Wildlife Service has published a proposal to list as threatened or endangered in the Federal Register. Based on consultation with the U.S. Fish and Wildlife Service and surveys conducted, no federally listed plant species are known to occur

or were identified in the Proposed Action area. Federally listed wildlife species are discussed in Section 3.8.5.

In addition to federally listed, proposed species, the BLM maintains a list of Nevada sensitive species. The BLM Manual 6840.06 E states that native species may be listed as sensitive if the species:

- Could become endangered or extirpated from a state, or within a significant portion of its range, in the foreseeable future;
- Is under review (for listing as threatened or endangered) by the U.S. Fish and Wildlife Service;
- Is undergoing significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution, and/or population or density such that federally listed, proposed, or state-listed status may become necessary;
- Typically consists of small and widely dispersed populations;
- Inhabits ecological refugia, or specialized or unique habitats; and
- Is state-listed but may be better conserved through application of BLM sensitive species status.

The BLM affords these species the same level of protection as federal candidate species. The BLM's policy for sensitive species is to avoid authorizing actions that would contribute to the listing of a species as threatened or endangered.

The Nachlinger catchfly (*Silene nachlingerae*), a BLM sensitive species, has been identified as potentially occurring in the Proposed Action area. Habitat for this species is described as "dry, exposed carbonate crevices in ridgelines, outcrops, talus, or very rocky soils on or at the bases of steep slopes or cliffs" (NNHP, 2001a). The species has been recorded at elevations ranging from 7,160 feet to 11,250 feet. This species is found in Elko County in the southern portion of the Ruby Mountains. It is found in the Cherry Creek, Egan, Schell Creek, and Snake ranges in White Pine County. Two locations have been recorded in Nye County: one in the Horse Range and one in the Grant Range (NNHP, 2001a). During the baseline biological surveys (SRK, 2008), no habitat for this species was observed within the Proposed Action area. No other BLM sensitive species or habitat for sensitive species was identified in the Proposed Action area.

3.6.4 Special Status Plant Species Environmental Consequences

Proposed Action

There would be no direct or indirect impacts from the Proposed Action on special status plant species because no special status species or habitat for special status species was identified within the Proposed Action area.

Alternative A – Partial Backfill Alternative

Direct and indirect impacts of this alternative to special status plant species would be the same as with the Proposed Action because no special status plant species or potential habitat was found within the Proposed Action area.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Direct and Indirect impacts of this alternative to special status plant species would be the same as with the Proposed Action because no special status plant species or potential habitat was found within the Proposed Action area.

No Action Alternative
Under this alternative, activities associated with the Proposed Action would not occur. There would be no impacts other than those already disclosed in the BMM 1995 EIS.

3.7 Non-Native Invasive Species

3.7.1 Non-Native Invasive Species Affected Environment

The BLM defines a weed as a non-native plant that disrupts or has the potential to disrupt or alter the natural ecosystem function, composition, and diversity of the site it occupies. A weed's presence deteriorates the health of the site, makes efficient use of natural resources difficult, and may interfere with management objectives for that site. It is an invasive species that requires a concerted effort (manpower and resources) to remove from its current location, if it can be removed at all. A noxious weed is a species that has received a federal or state designation as a noxious weed. In the Proposed Action area this designation can come from the Nevada Department of Agriculture or from the U.S. Department of Agriculture Animal and Plant Health Inspection Service (NDA, 2008: USDA, 2008). Both noxious weed species and invasive weed species are found in the Proposed Action area.

A BLM noxious weed risk assessment, as defined in BLM Manual 9015 (BLM, 1992b), was conducted during 2007 in order to determine existing weed populations and evaluate the risk of introducing or spreading noxious weeds as a result of the Proposed Action. As part of the risk assessment, noxious weeds identified during surveys were placed into one of three classes of the Nevada noxious weed identification system: Class A, Class B, or Class C. Class A weeds are limited in distribution within the state of Nevada and area, and complete control is emphasized. Class B weeds are limited in distribution in the region but are known to occur in other regions within the state of Nevada. Management of Class B weeds is to control population spread and decrease population size. Class C weeds include the remainder of noxious weeds, and management focuses on controlling population size (BLM, 1992b). Barrick conducts annual noxious weed treatments in the BMM and Mooney Basin Operations Area. Treatment frequency varies by year, location of species, type of species, and abundance of species (Vaught, 2008).

The BLM and SRK Consulting performed weed inventories within the Proposed Action area and surrounding areas (SRK, 2008). The weed inventory was then used to conduct the risk assessment for the Proposed Action. A list of noxious weeds identified within the Plan of Operations boundary and identified class for each is provided in Table 3-11. The noxious weed surveys conducted, BLM weed database, and information from Tri-County Weed Control indicate that one Class A, three Class B, and four Class C weed species are present within the Proposed Action area (SRK, 2008; BLM, 2007a; Tri-County Weed Control, 2007). Locations of noxious weeds surveyed within the Proposed Action area are shown in Figure 3-11 (BLM, 2007a; Tri-County Weed Control, 2007).

TABLE 3-11 NOXIOUS WEEDS PRESENT IN THE PROPOSED ACTION AREA

Common Name	Scientific Name	Location			Weed Class	Risk Assignment*
		Proposed Action Area	Surrounding Public Roads	Surrounding Areas		
Black henbane	*Hyoscyamus niger*	Yes	Yes	Yes	C	25
Musk thistle	*Carduus nutans*	Yes	Yes	Yes	B	50
Russian knapweed	*Acroptilon repens*	No	No	Yes	B	25
Scotch thistle	*Onopordum acanthium*	Yes	Yes	Yes	B	25
Salt cedar	*Tamarix* spp.	Yes	No	No	C	**
Hoarycress	*Lepidium draba*	No	Yes	Yes	C	50
Canada thistle	*Cirsium arvense*	Yes	Yes	Yes	C	50
Spotted knapweed	*Centaurea stoebe*	Yes	No	No	A	25

*High = 50-100; Moderate = 11-49; Low 1-10; None = 0 (SRK, 2008)
** Identified by BLM weeds database, no SRK Consulting risk assessment completed for this species.

Invasive weeds in the Proposed Action area appear on the BLM National List of Invasive Weed Species of Concern (BLM, 2008c). Documented invasive species include cheatgrass (*Bromus tectorum*), bull thistle (*Cirsium vulgare*), and Russian thistle (*Salsola kali*) (NRC, 2004; SRK, 2008). Bull thistle locations are shown on Figure 3-11. Russian thistle has been identified on the reclaimed RBM rock disposal areas and the reclaimed Rat rock disposal areas (NRC, 2004). Cheatgrass is an invasive species that can out-compete seedlings of perennial species and is very competitive in drier environments (Sheley and Petroff, 1999). Cheatgrass can be found throughout the Proposed Action area and particularly in some of the burned areas shown in Figure 3-10. The displacement of native species with invasive species such as cheatgrass can alter natural fire regimes and decrease productivity (Sheley and Petroff, 1999).

3.7.2 Non-Native Invasive Species Environmental Consequences

Proposed Action

The anticipated environmental impact from non-native species is the increased risk that these species could spread to new areas, as described below.

Noxious weed impacts from the Proposed Action include the potential for additional establishment of noxious weeds with the removal of native vegetation on approximately 3,920 acres. Indirect impacts include a decrease in native plant communities with the increase in competition from noxious weeds. These impacts are expected to be negligible with continued implementation of the Design Features (Table 2-13) and BLM Best Management Practices (Appendix D) and reclamation activities including revegetation and monitoring (BMM, 2009).

Non-native invasive species impacts within the Proposed Action area include the potential spread of non-native invasive species into disturbed areas and along transportation routes. Spread of these undesirable species can lead to a change in the natural fire regime and decrease productivity (Sheley and Petroff, 1999). Successful reclamation, Design Features (Table 2-13), and BLM Best Management Practices (Appendix D), would minimize potential impacts from invasive non-native species.

Alternative A – Partial Backfill Alternative
Impacts to non-native invasive species with this alternative would be the essentially same as the Proposed Action, although there would be a reduction of approximately 434 acres of surface disturbance.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Impacts to non-native invasive species with this alternative would be essentially the same as with the Proposed Action, although there would be a reduction of approximately 105 acres of surface disturbance.

No Action Alternative
Under this alternative, the approximately 3,920 acres of disturbance to soil associated with the Proposed Action would not occur. There would be no additional risk of spreading non-native invasive species under this alternative.

3.8 Wildlife

Wildlife species occurring in the Proposed Action area include big game and non-game mammals, predatory species, game birds, migratory bird species, bats, reptiles, and amphibians. Wildlife occurrence in the Proposed Action area has been described in the BMM EIS (BLM, 1995a), several past Environmental Assessments (BLM, 2003a, 2004b, 2005b, 2006c), and NDOW's Mule Deer Herd Prescription, Management Area 10 (NDOW, 2007e). In addition to these previous environmental documents, recent dedicated baseline wildlife surveys were conducted in the Proposed Action area by SRK Consulting (2008).

Assumptions for Analysis
Assumptions made for the wildlife analysis include the following:

- Wildlife would avoid active operational areas and move back into these areas once activity ceases and the site has been reclaimed; and

- The breeding season for birds, April 15 to July 15, is accurate and would include all breeding activities.

3.8.1 Wildlife Affected Environment

Big Game
As described in the BMM EIS (BLM, 1995a), mule deer (Odocoileus hemionus) are the most common big game species in and near the Proposed Action area. NDOW estimates that a resident population of between 200 and 400 mule deer occurs in and near the Proposed Action area. Specifically, these deer occur in low densities in the Big Bald Mountain, Little Bald Mountain, Buck Mountain, Mooney Basin, and Alligator Ridge areas (Wasley, 2007a). Most deer remain within two miles of a water source and are most commonly found in mountain brush habitats (SRK, 2008). Mountain brush habitats comprise approximately 5.5 percent of the Proposed Action area (Table 3-10). The scarcity of surface water in the Proposed Action area is a limiting factor for summer resident mule deer populations.

In addition to resident mule deer, the Proposed Action area is located in a migration corridor utilized by the Ruby Deer Herd (Figure 3-12). This herd occupies the Ruby and East Humboldt mountain ranges during the summer season and moves south with the onset of winter snowfall. The extent of this southward movement, both in terms of numbers of deer and actual travel routes and distance traveled, is influenced by the amount of snow accumulation. During mild winters, few deer may move as far south as the Proposed Action area, but during heavy winters,

Figure 3-11 Invasive and Non-Native Species Distribution

Figure 3-12 Deer Seasonal Range and Migration Corridors

NDOW estimates that as many as 16,000 deer may move through the Bald Mountain area and continue south at least as far as the Little Antelope Summit area near U.S. Highway 50 (Wasley, 2007a). Baseline studies indicate the migration corridor splits in the Proposed Action area (SRK, 2008). Most deer move south along the western flank of the southern Ruby Mountains (Wasley, 2007a), while smaller numbers move southeast toward the Maverick Springs Range and Butte Mountains (BLM, 1995a). Wintering deer move back north through the area as snows melt and spring green-up occurs.

Antelope (*Antilocapra americana*) numbers have increased in the area since the BMM EIS (BLM, 1995a) was published. Approximately 100 antelope now occur in the Buck Mountain and Bald Mountain areas, generally in the valley bottoms and on adjacent fans. Areas of pinyon-juniper habitat are not utilized (SRK, 2008). NDOW notes that antelope frequent agricultural fields in Newark Valley, with smaller numbers occurring in surrounding valleys (Wasley, 2007a). Antelope may occur in low numbers within the Proposed Action area, primarily at lower elevations.

Elk (*Cervus elaphus*) are also beginning to move into the Proposed Action area from the north and east. Elk numbers in the area are low, and the animals move over large areas (Lamp, 2007). The White Pine County Elk Management Plan (White Pine County, 2007) indicates the 2005 elk population estimate for the White Pine County portion of hunt units 104, 108, 121 was 140 animals. According to the Elk Management Plan, no augmentation projects for elk are planned in this area. NDOW has a single report of mountain goats (*Oreamnos americanus*) in the Bald Mountain area (Lamp, 2007). These animals did not remain in the area.

Game Birds

Game birds potentially occurring in the Proposed Action area include greater sage-grouse (*Centrocercus urophasianus*), chukar (*Alectoris chukar*), gray (Hungarian) partridge (*Perdix perdix*), and mourning doves (*Zenaida macroura*). Sage-grouse are discussed in Section 3.8.5, under BLM sensitive species. Chukar occur in rugged, rocky areas near available water sources. Gray partridge occur near riparian drainages and in agricultural areas, while mourning doves occupy a variety of habitats but require access to water. Sightings of dusky grouse (*Dendragapus obscurus)*, formerly known as blue grouse, have been reported in the area.

Because water sources are limited in the area, NDOW, with assistance from BMM, has installed two of four planned wildlife guzzlers (precipitation collection and storage structures) in the southern Ruby Mountains in and near the Proposed Action area. While designed for big game, these structures are utilized by a wide variety of wildlife species. Two guzzlers have been installed south of the Proposed Action area, near the inactive Alligator Ridge Mine and the inactive Yankee Mine. Potential locations for guzzlers have been identified in Bourne Canyon, south and southwest of the Proposed Action area, and in Mooney Basin, south of the Proposed Action area (Figure 3-13).

Raptors occurring in the area are discussed under State-Protected Species and BLM Sensitive Species in Section 3.8.5.

Other Wildlife

Other game and non-game mammals including mountain lions (*Felis concolor*), coyotes (*Canis latrans)*, bobcats (*Felis rufus*), and badgers (*Taxidea taxus*) occur as the larger or more common predators in the area. Mountain lions and bobcats are usually associated with more rugged, rocky areas, while coyotes and badgers are typically found in sagebrush and mountain brush communities (SRK, 2008). Red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), and kit fox (*Vulpes macrotis*) may occur in the area. Mammalian prey

species present in the Proposed Action area include black-tailed jackrabbits (*Lepus californicus*), mountain cottontails (*Sylvilagus nuttallii*), and a variety of small rodents. White-tailed jackrabbits (*Lepus townsendii*) may occur at higher elevations in the Proposed Action area. Porcupines (*Erythizon dorsatum*) and woodrats (*Neotoma* sp.) are reported to utilize wooded habitats, and pikas (*Ochotona princeps*) may occur in higher-elevation rocky habitats (SRK, 2008). According to NDOW's Wildlife Species List - South Ruby Allotment (Unit 104) (Appendix F), reptiles expected to occur in the area include the western fence lizard (*Sceloporus occidentalis*), sagebrush lizard (*Sceloporus graciosus*), desert horned lizard (*Phrynosoma platyrhinos*), gopher snake (*Pituophis melanoleucus*), and Great Basin rattlesnake (*Crotalus viridis lutosus*). Amphibians potentially occurring in the area include the Pacific chorus frog (*Pseudacris regilla*) and Great Basin spadefoot toad (*Scaphiopus intermontanus*).

Fisheries

No fisheries or potential fish habitat exist in the Proposed Action area.

3.8.2 Wildlife Environmental Consequences

Proposed Action

Anticipated environmental impacts to wildlife resources include loss of habitat, potential injury and mortality from increased traffic, and human disturbance, as described below. Potential impacts can be categorized into those that are temporary and those that are permanent. Impacts may also be adverse (destruction of habitat) or beneficial (increased vegetative diversity) for one or more species.

NDOW has previously expressed concern over mining operations in this region because the Proposed Action area is located in a migration corridor utilized by the Ruby Deer Herd (Figure 3-12), and disturbance in the area may reduce the transitional habitat present (i.e., a narrow passage), potentially adversely affecting deer movement. Such a bottleneck would have the greatest potential impact on mule deer during winters of heavy snow accumulation, when deer traditionally move south through the Proposed Action area to reach wintering grounds in the Little Antelope Summit area near U.S. Highway 50.

As noted in Section 3.8.1, most north-south migratory deer movement occurs on the western side of the Proposed Action area. NDOW notes the current haul road on the western side of the Proposed Action area is constructed across steep slopes and includes cuts and fills that could hamper deer movement. This issue was also noted in the 1995 EIS (BLM, 1995a), which stated that “hazards to deer moving across the haul road and negotiating the steep, rocky hill adjacent to the road have been recorded.” The 1995 document goes on to state that observation of deer behavior suggested that the development proposed at that time would not adversely affect deer movement. NDOW is concerned that the berms constructed on the downhill sides of the haul road (required by Mine Safety Health Administration regulation to be at least half the height of the largest vehicle tires used on the mine site) may inhibit deer movement. Deer that enter the haul road areas with high, steep berms may have difficulty exiting the road and could also be exposed to collision with mine vehicles. However, actual mortalities of deer due to impacts with equipment on existing haul roads have been rare (Zietlow, 2007b), and there have been only six deer mortalities in mine traffic areas reported at the site over the past 12 years. NDOW has suggested that BMM install gaps in the road berm to allow the deer to more easily exit the haul road. The Mine Safety Health Administration would not object to the installation of such gaps, as long as gap size does not become excessive (Bixler, 2007). This has been incorporated in the Proposed Action.

Figure 3-13 NDOW Guzzler Locations

In addition to potential impacts on seasonal deer movements, approximately 219 acres of mountain brush habitat would be impacted by the Proposed Action (Table 3-10) and would no longer be available to the small number of deer that permanently reside in the Proposed Action area. This vegetation type is preferred deer habitat within the Proposed Action area. Impacts to lower elevation habitats on the flanks of the range and in the Mooney Basin area would reduce the amount of potential wintering habitat in the Proposed Action area. A permanent loss of approximately 540 acres of habitat is anticipated as a result of pit expansions. Although there would be some loss of wintering habitat during operation, it is anticipated that conversion of some pinyon-juniper and other areas to shrub and grass habitats following successful reclamation would benefit mule deer populations by enhancing forage in the wintering range and migratory pathways. Because of the abundance of pinyon-juniper (Table 3-10), the loss of some trees is not expected to significantly reduce the amount of thermal cover available for deer and other large wildlife species.

The Proposed Action is expected to have little impact on antelope, which primarily utilize lower elevation habitats, or on elk, which move widely throughout the area. Water sources in the area would continue to be avoided by design and would remain available for deer and other wildlife.

Mining activities near water sources may, however, cause some species to avoid these areas at times.

The impacts to currently undisturbed portions of the Proposed Action area would also temporarily reduce habitats available for other wildlife. Smaller and less mobile animals may suffer direct mortality during land-clearing activities. Larger species would be forced into adjoining habitats, temporarily increasing competition with resident individuals in those habitats. If adjacent habitats are at carrying capacity, the increased competition or a lack of resources could result in wildlife mortality.

Impacts to wildlife from exposure to cyanide or other hazardous chemicals are not expected, since hazardous materials are contained within closed vessels and/or lined and covered ponds. Process solution ponds, including cyanide-containing ponds, are double lined with high density polyethylene and equipped with leak collection and recovery systems. Ponds containing cyanide are fenced and covered with floating high density polyethylene balls designed to prevent access by wildlife. Should wildlife access process solutions, at a gap in pond coverage, for example, some mortality could occur.

Indirect effects of the Proposed Action could result if wildlife species alter their use of the Proposed Action area in response to disturbance and move into adjacent undisturbed areas. Such a change in utilization could result in increased competition for limited resources, potentially resulting in increased mortality for some species. Conversely, conversion of pinyon-juniper habitat to a sagebrush vegetation type may benefit species such as greater sage-grouse. Pit high walls may be utilized as nesting sites by raptors and swallows and as roost sites by bats. Another indirect effect would be the increase in the risk of wildlife injury or mortality by collisions with vehicles as a result of an increase in traffic on mine access roads.

Alternative A – Partial Backfill Alternative

Selection of this alternative would result in a reduction of total disturbance to vegetation at the mine site, relative to the Proposed Action. Specifically, rock disposal area disturbance would be reduced by up to 434 acres.

Portions of the Belmont Pit 2, East Bida Pit, North Pit 1, Saga Pit, and Sage Flat Pit would be backfilled and reclaimed. This would reduce the total unreclaimed acreage remaining at the

close of mining. Because these areas are immediately adjacent to active mining areas, wildlife species are likely to avoid these areas during operations. Therefore, short-term impacts would be similar to those of the Proposed Action. Over the longer term, wildlife would be expected to utilize the reclaimed areas.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Selection of this alternative would result in a reduction in impacts to big sagebrush habitat in the Mooney Basin area but an increase in the size of the 2/3 Heap Leach Pad and associated facilities. Under this alternative, less big sagebrush habitat would be impacted in the Mooney Basin area due to the reduction of 105 acres in the size of the Mooney Basin Heap Leach Pad and associated facilities; however, because it is an active mine site, wildlife species are still likely to avoid the area during operations.

No Action Alternative
Under this alternative, new mine development at the BMM and Mooney Basin areas would not occur. Permitted disturbance would likely be implemented, resulting in a total of up to 4,165 acres of disturbance in the BMM and Mooney Basin areas. Active mining in the Proposed Action area will cease in 2009. Some wildlife would continue to avoid the active mining area until reclamation is complete, while other species or individuals, which have become habituated to the activity, would continue to use the area.

3.8.3 Migratory Birds Affected Environment

Migratory birds include species of birds that breed in the Proposed Action area but migrate south, out of the area, prior to the onset of winter. Migratory bird species are defined and protected by the Migratory Bird Treaty Act of 1918. This act prohibits killing or taking migratory bird species. Protection under the Act extends to nesting birds, their eggs, and occupied nests.

Avian species composition and density in the area varies with season and habitat type. Avian species diversity is highest during the spring and summer months, when migrant species are nesting in the area. Species diversity decreases markedly during the fall and winter seasons, when many nesting species move south, out of the Proposed Action area. Surveys of avian species utilizing the Proposed Action area were conducted in 1994 (JBR, 1994) as part of baseline surveys conducted in connection with the BMM EIS (BLM, 1995a). More common species recorded during the 1994 surveys included northern flickers (*Colaptes auratus*), mountain chickadees (*Poecile gambeli*), house wrens (*Troglodytes aedon*), sage thrashers (*Oreoscoptes montanus*), and Brewer's sparrows (*Spizella breweri*). Most species recorded during these surveys migrate out of the Proposed Action area before the onset of winter, though a few, including northern flickers as well as horned larks (*Eremophila alpestris*), black-billed magpies (*Pica hudsonia*), and bushtits (*Psaltriparus minimus*), may remain in the area year-round. More recent surveys were conducted as a part of the baseline data collection for this EIS (SRK, 2008). Migrant species recorded during the SRK Consulting surveys include broad-tailed hummingbirds (*Selasphorus platycercus*), western wood-pewees (*Contopus sordidulus*), mountain bluebirds (*Sialia mexicana*), green-tailed towhees (*Pipilo chlorurus*), and sage sparrows (*Amphispiza belli*).

The sagebrush, mixed brush (also referred to as mountain brush), pinyon-juniper, and mountain mahogany vegetation communities each support differing communities of birds. Brewer's sparrows and sage thrashers are common breeding species in sagebrush habitats. Green-tailed as well as spotted towhees (*Pipilo maculatus*) are usually found in the mountain/mixed brush habitats. Mountain chickadees as well as nuthatches (*Sitta* sp.) and species such as plumbeous vireos (*Vireo plumbeus*) are typically associated with pinyon-juniper. During the 1994 surveys, house wrens were most often found in mountain mahogany stands.

A Breeding Bird Atlas Block (atlas block) was established just south of the Proposed Action area as a part of the Atlas of Breeding Birds of Nevada program (Floyd et al., 2007). The atlas block is located on Little Bald Mountain north of Bourne Canyon in habitat similar to that of the Proposed Action area. Atlas blocks are surveyed during the breeding season. Surveyors identify bird species present on the atlas block and attempt to determine whether those species breed on the atlas block. The 4-square-kilometer atlas block was surveyed in 2000. Table 3-12 lists species recorded on the atlas block as well as their breeding status.

The BLM's Nevada Migratory Bird Best Management Practices for the Sagebrush Biome (BLM, 2003b) notes that sagebrush landscapes within the Great Basin "are complex and variable" and actually include a mosaic of habitat types that include varying amounts of sagebrush as well as annual and perennial grasses, forbs, wetland and riparian areas, and pinyon-juniper woodland. No riparian habitat, other than a few isolated willow patches, is found within the Proposed Action area. The BLM's Nevada Migratory Bird Best Management Practices for the Sagebrush Biome document stresses the importance of maintaining the sagebrush biome mosaic and potentially employing management practices designed to enhance habitats for target species. The document, herein incorporated by reference, reviews the habitat requirements of a number of avian species of concern, including greater sage-grouse, ferruginous hawks (*Buteo regalis*), and burrowing owls (*Speotyto (Athene) cunicularia*) (all BLM sensitive species, as discussed below) and lists management practices that would tend to benefit specific species.

TABLE 3-12 BREEDING BIRD ATLAS SURVEY RESULTS, SOUTHERN RUBY MOUNTAINS BLOCK

SPECIES	BREEDING STATUS
Red-tailed Hawk (*Buteo jamaicensis*)	Probable breeder
Peregrine Falcon (*Falco peregrinus*)	Possible breeder
Mourning Dove (*Zenaida macroura*)	Confirmed breeder
Northern Flicker (*Colaptes auratus*)	Confirmed breeder
Western Scrub-Jay (*Aphelocoma californica*)	Possible breeder
Black-billed Magpie (*Pica hudsonia*)	Confirmed breeder
Violet-green Swallow (*Tachycineta thalassina*)	Confirmed breeder
Mountain Chickadee (*Poecile gambeli*)	Confirmed breeder
White-breasted Nuthatch (*Sitta carolinensis*)	Confirmed breeder
Rock Wren (*Salpinctes obsoletus*)	Possible breeder
House Wren (*Troglodytes aedon*)	Confirmed breeder
Blue-gray Gnatcatcher (*Polioptila caerulea*)	Confirmed breeder
Mountain Bluebird (*Sialia currucoides*)	Confirmed breeder
American Robin (*Turdus migratorius*)	Confirmed breeder
Sage Thrasher (*Oreoscoptes montanus*)	Confirmed breeder
Yellow-rumped Warbler (*Dendroica coronata*)	Possible breeder
Western Tanager (*Piranga ludoviciana*)	Confirmed breeder
Green-tailed Towhee (*Pipilo chlorurus*)	Confirmed breeder
Spotted Towhee (*Pipilo maculatus*)	Confirmed breeder
Chipping Sparrow (*Spizella passerina*)	Confirmed breeder
Brewer's Sparrow (*Spizella breweri*)	Confirmed breeder
Vesper Sparrow (*Pooecetes gramineus*)	Confirmed breeder
Lazuli Bunting (*Passerina amoena*)	Possible breeder
Brown-headed Cowbird (*Molothrus ater*)	Probable breeder
House Finch (*Carpodacus mexicanus*)	Confirmed breeder

3.8.4 Migratory Birds Environmental Consequences

Proposed Action

Anticipated environmental impacts to migratory birds include the possibility of nests being destroyed, loss of habitat, and displacement from human disturbance. Each of these anticipated impacts is described below.

To avoid certain impacts to active migratory bird nests, eggs, and/or young, Barrick proposes to continue performing land-clearing activities outside of the avian breeding season (April 15 to July 15, as specified by the BLM's Egan Field Office). If surface-disturbing activities are unavoidable during the avian breeding season, a qualified wildlife biologist would survey the areas of proposed disturbance immediately prior to the disturbance. Consistent with current practices, if active nests or evidence of nesting is found or observed, a buffer zone would be established around the nest area to prevent the destruction or disturbance of nests until young have fledged (left the nest).

The above measures are designed to avoid impacts to actively nesting birds. The Proposed Action would, however, result in impacts to and conversion of potential nesting habitat, incrementally reducing the area available for nesting. A permanent loss of approximately 540 acres of habitat is anticipated as result of pit expansions. The Proposed Action would disturb approximately 1,917 acres of big sagebrush habitat (see Table 3-10). Disturbance of up to 2,085 acres of this habitat type has been authorized within the Proposed Action area to date. A total of 1,712 acres of pinyon-juniper habitat would be disturbed by the Proposed Action, in addition to the disturbance of up to 1,928 acres of this habitat type authorized to date (a total of 3,640 acres). The majority of these disturbed areas would be reclaimed at or before (in the case of concurrent reclamation) the close of mining operations but would be temporarily unavailable to avian species and other wildlife. Reclamation would be designed to establish a productive post-mining environment that would support wildlife and grazing. Reclamation is intended to restore a grass-forb shrub community. Pinyon-juniper habitat would only return through natural colonization, meaning the reestablishment of pinyon-juniper habitats would only occur in the future following reclamation. The result of this change would alter local species composition over a longer period. As stated in the BLM's Nevada Migratory Bird Best Management Practices for the Sagebrush Biome (BLM, 2003b), "conversion of a juniper habitat type to a sagebrush habitat type would adversely affect gray flycatchers, juniper titmice, Bewick's wrens, blue-gray gnatcatchers, and black-throated gray warblers, but it would favor greater sage-grouse, Brewer's sparrows, sage sparrows, sage thrashers, vesper sparrows, burrowing owls and loggerhead shrikes."

Indirect effects that could result from implementation of the Proposed Action include displacement of migratory birds into adjacent habitats. As is the case with other wildlife, such a change in utilization could result in increased competition for limited resources.

The U.S. Fish and Wildlife Service has expressed concern that an increase in lighting at the BMM may affect migrating birds, many of which fly at night. Migrating birds may become attracted to or disoriented by artificial lights, particularly during inclement weather (Rich and Loncore, 2005). This disorientation represents a hazard if towers or other tall structures are present, as birds may collide with such structures. BMM operates on a 24-hour-a-day basis. Artificial lighting is used within pits, at sites where trucks are dumping (e.g., leach pads, rock disposal areas), and in areas with buildings. With the increase in the size and extent of these features, an increase in lighting can be expected. However, tall structures that may represent collision hazards are limited at the mine. The most "tower-like" structures are two lime silos, one at the BMM and one at Mooney Basin. Each of these silos is approximately 60 feet tall. The process plant and truck shop buildings are each about three stories high. The mine does

not use large conveyors, which are often lighted. Further, most lighting at the mine utilizes white lights. According to Rich and Loncore (2005), red lights on towers are thought to be more disorienting than white lights. Mine personnel have not reported disoriented birds or other evidence of lighting/structure issues at the existing BMM operations (Zietlow, 2007d).

Exploration drill rigs used at the mine are approximately 30 feet tall. NDOW has not recorded a bird mortality associated with drill rigs. NDOW does note they are concerned about the presence of tall structures near sage-grouse leks (Lamp, 2007; Williams, 2007). However, none are proposed under the BMM North Operations Area Project. Drilling deep mine dewatering wells, which generally requires taller drill platforms, is not part of the Proposed Action.

Alternative A – Partial Backfill Alternative

Selection of this alternative would reduce rock disposal area disturbance by 434 acres. Reductions in rock disposal area size would reduce the effects on potential avian nesting habitat in these areas. Most species would directly benefit from reductions in disturbance area. Many species require habitat of a minimum size (which varies with species and from year to year, depending on environmental conditions) to breed successfully (DeGraaf and Rappole, 1995). Fragments of habitat below the minimum required size would not include sufficient resources to allow successful breeding. Conversely, if areas of preserved habitat are adjacent to undisturbed native habitat, the effects of fragmentation would be minimized. Reductions in rock disposal areas located within interpit areas may provide minimal suitable habitat to breeding birds. Reductions in the size of rock disposal areas on the edges of disturbance areas (e.g., the potential reduction in the size of the North 2 Rock Disposal Area) would provide the greatest benefit to breeding birds. Portions of the Belmont Pit 2, East Bida Pit, North Pit 1, Saga Pit, and Sage Flat Pit would be backfilled and then reclaimed. This would reduce the total unreclaimed acreage remaining at the close of mining. As the pit backfills are reclaimed, some additional habitat for migratory birds and other smaller species of wildlife (i.e., species that are able to access the backfill areas) would be created. Reclamation of backfills that fill the majority of a pit, such as in the Belmont Pit 2, would be more effective in creating habitat accessible to a variety of wildlife, including migratory birds.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Selection of this alternative would result in a reduction in impacts to big sagebrush habitat in the Mooney Basin area but an increase in the size of the 2/3 Heap Leach Pad and associated facilities. For the reasons discussed in the Partial Backfill Alternative section, this alternative would be expected to benefit migrant breeding birds since an area adjacent to relatively undisturbed native habitat at the south end of the Mooney Basin Heap Leach Pad would not be impacted, while habitats that would be disturbed at the BMM heap leach facilities are already fragmented and offer limited potential nesting habitat to migratory birds.

No Action Alternative

Under this alternative, mine development would be limited to that currently authorized. Permitted disturbance would occur, resulting in a total of up to 4,165 acres of disturbance in the BMM and Mooney Basin areas. Active mining in the Proposed Action area would cease in 2009. Disturbance to potential migratory breeding bird habitat in excess of that already disclosed in the BMM 1995 EIS would not occur.

3.8.5 Special Status Wildlife Species Affected Environment

Federally Listed and Proposed Species

Federally listed species are species listed as endangered or threatened by the U.S. Fish and Wildlife Service and species that are proposed for listing by the U.S. Fish and Wildlife Service. The status of threatened and endangered species is determined by the U.S. Fish and Wildlife

Service under the provisions of the Endangered Species Act, as amended. Under the Endangered Species Act, endangered species are defined as being in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered in the foreseeable future. The U.S. Fish and Wildlife Service also maintains a listing of species or subspecies (i.e., taxa) that may warrant listing as threatened or endangered and for which the U.S. Fish and Wildlife Service has sufficient biological information to support a rule to list as threatened or endangered. These species are referred to as candidate species. Proposed species are species (taxa) for which the U.S. Fish and Wildlife Service has published a proposal to list as threatened or endangered in the Federal Register.

Because the Proposed Action would occur on lands administered by the BLM, the proposal is considered a federal action. Section 7 of the Endangered Species Act stipulates that no federal action shall jeopardize the continued existence of any threatened or endangered species or adversely modify its critical habitat.

With the August 8, 2007, de-listing of the bald eagle (*Haliaeetus leucocephalus*), no federally listed threatened, endangered, or proposed species are known to occur in the Proposed Action area (USFWS, 2007). While no longer listed as threatened or endangered, bald eagles continue to receive protection under the Bald and Golden Eagle Protection Act. Bald eagles occur at the Ruby Lake National Wildlife Refuge during the early winter, and at least one bald eagle regularly overwinters on the refuge (BLM, 1995a). As many as four bald eagles have been present during recent winter seasons (MacKay, 2007). Wintering bald eagles have also been recorded in the valleys surrounding the Proposed Action area (BLM, 1995a; MacKay, 2007).

The Columbia spotted frog, Great Basin Distinct Population Segment, a candidate for listing as threatened or endangered, is known to occur in streams in the Ruby Mountains approximately 25 miles north of the Proposed Action area. In eastern Nevada, the Columbia spotted frog occurs in clear, slow-moving or ponded surface waters with little canopy cover. Habitats where this species is found include springs, lakes, oxbows, beaver ponds, and seeps in wet meadows (Reaser, 1997). A deep silt or muck substrate may be required for hibernation and torpor (Morris and Tanner, 1969). Most occurrences of Columbia spotted frogs in the Ruby Mountains are known from the upper reaches of streams north of Harrison Pass, approximately 25 miles north of the Proposed Action area (Columbia Spotted Frog Technical Team, 2003). The nearest known occurrence of Columbia spotted frogs to the Proposed Action area is an isolated population on the upper reaches of Corral Creek, approximately 23 miles north of the Proposed Action area. SRK Consulting detected no Columbia spotted frogs in the Proposed Action area during seep and spring or springsnail surveys (SRK, 2008). The scarcity of perennial waters in the Proposed Action area, particularly when habitats in the area are compared with the perennially watered habitats to the north that are occupied by spotted frogs, suggests the presence of this species is highly unlikely.

State-Protected Species

Nevada state-protected wildlife species include a number of bats and most diurnal and nocturnal raptors (hawks and owls). Table 3-13 and Table 3-14 list state-protected species that may occur in the area.

The spotted bat (*Euderma maculatum*) is widespread but evidently occurs in low numbers. The spotted bat roosts in crevices on cliffs and has been reported from a variety of elevations and habitats, including ponderosa pine forest, desert scrub, pinyon-juniper, and open pasture (Leonard and Fenton, 1983). Most often, they are found in dry, rough desert terrain (Watkins, 1977). Spotted bat populations may be limited by the availability of suitable roosting sites. The

Revised Nevada Bat Conservation Plan indicates the spotted bat is a species at moderate risk in Nevada (Bradley et al., 2006). Large cliffs are limited in the Proposed Action area, suggesting the presence of spotted bats is unlikely.

TABLE 3-13 NEVADA STATE-PROTECTED, THREATENED, AND SENSITIVE MAMMALS THAT MAY OCCUR IN THE PROPOSED ACTION AREA

COMMON NAME	SCIENTIFIC NAME	STATE STATUS
Spotted bat	*Euderma maculatum*	Threatened
Townsend's big-eared bat	*Corynorhinus townsendii*	Sensitive
Pallid bat	*Antrozous pallidus*	Protected
Fringed myotis	*Myotis thysanodes*	Protected

Defined by Nevada Administrative Code 503.030

The Townsend's big-eared bat (*Corynorhinus townsendii*) is generally a cave dweller. This species often roosts in abandoned mine shafts and adits. The big-eared bat is generally found in desert scrub and pinyon-juniper habitats (Jameson and Peeters, 1988). The species hibernates in cold, well-ventilated places in caves, mine adits, and similar locations (Pierson et al., 1991; Kunz and Martin, 1982). The Revised Nevada Bat Conservation Plan indicates that Townsend's big-eared bat occurrence in Nevada is highly correlated with available cave and abandoned underground mine sites and that the species is at high risk in Nevada (Bradley et al., 2006). Surveys conducted in and near the Proposed Action area (BLM, 1995a; JBR, 2006) have not detected Townsend's big-eared bats, but the species is expected to occur in the area (Bradley, 2007).

The pallid bat (*Antrozous pallidus*) is a large, pale-colored western bat that often preys on large terrestrial insects. Pallid bats roost in a variety of situations, including trees, caves, abandoned mines, and buildings. This species is common in arid habitats (Wilson and Ruff, 1999), with most Nevada occurrences recorded below approximately 8,500 feet (Bradley et al., 2006). Pallid bats are thought to be hibernators (Sherwin, 1998; Bradley et al., 2006). The pallid bat is considered to be a species at moderate risk in Nevada (Bradley et al., 2006). Pallid bats have not been recorded in the Proposed Action area, but the area is within the range of this species and suitable habitat is present if roost sites are available.

The fringed myotis (*Myotis thysanodes*) occurs throughout much of the western United States in a variety of habitats. Oak and pinyon-juniper woodland seem to be favored habitats (Bradley and Ports, 1998). Fringed myotis are colonial and may roost in caves, in underground mines, in buildings, under bridges, and in trees. Hibernation occurs in buildings and underground mines (Bradley and Ports, 1998). According to the Revised Nevada Bat Conservation Plan (Bradley et al., 2006), the fringed myotis is considered to be at high risk in the state. No fringed myotis have been recorded in the Proposed Action area (BLM, 1995a; JBR, 2006), although extensive bat surveys have not been conducted.

Several state-protected birds (Table 3-14) are found primarily in aquatic habitats (e.g., white-faced ibis, white pelican, kingfisher) and would be expected to occur in the Proposed Action area only during migration or as transients. The pigeon hawk, or merlin, is rare in Nevada and would likewise be expected in the Proposed Action area only on rare occasions. Suitable nesting habitat for the northern goshawk (in Nevada, usually in aspen stands along wetted drainages) is lacking in the Proposed Action area.

TABLE 3-14 NEVADA STATE-PROTECTED BIRDS THAT MAY OCCUR IN THE PROPOSED ACTION AREA

COMMON NAME	SCIENTIFIC NAME	STATE STATUS
Bald eagle	*Haliaeetus leucocephalus*	Protected
Southern bald eagle	*Haliaeetus leucocephalus leucocephalus*	Endangered
Golden eagle	*Aquila chrysaetos*	Protected
Merlin (Pigeon hawk)	*Falco columbarius*	Protected
Prairie falcon	*Falco mexicanus*	Protected
Peregrine falcon	*Falco peregrinus*	Endangered
American kestrel (Sparrow hawk)	*Falco sparverius*	Protected
Cooper's hawk	*Accipiter cooperii*	Protected
Ferruginous hawk	*Buteo regalis*	Protected
Northern goshawk	*Accipiter gentilis*	Protected
Northern harrier (Marsh hawk)	*Circus cyaneus*	Protected
Red-tailed hawk	*Buteo jamaicensis*	Protected
Rough-legged hawk	*Buteo lagopus*	Protected
Sharp-shinned hawk	*Accipiter striatus*	Protected
Swainson's hawk	*Buteo swainsoni*	Protected
White-faced ibis (White-faced glossy ibis)	*Plegadis chihi*	Protected
Belted kingfisher	*Ceryle (Megaceryle) alcyon*	Protected
Common nighthawk	*Chordeiles minor*	Protected
Osprey	*Pandion haliaetus*	Protected
Barn owl	*Tyto alba*	Protected
Burrowing owl	*Speotyto (Athene) cunicularia*	Protected
Great horned owl	*Bubo virginianus*	Protected
Long-eared owl	*Asio otus*	Protected
Short-eared owl	*Asio flammeus*	Protected
White pelican	*Pelecanus erythrorhynchos*	Protected
Turkey vulture	*Cathartes aura*	Protected

Defined by Nevada Administrative Code 503.050

Other species on the state-protected list, such as the golden eagle, prairie falcon, sparrow hawk American kestrel (sparrow hawk), northern harrier (marsh hawk), common nighthawk, several of the owl species, and turkey vultures may occur in the Proposed Action area in the appropriate season. According to NDOW, an active golden eagle nest was present in the RBM Pit, but since this pit is now being actively mined, the nest is apparently no longer in use (Lamp, 2007). Golden eagles, like some other raptors, may build more than a single nest and may alternate nesting attempts between nests in different years. These nests are referred to as alternate nests or alternate nest sites. In 1994, a possible golden eagle alternate nest was found on an outcrop in Water Canyon during baseline surveys conducted by JBR (1994) in support of the 1995 EIS. NDOW has no record of an active nest in this area. As described below, ferruginous hawks are known to nest near the Proposed Action area. However, baseline surveys conducted by SRK Consulting (2008) have detected no nests within the Proposed Action area. Swainson's hawks may occur in the surrounding valleys during the summer season, while rough-legged hawks may occur during the winter and early spring. Golden eagles, prairie falcons, and turkey vultures usually nest on cliffs or outcrops. Such features are limited in the Proposed Action area, though eagles may also nest in trees. American kestrels are cavity nesters. American kestrels were not recorded nesting in the Nevada Breeding Bird Atlas Block located just south of the Proposed Action area but may nest in the area. American kestrels, as well as Cooper's and sharp-shinned hawks, were recorded in Water Canyon during JBR (1994) baseline surveys. Northern harriers typically nest on the ground in marshy habitats. Such habitats are lacking in

the Proposed Action area but occur in the surrounding valleys. Northern harriers may forage in the Proposed Action area. Northern harriers and red-tailed hawks were recorded in the Proposed Action area during baseline surveys conducted by JBR (1994). Common nighthawks occur in northern Nevada only during the warmer months. This species nests on the ground and may nest in the Proposed Action area. Most owls nest in trees or outcrops, though short-eared owls nest on the ground and burrowing owls nest underground. Short-eared owls may nest in the Proposed Action area, though nesting by this species has not been documented.

BLM Sensitive Species

In addition to federally listed or proposed species and Nevada state-protected species, the BLM maintains a list of Nevada sensitive species. The BLM Manual 6840.06 E states that native species may be listed as sensitive if the species:

- Could become endangered or extirpated from a state, or within a significant portion of its range in the foreseeable future;
- Is under review (for listing as threatened or endangered) by the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service;
- Is undergoing significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution and/or population or density such that federally listed, proposed, or state-listed status may become necessary;
- Typically consists of small and widely dispersed populations;
- Inhabits ecological refugia, or specialized or unique habitats; and
- Is state listed but may be better conserved through application of BLM sensitive species status.

The BLM affords these species the same level of protection as federal candidate species had formerly. The BLM's policy for sensitive species is to avoid authorizing actions that would contribute to the listing of a species as threatened or endangered.

BLM sensitive species potentially occurring in the Proposed Action area include several species of bats, the pygmy rabbit (*Brachylagus idahoensis*), and a number of bird species (Appendix G). Two species of reptiles, the short-horned lizard (*Phrynosoma douglassii*) and the mountain king snake (*Lampropeltis pyromelana*), have been recorded only east of the Proposed Action area (Stebbins, 1985). No fisheries occur in the Proposed Action area.

In addition to state-protected bat species, BLM sensitive bat species that may occur in the Proposed Action area include the big brown bat (*Eptesicus fuscus*), the silver-haired bat (*Lasionycteris noctivagans*), the hoary bat (*Lasiurus cinereus*), a number of myotis bats, the western pipistrelle (*Pipistrellus hesperus*), and the Mexican free-tailed bat (*Tadarida brasiliensis*).

The big brown bat occurs over a wide range of habitats. The species roosts in caves, mines, buildings, and other situations. The species is a hibernator but may migrate elevationally in some areas (Perkins, 1998a). The Revised Nevada Bat Conservation Plan indicates the big brown bat is a species at low risk in Nevada (Bradley et al., 2006). The Proposed Action area is within the range of the big brown bat, but the species has not been recorded in the area.

The silver-haired bat is usually found in forested habitats, where the bat roosts in trees. The species is known to hibernate in hollow trees, under bark, and in leaf litter, as well as in buildings, mines, and caves (Perkins, 1998b). Portions of the population may be migratory (Wilson and Ruff, 1999). The silver-haired bat is considered to be a species at moderate risk in Nevada (Bradley et al., 2006). Silver-haired bats have not been documented in the Proposed Action area but may occur in areas of pinyon-juniper habitat.

The hoary bat is a large, solitary bat that typically roosts in deciduous or coniferous trees. The species occurs over much of the United States. In the west, hoary bats usually occur in forested habitats. Hoary bats are migratory and may move in large groups in the fall, with spring migration. This species is apparently more solitary in nature (Bolster, 1998). The Revised Nevada Bat Conservation Plan indicates the hoary bat is a species at moderate risk in Nevada (Bradley et al., 2006). Limited bat survey work has been conducted in the area (BLM, 1995a; JBR, 2006), but no hoary bats have been recorded.

Several species of bats in the genus *Myotis* occur or may occur in the area. Two myotis species, the western small-footed myotis (*Myotis ciliolabrum*) and a single long-eared myotis (*Myotis evotis*), were found hibernating in the underground workings of the Little BMM in March 2006 (JBR, 2006). The small-footed myotis occurs in deserts, chaparral, riparian zones, and forests but is most common in pinyon-juniper habitat. The long-eared myotis also occurs in a variety of habitats but is most often associated with coniferous forest. This species also utilizes a variety of roost locations (Bogan et al., 1998a). Long-eared myotis were recorded at Buck Spring (north of Overland Pass) and approximately nine miles north of the Proposed Action area, in 1994 (BLM, 1995a).

Other species of myotis bats that have not been recorded but that may occur in the area include the California myotis (*Myotis californicus*), the little brown myotis (*Myotis lucifugus*), the fringed myotis (*Myotis thysanodes*) (discussed above), the long-legged myotis (*Myotis volans*), and the Yuma myotis (*Myotis yumanensis*). The California myotis occurs in a variety of habitats throughout the west, including arid areas. Roost habitats are also varied and include caves and mines, the bark of trees, under rocks, and in buildings. California myotis hibernate in winter but may be active even at temperatures below freezing (Bogan et al., 1998b). The little brown myotis is a widely distributed species that occurs in mesic or forested habitats. The species is usually absent from hot, arid lowlands (Rainey, 1998). Little brown myotis roost in tree cavities, caves, and buildings, with caves and abandoned underground mines utilized as hibernation sites (hibernacula).

The long-legged myotis usually occurs in forested habitats throughout the western United States but may be found in drier situations, including desert habitat. The species uses a variety of roost sites during the warmer season and hibernates in caves and underground mines (Bogen et al., 1998c). Long-legged myotis were recorded at Buck Spring and near the Bellview Mine in 1994 (BLM, 1995a). The Yuma myotis is often associated with water, including small ponds, lakes, and streams. Yuma myotis may roost in buildings, in caves, in trees, and under bridges (Bogen et al., 1998d). Yuma myotis lack the adaptations to arid environments shown by some other myotis species (Wilson and Ruff, 1999).

According to the Revised Nevada Bat Conservation Plan (Bradley et al., 2006), most species of myotis in Nevada (with the exception of the fringed myotis, as noted above) are considered to be species at moderate risk.

Western pipistrelles are the smallest of North American bats. The species occurs throughout much of the west and southwest, roosting in cliffs and outcrops, typically near permanent

sources of water (Wilson and Ruff, 1999). Western pipistrelles hibernate in rock crevices (Brown, 1998). Bradley et al. (2006) indicate the western pipistrelle is a species at moderate risk in Nevada. The limited amount of free water in the Proposed Action area may limit use of the area by western pipistrelles.

The Mexican free-tailed bat is widely distributed across the southern and central United States and Mexico (BCI, 1998). The bats roost in caves, in abandoned underground mines, in buildings, in hollow trees, and under bridges. The species is migratory. Mexican free-tailed bats are highly colonial and form maternity colonies that may number in the millions of individuals (BCI, 1998). Mexican free-tailed bats are strong fliers and may travel long distances from roosting sites to forage. The Mexican free-tailed bat is considered to be a species at low risk in Nevada (Bradley et al., 2006). As is the case with several of the above species, Mexican free-tailed bats have not been recorded in the Proposed Action area.

Pygmy rabbits forage on sagebrush and construct underground burrow systems. Typically, pygmy rabbits occur in habitats dominated by mature, dense stands of big sagebrush and green rabbitbrush found in relatively level areas of deep, soft soil (Katzner and Parker, 1997). Based on known habitat requirements and results of previous surveys in the area, SRK Consulting modeled pygmy rabbit habitat in and near the Proposed Action area (SRK, 2008). The model has subsequently been corroborated by numerous field studies. At elevations below 7,000 feet above mean sea level, suitable pygmy rabbit habitat was identified as areas with soils greater than 40 inches deep, slopes of less than 15 percent, and big sagebrush as the dominant shrub. Suitable habitat above 7,000 feet above mean sea level was identified as including the same soil depth and slope parameters and, again, dominated by big sagebrush but also including position on the slope and the area (extent) of suitable habitat. Concave slopes and toe slopes were utilized, as were sagebrush patches larger than 10 acres in size. Areas of shallow soils were not utilized. Mapping based on the SRK Consulting (2008) model identifies pygmy rabbit habitat in the valleys surrounding the Proposed Action area, but potential habitat is much more limited at higher elevations of the Proposed Action area. The largest area of potential habitat within the Proposed Action area is located in the western part of the area (Figure 3-14).

In pinyon-juniper habitats of the Great Basin, ferruginous hawks typically nest in juniper trees along the forest-shrubland edge, often in the furthest extension of trees out into the adjacent shrubland habitats (Howard and Wolfe, 1976; Smith and Murphy, 1982). As noted in the BMM EIS (BLM, 1995a), “the Egan Resource Area is the most important resource area within the State for ferruginous hawks, with Newark Valley supporting the greatest number of breeding pairs.” Also stated in the BMM EIS (BLM, 1995a), the numbers of ferruginous hawk nests in the area declined markedly between the early 1980s and 1994. Important nesting areas near the Proposed Action area are identified west of Buck Mountain in Newark Valley and east of Alligator Ridge in Long Valley. Ferruginous hawks prey heavily on ground squirrels. Because their principal prey (ground squirrels) enters aestivation by late July or early August, ferruginous hawks typically fledge young and leave the area by early August (SRK, 2008). Terrestrial surveys conducted by SRK Consulting (2008) have detected no ferruginous hawk nests within the Proposed Action area (SRK, 2008).

Western burrowing owls generally inhabit open areas with low vegetation. This owl species was listed as a Category 2 candidate species for consideration to be listed as a threatened or endangered species in the BMM 1995 EIS; however, in 1996, the Category 2 designation was discontinued. The owls utilize underground burrows for nesting and shelter. Nesting areas characteristically include an elevated perch site or sites, such as fence posts, utility poles, or mounds of earth. Burrowing owls may be active throughout the day, with activity peaks near dawn and into the early morning, and near dusk. The burrowing owl is a migratory species in

the northern portion of its range and a year-round resident in the south and is federally protected under the Migratory Bird Treaty Act. Ryser (1985) states most burrowing owls in the Great Basin are migratory. Potential burrowing owl habitat is located in the valleys surrounding the Proposed Action area. No burrowing owl nests have been located within the Proposed Action area (SRK, 2008).

Greater sage-grouse occur in sagebrush habitats in the Great Basin and in similar habitats in the western United States. During the winter season, the birds subsist almost entirely on sagebrush. During the spring season, males gather to display or "strut" on communal strutting grounds, or leks. Most sage-grouse leks are situated on level ground or on gently sloping hillsides. Most are located in open areas away from trees and other potential raptor perches. Females come onto strutting grounds to mate and subsequently nest, usually within two miles of the lek. Wet meadow and riparian areas are utilized as brood-rearing habitats. These mesic areas, including seep and spring sites, provide a crucial source of insects and succulent forage for young birds. Together, the strutting grounds and nesting and brood-rearing areas form a sage-grouse habitat complex that may encompass areas from valley floors or benches up into the mountains, to include mountain meadow habitats. The White Pine County portion of the Sage-grouse Conservation Plan (NDOW, 2004) notes that the White Pine-Lincoln county area has been divided into four sage-grouse population management units. Each population management unit includes a geographical subunit that contains a largely separate sage-grouse population. The Proposed Action area is located within the Butte Valley/Buck Mountain/White Pine Range Population Management Unit. The greatest concentration of nesting and early and late brooding habitat in this large population management unit is located in the White Pine Range south of U.S. Highway 50. The Buck Mountain area, south of the Proposed Action area, is also identified as an important sage-grouse area. The closest sage-grouse leks are located several miles from the Proposed Action area, in southern Ruby Valley to the north, in Long Valley to the southeast (BLM, 1995a), and below the mouth of Bourne Canyon (Lamp, 2007). Juniper encroachment has reduced potential sage-grouse habitat in the Proposed Action area (NDOW, 2004), and the lack of extensive riparian or wet meadow habitat limits the amount of summer (brood-rearing) habitat present in the Proposed Action area (SRK, 2008).

The peregrine falcon was identified as a potential breeder on the Nevada Breeding Bird Atlas Block located just south of the Proposed Action area (Floyd et al., 2007). Tall cliffs (potential peregrine falcon nesting sites) are limited in the immediate Proposed Action area, suggesting nesting by peregrine falcons within the Proposed Action area is unlikely. Peregrine falcons are rarely reported at the Ruby Lake National Wildlife Refuge, northeast of the Proposed Action area (MacKay, 2007). The Ruby Lake National Wildlife Refuge area probably represents the best potential peregrine falcon foraging habitat in the surrounding area. The lack of regular sightings of peregrine falcons at the refuge suggests nesting does not occur in the area. Peregrine falcons may pass through the area during migration, but the species is not expected to linger.

In the Great Basin, loggerhead shrikes (*Lanius ludovicianus*) are typically associated with greasewood (Grant et al., 1991) and sagebrush communities (McAdoo et al., 1989). They also frequent open country in valleys and foothills, juniper or pinyon-juniper woodlands, mahogany stands, and the edges of ranches and towns (Ryser, 1985). Dense stands of trees and shrubs are used for nesting and roosting sites, as well as for hunting perches (Ryser, 1985). Nests are usually built between three and 30 feet above the ground in a tree crotch or on top of an old nest, often in dense twigs or foliage (Fraser and Luukkonen, 1986). Shrikes hunt where tall vegetation is scattered and there is much bare ground or ground covered with short vegetation. They often hunt from telephone wires and fences (Ryser, 1985). These small predators are known to prey on rodents, insects, and even on other small birds, often impaling their catch on

Figure 3-14 Potential Pygmy Rabbit Habitat

thorns of trees or shrubs or on barbed wire fences. Grant et al. (1991) found loggerhead shrike populations in northeastern Utah were positively correlated with deer mouse (*Peromyscus maniculatus*) populations. No nesting loggerhead shrikes were found in the atlas block located just south of the Proposed Action area (Floyd et al., 2007), and no evidence of nesting was recorded during the JBR 1994 or SRK Consulting baseline surveys (JBR, 1994; SRK, 2008), though habitat for the species is present.

Ryser (1985) describes the pinyon jay (*Gymnorhinus cyanocephalus*) as a common resident of the Great Basin, where it occupies pinyon and juniper habitats. Pinyon jays forage on pine nuts and juniper berries and practice caching behavior, which involves burying seeds in the ground. Ryser (1985) and Lanner (1981) describe the close relationship that has evolved between pinyon jays and pinyon pines (both single-leaf and two-leaf, or Colorado, pinyon pine, *Pinus monophylla* and *P. edulis*, respectively). The pinyon jay is a highly social species and typically is seen in flocks of various sizes. The birds nest in loose colonies, with nesting beginning in the early spring (Alcorn, 1988; Ryser, 1985). Ryser (1985) states the flocks generally occupy a specific home range but that the birds may wander nomadically during years of low pine nut production. Pinyon jays were recorded in the area of the Galaxy Pit in 1994 (JBR, 1994) and would be expected to utilize pinyon-juniper habitats in the area.

The juniper titmouse occurs in juniper and pinyon-juniper habitats east of the Sierra Nevada crest. This species was formerly known as the plain titmouse but was recently “split” (identified as a separate species). Titmice occurring in primarily oak habitats west of the Sierra crest are now identified as the oak titmouse (*Baeolophus inornatus*). Juniper titmice occur as year-round residents in pinyon and juniper woodlands (Ryser, 1985). The birds are cavity nesters and may utilize either natural cavities or abandoned woodpecker cavities. Juniper titmice were recorded in the area of the Horseshoe, Saga, and Galaxy pits in 1994 (JBR, 1994) and would also be expected to utilize pinyon-juniper habitats in the area.

The BLM has expressed concern about impacts to springsnails in the Great Basin. These small snails inhabit springs and other persistent water sources. Springsnails are believed to have been more widespread during wetter geologic periods and have subsequently become isolated as habitats in the Great Basin dried at the close of the Pleistocene (Sada, 2004). SRK Consulting surveyed springs in the area for the presence of springsnails (SRK, 2008). Surveyed sites included Cracker Johnson #1 and #2 springs, upper and lower Mill springs, South Water Canyon Spring, Cherry Spring, and Bourne Tunnel Spring (Figure 3-2). Springsnails were not found at any of these sites. Several of these springs (the Cracker Johnson springs, Cherry Spring, and Bourne Tunnel Spring) lacked flow at the time of the 2007 surveys. Springs which are subject to occasional drying (i.e., have not persisted since the Pleistocene) are not expected to support springsnails (Sada, 2004).

3.8.6 Special Status Wildlife Species Environmental Consequences

Federally Listed, Proposed, and Sensitive Species

Proposed Action

Environmental impacts to federally listed animal species are not anticipated. The bald eagle was de-listed (removed from the U.S. Fish and Wildlife Service list of threatened and endangered species) in August 2007. Bald eagles are known to overwinter at the Ruby Lake National Wildlife Refuge (BLM, 1995a; MacKay, 2007). Bald eagles continue to receive protection under the Bald and Golden Eagle Protection Act of 1940. Bald eagle occurrence is considered unlikely in the Proposed Action area due to the limited amount of surface water and lack of large trees that could be used as roost sites in the area. Therefore, the Proposed Action is not expected to contribute toward re-listing of the species.

Like the bald eagle, the scarcity of perennial waters in the Proposed Action area suggests the presence of Columbia spotted frogs is highly unlikely, and none were found in or near the Proposed Action area. Therefore, the Proposed Action is not expected to contribute toward the listing of this species.

Alternative A – Partial Backfill Alternative
Because no listed or proposed species are known to occur in the Proposed Action area, impacts under this alternative are expected to be the same as those under the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Because no listed or proposed species are known to occur in the Proposed Action area, impacts under this alternative are expected to be the same as those under the Proposed Action.

No Action Alternative
Because no listed or proposed species are known to occur in the Proposed Action area, selection of this alternative is not expected to benefit or harm any of these species.

State-Protected Species
Proposed Action
Anticipated environmental impacts to state-protected species include loss of habitat and displacement from human disturbance, as described below.

The Proposed Action would directly impact potential bat foraging habitat and roosting habitat for tree-roosting bats. Large cliffs that may be utilized as roost sites by spotted bats are limited in the Proposed Action area. Both the Townsend's big-eared bat and the pallid bat are strong fliers, and impacts to vegetation may reduce potential foraging habitat used by these state sensitive species as well as other bat species.

Baseline surveys (SRK, 2008) have found no state-protected raptor nest sites within the Proposed Action area. Terrestrial surveys conducted by SRK Consulting (2008) have detected no ferruginous hawk nests within the Proposed Action area. The Proposed Action would result in reductions in foraging habitat for diurnal raptors, owls, and turkey vultures. Successful reclamation would eventually reduce these impacts. Approximately 540 acres of open pit would not be reclaimed, but pit high walls represent potential roosting habitat for bats and potential nesting habitat for diurnal raptors, several species of owls, and potentially for turkey vultures.

The peregrine falcon was identified as a potential breeder on a Nevada Breeding Bird Atlas Block located just south of the Proposed Action area (Floyd et al., 2007). The lack of regular sightings of peregrine falcons at the Ruby Lake National Wildlife Refuge suggests nesting by peregrine falcons does not occur in the area.

Potential indirect effects to state-protected species that could result from implementation of the Proposed Action include displacement of wildlife, including bats and/or raptors, into adjacent habitats. Such a change in utilization could result in increased competition for limited resources. As noted above, this increased competition could result in mortality for some individuals. In the case of tree-roosting bats, considerable alternate roosting habitat is available on lands surrounding the Proposed Action area. Also as noted above, this displacement may be considered temporary provided reclamation creates habitats similar to those that were disturbed by the proposed activity. If reclamation creates a habitat different from that originally present (replacement of a pinyon-juniper community with a shrub-grass community, for example), some species may be permanently displaced and others may benefit.

Alternative A – Partial Backfill Alternative
Reductions in impacts to pinyon-juniper habitat may slightly benefit tree-roosting bats. Such reductions in impacts could occur in the area of the North 2 Rock Disposal Area. Impacts to state-protected birds are expected to be minimal under Alternative A. Reduction in rock disposal area size would have little impact on these species. Pit backfills may slightly reduce potential bat roosting habitat in pit walls, but unreclaimed pits would continue to offer potential bat roosting habitat.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Habitats in Mooney Basin that would remain undisturbed, if this alternative was selected, are predominantly sagebrush habitats. Selection of this alternative is therefore expected to have little effect on potential bat habitat. Reduction in the size of the Mooney Basin Heap Leach Pad would reduce the area of impact on potential diurnal and nocturnal raptor habitat.

No Action Alternative
Disturbance to potential bat and bird habitat in excess of that already permitted would not occur.

BLM Sensitive Species
Proposed Action
Anticipated environmental impacts to BLM sensitive species include loss of habitat and displacement from human disturbance, as described below.

Impacts to vegetation may reduce foraging habitat for bats in the area. Impacts to pinyon-juniper woodland would reduce the amount of potential roosting habitat available for tree-roosting bats (including the BLM sensitive species identified above and in Appendix G).

Potential pygmy rabbit habitat (described in Section 3.8.5) occurs in the valleys surrounding the Proposed Action area but is limited within the Proposed Action area. As shown in Figure 3-14, the largest area of potential pygmy rabbit habitat is located in the western portion of the Proposed Action area. Areas of potential pygmy rabbit habitat (as identified by SRK [2008]) that would be disturbed by the Proposed Action would be surveyed for the presence of pygmy rabbits prior to any disturbance. Because areas of proposed disturbance are on the margins of occupied habitat, or have previously been subject to disturbance, any losses are not expected to contribute to a trend toward listing this species.

Sage-grouse may utilize mesic areas as brood-rearing habitat. Water sources and associated wetland/mesic habitats would be avoided by design, but impacts to sagebrush habitats may reduce potential sage-grouse habitat in the area. Impacts to sage-grouse are expected to be minimal, since there are no known leks within the Proposed Action and reduction in overall sagebrush habitat would be a small portion of available habitat. Removal of pinyon-juniper habitat could have a positive impact on sage-grouse if the result was an increase in sagebrush habitat.

Impacts to big sagebrush habitat within the Proposed Action area may result in slight reductions in ferruginous hawk foraging habitat (no ferruginous hawk nests are known to be present in the Proposed Action area). Removal of large shrubs or small trees would reduce potential loggerhead shrike nesting habitat, though fencing and power lines may provide additional shrike perch sites. Impacts to pinyon-juniper habitat would reduce available habitat for pinyon jays, juniper titmice, and other forest-dependant and cavity-nesting species. Reductions in habitat would result in displacement of some species and a reduction in carrying capacity, while other species would experience only temporary displacement. The burrowing owl is unlikely to be

affected because suitable habitat is limited in the Proposed Action area and much remains outside the area.

Potential indirect effects to BLM sensitive species are similar to those for other wildlife. Specifically, implementation of the Proposed Action could result in displacement of sensitive species into adjacent habitats. Such a change in area of utilization could result in increased competition for limited resources. In the case of species such as tree-roosting bats, considerable alternate roosting habitat is available on lands surrounding the Proposed Action area. Impacts to occupied pygmy rabbit habitat are expected to be minimal.

Migratory and resident birds that utilize defended territories would appear to be the most susceptible to indirect impacts, as adjacent undisturbed habitats would probably be already occupied.

Alternative A – Partial Backfill Alternative
Reductions in impacts to pinyon-juniper habitat may slightly benefit tree-roosting bats. The total area of vegetation removal for this alternative is approximately 434 acres less than with the Proposed Action. The reduction in vegetation loss would be a result of smaller waste rock disposal areas. SRK Consulting's model of pygmy rabbit habitat indicates no pygmy rabbit habitat is present in the area of the rock disposal areas. Surveys conducted by SRK Consulting (2008) detected no ferruginous hawks or burrowing owls in the Proposed Action area. Selection of this alternative would have no effect on these BLM sensitive species. The effects of reducing the size of rock disposal areas and backfilling portions of some pits on BLM sensitive migratory birds would be similar to those described for other migrant bird species (see Section 3.8.4).

Alternative B – Mooney Basin Heap Leach Pad Alternative
Potential pygmy rabbit habitat is identified east of the proposed Mooney Basin Heap Leach Pad expansion. Pygmy rabbit habitat is identified in the area of the 2/3 Heap Leach Pad, though this habitat may not be occupied. Selection of this alternative may minimize impacts near pygmy rabbit habitat in Mooney Basin but would increase the amount of disturbance in potential pygmy rabbit habitat in the western BMM facilities area.

No Action Alternative
Under this alternative, new mine development at the BMM and Mooney Basin areas would not occur. Disturbance to potential BLM sensitive species habitat, primarily sensitive migratory breeding bird habitat, in excess of that already permitted, would not occur.

3.9 Wetlands, Riparian Zones, Waters of the U.S.

Wetlands and riparian zones are particularly important habitats in the dry environment of the Great Basin. Aquatic habitats such as seeps, springs, and streams serve as water sources for wide-ranging wildlife and range species. Associated wetland and riparian habitats support other species that occur only in or near these vegetation communities. Riparian habitats (deciduous shrub or tree species that border rivers and streams) support a variety of avian species not found in surrounding drier areas. Game birds, including sage-grouse, utilize streamside and wet meadow habitats as brood-rearing areas, where young birds can obtain high protein insect forage and succulent vegetation. Wetlands provide water filtration and soil stabilization functions, as well as habitat benefits.

Assumptions for Analysis
Assumptions made for the wetland, riparian zones, and waters of the U.S. analysis include the following:

- The U.S. Army Corps of Engineers will concur with the finding that there are no jurisdictional waters of the U.S. (including jurisdictional wetlands) within the Proposed Action area.

3.9.1 Wetlands Affected Environment

A wetland is an area such as a seep, spring, or wet meadow in which the soil or substrate is at least periodically saturated with or covered by water. The saturation affects the type of soils that develop and the plant species that can survive there. Furthermore, if a wetland meets specific criteria (regarding hydrology and the types of soil and vegetation present) it can fall under the jurisdiction of the Clean Water Act and be regulated as a jurisdictional water of the U.S. This section discusses non-jurisdictional wetlands; jurisdictional waters of the U.S. (including jurisdictional wetlands) are discussed in Section 3.9.5.

Wetlands are limited in the Proposed Action area. Springs located within the Proposed Action area include Cherry Spring, South Water Canyon Spring, and Upper and Lower Mill springs (Figure 3-2). In 1994, JBR conducted a wetland and seep and spring delineation in the Water Canyon area (JBR, 1995). Tetra Tech has monitored seeps and springs in and near the Proposed Action area since the fourth quarter of 2005. A 2007 report on this monitoring describes seep, spring, and well sites in the area (Tetra Tech, 2007).

Baseline surveys performed by JBR in Water Canyon in 1994 identified three spring sites JBR, 1995). Two, including a site in a tributary canyon north of Water Canyon, were small sites that supported less than 1,000 square feet of hydrophytic vegetation. Hydrophytic vegetation is plant life that grows in water or on a substrate that is, at least periodically, deficient in oxygen as a result of excessive water content. Hydrophytic vegetation is one indicator that is used to identify the presence of wetlands. South Water Canyon Spring, the third and lowest-elevation site, included approximately 12,400 square feet (0.28 acre) of hydrophytic vegetation. Flow from this site supports a stock pond in Water Canyon. A small depression that accumulates snow melt and precipitation is located on the upper slopes south of upper Water Canyon. The site does not possess vegetation seen at other area springs and dries by early summer (Zietlow, 2007b, 2007d).

South Water Canyon Spring, the larger spring site surveyed by JBR in 1994, was flowing when surveyed in July 2007 and appeared to be perennial (SRK, 2008). Tetra Tech (2007) recorded flows of six to 10 gallons per minute from this site and noted vegetation at the site was quite thick. Flow from this site collects in a stock pond located approximately 1,000 feet below this spring. The small Upper Water Canyon site was not included in the Tetra Tech surveys.

Upper and lower Mill springs, located north of Water Canyon, were both flowing when surveyed in July 2007 (SRK, 2008). The springs appear to be perennial, though limited flow issued from Upper Mill Spring when the sites were surveyed. Tetra Tech (2007) documented flows at Lower Mill Spring ranging from approximately 1.2 gallons per minute in May 2007 to 5.7 gallons per minute in March 2006. Lower Mill Spring supports a small area of hydrophytic vegetation. A flow of 1.5 gallons per minute was found at Mill Spring in November 2005, but no flow was present at the site in May 2007 (Tetra Tech, 2007).

Small isolated wetland areas are associated with seeps and springs in the Proposed Action area (JBR, 1994; Tetra Tech, 2007). All wetlands in the Proposed Action area are isolated and lack a defined channel or significant connection (nexus) to potentially jurisdictional waters downstream.

3.9.2 Wetlands Environmental Consequences

Proposed Action

Potential impacts to wetlands include direct impacts from ground disturbance and indirect impacts that could result from actions that affected surface flow or spring recharge rates, as described below.

Few wetlands exist in the Proposed Action area. Direct impacts to wetlands in the Proposed Action area would be avoided by design (Table 2-13). Potential indirect impacts to seeps and springs include possible increases in erosion, changes in chemistry of water draining though rock disposal areas, and alteration of recharge areas. Design Features (Table 2-13) would minimize potential indirect impacts. As described in Section 3.2, Water Resources, expansion of the East Sage Rock Disposal Area and construction of the Sage Flat Rock Disposal Area may reduce or delay recharge to Cherry Spring. However, this spring has not flowed in recent years and no impacts to surface water flow from this site are anticipated.

Alternative A – Partial Backfill Alternative

Impacts to wetlands would be essentially the same as for the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Impacts to wetlands would be the same as those that would occur under the Proposed Action because no wetlands have been identified in the vicinity of the proposed Mooney Basin Heap Leach Pad.

No Action Alternative

Under this alternative, activities associated with the Proposed Action would not occur. No impacts to wetlands would occur under this alternative, other than those already authorized.

3.9.3 Riparian Zones Affected Environment

Riparian zones include plant species such as willow (*Salix* sp.) and cottonwood (*Populus* sp.) that border rivers and streams. No riparian habitat has been identified within the Proposed Action area.

3.9.4 Riparian Zones Environmental Consequences

Proposed Action

No riparian habitat has been identified in the Proposed Action area; therefore, implementation of the Proposed Action would have no impact on riparian zones.

Alternative A – Partial Backfill Alternative

Impacts to riparian zones would be the same as under the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Impacts to riparian zones would be the same as under the Proposed Action.

No Action Alternative

Under this alternative, activities associated with the Proposed Action would not occur. No impacts to riparian zones would occur under this alternative.

3.9.5 Waters of the U.S. Affected Environment

Waters of the U.S. are defined by 33 Code of Federal Regulations 328.3 as:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

- All interstate waters including interstate wetlands;

- All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce.

In 2001, the U.S. Supreme Court ruled in the Solid Waste Agency of Northern Cook County case that the U.S. Army Corps of Engineers cannot invoke migratory bird use as the sole basis to establish jurisdiction over certain isolated waters of the U.S., including isolated wetlands. Prior to the ruling, the U.S. Army Corps of Engineers considered migratory bird use of isolated wetlands to be a tie to interstate or foreign commerce and thus claimed jurisdiction of isolated water bodies and wetlands. The Solid Waste Agency of Northern Cook County determination found that wetlands that are not adjacent to, and do not share a physical connection with, an otherwise jurisdictional water body could be considered isolated and not subject to jurisdiction by the U.S. Army Corps of Engineers. Likewise, drainages that did not have a tributary connection to a jurisdictional water body would also be considered isolated and not subject to jurisdiction.

Drainages in the Proposed Action area were surveyed for a defined channel connection to other downstream waters and for other potential connections to interstate commerce. Channels running southwest from the Proposed Action area, including Water and Bourne canyons, drain to Newark Valley. Channels draining southeast drain to Long Valley. Both Newark Valley and Long Valley are closed basins, and channels draining to these basins lack ties to interstate commerce. Channels draining northwest from the Proposed Action area are located within the Huntington Creek watershed. Huntington Creek ultimately drains to the Humboldt River, and drainages sharing a defined channel connection to Huntington Creek could be considered jurisdictional features. Channels draining to the northeast enter Ruby Valley. Recreation at the Ruby Lake National Wildlife Refuge could be considered an activity that involves interstate commerce. In both of these cases channels draining the mine area were found to lose definition prior to reaching any water that could support interstate commerce. Documentation demonstrating that drainages in the Proposed Action area are isolated and not subject to regulation under the Clean Water Act has been provided to the U.S. Army Corps of Engineers for review and verification.

3.9.6 Waters of the U.S. Environmental Consequences

Proposed Action

A survey of drainages in the Proposed Action area determined that no waters in the Proposed Action area share a defined channel connection or other significant connection (nexus) with potentially jurisdictional waters downstream. Therefore, there would be no impacts from the Proposed Action.

Alternative A – Partial Backfill Alternative

Impacts to waters of the U.S. would be the same as with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Impacts to waters of the U.S. would be the same as with the Proposed Action.

No Action Alternative
Under this alternative, activities associated with the Proposed Action would not occur and there would be no impacts to jurisdictional waters of the U.S.

3.10 Range Resources

The following section presents the range resources affected environment and environmental consequences.

3.10.1 Range Resources Affected Environment

The Proposed Action area lies entirely within the Warm Springs livestock grazing allotment (Figure 3-15), in the northwest corner of White Pine County. Active mining areas within this allotment are not open to livestock grazing. The Warm Springs allotment encompasses 356,666 acres, most of which is public land administered by the BLM. The allotment has been categorized as "I" (Improve the current unsatisfactory condition), as opposed to "M" (Maintain) or "C" (manage in a Custodial fashion) (BLM, 1988). An "I" designation may have the following characteristics:

- Ecologic conditions are poor to fair;
- Vegetation types have the capability of increased production;
- The range trend is declining or static;
- A high potential exists for positive economic return of public investments;
- The degree to which social/political controversy or interest conflict with present management is moderate to high;
- Resource management objectives are not being met (allotment is in need of an allotment management plan or grazing system, or major revisions are needed to an existing allotment management plan);
- Additional range improvements are required to meet management objectives;
- Land status, exchange-of-use agreement, and size are not prohibitive factors for future management practices if there is a history of prior trespass;
- It is feasible to implement more intensive grazing management and to further develop range improvements (as compared to other allotments considering constraints of 10-year projections of funding and manpower availability); and
- One or more major resource conflicts are present with critical wildlife habitat, wild horse and burro/livestock use areas, recreation, water rights, mining, lands action, reintroduction of plants and animals, soil, water, and air quality.

The Warm Springs allotment is currently leased by the Tumbling JR Ranch (owned by Barrick Gold U.S. Inc.) and is managed for an active grazing preference of 7,709 animal unit months, year-round, on BLM-administered lands. The Mooney Basin and BMM heap leach pads and process areas are the only portion of the Proposed Action area that are currently fenced or proposed to be fenced under the Proposed Action. No plans currently exist to fence the entire Proposed Action area. No range improvements are currently proposed for this allotment. Few

Figure 3-15 Grazing Allotments

natural surface water sources, including springs, are available for use by grazing livestock in the project vicinity (Section 3.9).

The four prominent vegetation community types that occur within the Proposed Action area are pinyon-juniper, big sagebrush, low sagebrush, and mountain brush. Table 3-15 displays the percentage of each vegetation community type within the Proposed Action area, associated soil types, and average annual forage production in pounds per acre per year. Section 3.6 describes the vegetation community types in detail.

TABLE 3-15 VEGETATION COMMUNITIES, SOIL CHARACTERISTICS AND AVERAGE ANNUAL FORAGE WITHIN THE PROPOSED ACTION AREA

VEGETATION COMMUNITY TYPE	PERCENTAGE OF PROPOSED ACTION AREA	ACREAGE WITHIN PROPOSED ACTION AREA	ASSOCIATED SOIL CHARACTERISTICS	AVERAGE ANNUAL FORAGE PRODUCTION (POUNDS PER ACRE)
Pinyon-juniper	45.5	7,482	shallow, loamy soils with high percentages of coarse fragments	440
Big sagebrush	48.2	7,941	alluvial fans, typically on soils derived from limestone	630
Low sagebrush	0.8	130	shallow, rocky soils along mountain ridges on gentle to very steep slopes	250
Mountain brush	5.5	912	steep side slopes and back slopes of hills and mountains at all aspects moist slopes with north and east aspects shallow to moderately deep, loamy soils	720

3.10.2 Range Resources Environmental Consequences

Proposed Action

Anticipated environmental impacts to livestock and grazing resources include the loss of forage due to ground disturbance and restricted access to active mining areas for security and safety reasons. The anticipated impacts are described below.

The primary impact on rangeland resources resulting from the Proposed Action would be a potential reduction in stocking rates because of access restrictions and disturbance to portions of the site and the loss of vegetation in disturbed areas. The Proposed Action would temporarily disturb and restrict access to 3,920 acres of rangeland (about 1 percent of the allotment), although the disturbance would not happen at the same time and reclamation would be implemented in stages. Assuming that 40 acres is needed to support one animal unit month, the maximum potential impact would be a temporary loss of 98 animal unit months, or less than 2 percent of the active grazing preference. This would temporarily reduce the active grazing preference. The actual stocking rate would also depend on other factors such as range condition. A permanent loss of 540 acres of rangeland would result from pit expansion associated with the Proposed Action and the construction of the berm along the pit perimeter after the mine closure and reclamation. The permanent loss would be less than 0.2 percent of the allotment area and would have a negligible effect on grazing.

Successful reclamation and increased forage productivity associated with the waste rock dumps may partially compensate for the permanent loss of forage, although this could be partially offset by establishment of non-native invasive species. At the end of reclamation, a re-evaluation of animal unit months would be completed during the term permit renewal process. This and other disturbances would be taken into account during this process to determine the appropriate number of animal unit months.

Alternative A – Partial Backfill Alternative
Impacts to grazing under this alternative would be essentially the same as with the Proposed Action. There would be a reduction of approximately 434 acres in the amount of disturbance resulting in a short-term loss of 87 animal unit months.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Impacts to grazing under this alternative would be essentially the same as with the Proposed Action. There would be a reduction of approximately 105 acres in the amount of disturbance resulting in a short-term loss of 95 animal unit months.

No Action Alternative
Under the No Action alternative, there would be no impacts to grazing other than those already authorized.

3.11 Wild Horses

The following sections present information on wild horses and environmental consequences.

3.11.1 Wild Horses Affected Environment

Wild horses, protected under the Wild Free-Roaming Horse and Burro Act of 1971, occur within the Proposed Action area, which lies within the Triple B Herd Management Area, which is comprised of the previously defined Buck and Bald, and Butte Herd Management Areas, as shown on Figure 3-16. Wild horse populations generally summer in the Buck and Bald mountains, moving down into Newark, Long, and Huntington valleys during the winter period. Sufficient year-long range is available within the region, and wild horses are generally in good condition. However, competition exists among wild horses, livestock, and wildlife for forage and water resources.

According to the Ely Record of Decision and Approved Resource Management Plan (BLM, 2008d), the initial Appropriate Management Levels for the Triple B Herd Management Area are between 250 and 518 (BLM, 2007b). Prior to establishment of the Triple B Herd Management Area and in order to achieve Appropriate Management Levels, 1,045 wild horses were removed from the Buck and Bald Herd Management Area in 1997, 667 in 2001, 586 in 2005, and 210 in 2006. Wild horses removed from the herd management area were placed into the BLM's adoption program or a permanent holding facility.

As of the census in July 2008 there were 555 wild horses in the Triple B Herd Management Area (Thompson, 2009). The initial Appropriate Management Level for the Triple B Herd Management Area, as discussed in the Ely District Approved Resource Management Plan, is 250 to 518 horses (BLM, 2008d). This range is achieved by capturing enough horses during a gather to approach the lower end, and then allowing natural increase in the population until it approaches the high end. Wild horses are occasionally found in the vicinity of the Proposed Action, but usually avoid this area because of the activity (Thompson, 2009).

Figure 3-16 Wild Horse Herd Management Areas

3.11.2 Wild Horses Environmental Consequences

Proposed Action

Potential environmental impacts to wild horses include reduction in forage, displacement by human disturbance, and collisions with vehicles, as described below.

Overall impacts to wild horses associated with the Triple B Herd Management Area are expected to be minimal. Approximately 540 acres of foraging or thermal cover area would be permanently lost as a result of expanded pits with 3,920 acres of foraging and thermal cover temporarily lost during active mining. The short-term effects from mine blasting, equipment operation, and increased human presence in the Proposed Action area would temporarily displace animals within the Triple B Herd Management Area. Vehicle-related mortalities within the entire herd management area and loss of forage from habitat removal would result in short-term impacts on wild horses. The locations of project components (e.g., haul roads) could intersect daily movement routes between foraging areas and seasonal migration corridors. Wild horses have adapted to the existing mining activity and thus are expected to adjust to similar activities under the Proposed Action. The anticipated habitat loss would last until reclamation is completed (BLM, 1995a).

Mining operations could displace wild horses into adjacent areas. The BLM's final allotment decisions and control of the number of wild horses in the herd area would maintain wild horse populations at the appropriate carrying capacity of the range. This would minimize the potential for direct conflicts between mine activities and wild horses in the Proposed Action area.

The BLM has developed specific Best Management Practices to minimize potential impacts to wild horses and other wildlife (Appendix D). These include road warning signs and timely reclamation of disturbed areas.

As vegetation is re-established, habitat quality and forage availability would improve, resulting in a beneficial effect to the horses over time on these areas. No additional adverse impacts to wild horses are anticipated from mine closure and reclamation activities.

Alternative A – Partial Backfill Alternative

Under this alternative, there would be a reduction of disturbance acreage by approximately 434 acres. No permanent impacts to wild horses are anticipated.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Under this alternative there would be a reduction of disturbance acreage by approximately 105 acres of disturbance. Permanent impacts to wild horses are not anticipated.

No Action Alternative

Under this alternative, additional impacts to range resources would not occur from development and operation of the Proposed Action. Presently permitted mine and exploration projects for the BMM would result in disturbance of up to 4,165 acres of rangeland. No additional impacts to wild horses other than those already authorized would occur.

3.12 Land Use and Access

This section identifies and describes current land ownership patterns, land use plans, public access, and major land uses that could be affected by the Proposed Action and alternatives.

3.12.1 Land Use and Access Affected Environment

Access and land use information was compiled from U.S. Geological Survey 7.5-minute topographic quadrangles, Nevada Department of Transportation highway maps, BLM Master Title Plats, BLM Oil and Gas Plats, BLM Transportation Plan, White Pine County Land Use Plan, aerial photography, and the BLM's Ely Resource Management Plan.

Land use patterns in the Proposed Action area are typical of eastern Nevada and the Ely District Office jurisdiction and consist mainly of mining, ranching, wildlife habitat, hunting, and recreation. The private ranches in the immediate vicinity of the Proposed Action area were owned by Silver State Ranches until May 16, 2006, when they were purchased by Barrick Gold U.S. Inc. and are now leased to other operators under the new name of Tumbling JR Ranch.

Other land uses in the vicinity include Christmas tree harvesting, fuel wood cutting, and pinyon nut gathering, although the remote location and distance to nearby population centers significantly limits these activities. Pinyon-juniper fuel wood sales in the Ely District in 2004 totaled 1,581 cords, and 1,026 Christmas trees were harvested for individual and commercial use (BLM, 2007b). Harvesting of pinyon nuts on BLM land is permitted for both personal and commercial use. Up to 25 pounds of pinyon nuts may be collected from District land for personal use without a permit; commercial collection permits are sold at auction for designated areas only (BLM, 2007b). Pinyon nuts were an important resource for Native Americans, and pinyon nut collecting remains part of their tradition and the focus of tribal ceremonies.

A discussion of existing conditions and potential project impacts on specific land uses such as grazing, vegetation, wildlife, and recreation are discussed in more detail in their respective sections of this document.

Land Jurisdiction/Ownership

White Pine County

The Proposed Action area is located in the northwest corner of White Pine County. The County encompasses approximately 5.7 million acres, over 90 percent of which is federal land administered by the BLM, U.S. Forest Service (USFS), National Park Service, U.S. Fish and Wildlife Service, and other agencies. Tribal lands comprise 1.2 percent, and State government administers 0.2 percent of the County's land (White Pine County, 2006).

In the White Pine County Land Use Plan (1998a), the County presents specific land use plans for the communities of Ely, Baker, Lund, McGill, Preston, and Ruth. The balance of the County is treated collectively and in more general terms. White Pine County has 11 general land use designations in the plan: Open Range; Low-, Medium-, and High-Density Residential; Mobile Home; Commercial; Industrial; Public Facility/Recreation; Public Land Transfer; Brownfield; and Federal Reserve. Most land outside of established communities, including the Proposed Action area, is designated in the county land use plan as Open Range or Federal Reserve. Land designated as Open Range is used mainly for ranching but also for mining, for recreation, and as wildlife habitat.

The County also prepared the White Pine County Public Land Use Plan (White Pine County, 1998b), which is Appendix 1 in the White Pine County Land Use Plan (White Pine County, 1998a). The purpose of the Public Land Use Plan is to coordinate County planning on public lands with federal land management agencies. The Public Land Use Plan applies to public lands designated as Open Range and Federal Reserve in the White Pine County Land Use Plan. This plan specifically encourages mineral exploration and development on public lands, consistent with sound economic and environmental practices. The plan also supports

transportation of mineral and mining products and material essential to the mining operation on public roads and highways.

Bureau of Land Management

Except for approximately 73 acres of private land owned by Barrick, the Proposed Action area is on public land administered by the BLM. The Proposed Action area is located in the Egan Field Office jurisdiction and is managed according to the Ely District Resource Management Plan (BLM, 2007b). The Ely District Resource Management Plan provides guidance for management of 3.8 million acres of public land in east-central Nevada. Most of the Egan Field Office jurisdiction is in White Pine County, with the remainder in Nye County. BLM Resource Management Plans are long-range, comprehensive land use plans, which identify planning objectives and policies for designated areas and provide for multiple land uses. The planning objectives are implemented through activity plans for specific uses such as grazing allotments, wildlife habitat, and wild horses.

The BLM grants land use authorizations to private entities and other government agencies to use BLM land for specific purposes. A review of BLM documents identified the land use authorizations shown in Table 3-16. There are no designated or planning utility corridors or land disposal areas within the Proposed Action area. The status of mining claims in the Proposed Action area is contained in the BMM North Operations Area Project Plan of Operations (BMM, 2009). The BLM Land and Mineral Records System (LR2000) was used to access land and mineral records.

Access

The major highway closest to the Proposed Action area is U.S. Highway 50, approximately 35 miles to the south. State Route 892 is paved from U.S. Highway 50 north to the BMM mine turnoff, a distance of about 35 miles. This is the main access road for the mine and the designated route for deliveries of most equipment and materials. The town of Elko and Interstate Highway 80 are approximately 70 miles north of the BMM. Access from Elko to the mine is only partially paved. A third access route is from U.S. Highway 50 north on Long Valley Road, which continues past the mine to the Ruby Lake National Wildlife Refuge and Ruby Valley. Long Valley Road is paved only for about 25 miles north of U.S. Highway 50. The Long Valley Road access route is used only for deliveries of equipment and materials to the Mooney Basin area.

The mine's employees live in one of three general areas (Elko, Ely, and Eureka) and are transported to and from the mine in company-operated buses or vans. Personal vehicle travel to the site is discouraged and, because of the cost, employees rarely use personal vehicles unless they miss the bus or van.

The larger unpaved roads, including Long Valley Road, the road on the east side of Newark Valley, and the unpaved portion of the road to Elko, are maintained by White Pine or Elko counties. The remainder of the unpaved roads in the vicinity are maintained by the BLM. Road maintenance responsibilities are shown on Figure 3-17. Because of White Pine County's recent financial difficulties, road maintenance funding has remained at the 2003 level and the maintenance work force is currently being reduced through attrition. No tax revenue increases that would change this situation are likely in the near future (Sprouse, 2007).

TABLE 3-16 ADMINISTRATIVE LAND USE AUTHORIZATIONS IN THE VICINITY OF THE PROPOSED ACTION AREA

SERIAL NUMBER	DESCRIPTION/HOLDER
Township 23 North, Range 57 East	
NVN 078822	Mooney Basin Mine/Barrick Gold US (Proposed Action)
NVN 078825	Bald Mountain Exploration/Barrick Gold US
Township 23 North, Range 58 East	
NVN 057896	Power 25-foot Right-of-Way Placer Dome
NVN 078822	Mooney Basin Mine/Barrick Gold US (Proposed Action)
NVN 078825	Bald Mountain Exploration/Barrick Gold US
NVN 080865	Oil and Gas Lease/Plains Exploration and Production Co.
SS9	State Selection 1880 Sec 5, Lot 1
Township 24 North, Range 56 East	
NVN 053638	Road Federal Facility 40-foot Right-of-Way/BLM
NVN 057896	Power 25-foot Right-of-Way/Placer Dome
NVN 068193	Bald Mountain Mine/Barrick Gold US (Proposed Action)
0402	Range Improvement, Fence
0477	Land Treatment
0525	Range Improvement, Fence
0873	Land Treatment
0892	Range Improvement, Fence
0985	Range Improvement, Fence
4127	Range Improvement, Cattle Guard
4760	Range Improvement, Troughs and Pipeline
Township 24 North, Range 57 East	
MS 37	Mineral Survey
MS 38 A/B	Mineral Survey
MS 39	Mineral Survey
MS 3860	Mineral Survey
MS 5122	Mineral Survey
N43674	Water Storage Facility and Pipeline
NVN 053638	Road Federal Facility 40-foot Right-of-Way/BLM
NVN 062793	Communication Site Right-of-Way Federal Fac/BLM
NVN 062794	Communication Site Right-of-Way Federal Land Policy Management Act/BLM
NVN 068193	Bald Mountain Mine/Barrick Gold US (Proposed Action)
NVN 068282	Little Bald Mountain Mine/Barrick Gold US
NVN 068521	Winrock/Casino Mine/Barrick Gold US
NVN 078822	Mooney Basin Mine/Barrick Gold US (Proposed Action)
NVN 078825	Bald Mountain Exploration/Barrick Gold US
NVN 080044	Other Right-of-Way Federal Land Policy Management Act/Unavco Inc.
NVNVAA 000724	Mineral Patent/Lamoureux, Olmsted
NVNVAA 000725	Mineral Patent/Lamoureux, Olmsted
NVNVAA 000726	Mineral Patent/Lamoureux, Olmsted
NVCC 0005437	Mineral Patent/Ely-Nevada Exploration Co.
0043	Range Improvement, Fence
4607	Range Improvement, Fence
4608	Range Improvement, Fence
Township 24 North, Range 58 East	
NVN 057896	Power 25-foot Right-of-Way/Placer Dome
NVN 076694	Oil and Gas Lease/Connelly, M.S.
NVN 078822	Surface Management Plan/Placer Dome
NVN 079680	Oil and Gas Lease/Fasken Nevada
0491	Range Improvement, Windmill
1052	Range Improvement, Improved Spring
4460	Range Improvement, Fence

Source: BLM Master Title Plats from LR2000.

Figure 3-17 Road Maintenance Responsibilities

To assist local counties and to help provide road maintenance to meet the needs of BMM for maintained access, Barrick has been grading some of the main unpaved access roads at its own expense and recently hired a private contractor to maintain approximately 40 miles of road (a mix of both BLM and county roads) between Jiggs, Nevada, and the mine. Some additional work is done on unpaved portions of the Long Valley Road, which is used for deliveries to the Mooney Basin area. Barrick's road work has helped White Pine County conserve maintenance funds, but there have been some problems with the road base being scraped off. The base must then be moved back on the road by County crews (Sprouse, 2007). In the winter there have been problems with trucks (mainly with double loads) getting stuck, digging ruts in the road surface, and requiring assistance from the County. When this happens the County must divert workers from higher priority roads (Sprouse, 2007).

The County is currently experimenting with a surface treatment for unpaved roads that is supposed to repel water and reduce maintenance costs. If the experiment is successful, the treatment might be used on roads in the mine vicinity (Sprouse, 2007).

3.12.2 Land Use and Access Environmental Consequences

Proposed Action

Anticipated environmental impacts to land use and access include potential conflicts with existing land use authorizations, restricted access, and increased traffic on roads in the vicinity. Each of these anticipated impacts is described below.

Under the Proposed Action, the BLM would authorize expansion of the BMM North Operations Area Project operations area by 3,920 acres. There are existing BLM land use authorizations (Table 3-16) in the operations area such as rights-of-way for power transmission lines, roads, communications sites, oil and gas leases, and water facilities. Any potential conflict with an existing land use authorization would be resolved by consultation with the holder of the land use authorization. Resolving the conflicts might include actions such as re-locating existing utilities and obtaining any required permits from the BLM for permission to cross the authorization. Obtaining other necessary permits from state and county authorities might also be required.

The Proposed Action would result in active mining areas being restricted from public access for the life of the mine to protect mine property and for the safety of the public. Approximately 3,738 acres would be temporarily restricted during active mining and reclamation, and approximately 540 acres would be permanently lost as a result of expanded pits. Discussions of potential project impacts on specific land uses such as grazing, vegetation, wildlife, and recreation are found in other sections of this document. Pinyon-juniper woodlands within the Proposed Action area would continue to be unavailable for cutting fuel wood and Christmas trees or for harvesting pinyon nuts. The potential impact is expected to be minimal because existing land use within the areas proposed for expansion is light and vast amounts of pinyon-juniper forest closer to populated areas would remain.

Because the mine provides transportation for its employees, the effect of the transportation components of the Proposed Action on access roads would be minimal. Under the Proposed Action, the additional employees could be transported by using larger vehicles or by increasing the number of vehicles for the extended life of the mine; however, it is anticipated that one bus would be added to the fleet of two buses currently used. The new bus would likely be added to the Elko route because, based on current demographics, the majority of new employees are expected to live in the Elko area. The proposed increase in mine production would also result in more deliveries of materials and equipment. Deliveries are expected to increase to approximately 1,500 trips per year, or an increase of between 10 and 15 percent over current deliveries. This change would have a minimal effect on the condition of state and county roads.

Barrick proposes to continue its program of maintenance of unpaved access roads for the life of the mine.

Alternative A – Partial Backfill Alternative
Effects on land use and access under this alternative would be the same as the Proposed Action, except for fewer acres permanently lost.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Effects on land use and access under this alternative would be the same as the Proposed Action.

No Action Alternative
Under this alternative, mine operation would continue under the existing plan until gold production ceases in 2009. There would be no change in existing impacts to land use and access until mine closure and reclamation. At that time, land that was previously closed to all uses other than mining would be opened, and impacts to access roads from mine activity would end, in accordance with existing authorizations. In addition, Barrick would cease voluntary maintenance activities on unpaved portions of public access roads leading to the site.

3.13 Recreation

3.13.1 Recreation Affected Environment

For the fiscal year ending September 30, 2007, there was an estimated 297,895 visitor days to public land on the BLM Ely District (BLM, 2007b). Most recreational activities consist of dispersed uses such as off-highway vehicle use, hunting, fishing, camping, cross-country skiing, horseback riding, caving, rock climbing, and mountain biking (BLM, 2007b). Recreational usage of public lands in the BLM Ely District has been increasing, partly because of population growth in both the District and in Las Vegas. As opportunities for primitive recreation become scarce in other areas, more visitors are drawn to public land in the BLM Ely District.

Recreation in the BLM Ely District is managed by designation of Special Recreation Management Areas and Extensive Recreation Management Areas (BLM, 2007b). A Special Recreation Management Area is an area where more intensive recreation management is needed and where recreation is a principal management objective. An Extensive Recreation Management Area includes all BLM-administered lands outside the special recreation management areas and may include developed and primitive recreation sites with minimal facilities.

The Loneliest Highway Special Recreation Management Area was designated April 1, 1988 and was amended in the 2008 Ely District Approved Resources Management Plan. It encompasses the U.S. Highway 50 corridor (Figure 3-18). The Loneliest Highway Special Recreation Management Area encompasses 675,120 acres. BLM management objectives for this Special Recreation Management Area are to provide recreational opportunities to the public that would otherwise not be available, reduce conflict among users, minimize damage to resources, and reduce visitor health and safety issues. The remainder of the BLM Ely District is divided into the Schell, Egan, and Caliente Extensive Recreation Management Areas and other Special Recreation Management Areas outside of the project area (BLM, 2008d).

Executive Order 13443 Facilitation of Hunting Heritage and Wildlife Conservation was signed on August 16, 2007. The order directs federal agencies that have programs and activities that have a measurable effect on public land management, outdoor recreation, and wildlife management to evaluate the effect of their actions on trends in hunting participation and to

Figure 3-18 Recreation Areas

facilitate the expansion and enhancement of hunting opportunities and management of game species and their habitat.

Hunting, primarily for mule deer, fishing, and off-highway vehicle use are the main recreational activities in the vicinity of the Proposed Action. Hunting within the active mine area itself is prohibited by Mine Safety Health Administration regulations. The Proposed Action area is located within NDOW's Hunting Area 10, which totals approximately 6,000 square miles and comprises Units 101 through 108. Unit 108 encompasses approximately 900 square miles and includes land in the Ruby Mountains south of Overland Pass and north of U.S. Highway 50 (NDOW, 2007a). Area 10 generally includes land between Interstate Highway 80 and U.S. Highway 50 east of Elko and west of Ely. NDOW (2007b) reports that the mule deer population in Area 10 is up slightly from the previous year and has increased in six of the last seven years. Area 10 is reported to have been less adversely affected by drought than other hunting areas. A total of 916 mule deer were harvested in Area 10 during the 2006-2007 season by residents and 171 by non-residents (NDOW, 2007c). The level of deer-hunting activity in surrounding areas of the Proposed Action area is considered moderate by NDOW (Wasley, 2007b).

In addition to mule deer–hunting, there is some level of activity by trappers and upland game hunters in the vicinity of the Proposed Action area (Wasley, 2007b).

There are no fisheries in the immediate vicinity of the Proposed Action area. The most popular fishing area in the general vicinity is Ruby Lake, a natural, spring-fed, high elevation marsh located entirely on the Ruby Lake National Wildlife Refuge. The Ruby Lake National Wildlife Refuge is about seven miles northeast of the BMM North Operations Area Project boundary and contains over 9,000 acres of lakes, ponds, and waterways at an elevation of approximately 6,000 feet. A campground operated by the USFS is adjacent to Ruby Lake, and there are several primitive camping sites along the west side foothills (NDOW, 2007d). The Ruby Lake National Wildlife Refuge is popular for wildlife viewing as well as fishing.

Cold Creek Reservoir is located approximately 15 miles southwest of the Proposed Action area. The reservoir is a small, spring-fed fishery that was constructed in 1943 for irrigation purposes and is located on both public and private land. The complex consists of a main spring with an outflow that feeds two lower ponds (only the lower pond presently contains water). The lower pond is considered to be the actual Cold Creek Reservoir and covers a total of 14 surface acres with a maximum depth of 24 feet. Along with a wild, spawning population of rainbow trout, hatchery rainbow trout are stocked annually to augment the population. A primitive boat ramp is available on the main pond, but no other facilities are available. Because of its remote location, Cold Creek Reservoir receives little fishing pressure (NDOW, 2007d).

Illipah Reservoir is located approximately 40 miles south of the Proposed Action area near U.S. Highway 50. The reservoir was first created in 1953 when Illipah Creek was impounded for irrigation purposes. In an agreement with the landowner that guaranteed a minimum pool, NDOW paid for construction of a new dam and the reservoir was enlarged in 1981 (NDOW, 2007d). Although located almost entirely on private land, the adjacent land is managed as a recreational area by the BLM under a cooperative agreement with NDOW. At capacity, Illipah covers 70 surface acres to a maximum depth of 50 feet. The BLM maintains a campground, and an undeveloped boat launch is available.

Additional recreation opportunities are found in the Ruby Mountains Ranger District of the Humboldt-Toiyabe National Forest. The District is made up of the East Humboldt and Ruby Mountain ranges and covers about 450,000 acres, including the East Humboldt Wilderness Area, with elevations ranging from 6,000 feet to 11,387 feet at Ruby Dome. Hiking, horseback

riding, cross-country skiing, photography, camping, hunting, and fishing are available within the USFS wilderness area with snowmobiling, mountain biking, and four-wheeling available outside the wilderness area.

The 1,280-acre Garnet Hill Rockhounding Area, known for the abundance of gemstone quality ruby red garnets found in the volcanic rock, is located approximately 50 miles southeast of the Proposed Action area.

Only a limited amount of data for recreational activity in the vicinity of the Proposed Action area were available for analysis. Recreation usage compiled by the BLM (2007c) for the fiscal year ending September 30, 2007, shows 41,356 total visitor days for the Loneliest Highway Special Recreation Management Area; 2,343 visitor days for Cold Creek Reservoir; 2,912 visitor days for the Garnet Hill Rockhounding Area; and 35,387 visitor days for Illipah Reservoir.

3.13.2 Recreation Environmental Consequences

Proposed Action

Anticipated environmental impacts to recreation result mainly from restricted access. Under the Proposed Action, the Plan of Operations boundary would expand from 12,727 acres to 16,465 acres. This would restrict public access for hunting and other recreation from active mining areas for the duration of mine operation and reclamation. The displacement of dispersed recreational users from this area is expected to have a minimal adverse impact because recreational use of public lands in the Proposed Action area is relatively light and an abundant amount of open public land remains in the BLM Ely District Office area. The Pony Express Trail would remain open for off road touring, and the Long Valley Road would remain open for access to Ruby Lake National Wildlife Refuge. No impacts to recreation are anticipated at Cold Creek Reservoir, Illipah Reservoir, Ruby Lake National Wildlife Refuge, Garnet Hill Rockhounding Area, or Humboldt-Toiyabe National Forest. Potential indirect effects to recreational users from visual impacts are discussed in Section 3.15, Visual Resources.

As discussed in Section 3.8, potential indirect effects to hunting and trapping from the project on game species populations are anticipated to be minimal. The Proposed Action would comply with Executive Order 13443 Facilitation of Hunting Heritage and Wildlife Conservation because potential effects to hunting have been evaluated and hunting access has been facilitated to the extent possible.

Alternative A – Partial Backfill Alternative

Recreation effects under this alternative would be the same as with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Recreation effects under this alternative would be the same as with the Proposed Action.

No Action Alternative

Under this alternative, gold mining activities would continue under the current authorizations for the BMM and Mooney Basin Operations Area. There would be no change in existing road closures or the amount of land closed to recreation until mine operation and reclamation is completed. At that time, the 12,727 acres of public land currently closed to recreation would be opened, in accordance with existing authorizations.

3.14 Air Quality

Assumptions for Analysis

Assumptions made for the air quality analysis include the following:

- Quantitative air quality modeling assumed that all pollutants were emitted at maximum operational capacity consistent with the operational scenario modeled;

- For all pollutant impact analyses other than ozone, all pollutants emitted were assumed to remain in their emitted state without physical or chemical transformation during atmospheric transport, consistent with U.S. Environmental Protection Agency and Nevada Division of Environmental Protection guidance; and

- Regional data are assumed to be representative of conditions within the direct impact analysis area.

3.14.1 Air Quality Affected Environment

Area of Analysis

The air quality direct impact analysis area includes a broad zone around the current and proposed mine sites west of Long Valley. The direct impact analysis area is defined by a 12-mile radius around the proposed mine site. That area includes all predicted maximum impact areas and most of the areas where air quality modeling showed a significant contribution (as defined quantitatively by U.S. Environmental Protection Agency Significant Contribution Levels for Class II airsheds) to ambient air quality. The analysis area also includes a 200-yard-wide corridor centered along the primary access roads to the mine for 12 miles beyond the mine boundary.

Climate

The existing and proposed mine is at a high elevation on and around Bald Mountain. Terrain on the west side of Bald Mountain is channeled by the Bald Mountain ridge primarily from south to north. Wind speeds are moderate during most daylight hours after mid-morning and generally lighter during the evening hours. Atop the ridge, the wind patterns are understood to have a stronger component of west to east flow. Winds are also affected by terrain channeling, primarily along valleys and drainages where winds are directed in a north and south direction down valleys during evening hours. On the east side of the ridge, winds are channeled north and south, with terrain blocking significant transport to the west. The Nevada Division of Environmental Protection recommended the use of Elko meteorological data for air quality impact modeling associated with the facility's air permit applications. The Elko area features similar wind patterns forced by the valleys in this Basin and Range country, trending south to north. The Elko windrose chart (Figure 3-19) shows predominant and strongest winds are from the west and southwest, with moderate frequency and wind speeds from the east and northeast.

The analysis area includes a four-season environment with cold winters in the Proposed Action area. The valley locations feature warmer mean temperatures than the high elevation activity areas, but they are still above 5,000 feet in elevation and have temperatures below freezing in the fall and spring and have cold winters. Due to the high elevation of the mine, all emissions are above the inversions that form on the valley floor. Precipitation amounts are less in the valleys and more in the surrounding highlands. Table 3-17 summarizes meteorological conditions in the vicinity of the Proposed Action.

TABLE 3-17 METEOROLOGICAL CONDITIONS IN THE PROPOSED ACTION VICINITY

MONITOR	ELEV. (FEET)	WINTER AVERAGE	SPRING AVERAGE	SUMMER AVERAGE	FALL AVERAGE	ANNUAL AVERAGE
Mean Seasonal Temperature Average (degrees Fahrenheit)[1]						
Eureka	6,540	31.5	51.4	65.3	37.5	46.4
Diamond Valley (USDA)	5,910	29.8	51.3	62.6	34.9	44.7
Diamond Valley Pollard	5,840	28.2	48.6	63.1	33.5	43.4

MONITOR	ELEV. (FEET)	WINTER AVERAGE	SPRING AVERAGE	SUMMER AVERAGE	FALL AVERAGE	ANNUAL AVERAGE
Cortez Gold Mine	4,910	35.6	56.1	69.8	39.4	50.2
Pine Valley Bailey Ranch	5,050	31.1	51.4	61.8	34.4	44.7
Jiggs	5,760	29.7	50.4	62.5	35.2	44.4
Mean Seasonal Precipitation Average (inches)[1]						
Eureka	6,540	3.3	3.5	2.3	2.7	11.8
Diamond Valley (USDA)	5,910	2.4	2.8	2.0	2.1	9.3
Diamond Valley Pollard	5,840	1.5	3.6	1.9	2.0	9.1
Cortez Gold Mine	4,910	2.5	3.0	1.9	2.3	9.7
Pine Valley Bailey Ranch	5,050	2.8	3.5	1.7	2.7	10.7
Jiggs	5,760	3.9	4.6	2.0	3.4	13.9
Mean Seasonal Snowfall/Snow Cover (inches)[1]						
Eureka	6,540	19.5 / 1.0	7.1 / 0	0.4 / 0	13.6 / 0.3	40.7 / 0.3
Diamond Valley (USDA)	5,910	0.8 / 0	0.2 / 0	0 / 0	0.2 / 0	1.3 / 0
Diamond Valley Pollard	5,840	11.6 / 0.7	0 / 0	0 / 0	8.5 / 0.3	20.1 / 0.3
Cortez Gold Mine	4,910	9.2 / 0	3.4 / 0	0 / 0	5.7 / 0	18.2 / 0
Pine Valley Bailey Ranch	5,050	10.5 / 1.0	0.1 / 0	0 / 0	8.2 / 0.3	18.7 / 0.3
Jiggs	5,760	24.5 / 0	7.5 / 0	0 / 0	11.5 / 0	43.4 / 0

Source: WRCC, 2006.

[1] For mean monthly temperature, mean monthly precipitation, and mean monthly snowfall, the period used is from inception (1982 or earlier) – 2006, except for the Cortez Gold Mine, for which data are from 1968 - 1977.

Regional Air Quality

The entire direct impact analysis area and immediately surrounding areas are currently in attainment or unclassified (these terms are defined below) for all criteria air pollutants. Monitoring of criteria pollutants in east-central Nevada has been limited since the late 1990s. The Nevada Division of Environmental Protection discontinued historic particulate matter (PM_{10}) monitoring when the U.S. Environmental Protection Agency allowed monitoring to cease where monitoring showed pollutant trends at less than 60 percent of the National Ambient Air Quality Standards. PM_{10} monitoring was conducted in McGill from 1993 to 1998, and ongoing PM_{10} monitoring is conducted in Elko, in Battle Mountain, in Baker, and at Great Basin National Park. Those historic monitoring efforts indicate low particulate levels in rural portions of the region, with levels slightly elevated but well below State or U.S. Environmental Protection Agency air quality standards in the developed areas.

Most air pollutant monitoring is undertaken in locations with relatively high population density where high pollutant levels might be expected. Almost all of the monitoring conducted by the State of Nevada is done in the Reno/Carson City or Las Vegas areas. Monitoring data from throughout the United States are available at the U.S. Environmental Protection Agency Air Data web site (http://www.epa.gov/air/data/index.html). Monitoring data from most of the western States were reviewed for the air impact modeling conducted for the Proposed Action (Enviroscientists, 2008). Not all monitoring sites monitor all of the criteria pollutants. Table 3-18 lists the pollutant, timeframe, monitor location, and assumed background value based on the first-high value from the years reviewed (Enviroscientists, 2008). The first-high value from the monitoring data was used rather than the second-high value because the State of Nevada uses the more stringent first-high value to determine compliance with State ambient standards (see Table 3-18).

Figure 3-19 Windrose Chart

Trona, California, was chosen for background values for sulfur dioxide and nitrogen oxide. Trona is a small desert town in southern California. The monitoring at Trona does not include carbon monoxide. Barstow, California, was chosen for carbon monoxide, although this southern California town is located at the junction of two interstate highways and is a major railroad center. Monitored combustion emissions would be expected to be higher in Barstow than in the Proposed Action and cumulative effects areas. All ozone monitoring in southern California indicated high ozone values. These values probably reflect local combustion sources, down-wind transport of pollutants from the Los Angeles basin, and persistent warm, sunny weather ideal for the creation of ozone. Craters of the Moon National Monument in Idaho was chosen for the background value for the one-hour ozone standard. The Monument is a remote, sagebrush-dominated landscape similar to the Proposed Action's direct and cumulative effects areas.

There are no measured values for air pollutant concentrations for the direct impact analysis area; therefore, the regional data documented above are assumed to be representative of current conditions within the direct impact analysis area. The measured values in Table 3-18 provide the estimate of regional pollutant levels and are therefore used to represent background pollutant concentrations in the analysis area (Enviroscientists, 2008).

TABLE 3-18 REGIONALLY MEASURED BACKGROUND DATA

POLLUTANT	MONITOR LOCATION	AVERAGING PERIOD	AMBIENT BACKGROUND CONCENTRATION (MG/M^3)
Sulfur Dioxide	Trona, CA	3 hours	28.6
		24 hours	18.3
		Annual	5.3
Particulate Matter PM_{10}	Bureau of Air Pollution Control default values	24 hours	10.2
		Annual	9.0
Nitrogen Oxide	Trona, CA	Annual	9.4
Carbon Monoxide	Barstow, CA	1 hour	3,771
		8 hours	1,666
Ozone	Craters of the Moon National Monument, ID	1 hour	141

Source: Enviroscientists, 2008.

Sensitive Receptors

Properties or areas were considered sensitive receptors if impacts to those sites could affect existing (or formally and definitive planned) populations or ecological areas especially sensitive to those impacts. The Ruby Lake National Wildlife Refuge is located to the north of the BMM North Operations Area Project. Because of the sensitivity of the ecosystem and local activities, the State fish hatchery on the west side of the Refuge was identified as the closest sensitive receptor. That National Wildlife Refuge and the wilderness area in the mountains to the west are the nearest special designation Class II areas. The fish hatchery at the Refuge was chosen as the worst-case sensitive receptor because the prevailing west and southwest winds in the model made the hatchery the nearest downwind sensitive area. The Jarbidge Wilderness, 130 miles to the north near the Idaho border, the nearest Class I airshed, was also considered a sensitive receptor.

Existing Emission Sources

Land use in the direct impact analysis area is dominated by mining, ranching, and recreation. The BMM is currently operating as a Class II source with emissions below the Prevention of

Significant Deterioration major source threshold, so existing mining activity is included as part of the affected environment. Other currently operating projects are identified in the cumulative effects analysis.

Effects on Air Quality from Existing Emission Sources

Current activity levels include emissions from two oil and gas wells, the USFS Fuel Management Program, and the active BMM. There are no sensitive receptors in the immediate vicinity of the BMM North Operations Area Project. The nearest residence or areas of human activity are ranches in the valleys below the Proposed Action area and at least five miles distant from the mine boundary. The high-elevation mine site is mostly above surrounding topography, limiting the potential for concentration of pollutants by terrain but potentially allowing for transport by wind.

Existing Emission Sources Other Than Bald Mountain

Other emission sources are identified in the cumulative impacts section. Their impacts are accounted for in the background concentrations used in the quantitative modeling analyses (Appendix H).

Regulatory Framework

Federal Clean Air Act

The Federal Clean Air Act and the subsequent Federal Clean Air Act Amendments of 1990 require the U.S. Environmental Protection Agency to identify National Ambient Air Quality Standards to protect public health and welfare. The Federal Clean Air Act and the Federal Clean Air Act Amendments of 1990 established National Ambient Air Quality Standards for seven pollutants, known as "criteria" pollutants, because the ambient standards set for these pollutants satisfy "criteria" specified in the Federal Clean Air Act. These ambient air quality standards are quantitatively set for criteria air pollutants: nitrogen dioxide, sulfur dioxide, PM_{10} and $PM_{2.5}$ particulate matter, carbon monoxide, ozone, and lead. The primary regulated particulate is PM_{10}, particulate matter 10 microns or less in diameter. Materials in this size range are considered inhalable because they generally pass into the human respiratory system. Standards for $PM_{2.5}$, particulate matter 2.5, a subset of PM_{10} including the smaller particle sizes, are being phased in by the U.S. Environmental Protection Agency.

Pursuant to the Clean Air Act, the U.S. Environmental Protection Agency has developed classifications for distinct geographic regions known as Air Pollution Control Regions. In Nevada, the Air Pollution Control Regions are largely analogous with hydrographic basins. Under these classifications, an area (an Air Pollution Control Region or portion there of) is classified as follows for each federal criteria pollutant:

- "Attainment" if the area has "attained" compliance with (that is, not exceeded) the adopted National Ambient Air Quality Standards for that pollutant.
- "Non-attainment" if the levels of ambient air pollution exceed the National Ambient Air Quality Standards for that pollutant.
- “Maintenance” if the monitored pollutants have fallen from non-attainment levels to attainment levels.

Areas for which sufficient ambient monitoring data are not available are designated as "attainment, unclassifiable" for those particular pollutants.

In addition to the designations relative to attainment of the National Ambient Air Quality Standards, the Clean Air Act requires the U.S. Environmental Protection Agency to place

selected areas within the United States into one of three classes which are designed to limit the deterioration of air quality when it is “better than” the National Ambient Air Quality Standards. “Class I” is the most restrictive air quality category and was created by Congress to prevent further deterioration of air quality in National Parks and Wilderness Areas of a given size which were in existence prior to 1977 or in additional areas that have since been designated Class I under federal regulations (40 Code of Federal Regulation 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allows a relatively greater deterioration of air quality, although still below National Ambient Air Quality Standards. No Class III areas have been designated.

Federal Prevention of Significant Deterioration regulations limit the maximum allowable increase in ambient particulate matter in a Class I area resulting from a major or minor stationary source to 4 $\mu g/m^3$ (annual geometric mean) and 8 $\mu g/m^3$ (24-hour average). Increases in other criteria pollutants are similarly limited. Specific types of “listed facilities” that emit, or have the potential to emit, 100 tons per year or more of particulate matter (PM), PM_{10}, or other criteria air pollutants, or any facility that emits, or has the potential to emit, 250 tons per year or more of PM, PM_{10}, or other criteria air pollutants is considered a major stationary source. However, fugitive emissions are not counted as part of the determination of major source status for prevention of significant deterioration for non-listed facilities such as gold mines. Major stationary sources that may affect a Class I area are required to notify federal land managers of Class I areas. There are no Class I areas within 100 kilometers of the Proposed Action area. The Class I planning area nearest to the Proposed Action area, the Jarbidge Wilderness Area, is located approximately 130 miles (210 kilometers) north of the Proposed Action area. Neither the existing BMM project air pollutant emission sources nor the Proposed Action emission sources are major stationary sources subject to prevention of significant deterioration regulatory requirements.

The Class II pollution concentration limits are triggered for a planning area when an application for a major source affecting that planning area has been deemed complete by the regulatory authority (40 Code of Federal Regulation 52.21[b][14]). The closest triggered Class II planning area (Air Pollution Control Region 179) is located approximately 25 miles (40 kilometers) east of the facility. The planning area in which the facility is located has not been triggered for any pollutant.

New Source Performance Standards, also required under the Clean Air Act, are set by the U.S. Environmental Protection Agency for specific types of new or modified stationary sources. New Source Performance Standards set fixed emission limits for classes of sources to prevent deterioration of air quality from the construction of new sources and to reduce control costs by building pollution controls into the initial design of sources. In establishing New Source Performance Standards, the U.S. Environmental Protection Agency is required to consider cost, non-air impacts, and energy requirements. Certain project units used to process metallic minerals are subject to the New Source Performance Standards found in 40 Code of Federal Regulation Part 60, Subpart LL (Standards of Performance for Metallic Mineral Processing Plants).

The Clean Air Act Amendments of 1990 introduced a new facility-wide permitting program known as the Federal Operating Permit, or “Title V,” program, that requires facilities with the potential to emit more than 100 tons per year of any regulated pollutant (excluding PM), 10 tons per year of any single hazardous air pollutant, or 25 tons per year or more of any combination of hazardous air pollutants to submit a Federal Operating Permit application.

The Clean Air Act directs the U.S. Environmental Protection Agency to delegate primary responsibility for air pollution control to state governments, which comply with certain minimum requirements. State governments, in turn, often delegate this responsibility to local or regional governmental organizations. The State Implementation Plan was originally the mechanism by which a state set emission limits and allocated pollution control responsibility to meet the National Ambient Air Quality Standards. The function of a State Implementation Plan broadened after passage of the Clean Air Act Amendments of 1990 and now includes the implementation of specific technology-based emission standards, permitting of sources, collection of fees, coordination of air quality planning, and prevention of significant deterioration of air quality within regional planning areas and statewide. Section 176 of the Clean Air Act, as amended, requires that federal agencies must not engage in, approve, or support in any way any action that does not conform to a State Implementation Plan for the purpose of attaining ambient air quality standards (Wooley, 1998).

Nevada State Air Quality Program

The Bureau of Air Pollution Control is the agency in the State of Nevada that has been delegated the responsibility for implementing a State Implementation Plan (excluding Washoe and Clark counties, which have their own State Implementation Plans). Included in the State Implementation Plan are the State of Nevada air quality permit programs (Nevada Administrative Code 445B.001 through 445B.3497, inclusive). Also, part of the State Implementation Plan is the Nevada State Ambient Air Quality Standards. The Nevada State Ambient Air Quality Standards are generally identical to the National Ambient Air Quality Standards, with the exception of the following: (a) an additional standard for carbon monoxide in areas with an elevation in excess of 5,000 feet above sea level; (b) the recently promulgated National Ambient Air Quality Standards for $PM_{2.5}$ (Nevada has yet to adopt the new standards); (c) the revised National Ambient Air Quality Standards for particulate matter of aerodynamic diameter less than 10 microns (PM_{10}); (d) ozone (Nevada has yet to adopt the new and revised standards); and (e) a violation of a state standard occurs with the first annual exceedance of an ambient standard, while federal standards are generally not violated until the second annual exceedance. In addition to establishing the Nevada State Ambient Air Quality Standards, the Bureau of Air Pollution Control is responsible for permit and enforcement activities throughout the State of Nevada.

The Proposed Action area is located in White Pine County, Nevada. The regulatory authority for air quality within White Pine County is the Nevada Bureau of Air Pollution Control. Before any construction of a potential source of air pollution can occur, an air quality permit must be obtained from the Bureau of Air Pollution Control.

The Bureau of Air Pollution Control permitting program implements the Title V federal operating permitting program, as well as the minor source permitting program for facilities that emit less than 100 tons per year of all criteria pollutants and are not a major source of hazardous air pollutants. BMM's current operations are regulated by three air quality operating permits. Operations at the BMM are permitted under the Bureau of Air Pollution Control's minor source permitting program via air quality operating permit AP1041-1362. The crushing circuit located at the BMM project area is permitted under permit AP1611-2227 for temporary sand and gravel processing. The Mooney Basin project operations were permitted under a Class III air quality operating permit AP1041-1336.

Barrick, in concert with the Bureau of Air Pollution Control, the U.S. Environmental Protection Agency, and three other mining companies participated in the Voluntary Mercury Reduction Program from 2001 to 2005. Using the data collected from that program, the Nevada Bureau of Air Pollution Control implemented the Nevada Mercury Control Program in March 2006 by

regulation. The Nevada Mercury Control Program is designed by regulation to control mercury emissions from thermal units located at precious metal mines and mills. In the initial phase of the Nevada Mercury Control Program, data on thermal units and their controls are being collected throughout Nevada. This would be followed by the development of Maximum Achievable Control Technology standards for each type of thermal unit. The installation of Maximum Achievable Control Technology control devices would be the main requirement of the ensuing mercury permitting program under the Nevada Mercury Control Program (Enviroscientists, 2008).

3.14.2 Air Quality Environmental Consequences

The primary indicator of air quality impacts would be the Nevada and U.S. Environmental Protection Agency National Ambient Air Quality Standards. The U.S. Environmental Protection Agency–defined Significant Contribution Levels would be used as indicators for Class I and Class II airsheds (there are no Class I areas within 100 kilometers of the BMM). These are enforced through air permitting requirements to protect public health.

The Nevada and National Ambient Air Quality Standards define air pollutant concentrations that are not to be exceeded in ambient air. Significant impact levels are quantitatively defined in U.S. Environmental Protection Agency regulations. The use of significant impact levels for indicators is conservative since no air permitting action has triggered a prevention of significant deterioration minor source baseline date that would make the significant contribution levels enforceable at Class I areas or any other area in the vicinity of the Proposed Action. Table 3-19 lists defined U.S. Environmental Protection Agency and Nevada Bureau of Air Pollution Control impact thresholds and impact limits for criteria air pollutants. For this analysis, ambient air quality impacts are considered minor when predicted impacts are below the Class I SILs, moderate when predicted impacts exceed the SILs but remain below the national and Nevada Ambient Air Quality Standards, or major when predicted impacts exceed the national or Nevada Ambient Air Quality Standards.

Though there are no mercury ambient air quality standards, BMM had modeling performed by Air Sciences to assess the mercury ambient air quality impact (Air Sciences, 2008). Based on 2007 BMM mercury emissions, the deposition impacts from the Nevada gold mines at the watersheds bordering Nevada with Idaho and Utah are between 0.06 percent and 6.35 percent of the total impact. Impacts from BMM range from 0.01 percent to 0.14 percent.

Table 3-19 summarizes significant impact levels, as well as State of Nevada and National Ambient Air Quality Standards, for all U.S. Environmental Protection Agency–defined criteria air pollutants.

The U.S. Environmental Protection Agency has supported development of a set of air quality dispersion models to estimate ambient air quality impacts in areas surrounding air pollutant emission sources. The U.S. Environmental Protection Agency recommends the use of the model most appropriate for the application based upon the nature and extent of the emission sources, the distance to potential off-site receptors, and the intervening terrain.

To assess ambient air quality impacts off-site as a result of the Proposed Action, the U.S. Environmental Protection Agency–approved model AERMOD was applied. As documented in the Air Quality Modeling Report in Appendix H, AERMOD, one of the most frequently used regulatory dispersion models in the United States since it replaced ISCST3 in U.S. Environmental Protection Agency guidance, is the most appropriate of the U.S. Environmental Protection Agency–approved models given the site's physical characteristics and the variety of

facility emission sources. Therefore, AERMOD was used to estimate potential off-site impacts as a result of maximum activity levels anticipated under the Proposed Action.

TABLE 3-19 MODELING SIGNIFICANCE LEVELS AND AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING PERIOD	U.S. ENVIRONMENTAL PROTECTION AGENCY-DEFINED CLASS II SIGNIFICANT CONTRIBUTION LEVEL[1] (SIL) (µG/M^3)	NATIONAL AAQS (µG/M^3)	NEVADA AAQS (µG/M^3)
Nitrogen Oxide	Annual	1	100	100
Sulfur Dioxide	Annual	1	80	80
	24 hours	5	365[2]	365
	3 hours	25	1,300[2]	1,300
Carbon Monoxide	8 hours	500	10,000[2]	10,000[3]
	1 hour	2,000	40,000[2]	40,000
PM_{10}	Annual	1	Revoked[4]	50
	24 hours	5	150[2]	150
$PM_{2.5}$	Annual	NA	15[5]	NS
	24 hours	NA	35[6]	35[6]
Lead	Quarterly	NA	1.5	1.5
Ozone	1 hour	NA	235[2]	235
	8 hour	NA	146.9[7]	NS

µg/m^3 = Microgram per cubic meter.
AAQS = Ambient Air Quality Standards.
NA = Not applicable.
NS = No state standard formally adopted.
[1] EPA, 1990.
[2] Applicable only in nonattainnment areas, not to be exceeded more than once per calendar year, 195 in Lake Tahoe Basin.
[3] 6,670 µg/m^3 at areas equal to or greater than 5,000 feet above mean sea level.
[4] U.S. Environmental Protection Agency revoked this standard effective December 17, 2006.
[5] 3-year weighted average.
[6] 3-year average of annual 98th percentile value.
[7] 3-year average of 4th maximum.

Proposed Action

For the purposes of analyzing the air quality impacts, the Proposed Action included the estimated emissions from future operations of the combined BMM and Mooney Basin Operations for an optimum operating scenario of the two larger open pits, North Pit and Top/Sage Complex, wherein the North Pit mining rate was 95,000 tons per day and the Top/Sage Complex mining rate was 125,000 tons per day. Ore from these mining operations would be delivered to the expanded BMM 2/3 Leach Pad and the expanded Mooney Basin Pad. Point source emissions were estimated for full production of loaded carbon through the BMM and Mooney Basin process facilities.

Stationary Process Point and Volume Source Air Pollutant Emissions

Under the Proposed Action the BMM would remain a Class II source with emissions below the Prevention of Significant Deterioration major source threshold. Table 3-20 provides a summary of the potential to emit criteria air pollutants from the Proposed Action. These are the emissions estimates that are expected to be requested as emission limits in an air permit application. The summary includes all on-site operational emissions: point sources (modeled as single point releases) include thermal sources, combustion sources, and a silo. Volume sources (modeled

as three-dimensional releases) include crushing and transferring, and conveying and stacking. Not included are commuter vehicles and some on-site vehicular traffic or equipment operation not related to production. These emission rates are based upon conservative assumptions that the site operates at full-load operations at the high end of the requested range of emission rates and all support systems operate sufficiently to support continuous operation. Actual operations do not typically reach the emission rates at potential maximum operation.

TABLE 3-20 STATIONARY PROCESS POINT AND VOLUME SOURCES POTENTIAL TO EMIT

POLLUTANT	POTENTIAL TO EMIT (TONS/YEAR)
Particulates as PM_{10}	45.2
Sulfur Dioxide	3.4
Carbon Monoxide	4.4
Oxides of Nitrogen	24.7
Volatile Organic Compounds	0.86

Source: Enviroscientists, 2008.

These potential-to-emit rates qualify the facility as a Nevada Class II source as defined under Nevada air quality regulations. The air quality impact analyses and their results are discussed under Ambient Air Quality Impacts.

Mercury Emissions

Mercury is a naturally occurring element in many soils, volcanic rocks, and marine and geothermal water sources. It assumes many forms and can be found naturally in the environment as free metallic mercury, chemically combined with other elements in a number of soil or rock types, and in the form of methylmercury in the biosphere. Mercury is generally present in the atmosphere in one of three chemical forms: gaseous elemental mercury, gaseous reactive mercury, or particulate mercury.

Particulate mercury is present naturally in the soils, overburden, and ore at the mine; therefore, it would be present as a small fraction of all particulate emissions produced during the various mine processes. Material handling; primary, secondary, and tertiary crushing; conveying; and stacking are potential emission sources of particulate mercury. Controls would be applied to each of the processes to reduce overall particulate emissions (Enviroscientists, 2008). Mercury emissions from fugitive dust at the mine (0.27 lbs/year) were estimated using an average mercury concentration of 1.726 ppm in the PM_{10} ore dust emissions from area sources (Dickerson, 2008). The weighted average of mercury concentrations in ore from drill hole data from 2008 is 3.16 ppm (Zietlow, 2009).

Thermal sources of mercury emissions associated with each of the two refining processes in the Proposed Action include the refining furnace, carbon kiln, retort, and electrowinning cells. All refining for the Proposed Action would occur at the refining facilities at the Mooney Basin Heap Leach Pad and at the BMM refinery. Mercury emissions will continue to be controlled as required by the Nevada Mercury Control Program as shown in Table 3-21.

TABLE 3-21 MERCURY EMISSIONS CONTROLS ON THERMAL SOURCES INSTALLED IN JANUARY 2009

THERMAL SOURCE	EXISTING CONTROL[1]	PROPOSED NVMACT CONTROLS[1]
Refinery furnace	Baghouse	Baghouse and carbon beds
Carbon regeneration kiln	Demister followed by carbon bed	Demister followed by carbon bed

THERMAL SOURCE	EXISTING CONTROL[1]	PROPOSED NVMACT CONTROLS[1]
Retort	Condenser followed by carbon bed	Condenser followed by carbon bed
Electrowinning cells	Spray chamber	Spray/cooling chamber, demister, heater, and carbon beds

[1] Future controls will be compliant with Nevada Maximum Achievable Control Technology (NvMACT) for mercury.

BMM is required to provide the total mercury emissions annually. Mercury speciation values are estimated in Table 3-22 from the most recent Ontario Hydro Method stack test data collected in July and August of 2007.

TABLE 3-22 MERCURY EMISSIONS FROM THERMAL SOURCES

SOURCE DESCRIPTION	Hg0 (POUNDS PER YEAR)	Hg2 (POUNDS PER YEAR)	HgP (POUNDS PER YEAR)	TOTAL Hg (POUNDS PER YEAR)
Carbon kiln	0.067	0.002	0.003	0.072
Electrowinning cells	46.25	0.19	0.00	46.44
Retort	0.024	0.004	0.000	0.029
Furnace	7.61	0.14	0.01	7.75
De minimis equipment	1.341	0.992	0.791	3.125
Facility Total	**55.3**	**1.3**	**0.8**	**57.4**

Hg - mercury
Hg0 – elemental mercury
Hg2 – divalent gaseous mercury
HgP – particulate mercury

The 57.4 pounds HG/year value shown in Table 3-22 reflects current conditions and emissions controls at BMM. Estimated mercury under the Proposed Action assuming similar rock characteristics and following the installation of remaining Nevada Maximum Achievable Control Technology controls as shown in Table 3-21 is 14.2 pounds mercury/year (EPA, 2001 and Lewis, 2008). This results in a reduction of 43.2 pounds per year or a 75% reduction in the mercury emissions from the BMM.

Area Source Emissions

Operation at the mine site for the Proposed Action involves area source emissions (modeled as two-dimensional releases). These include fugitive emissions from drilling, blasting, loading, unloading, wind erosion, haul roads, and dozing. Also included are tailpipe emissions from equipment and haul road vehicles. Table 3-23 shows the potential to emit for these emissions.

TABLE 3-23 STATIONARY PROCESS AREA SOURCE POTENTIAL TO EMIT

POLLUTANT	POTENTIAL TO EMIT (TONS PER YEAR)
Particulates as PM_{10}	544.7
Sulfur Dioxide	280.9
Carbon Monoxide	3510.2
Oxides of Nitrogen	5945.7
Volatile Organic Compounds	445.3

Source: Enviroscientists, 2008.

Commuter and Supply Vehicle Emissions
All passenger vehicles have tailpipe emissions. BMM presently employs approximately 180 to 210 full-time and 50 to 100 contract employees. Employees are transported via buses to the mining areas from Elko, Ely, and Eureka.

There are three main access routes to the Proposed Action area:

- From Elko via State Highway 228 (Jiggs Highway) south;
- From Ely and Eureka via U.S. Highway 50 to State Route 892 (Strawberry Highway); and
- From Ely via U.S. Highway 50 to Long Valley Road.

Total tailpipe emissions for commuter buses were calculated based on a traveling distance of 175 miles per day during site construction, 40 miles one way (80 miles round trip) of which are on unpaved roads. Two buses are used to transport employees. The average heavy duty diesel vehicle emission factor was based on the U.S. Environmental Protection Agency MOBILE6 program using default values. In addition to commuter buses, it is estimated that supply vehicles make four round trips per day covering the same distance and road routes. Table 3-24 summarizes the calculations of total potential emissions for commuting and delivery resulting from existing BMM operations.

TABLE 3-24 EMPLOYEE AND SUPPLY VEHICLE TAILPIPE EMISSIONS

VOLATILE ORGANIC COMPOUNDS (TONS PER YEAR)	CARBON MONOXIDE (TONS PER YEAR)	NITROGEN OXIDE (TONS PER YEAR)	PM_{10} (TONS PER YEAR)	SULFUR DIOXIDE (TONS PER YEAR)
0.71	5.31	4.44	0.13	0.01

Should employees drive a light duty gasoline vehicle instead of taking the bus, emissions per vehicle would increase by approximately 11 percent for volatile organic compounds, 16 percent for carbon monoxide, 1 percent for nitrogen oxide, 1 percent for particulate as PM_{10}, and 17 percent for sulfur dioxide.

In addition to tailpipe vehicular emissions by commuter buses and delivery trucks, fugitive PM_{10} emissions would occur from re-entrained dust from road surfaces. The same inputs regarding number of employees and use of buses, and supply vehicles described above were used to estimate fugitive dust emissions. Emission factors were developed, and PM_{10} emissions were calculated. Emission factors for paved road travel were calculated based on an average vehicle weight of 22.5 tons and surface silt content of 8.5 percent. The paved road traveling distance is estimated to be 95 miles round trip per day. Emission factors for unpaved road travel were calculated based on a surface silt content of 18.4 percent, an average vehicle weight of 22.5 tons, and 90 mean days with 0.01 inch or more of precipitation. Travel over unpaved roads was estimated at 80 miles round trip per day. The maximum PM_{10} fugitive emissions resulting from employees commuting and material deliveries for the existing BMM operations were estimated to be 447 tons per year. It is noted that all estimated commuter emissions as described above are for the continued use of established, public roadways already in existence, and not new access roads specific to the Proposed Action.

Greenhouse Gas Emissions
Recent scientific evidence suggests there is a direct correlation between global warming and emissions of greenhouse gases. Greenhouse gases include carbon dioxide, methane, nitrogen oxide, and ozone. Although many of these gases occur naturally in the atmosphere, man-made sources substantially have increased the emissions of greenhouse gases over the past several

decades. Of the man-made greenhouse gases, the greatest contribution currently comes from carbon dioxide emissions.

Greenhouse gases emissions associated with the proposed project primarily would be associated with the consumption of energy for mining and ore processing over the life of the mine. Operations that would contribute to greenhouse gases emissions would include:

- Fuel consumption (vehicles and machinery); and
- Electricity consumption (machinery, milling, heap leach water circulation, dewatering).

The estimated annual fuel and electrical power consumption under the Proposed Action are 7.7 million gallons and 10,900 mega watts per hour, respectively. The current national annual emissions of greenhouse gasses are approximately eight billion tons (EPA, 2008). Under the Proposed Action with fuel and energy consumption as described above, estimate greenhouse gas emissions from the project would be approximately 102,000 tons annually or approximately 0.002 percent of the national annual emissions.

Access Road Corridors

Current activity levels include the buses and limited private vehicle traffic transporting staff to and from the mine site and supply trucks bringing mine supplies. The sections above document the quantities of emissions associated with vehicular traffic to and from the mine. The approaching stretch of each of the two access roads is gravel surfaced, cutting down vehicle speeds but potentially increasing particulate emissions in the form of dust. There are few, if any, sensitive receptors in the direct impact area. The only property with human residence close to either access road in the area of analysis is a Barrick-owned ranch that rents space to mine contractor employees. That ranch and rental property is along a paved section of road at or beyond the edge of the direct impact area.

Ambient Air Quality Impacts

Dispersion modeling was conducted for the four criteria air pollutants (PM_{10}, carbon monoxide, nitrogen oxide, and sulfur dioxide) proposed to be emitted from the BMM above Nevada Division of Environmental Protection modeling thresholds (Enviroscientists, 2008). The U.S. Environmental Protection Agency–approved model AERMOD was applied consistent with Nevada Division of Environmental Protection and U.S. Environmental Protection Agency guidance to assess dispersion of those pollutants and potential impacts beyond the activity areas in the Proposed Action. Impacts were predicted at model receptors at 100-meter intervals along the Plan of Operations boundary and on a large Cartesian grid of receptors at 3,000-meter intervals beyond to cover a total area of 102 kilometers by 72 kilometers encompassing all areas with predicted impacts exceeding U.S. Environmental Protection Agency significant contribution levels. A model receptor was also placed at the site of one sensitive receptor, Gallagher State Fish Hatchery at the Ruby Lake National Wildlife Refuge, the nearest sensitive Class II area, to assess potential impacts there. All model sources and receptors utilized elevations calculated from U.S. Geological Survey 30-meter Digital Elevation Model data. For each averaging period for which a National Ambient Air Quality Standard exists, model sources were modeled under a scenario consistent with maximum operations under the Proposed Action. Ozone formation due to atmospheric transformation of project emissions is expected to be minimal because emissions are below Prevention of Significant Deterioration major source thresholds. Ozone formation was estimated using the Scheffe method consistent with Nevada Division of Environmental Protection guidance (Enviroscientists, 2008). The air quality modeling analyses verified that the furthest extent of significant contributions resulting from the Proposed Action ended well short of the Jarbidge Wilderness and all other Class I areas.

Air quality modeling also showed all predicted maximum impacts would occur on the Plan of Operations boundary, miles short of the nearest residence or area of regular human activity. The ratio of $PM_{2.5}$:PM_{10} for fugitive dust sources is approximately 0.15 (Pace, 2004; WRAP, 2006). This ratio is used in Table 3-25 to compare worst-case operation $PM_{2.5}$ ambient concentrations to the $PM_{2.5}$ National Ambient Air Quality Standards. Table 3-23 shows that the model-predicted maximum concentrations are well below the Nevada and National Ambient Air Quality Standards for all criteria pollutants at the facility property boundary.

TABLE 3-25 MODEL-PREDICTED MAXIMUM IMPACTS OF PROPOSED ACTION

Pollutant	Averaging Time	Highest Modeled Receptor Point					Lowest Applicable Ambient Standard ($\mu g/m^3$)
		Receptor Location[1]		Dispersion Modeling Results	Background Conc.	Maximum Ambient Conc.	
		UTM East (m)	UTM North (m)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	
PM_{10}	24-Hour	630,964	4,420,316	70.59	10.2	80.8	150
	Annual	630,964	4,420,266	5.90	9.0	14.9	50
$PM_{2.5}$	24-Hour	630,964	4,420,316	10.59	10.2 [2]	20.8	35
	Annual	630,964	4,420,266	0.89	9.0 [2]	9.9	15
Sulfur Dioxide	3-Hour	630,886	4,418,190	459.28	28.6	487.9	1,300
	24-Hour	630,885	4,418,340	97.84	18.3	116.14	365
	Annual	623,571	4,421,339	3.17	5.3	8.47	80
Carbon Monoxide	1-Hour	620,362	4,426,563	7,825	3,771	11,596	40,000
	8-Hour (< 5,000')	626,482	4,423,522	3,589	1,666	5,255	10,000
	8-Hour (≥ 5,000')	626,482	4,423,522	3,589	1,666	5,255	6,667
Ozone	1-Hour	-	-	197	141	197	235
Nitrogen Dioxide	Annual	623,571	4,421,339	67.9	9.43	77.3	100

[1] All coordinates in UTM projection, North American Datum 1927.
[2] $PM_{2.5}$ background very conservatively estimated as equal to PM_{10} background.
Source: Enviroscientists, 2008.

Table 3-26 documents the impacts at the identified sensitive receptor, the Gallagher State Fish Hatchery at the Ruby Lake National Wildlife Refuge. The table also documents the U.S. Environmental Protection Agency- and Nevada Division of Environmental Protection-defined significant contribution levels (Enviroscientists, 2008).

The air quality modeling analyses verified that the farthest extent of significant contributions resulting from the Proposed Action end well short of the Jarbidge Wilderness and all other Class I areas. Significant contributions of sulfur dioxide were limited to the immediate vicinity of the Plan of Operations boundary. The largest contributions for nitrogen oxide were estimated to be less than 15 miles in all other directions and less than 25 miles to the east. Tables 3-25 and 3-26 show that the maximum predicted air concentration of both acid rain precursors are below the significant impact levels, showing no significant contributions of those pollutants. A small section of the southernmost portion of the Ruby Lake National Wildlife Refuge drainage is expected to have minimal air concentrations of nitrogen oxide (less than one percent). The

Proposed Action would result in air quality impacts well within applicable impact limits in all areas and in insignificant contributions to air quality at all identified sensitive receptors.

TABLE 3-26 MODEL-PREDICTED MAXIMUM IMPACTS OF PROPOSED ACTION AT THE GALLAGHER STATE FISH HATCHERY SENSITIVE RECEPTOR

Pollutant	Averaging Time	Highest Modeled Concentration Gallagher State Fish Hatchery (µg/m^3)	Lowest Applicable Ambient Standard (µg/m^3)	Significant Contribution Level (µg/m^3)
PM_{10}	24-Hour	1.88	150	5
	Annual	0.05	50	1
Carbon Monoxide	1-Hour	486.92	40,000	2,000
	8-Hour (< 5,000')	128.71	10,000	500
	8-Hour (≥ 5,000')	128.71	6,667	500
Nitrogen Dioxide	Annual	0.49	100	1
Sulfur Dioxide	3-Hour	2.60	1,300	25
	24-Hour	0.35	365	5
	Annual	0.02	80	1

Source: Enviroscientists, 2008.

The primary emissions from the Proposed Action not included in the modeling impact analysis are the emissions from traffic bound to the mine. During operational periods, the impacts from mine-bound traffic would be comparable to impacts currently observed. Those impacts are expected to be minor and limited to intermittent periods of traffic at the few isolated areas of human activity along the primary access routes. Traffic levels would be higher during the construction phase, but only the few ranches closest to the most heavily traffic routes would see more than minor impacts from road dust. Given the facility's restriction on public access and meeting the Mine Safety Health Administration worker health safety standards, public exposure to hazardous materials through the air pathway would be well below allowable limits.

Indirect Impacts of Action Alternatives

The result of any action alternative would be an increase in employment at the mine site during construction and then a slight increase in employment at the mine site during the operational phase. Delivery shipments would increase during construction and then remain near current levels. The net result would be a temporary increase in population and economic activity in access communities to the north and south during construction estimated at under 10 percent and then an increase of a few percentage points during the operational phase. That increased activity would likely result in a comparable percentage increase in vehicular traffic and household activity that would be difficult to estimate but would be expected to generate a similar percentage increase in population and lifestyle-generated emissions of air pollutants in and around the surrounding communities.

Alternative A – Partial Backfill Alternative

This alternative would result in a net reduction of up to 11 percent from earth-moving emissions due to a reduction in disturbed areas of up to 434 acres. PM_{10} earth-moving construction and operation emissions would be less than with the Proposed Action. Equipment, site operation, and employee-commuting emissions would be essentially unchanged from those associated with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Under this alternative, there would be a small decrease in acres of disturbance compared with the Proposed Action. This would likely result in a proportional decrease in earth-moving emissions. Equipment, site operation, and employee-commuting emissions would be essentially unchanged from those associated with the Proposed Action.

No Action Alternative
This alternative would not result in any additional construction or operational air emissions associated with this project. Current mining activity would cease in 2009. Reclamation would occur for a few years, likely with air quality impacts at or below current mine operational air quality impact levels. After reclamation is completed in 2012, there would be no operational air quality impacts, and particulate emissions from wind erosion at the mine site would be diminished as a result of the reclamation effort. The post-reclamation period would see the currently minor air quality impacts in the Proposed Action area decrease to no impact as the reclaimed land establishes the same resistance to wind erosion as surrounding undisturbed land.

3.15 Visual Resources

This section describes visual resources in the Proposed Action area and the BLM's Visual Resource Management system, which is used in the analysis. This section also describes the Key Observation Points that were used to describe existing conditions and assess potential impacts of the Proposed Action and alternatives on visual resources.

3.15.1 Visual Resources Affected Environment

The visual resources analysis area consists of an approximately 200-square-mile area of the Ruby Mountains south of the Pony Express Trail, the adjacent portions of Huntington Valley and Newark Valley on the west, and Long Valley on the east (Figure 3-20).

The BLM's Visual Resource Management system provides a means to measure the scenic value of an area's visual resources so that the area can be appropriately managed (BLM, 1986a, 1986b, 1998a, 1998b). The Visual Resource Management system can also be used to analyze potential visual impacts and apply visual design techniques to minimize impacts on the landscape. The Visual Resource Management system consists of an inventory stage and an analysis stage. The inventory stage involves identifying and inventorying visual resources using BLM's visual resource inventory process. The analysis stage involves rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from representative or selected key travel routes and/or observation points. A Resource Management Plan establishes how public lands would be used and managed for different purposes. Visual resources are considered in development of a Resource Management Plan, and are assigned one of four Visual Resource Management classes. Management objectives of the Visual Resource Management classes are as follows:

Class I Objective. The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude limited management activity. The level of change to the characteristic landscape should be low and must not attract attention.

Class II Objective. The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes

must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III Objective. The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV Objective. The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of basic elements.

The Visual Resource Management system also subdivides landscapes into three distance zones based on relative visibility from travel routes or observation points. The three zones are foreground-middle ground, background, and seldom seen. The foreground-middle ground zone includes areas seen from highways, rivers, or other viewing locations that are within three to five miles of the observation point. The background zone is generally considered to include areas beyond the foreground-middle ground zone but usually less than 15 miles away. The seldom-seen distance zone is defined as the portion of the landscape that is not visible from the observation point or the portion that is visible but more than 15 miles distant.

Existing Conditions

The Proposed Action area is located in the Ruby Mountains near Bald Mountain. The Proposed Action area is bounded by Newark Valley and Huntington Valley on the west and by Long Valley on the east. Alluvial fans slope from the mountain foothills to the valleys on the east and west sides. Vegetation in the Proposed Action area consists mostly of gray-green sagebrush scrub at lower elevations and dark green pinyon-juniper forest at higher elevations. Past mining activity in the area has created areas of light tan rock disposal areas and heap leach pads that contrast strongly with the darker natural vegetation. The existing disturbance is visible from the valleys on both the east and west sides.

There are no heavily traveled highways, rest stops, scenic overlooks, or other attractions in the vicinity that would create important viewing locations for large numbers of travelers. The closest paved road is State Route 892, which is approximately six miles from the Proposed Action area. The highway is paved from U.S. Highway 50 north to the mine turnoff. The Long Valley Road connects U.S. Highway 50 with the Ruby Lake National Wildlife Refuge and the eastern slopes of the Ruby Mountains. This road is paved for about 25 miles north of U.S. Highway 50.

The Pony Express Trail crosses the Ruby Mountains at Overland Pass, about two miles north of the Proposed Action area at its closest point. (Figure 3-20) The views from the Pony Express Trail itself are generally restricted by topography and trees, and distant vistas open up only infrequently. West of Overland Pass, in particular, the Pony Express Trail follows Big Wash through a shallow canyon and the view from the Pony Express Trail remains limited until the Trail descends into Huntington Valley. The existing BMM can only be seen from select spots along the Trail and then only for short periods of time. The mine is more visible from Huntington Valley, but is further away at this point.

Figure 3-20 Visual Resources Study Area and Key Observation Points

Visual Resource Management Classes
The Ely District Resource Management Plan has identified the eastern two thirds of the Proposed Action area as a Class III Visual Resource Management area, with the western third identified as Class IV. The current Mooney Basin Mine and top pit region of the BMM is within a Class III Visual Resource area which was designated due to the proximity of the Long Valley Road. The north and lower western portions of the BMM are within a Class IV visual resource area. The closest Class II Visual Resource Management area is located north of the Proposed Action along the Pony Express Trail (Figure 3-20).

Key Observation Points
In order to describe the existing visual environment and make an assessment of potential project impacts, representative viewing locations called Key Observation Points were selected. Key Observation Points are points on a travel route or from a use area where the view of the proposed activity would be most revealing. For this project, four Key Observation Points were selected from the analysis area (Figure 3-20). The Key Observation Points and existing visual condition of the landscape seen from each Key Observation Point are described below.

Key Observation Point 1
Key Observation Point 1 is located at the intersection of the Pony Express Trail and State Route 892, approximately 4.7 miles west of the Proposed Action area at its closest point. The view to the east includes the tan and gray-green valley floor with dark green forested mountains rising in the distance (Figure I-1 in Appendix I). Disturbance from past and current mining is clearly visible from this location even though the entire disturbance is over five miles away and in the background zone. Visible disturbance includes the North Area Rock Disposal Area on Big Bald Mountain, the 2/3 Heap Leach Pad and RBM Rock Disposal Area in the center, and the Rat Rock Disposal Area on Little Bald Mountain. Key Observation Point 1 is within Visual Resource Management Class II and the disturbances visible from that observation point are in a Management Class IV.

Key Observation Point 2
Key Observation Point 2 is located approximately 80 feet south of the Pony Express Trail at a location where the north slopes of Big Bald Mountain and the foothills are visible from a clearing in the trees. This Key Observation Point is approximately three miles from the Proposed Action area at its closest point. The foreground is a mix of sagebrush and pinyon-juniper forest (Figure I-1 in Appendix I). The slopes of the mountain foothills are mostly forested, and no disturbance is visible. The viewshed from Key Observation Point 2 for a distance of one mile is in Visual Resource Management Class II. After that, the viewshed is within a Visual Resource Management Class IV to the west and Class III to the east.

Key Observation Point 3
Key Observation Point 3 is located on the Long Valley Road, approximately 2.2 miles east of the Proposed Action area at its closest point. The view to the southwest shows the sagebrush-covered valley floor with forested mountains in the background (Figure I-2 in Appendix I). The only disturbance visible is a portion of the lighter-colored East Sage Rock Disposal Area that is approximately 3.3 miles away and partially hidden by hills on both sides. Most of the view on from Key Observation Point 3 is within Visual Resource Management Class III. The Class II viewshed around the Pony Express Trail is about five miles to the north.

Key Observation Point 4
Key Observation Point 4 is also on the Long Valley Road just inside the eastern boundary of the Proposed Action area near the existing Mooney Basin Heap Leach Pad. The view to the southwest shows the sagebrush-covered floor of Mooney Basin with mountains forming a

backdrop (Figure I-2 in Appendix I). Existing disturbance visible from Key Observation Point 4 includes a portion of the existing leach pad, some dirt roads in the distance, and a few wooden power poles. Mooney Basin is within a Visual Resource Management Class III viewshed. (Figure 3-20).

3.15.2 Visual Resources Environmental Consequences

Proposed Action

Anticipated environmental impacts to visual resources include changes in line, form, color, and texture that result from vegetation clearing and construction of pits, rock disposal areas, and other facilities. This section provides a general description of proposed facilities that could affect visual resources, describes potential impacts, and determines Visual Resource Management consistency of the Proposed Action and Alternatives. Cumulative impacts are discussed in Section 4.15.

The assessment of visual impacts is based on impact criteria and methodology described in the BLM Visual Contrast Rating System (BLM, 1986b). Two issues are addressed in determining impacts: (1) the type and extent of actual physical contrast resulting from the Proposed Action and (2) the level of visibility of a facility, activity, or structure. Impacts are considered high if visual contrasts that result from landscape modifications affect the quality of any scenic resources; scenic resources having rare or unique values; views from, or the visual setting of, designated or planned parks, wilderness areas, natural areas, or other visually sensitive land uses; views from, or the visual setting of, travel routes; and views from, or the visual setting of, established, designated, or planned recreational, educational, or scientific facilities, use areas, activities, viewpoints, or vistas. Appendix I contains Visual Contrast Rating Worksheets that are based on field examinations of the visual settings of each Key Observation Point. The forms describe the existing conditions of the characteristic landscape seen from each Key Observation Point, types of viewers, sensitivity of viewers, and other relevant information.

The extent to which elements of the Proposed Action would affect the visual quality of its viewshed depends on the degree of visual contrast between proposed facilities and existing landscape elements (form, line, color, and texture) and features (land and water surface, vegetation, and structures). Described below are potential impacts of the Proposed Action from the Key Observation Points. Visual simulations were developed for Key Observation Points 2, 3, and 4 to illustrate post-project conditions under the Proposed Action.

Key Observation Point 1

Even at a distance of almost five miles west of the Proposed Action area, the proposed disturbance would be visible from Key Observation Point 1 and would add to the contrast of existing mining disturbance with natural vegetation. During active mining, the proposed western rock disposal areas and 2/3 Heap Leach Pad would create a moderate level of contrast from those of existing conditions. This would meet the management goals for lands within a Class IV Viewshed. Following the active mining period, the rock disposal areas and heap leach pads would be recontoured and smoothed to make them more similar to natural landforms. After vegetation is established, the contrast with natural surroundings would be less noticeable and the reclaimed areas likely would not draw as much attention from viewers at Key Observation Point 1. Open pits and changes in form, color, and texture would remain indefinitely.

Key Observation Point 2

This existing view of the north slopes of Big Bald Mountain from near the Pony Express Trail shows an undisturbed landscape. Construction of North Area Rock Disposal Area would create a lighter-colored area that would contrast with the surrounding vegetated hillsides. Because the rock disposal area is over three miles away, the level of contrast would be moderate, but the

rock disposal area could draw attention of viewers near the Pony Express Trail who are looking in that direction. It should be noted that the mine is only intermittently visible from the Pony Express trail near Key Observation Point 2, and only for short periods of time. The additional disturbance from the Proposed Action would be noticeable, but not dominating the occasional views that are found along the Trail.

Following the active mining period, the rock disposal area would be recontoured and smoothed to make it more closely resemble a natural landform. After vegetation becomes established, the contrast with natural surroundings would be less noticeable and the reclaimed area likely would not draw as much attention from viewers near the Pony Express Trail. Open pits and changes in form, color, and texture would remain indefinitely. The second photograph in Figure H-3 in Appendix H is a simulation of the view from Key Observation Point 2 during active mining. The third photograph in Figure I-3 in Appendix I is a simulation of the view from Key Observation Point 2 following successful reclamation.

Key Observation Point 2 is within a Class II viewshed that extends for one mile on either side of the Pony Express Trail. The mine disturbance that is visible from Key Observation Point 2 is within a Class IV viewshed. The boundary of the Class II viewshed is 0.6 miles from the Plan of Operation boundary at its closest point. Visual changes due to the proposed action are well within the management goals for a Class IV Visual Management area.

Key Observation Point 3

The East Sage Rock Disposal Area is the only disturbance presently visible in the view to the southwest from Key Observation Point 3 on Long Valley Road. The proposed expansion of the East Sage Rock Disposal Area would result in a much larger area of contrast. Although about three miles away, the expanded rock disposal area would draw the attention of observers because of the scale and its contrasting color and shape. At the conclusion of mining and after successful reclamation, the level of contrast would be reduced but would still likely be moderate because of the scale. The East Sage Rock Disposal Area is in Visual Resource Management Class III that allows for moderate change. During mining the contrast would be strong and would temporarily be outside of Class III management objectives. However, following reclamation the disturbance change again would be moderate and would meet objectives. Figure I-4 in Appendix I shows the current view, a simulation of the view from Key Observation Point 3 during active mining, and a simulation of the view from Key Observation Point 3 following successful reclamation.

Key Observation Point 4

The view to the southwest from Key Observation Point 4 on the Long Valley Road shows the Mooney Basin Valley and foothills behind. At present, a portion of the existing Mooney Basin Heap Leach Pad, a few wooden power poles, and dirt roads are visible. The proposed expansion of the leach pad would fill much of the valley. The leach pad would be approximately 1.5 miles long, up to 0.5 mile wide, and 7,175 feet above mean sea level at its highest point (approximately 225 feet above existing ground level). The leach pad would be highest on the north end and slope downward to the south. The scale of the leach pad and its color and shape would create a strong contrast with the existing view and would be outside of Class III Management objectives. After active mining is completed and the leach pad has been successfully reclaimed, the contrast would be reduced. Reclamation would include smoothing the sides of the leach pad and grading to a slope of 3H:1V for a more natural appearance. When graded to final contours and vegetated, the reclaimed leach pad would more closely resemble a natural landform. The degree of contrast would be moderate because of the scale and remaining differences in color compared with the surrounding undisturbed land. Figure I-5 in Appendix I shows the current view, a simulation of the view from Key Observation Point 4

during active mining, and a simulation of the view from Key Observation Point 4 following successful reclamation.

Overall perspective should be noted in this analysis. Mooney Basin Mine was in existence prior to the BLM designation of a Class III Visual Management Corridor along the Long Valley Road. Visual Class Designations were assigned to large regions as a whole, and site specific disturbances were not given special consideration during the designations. There are several mines and disturbances along the Long Valley Road near Key Observation Point 3 that have had strong visual contrast that did not meet Class III objectives during operations. However, it is believed that following reclamation, the visual contrast for all of these mine sites would be reduced to moderate and would then meet the management objectives. The Ely District Resource Management Plan allows for, and acknowledges, the visual disturbance of projects that have valid existing rights such as mining. Mitigations may be required based on the visual management class. For the Proposed Action, the concurrent and final reclamation that are required to meet the 43 CFR 3809 and Nevada State reclamation standards are the mitigations. BMM has a proactive history of meeting and exceeding these reclamation standards.

In summary, the views from Key Observation Points 1 and 2 would meet management objectives. The views from Key Observation Points 3 and 4 would not meet management objectives during mining, but would meet them after reclamation. Mitigation through reclamation first involves blending visual disturbance lines and form through recontouring to better match those of the existing landscape. This alone can greatly reduce the contrast, especially from a distance. Color and texture changes would proceed more slowly over time, since this is more dependent on successful reclamation and a return to the native climax community. The color and texture contrast from bare earth to the start of a vegetative community will reduce contrast rather quickly and dramatically. However, there would still be a color and texture contrast between the re-established vegetation and the surrounding undisturbed vegetation for a number of years. The contrast would slowly fade over time as the native vegetation begins to re-establish. In areas of Pinyon and Juniper, this could be 20 years or more. However, it should be noted that vegetation enhancement projects and natural fires also occur throughout the Class III area that have similar visual effects. Areas of contrasting color and form from the Proposed Action can blend in with other and more natural processes that create vegetative diversity throughout the region.

Alternative A – Partial Backfill Alternative

Under this alternative, selected pits would be backfilled with waste rock, reducing the area of disturbance and volume of some of the rock disposal areas. Compared with the Proposed Action, the effect on visual resources of a reduction in size of the rock disposal areas would be minimal. As viewed from Key Observation Point 1, any reduction in size of the rock disposal areas would likely be difficult to detect at a distance of five miles. There would be no change in impact to visual resources from Key Observation Point 2 because the only visible rock disposal area (Rock Disposal Area 3) is not proposed to be reduced under this alternative. As viewed from Key Observation Point 3, the reduction in size of the East Sage Rock Disposal Area would not measurably change the degree of contrast. Therefore, the level of impact to visual resources would be virtually the same as under the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Under this alternative, the footprint of the Mooney Basin Heap Leach Pad would be reduced from approximately 379 acres to 283 acres while the 2/3 Heap Leach Pad would be increased from approximately 350 acres to 630 acres. As viewed from Key Observation Point 1, the difference in size of the 2/3 Heap Leach Pad would likely be difficult to detect at a distance of five miles. There would be no change in impact to visual resources from Key Observation

Points 2 and 3 because the leach pads would not be visible. As viewed from Key Observation Point 4, the reduction in size of the Mooney Basin Heap Leach Pad, although considerable, would not change the degree of contrast. The color and scale of the smaller leach pad would still create a strong contrast during active mining and a moderate contrast following reclamation. Therefore, the level of impact to visual resources would be virtually the same as under the Proposed Action.

No Action Alternative
Under this alternative, gold mining activities would continue under the current authorizations for the BMM and Mooney Basin Operations Area. There would be no change in the level of authorized impacts to visual resources.

3.16 Noise and Vibration

Assumptions for Analysis
The following assumption was made for the noise and vibration analysis:

- Noise associated with the Proposed Action would be generated with similar equipment and at levels similar to those associated with the existing operation.

Noise attributes (pitch, loudness, repetitiveness, vibration, variation, duration, and the inability to control the source) determine how a receptor is affected. The study of noise involves three important characterizing parameters: pressure, power, and intensity. The power of an oscillating sound wave is composed of kinetic and potential energies. The intensity of a sound wave is defined as the average rate at which power is transmitted per cross-sectional area in the direction of travel. Noise versus sound is a subjective measurement, and thus a receptor's reaction to sound is a poor measurement of the effect of noise.

The Federal Noise Control Act of 1972 established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. The U.S. Environmental Protection Agency was given responsibility for implementing programs to assess noise and identify acceptable noise impacts.

The U.S. Environmental Protection Agency identifies outdoor noise limits to protect against effects on public health and welfare by an equivalent sound level (Leq), which is an A-weighted average measure over a given time. Outdoor limits of 55 A-weighted decibels Leq have been identified as desirable to protect against speech interference and sleep disturbance for residential areas and areas with educational and healthcare facilities. Sites are generally acceptable to most people if they are exposed to outdoor noise levels of 65 A-weighted decibels Leq or less, potentially unacceptable if they are exposed to levels of 65 to 75 A-weighted decibels Leq, and unacceptable if exposed to levels of 75 A-weighted decibels Leq or greater (EPA, 1981).

Generally, natural noise levels would be approximately 35 A-weighted decibels in rural areas away from communities and roads. Within a rural community, the man-made noise level ranges from 45 A-weighted decibels to 52 A-weighted decibels (EPA, 1981). The day-night sound level (the A-weighted equivalent sound level for a 24-hour period with an additional 10 decibels imposed on the equivalent sound levels for nighttime hours of 10 PM to 7 AM) in residential areas should not exceed 55 A-weighted decibels to protect against activity interference and annoyance (EPA, 1981). Table 3-27 presents typical sound levels in A-weighted decibels and subjective descriptions associated with various noise sources.

There are no State of Nevada noise standards directly applicable to the Proposed Action; however, Nevada Revised Statutes give county and city governments the right to implement noise restrictions. No such ordinances apply in the sections of White Pine County where the Proposed Action and associated project components would be located.

TABLE 3-27 SOUND LEVELS ASSOCIATED WITH ORDINARY NOISE SOURCES

NOISE SOURCE	NOISE LEVEL (A-WEIGHTED DECIBELS)	SUBJECTIVE DESCRIPTION
Commercial Jet Take-Off	120	Deafening
Road Construction Jackhammer	100	Deafening
Busy Urban Street	90	Very loud
Standard For Hearing Protection 8-Hour Exposure Permissible Exposure Limit (Mine Safety Health Administration) Action Level within Active Mining Facilities	90 85	Very loud Loud – to very loud
Construction Equipment at 50 feet	80-75	Loud
Freeway Traffic at 50 feet	70	Loud
Noise Mitigation Level for Residential Areas Federal Housing Administration	67	Loud
Normal Conversation at 6 feet	60	Moderate
Noise Mitigation Level for Undisturbed Lands (FHA)	57	Moderate
Typical Office (interior)	50	Moderate
Typical Residential (interior)	30	Faint

Source: Federal Highway Administration Highway Construction Noise Handbook (2006).

3.16.1 Noise and Vibration Affected Environment

Area of Analysis

An assessment of noise levels for any area requires an explanation of noise effects and consideration of the topography, climate, flora, and current ambient noise is required. For wildlife, the affected environment for noise impacts is usually limited to a distance of 880 yards (2,640 feet) from the source based on current wildlife studies (Fletcher, 1978). However, if residential housing has potential to be impacted, the affected environment includes the distance from the source of the noise to the residence.

Noise impacts were assessed in a five-mile radius around all mine activities. There were no identified sensitive receptors within a five-mile radius of the mine; with the exception of the Tumbling TR Ranch, which is the Barrick-owned ranch located to the southwest of the mine site. A property was considered a sensitive receptor if impacts to these sites could effect existing (or formerly and definitive planned) populations or areas especially sensitive to those impacts.

Indicators

The unit of sound level measurement (i.e., volume) is the decibel, expressed as A-weighted decibel. The A-weighted decibel measure is used to evaluate ambient noise levels and common noise sources. Sound measurements in A-weighted decibels give greater emphasis to sound at the mid- and high-frequency levels, which are more discernible to humans. The decibel is a logarithmic measurement; thus, the sound energy increases by a factor of 10 for every 10 A-weighted decibel increase. A three A-weighted decibel change in noise level is considered barely perceptible, while a five A-weighted decibel change is typically perceptible to most people.

The primary indicator of noise levels for this and similar analyses is the A-weighted average noise level measured in decibels. The one-hour average noise level (A-weighted decibel Leq (one hour)) is often used to characterize ongoing operations or longer-term impact analyses. The maximum A-weighted decibel level (Lmax) is used to document the highest intensity, short-term noise level. Routine noise levels over 50 A-weighted decibels Leq or over 70 A-weighted decibels with some regularity would be considered a moderate impact. Regular public exposure to noise levels over 70 A-weighted decibels would be considered a major impact. Maximum public exposure below moderate levels defined would be considered a minor impact.

Affected Environment

The primary natural source of noise currently observed in the Proposed Action area is wind. Noise from the existing BMM operations is added to the natural sources in the baseline condition of the Proposed Action area. There are few receptors within audible range of the existing mine. Intermittent blasting can be heard, mostly faintly, at only a few receptors representing human residences or activity. Transportation impacts, primarily along the access routes, currently have light impacts on the few ranches scattered along the routes. Existing natural noise levels are generally low intensity away from traffic corridors, estimated to average between 30 and 35 A-weighted decibels. Traffic impacts contribute slightly higher background noise levels. The only human activity within the direct impact area close to the traffic corridor is a ranch, which is owned by Barrick and used for renting space to mine contractors. Existing conditions include the current level of activity at and supporting the BMM.

Mine Site

Most of the equipment on-site at the BMM generates sound levels at or below 90 A-weighted decibels Leq at 50 feet. Table 3-28 estimates noise levels at 50 feet generated by intermittent activity at the mine.

Noise levels drop off progressively with distance from the source. There are few sensitive receptors in the vicinity. The nearest residence or areas of human activity are ranches in the valleys, which are at least five miles away from the mine boundary. Current mine activities have only minor noise impacts on any off-site human receptors because the distances to the nearest occupied areas are sufficient to attenuate the noise of the heavy equipment to near background levels. Intermittent blasting can be audible but is at low enough volume and frequency to be considered minor. The mine site is mostly above surrounding terrain, limiting the potential for noise reflection or concentration by terrain. According to BMM staff, no complaints from surrounding land users for excessive noise have been received (Zietlow, 2007d).

TABLE 3-28 HIGHER VOLUME CONSTRUCTION EQUIPMENT NOISE SOURCES

NOISE SOURCE	MEAN NOISE LEVEL AT 50' (A-WEIGHTED DECIBELS)	MAXIMUM NOISE LEVEL AT 50' (A-WEIGHTED DECIBELS)
Haul Truck	80	84
Pile Driver	95	101
Blasting	94	N/A
Earth Scraper	90	94
Front End Loader	80	96 (within 15')
Blast Hole Drill	85	N/A
Exploration Drill	85	N/A

Source: Federal Highway Administration Construction Noise Handbook (2006).

Access Road Corridors

Current activity levels include bus and limited private vehicle traffic transporting staff to and from the mine site and trucks bringing mine supplies. The approaching stretches of access roads are

gravel surfaced, which tends to reduce vehicle speeds and associated noise. There are two ranches within one mile of the road to Jiggs (about 25 miles north of the mine and outside the area of analysis) and another ranch on State Route 892 that is owned by Barrick and is used to house mine contractors. Therefore, noise levels from traffic to and from the mine are short in duration and minor in magnitude.

3.16.2 Noise and Vibration Environmental Consequences

Potential sources of noise and vibration include earth moving, blasting, drilling, and increased traffic, as described below.

Indicators

Neither the State of Nevada nor White Pine County have regulations quantitatively limiting noise generation or impacts from the proposed project during the construction or operational phases. For this analysis, the U.S. Environmental Protection Agency guideline recommends that noise levels above 55 A-weighted decibels day-night sound level at residential land use be used as a guide for assessing impacts at the nearest home, ranch, business, or identified receptor.

Proposed Action

Mine Site

Expanded mine activities would closely resemble the historic and ongoing activities at the mine, which feature significant earth-moving activity. The noise profile from construction activities is expected to be little different from the existing noise profile. There might be more noise generated on site if new equipment was brought in to prepare for expanded operations. Even with that additional equipment, construction noise other than blasting would be attenuated down to background levels by the distance to the nearest human receptors.

Noise from project activity during the operational phase would primarily be generated by site equipment, blasting, drilling, and traffic to and from the site. The Proposed Action could result in slightly increased activity at the mine. The overall mine noise generation profile would be minimally changed compared with current activities on site because there is expected to be little change in the activities that generate the most noise, including blasting. Therefore, the noise profile described under existing conditions would also be representative of noise generation anticipated. The locations of the noise-generating activities would change slightly, but those changes would be expected to be unnoticeable or minor at all off-site receptors.

One of the closest private properties to the Proposed Action is located at NE ¼ NE ¼ Section 5, T23, R58, Lot #1. This property is currently undeveloped and unoccupied. The background noise levels in regional rural locations such as that surrounding the Proposed Action, are driven by natural conditions and are normally 35 A-weighted decibels or less, away from local sources such as roads. This property is located east of the BMM mine property. BMM operations on the southeast side of the mine, both existing and proposed, include the Mooney Heap Leach Pad, the Sage, Belmont, and Bida pits and associated rock disposal areas. The existing BMM Mooney Heap Leach Pad is approximately 7,500 feet northwest of the property. The Proposed Action would expand the leach pad to within 4,800 feet west-northwest of the property. The existing BMM Sage, Bida, and Belmont pits and their associated rock disposal areas are approximately 7,000 feet from the private property to the west-northwest and west-southwest. The Proposed Action would bring the nearest mine pit activity 8,400 feet west-southwest of the private property, and the nearest rock disposal areas activity 5,000 west-southwest of that property. No other BMM existing or proposed operations occur within two miles of the referenced property.

The BMM Mooney Basin operations are located in the south-southwest to north-northeast trending Mooney Basin. Noise travels by line of sight and is stopped or significantly buffered by intervening terrain. The ridges on each side of the Mooney Basin effectively block transmission of noise to the referenced private property. The Maverick Spring Ridge is located between the BMM operations and the property. The property is well below the ridge line and the Maverick Spring Ridge to the west blocks the majority of the historic Mooney Basin and BMM activities. BMM activities that are visible are associated with the small Belmont pits on the west side of the basin. All other historic BMM activity would have terrain between operational areas and the private property that would buffer and minimize noise transmission.

The only new BMM activity with the implementation of the Proposed Action without intervening terrain toward the referenced private property would be small sections of the far southern end of the expanded Mooney Heap Leach Pad.

Analytical assessments of noise generated by the Proposed Action in the vicinity of the eastern BMM property boundary were prepared using conservative assumptions of noise generated and regional and local environmental attenuation. Those quantitative analyses showed noise impacts from currently permitted on-site BMM operations are estimated to have a maximum 15 minute average of approximately 51 A-weighted decibels, and to have an instantaneous peak near 62 A-weighted decibels when blasting occurred near the eastern mine boundary. The average and maximum noise impacts of the Proposed Action would be comparable to those of the existing action. Under the Proposed Action, noise impacts are estimated to have a maximum 15 minute average of approximately 54 A-weighted decibels during the operational phases, and to have an instantaneous peak near 61 A-weighted decibels during blasting. The noise impacts have the potential to be three to four A-weighted decibels higher during the brief construction period associated with the Proposed Action. Higher equipment usage rates will result in a maximum 15 minute average of approximately 58 A-weighted decibels during the brief construction phase. Operations may have an instantaneous peak near 64 A-weighted decibels if blasting and the construction phase occurred simultaneously.

Under the Proposed Action, the increase in maximum short-term average noise is predicted to be approximately four A-weighted decibels, just barely above the three A-weighted decibels threshold of human perception. The maximum increase in noise levels when blasting would be below the human perception threshold. The predicted maximum noise levels are below the 50 A-weighted decibels routine and 70 A-weighted decibels instantaneous thresholds for moderate impact.

Access Road Corridors

The Proposed Action would result in a slight increase in commuter traffic to and from the mine site. One bus would likely be added to the current fleet of two buses to transport staff to and from communities to the north and south. There should be little change in individual commuter vehicles because personal vehicle travel to the site is discouraged and, because of the cost, employees rarely use personal vehicles unless they miss the bus or van. Supply vehicle traffic could potentially increase by 10 to 15 percent. Direct impacts of these slight increases in traffic along access roads would be minor. As noted previously, there are no occupied residences or businesses near either access road within 10 miles of the mine, other than the Barrick-owned ranch.

Direct impacts include regional traffic to and from the facility. Indirect impacts could include increased traffic, noise, and general activity in the vicinity, primarily in communities along U.S. Highway 50 to the south of Jiggs and communities to the north, associated with increased levels of support services and employment. Those effects are expected to be minor, as the Proposed

Action would represent a maximum staffing increase of approximately 110 individuals. Increased noise from traffic would also be expected along the Long Valley Road. BMM uses Long Valley Road for deliveries of equipment and materials to the Mooney Basin area. Historic traffic volumes are understood to be light, resulting in raising the maximum sustained noise levels on the property to between 35 and 40 A-weighted decibels, with higher instantaneous noise levels with the passage of vehicles. The Proposed Action would not be expected to result in any road improvements that would not have otherwise occurred, and would not be expected to affect any traffic on Long Valley Road other than mine-bound traffic. The proposed 10 to 15 percent increase in the historically light traffic would be expected to result in sustained noise impacts that were insignificant and probably below the threshold of human perception. Instantaneous impacts at the same elevated levels would be slightly more frequent, but would only lead to perceptible changes in sustained noise during periods of concentrated traffic during construction or the initial operational phases.

Therefore, the effect of the Proposed Action would be little or no increase in humanly perceptible noise compared to current or historic noise levels.

Alternative A – Partial Backfill Alternative
Direct and indirect impacts from project activity noise would be the same as those that would occur under the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Direct and indirect impacts from project activity noise would be the same as those that would occur under the Proposed Action.

No Action Alternative
The No Action Alternative would result in no change to existing noise levels at the mine until operations terminate. The lack of operational noise from the mine after reclamation was concluded would not be noticeable to the nearest residents, though those along the access roads would notice the lighter mine traffic and associated cessation of intermittent road noise. Indirect impacts could result in less noise in surrounding communities associated with fewer employees and likely a population decrease.

3.17 Socioeconomics

This section describes existing socioeconomic conditions and identifies potential effects of the Proposed Action and alternatives.

3.17.1 Socioeconomics Affected Environment

The analysis area for socioeconomic impacts comprises White Pine, Elko, and Eureka counties, all of which are predominantly rural and without large urban centers. Mining has been a major economic force in the area since the arrival of the first settlers in the mid-1800s. Even today, the economies of White Pine, Elko, and Eureka counties tend to follow the cycles of hard rock mining activity. In recent times, the area's scenic beauty, wildlife, and public lands have attracted increasing numbers of tourists and second-home owners. An economic profile of the three counties is presented in Table 3-29.

Elko County is the largest of the three counties in land area, and it also has the largest population and the most diversified economy. The largest employers in the county include state and local government, casino-hotels, retail outlets, a regional hospital, and mining companies (NDETR, 2007). Elko is the largest town in Elko County with a population of approximately

17,000, or about 33 percent of the County's total population (City of Elko, 2007). The town of Elko is on Interstate Highway 80, approximately 65 miles north of the BMM.

TABLE 3-29 COUNTY ECONOMIC PROFILES

	ELKO	EUREKA	WHITE PINE
Land Area[1] (square miles)	17,179	4,176	8,876
Population[1]			
2000	45,291	1,651	9,181
2006 est.	47,114	1,480	9,150
Employment[2]			
Civilian Labor Force (Oct. 2007)	26,744	784	4,718
Percent Unemployed (Oct. 2007)	3.3%	5.5%	4.2%
Housing[1]			
Housing Units (2005)	19,066	1,064	4,451
Percent Home Ownership (2000)	69.9%	73.7%	76.6%
Building Permits (2005)	198	0	20
Taxable Retail Sales[3] (2004, millions)	$805	$173	$102
Income[1]			
Median Household Income (2004)	$52,202	$42,790	$39,420
Per Capita Income (1999)	$18,482	$18,629	$18,309
Percent Below Poverty Level (2004)	8.7%	9.0%	12.4%
Average Wage (FY 2007)[4]	$15.49	$31.70	$16.35

[1] U.S. Census Bureau, 2007a.
[2] FRBSL, 2007.
[3] NDETR, 2007.
[4] EDAWN, 2007.

Elko County has seven elementary schools, two middle schools, three high schools, four combined schools, and several rural schools. Great Basin College is located in Elko. The City of Elko is served by Sierra Pacific Power Company; the cities of Carlin, Wells, and West Wendover are served by Wells Rural Electric Company. Law enforcement, fire protection, ambulance, and emergency medical services are provided by the County. County-provided services are generally adequate to serve the existing population (Johnson, 2008). The more rural areas tend to have longer response times for emergency services because of the County's large area of service.

Temporary housing is currently in fairly short supply in Elko, but there is an adequate supply of homes on the market and the supply of housing continues to expand (Aguirre, 2007).

The Elko County budget (NDT, 2007a) for the fiscal year ending June 30, 2007, listed total revenues of $29,784,245, the largest components of which were Intergovernmental Resources (54 percent) and property taxes (27 percent). The Intergovernmental Resources category includes such items as state and federal grants and state shared revenue.

Over the last 10 years, the unemployment rate in Elko County has averaged 4.4 percent, reaching a high of 7.6 percent in 1998 and a low of 3.0 percent in 2005 and 2006 (FRBSL, 2007).

The population of Eureka County is approximately 1,500, with most residents living in the unincorporated town of Eureka, which is on U.S. Highway 50, approximately 60 miles by road southwest of the BMM. The largest employers in Eureka County are mining companies, followed by local government, hotels, construction companies, and retail outlets (NDETR, 2007). The average wage in the county (Table 3-29) is higher than any other county in Nevada because of the large proportion of workers in well-paying jobs in the mining industry. The Eureka County budget (NDT, 2007a) for fiscal year ending June 30, 2007, listed total revenues of $11,371,543, the largest components of which were Intergovernmental Resources (44 percent) and property taxes (47 percent).

Eureka County is served by three electric utilities; the central and southern portions of the county, including the town of Eureka, are served by Mt. Wheeler Power. The Eureka Town Water System supplies water to the town of Eureka; the County operates a landfill on the west side of Eureka and a transfer station near Crescent Valley. The County operates one high school and two elementary schools. The County funds volunteer fire departments in Eureka, Crescent Valley, Beowawe, and Pine Valley.

Housing in the town of Eureka is currently limited because of increased mining activity. There is virtually no temporary housing available, and few homes are on the market (Mears, 2007). The Archimedes expansion of the Ruby Hill Mine is currently underway, and the shortage of housing is expected to become severe as the Mt. Hope Mine prepares to start operations within the next several years. To help meet the current and future housing demand, the County is considering leasing two properties it owns for development of residential and commercial facilities (Evans, 2007).

Over the last 10 years, the unemployment rate in Eureka County has averaged 4.4 percent, reaching a high of 8.7 percent in 2003 and a low of 2.2 percent in 2005 (FRBSL, 2007).

Ely, which is located on U.S. Highway 50 approximately 62 miles southeast of the BMM, is the largest town in White Pine County with a population of approximately 4,166 in 2005 (NDT, 2007a), or about 46 percent of the total County population. The number of County residents living in an institutional setting is notable. The Ely State Prison, which is located approximately 10 miles northwest of Ely, has a design capacity of 784, an operating capacity of 969, and an emergency capacity of 1,008 (NDC, 2007). The Ely Conservation Camp, south of Ely, has a capacity of 150. The largest employers in the County include mining companies, casino-hotels, retail outlets, and federal, state, and local government. The White Pine County budget (NDT, 2007a) for the fiscal year ending June 30, 2007, listed total revenues of $13,018,486, the largest components of which were Intergovernmental Resources (51 percent), property taxes (16 percent), and other taxes (real property transfer tax and sales tax, 19 percent).

White Pine County has four elementary schools, one middle school, and two high schools. Electricity is provided by Mt. Wheeler Power, a rural electric cooperative. Water and sewer service is provided by the Ely Municipal Water Department, McGill-Ruth Sewer and Water District, and Baker Water and Sewer General Improvement District. The Ely Volunteer Fire Department provides fire protection for the entire County, supplementing volunteer fire services in Ruth, McGill, Lund, and Baker. The White Pine County Sheriff's Department provides law enforcement services in the County. In recent years the County has had difficulty providing services because of declining revenue; however, the current demand for County services is being adequately met (Sprouse, 2008).

Temporary housing is currently in short supply and rents are increasing in Ely. The number of homes currently on the market is considered normal turnover, not a shortage or oversupply (Almberg, 2007).

During the last 10-year period the unemployment rate in White Pine County has averaged 4.3 percent, reaching a high of 9.2 percent in 1998 and a low of 2.9 percent in 1998 and 1999 (FRBSL, 2007)

An important part of the income of White Pine County and other predominantly rural counties in Nevada is produced by the net proceeds tax on mining activity within the county. The net proceeds tax is actually a property tax on minerals that originated because mines were unable to accurately estimate the value of ore deposits until the minerals were extracted. Ore deposits vary in size and richness, and valuation constantly changes in response to market fluctuation. The net proceeds tax is based on the value of the minerals extracted after deductions such as the costs of extraction, processing, transportation, and marketing. The tax is collected by the state, and a portion is returned to the county in which the mine is located. The net proceeds tax revenue is distributed by the counties in the same way as property taxes, that is, for schools and other government services (Nevada Taxpayers Association, 2007).

Table 3-30 presents state and county taxes due on net proceeds of minerals for the three most recent years for which data are available. It should be noted that the BMM had net proceeds of zero and therefore paid no net proceeds taxes in 2004 and 2005 (NDT, 2005b; NDT, 2006b).

The Robinson Copper Mine was a major force in the economy of White Pine County from the early 1900s until 1978, when Kennecott Copper closed the mine. The mine was sold to Magma Copper and later to Broken Hill Properties of Australia. The mine then operated from 1996 to 1999, when it became inactive for about five years. Each cycle of mine expansion and closure or inactivity rippled through the County's economy and labor force. The mine was purchased by Quadra Mining Company and went back into full operation in July 2004 (White Pine County, 2006).

TABLE 3-30 TAXES DUE ON NET PROCEEDS OF MINERALS

CALENDAR YEAR	2005	2006	2007
Elko County Tax Due	$1,725,706	$1,624,011	$2,451,408
Eureka County Tax Due	$4,777,576	$10,040,177	$8,102,780
White Pine County Tax Due	$1,344,830	$8,341,976	$8,881,793
Total Tax Due for All Nevada Counties	$22,424,616	$37,441,967	$32,621,781
Total State Tax Due	$19,381,298	$38,252,414	$29,972,916

Sources: NDT, 2006b; NDT, 2007b, NDT, 2008.

White Pine County was in such financial difficulty in 2005 that the local government was faced with insolvency (NDT, 2005a). The State Tax Commission voted in 2005 to declare a severe financial emergency in the County, which had overspent its budget despite more than $1 million in spending cuts. Emergency measures were taken in early 2006 that included increasing the Government Services Tax from 1 percent to 2 percent of the value of vehicles being registered, increasing the sales and use tax rate by 0.25 percent, increasing property taxes from $3.66 to $4.5 per $100 of assessed value, and increasing the transient lodging tax from 11 to 12 percent (NDT, 2006a). These measures started the process of returning the County to financial stability, but another important factor was a resurgence of mining activity (Las Vegas Review-Journal, 2007). The County received about $9 million in net proceeds funds because of renewed activity

in the Robinson Mining District. The Nevada Department of Taxation is now working on a transition plan to move the County from emergency status to a level of technical assistance.

The IMPLAN input-output model (Minnesota IMPLAN Group, 2004) was used to estimate the existing economic impact of the BMM as well as potential economic impacts from the Proposed Action and alternatives discussed below. The model was run by Professor Thomas R. Harris of the University of Nevada, Reno, Department of Resource Economics, University Center for Economic Development. Model outputs were provided in tabular form.

Economic data for the three counties in the analysis area were combined for the IMPLAN model runs. The current level of employment and labor income for the 10 largest sectors (by employment) of the analysis area economy are presented in Table 3-31 for the most current data available (Minnesota IMPLAN Group, 2006).

TABLE 3-31 LARGEST ECONOMIC SECTORS IN ANALYSIS AREA

ECONOMIC SECTORS	EMPLOYMENT	EMPLOYMENT (PERCENT)	LABOR INCOME (MILLIONS)	LABOR INCOME (PERCENT)
Gold, silver, and other metal mining	6,202	18.6	$550	33.9
Accommodation and food services	6,152	18.4	$169	10.4
Government and non-North American Industry Classification System	5,511	16.5	$318	19.6
Retail trade	2,930	8.8	$78	4.8
Construction	1,827	5.5	$90	5.5
Other mining	1,642	4.9	$98	6.0
Health and social services	1,493	4.5	$53	3.3
Other services	1,293	3.8	$33	2.0
Agriculture, forestry, hunting and fishing	1,045	3.1	$13	0.8
Wholesale trade	849	2.5	$51	3.1
Remaining sectors	4,469	13.4	$171	10.6
Total	**33,413**	**100**	**$1,624**	**100.0**

Source: IMPLAN data, 2006.

The IMPLAN model indicates that employment of the 215 workers at the BMM supports an additional 64 indirect and 98 induced jobs in the three-county area (indirect and induced jobs include full-time, part-time, and intermittent jobs). The 2006 total labor income effect of the BMM is estimated at $19.4 million plus an additional $3.6 million in indirect labor income and $3.1 million in induced labor income. While IMPLAN model results are helpful in quantifying economic effects, consideration must be given to the inherent limitations of input-output models and their underlying assumptions, as discussed in product literature (Minnesota IMPLAN Group, 2004).

The BMM employees live in one of three general areas (Zietlow, 2007a): Elko-Spring Creek (64 percent), Ely (22 percent), and Eureka (14 percent). Employees are transported to the mine from Elko, Ely, and Eureka in mine-operated buses or vans. Personal vehicle travel to the site is discouraged and, because of the cost, employees rarely use personal vehicles unless they miss the bus or van. In 2007, the BMM payroll was approximately $23.1 million. Of this total, an estimated $14,784,000 is paid to residents of Elko County, $5,082,000 is paid to residents of White Pine County, and $3,234,000 is paid to residents of Eureka County. The 2007 average cost with benefits per employee at the BMM is $107,000, well above the median household income and per capita income in the three counties. Because mining activity in the analysis area has been expanding in response to recent increases in metals prices, a shortage of skilled employees is developing and wages for skilled workers are likely to continue to increase.

Purchases of materials and services for mine operations in 2007 totaled approximately $23,000. A portion of this total would generate sales tax revenue for the state and counties, depending on the actual location of the sales.

Gold production at BMM increased gradually from approximately 50,000 ounces per year in 1987 to a peak of about 175,000 ounces per year in 2002. Production then declined to below 50,000 ounces per year in 2004, when the trend strongly reversed, and production climbed to over 250,000 ounces per year in 2006. Production returned to a historically normal level of 115,000 ounces in 2007.

3.17.2 Socioeconomics Environmental Consequences

Proposed Action

Anticipated socioeconomic impacts include changes in employment; personal, state, and local income; and demand for housing and services such as utilities, schools, safety, and fire protection. Anticipated impacts are described more fully below.

The staffing level at the mine is expected to increase under the Proposed Action to a maximum of about 325 employees, an increase of about 50 percent over current employment. Table 3-32 shows projected levels of staffing, gold production, and tax payments for the operating life of the mine. It must be recognized that these projections are tentative and subject to revision based on the market price of gold, the ability to find qualified employees, and other economic factors outside the mine's control.

White Pine County would be the recipient of the mine's ad valorem tax payments and would receive a share of the net proceeds tax paid to the state because the mine is located entirely within the County. This additional source of reliable income would help White Pine County stabilize its finances. All three counties would benefit from local spending by residents who are employed at the mine.

The IMPLAN model indicates that an increase of 110 employees at the BMM would be expected to support an additional 33 indirect and 50 induced jobs in the three-county analysis area. Most of these jobs would be in the gold, silver, and other metal mining sector, with much smaller contributions to retail trade, accommodation and food services, wholesale trade, health and social services, and other sectors of the economy. The IMPLAN model estimates that at maximum capacity, the value of direct, indirect, and induced annual labor income from the Proposed Action would be $9.9 million in 2006 dollars.

Exact population impacts cannot be determined because some positions are likely to be filled by current residents of the three counties while others would be filled from outside the analysis area. If all 110 new employees of the mine were from outside the analysis area, the population could increase by approximately 330 persons. This estimate uses an average family size of three, based on the number of persons per household in the analysis area provided by the U.S Census Bureau (2007a).

If the supply of housing was not a factor, the new employees would likely be distributed among Ely, Elko, and Eureka in approximately the same proportion as the mine's current employees. However, few new employees are likely to find housing in Eureka because of the current shortage, and the current supply of housing in Ely would probably be depleted quickly. In the long run, it is likely that the supply of housing in Eureka and Ely would expand to meet the increased demand. However, until that happens, the great majority of new employees would probably find housing in the Elko area. Some current residents of Eureka and Ely might find

TABLE 3-32 PROPOSED ACTION AND ACTION ALTERNATIVES – ESTIMATED MINE STAFFING, PRODUCTION, AND TAXES

Year	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Employees	215	205	280	290	325	325	325	300	260	210	160	100	60	25	15	6	4	4	1
Payroll ($ millions)	23.1	22.0	30.7	30.9	35.0	35.0	35.0	31.4	28.6	23.0	17.8	11.8	7.7	3.4	2.0	0.8	0.5	0.5	0.1
Gold Production (ounces per year thousands)	120	110	98	105	160	245	242	270	190	130	100	80	50	10	-	-	-	-	-
White Pine County Ad Valorem Tax ($ thousands)	560	700	980	1,020	1,100	1,150	1,080	1,010	875	720	410	150	100	25	15	15	10	10	5
Net Proceeds Tax ($ thousands)	190	150	-	-	-	1,400	1,200	1,500	550	300	200	180	50	20	-	-	-	-	-

Note: Dollar amounts are in 2007 dollars.

better paying jobs at the mine, increasing the income of residents and the counties with little adverse effect on county services.

In the event that most new employees (110) came from outside the area to live in the Elko vicinity, the effect on the supply of housing and county infrastructure would be manageable. This increase would represent only 0.4 percent of the current Elko County civilian labor force. The existing level of county public services such as schools, utilities, fire protection, and law enforcement should be adequate to serve the new employees.

Alternative A – Partial Backfill Alternative
Socioeconomic effects of the proposed project under this alternative would be essentially the same as with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
Socioeconomic effects of the proposed project under this alternative would be essentially the same as with the Proposed Action.

No Action Alternative
Under this alternative, mine operation would continue under the existing Plan of Operations. The number of employees would begin to decline immediately, and by 2012 production and net proceeds tax payments would end (Table 3-33). Tax revenues received by the three counties would be reduced, as would the demand by mine employees for housing, schools, fire and police protection, and utilities. However, because of the current expansion in mining activity in the analysis area, the impact on county employment, income, and infrastructure would be less than would occur under sluggish economic conditions. Many of the current BMM employees would be likely to find work at other mines in the analysis area.

TABLE 3-33 NO ACTION ALTERNATIVE – ESTIMATED MINE STAFFING, PRODUCTION, AND TAXES

Year	07	08	09	10	11	12	13	14	15	16
Employees	215	185	110	60	25	15	6	4	4	1
Payroll ($ millions)	23.1	19.9	12.5	7.7	3.4	2.0	0.8	0.5	0.5	0.1
Gold Production (ounces per year thousands)	120	110	70	40	10	-	-	-	-	-
White Pine County Ad Valorem Tax ($ thousands)	560	650	400	100	25	15	15	10	10	5
Net Proceeds Tax ($ thousands)	190	250	150	50	20	-	-	-	-	-

Note: Dollar amounts are in 2007 dollars.

3.18 Environmental Justice

On February 11, 1994, President William Clinton issued Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. This Executive Order was designed to focus the attention of federal agencies on human health and environmental conditions in minority communities and low-income communities. In an accompanying Presidential memorandum, the President emphasized that existing laws, including NEPA, provide opportunities for federal agencies to address environmental hazards in minority and low-income communities. In April of 1995, the U.S. Environmental Protection Agency released the document titled Environmental Justice Strategy: Executive Order 12898.

The document established U.S. Environmental Protection Agency-wide goals and defined the approaches by which the U.S. Environmental Protection Agency would ensure that disproportionately high and adverse human health or environmental effects on minority communities and low-income communities are identified and addressed.

3.18.1 Environmental Justice Affected Environment

Minority Population

Table 3-34 summarizes the ethnic composition of the counties nearest to the Proposed Action (White Pine, Elko, and Eureka) and of the State of Nevada. In accordance with the U.S. Environmental Protection Agency's Environmental Justice Guidelines (EPA, 1998), these minority populations should be identified when either (1) the minority population of the affected area exceeds 50 percent or (2) the minority population of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. Analysis reveals that the ethnic composition of the populations of White Pine, Elko, and Eureka counties is less than 50 percent and is not meaningfully different from that of the State of Nevada (Table 3-34). A second provision requires consideration of "impacts that may affect a cultural, historical, or protected resource of value to an Indian tribe or a minority population, even when the population is not concentrated in the vicinity." Seven Tribal governments, as described in Section 3.20, were contacted to solicit comments and identify any Native American concerns about the project. The BLM also holds regular meetings with local Tribes and discussed the proposed project with the Ely Shoshone Tribe at two meetings in 2007.

Low-Income Population

Analysis of the percentage of persons below the poverty level for the studied counties reveals that the incidence of poverty in White Pine, Elko, and Eureka counties is not meaningfully different from that of the State of Nevada (Table 3-34).

Protection of Children

The Environmental Justice analysis includes a protection of children component to determine if the Proposed Action would place an undue burden on children. Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks (April 27, 1997) recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because (1) children's bodily systems are not fully developed, (2) children eat, drink, and breath more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the Executive Order directed each federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The Executive Order also directed each federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks and safety risks. The number of children in White Pine, Elko, and Eureka counties and the State of Nevada are shown in Table 3-34.

TABLE 3-34 ETHNICITY, CHILDREN, AND INCOME

	Elko	Eureka	White Pine	Nevada
ETHNICITY (PERCENT, 2005)				
White persons	91.4	95.8	90.2	82.0
Black persons	0.9	0.4	4.5	7.7
Native Americans	5.6	1.0	3.5	1.4
Asian	0.9	1.3	1.0	5.7
Pacific Islanders	0.1	0.0	0.1	0.5

	Elko	Eureka	White Pine	Nevada
Hispanic or Latino	21.7[1]	12.7[1]	11.4[1]	23.5[1]
CHILDREN IN POPULATION (PERCENT, 2005)				
Persons under 5 years old	6.7	5.3	4.4	7.2
Persons under 18 years old	29.6	24.3	21.0	25.7
Per-Capita Income (1999)	$18,482	$18,629	$18,309	$21,989
Median Household Income (2004)	$52,202	$42,790	$39,420	$47,231
Persons Below Poverty (percent, 2004)	8.7	9.0	12.4	11.1

Source: U.S. Census Bureau, 2007a.

[1] People who identify their origin as Spanish, Hispanic, or Latino may be of any race. Thus, the percentage Hispanic should not be added to percentages for racial categories. Non-Hispanic White persons are those who responded "No, not Spanish/Hispanic/Latino" and who reported "White" as their only entry in the race question. More complete tallies that show race categories for Hispanics and non-Hispanics separately are also available.

3.18.2 Environmental Justice Environmental Consequences

Proposed Action

The Proposed Action is not expected to have a disproportionate effect on any particular population.

The area in the immediate vicinity of the proposed project is sparsely inhabited with scattered ranches being the only residences. The nearest residential area is the town of Eureka, which is approximately 60 road miles southwest of the Proposed Action area. Eureka does not have an unusually high minority or low-income population. Environmental effects that may occur at a greater distance, such as noise or air impacts, would affect the area's population equally, without regard to ethnicity or income level.

According to Section 3.20 of this FEIS, no traditional cultural properties or Executive Order 13007 (Executive Order on the Indian Sacred Sites) sites have been identified within the Proposed Action area that might be impacted by the Proposed Action or any of the alternatives. To date, no specific concerns about the proposed project have been raised by Native American Tribes. Therefore, there are no impacts associated with the Proposed Action on traditional Native American concerns.

The Proposed Action would not result in a disproportionate effect on a minority population. The Proposed Action is unlikely to place an undue burden on children because the area is remote and few, if any, children live or have reason to congregate in the vicinity. Because there is no disproportionate effect on an identified minority population or children as a result of the Proposed Action, no further environmental justice analyses are required.

Alternative A – Partial Backfill Alternative

Because no disproportionate effect on an identified minority population or children has been identified, no further environmental justice analyses are required for this alternative.

Alternative B – Mooney Basin Heap Leach Pad Alternative

Because no disproportionate effect on an identified minority population or children has been identified, no further environmental justice analyses are required for this alternative.

No Action Alternative

Because there is no disproportionate effect on an identified minority population or children from current operations, no further environmental justice analyses are required for the No Action Alternative.

3.19 Cultural Resources

The Bald Mountain Mining District has been the focus of industrial mining activity since 1906. However, modern cultural resource management practices began only when up-to-date mining operations were initiated in the mid 1980s at the Top Pit. The regulatory framework applied to cultural resources within the district consists of the Antiquities Act of 1906 (PL 59-209), the Archaeological Resources Protection Act of 1979 (PL 96-95), and the National Historic Preservation Act of 1966, as amended in 1992 (16 USC 470). Section 106 of the National Historic Preservation Act (36 Code of Federal Regulations Part 800) requires that federal agencies such as the BLM take into account the effects of their undertakings on properties (sites) eligible for nomination to the National Register of Historic Places. Also, NEPA, as amended (42 USC 4371 et seq.), requires that agencies consider the effects of their actions on cultural resources.

As various mining companies have operated in the Bald Mountain Mining District, the information available regarding archaeology has rapidly expanded. This, in turn, suggests a need for an administrative agreement that would cover modern mining's effect on local archaeology. This need resulted in the creation of a Programmatic Agreement (Appendix J) to help the BMM, the BLM Egan Field Office, and the Nevada State Historic Preservation Office identify, evaluate, and treat these cultural resources when necessary (BLM, 1995a). Next, a local mining district historic context was produced (Kautz et al., 2004) to provide a historic framework accompanied by appropriate research questions intended to guide investigations. Finally, information from 59 project reports and 767 archaeological site records from the mining district was used for a geographic analysis (a GIS-centered database) used to develop a description and interpretation of the archaeology within the Bald Mountain Mining District (Kautz and Simons, 2005).

The Proposed Action would disturb 3,920 acres. The location for 100 acres of exploration disturbance has not been identified, leaving a total of 3,820 acres of identified disturbance. Of this, 3,820 acres 503 acres remain to be surveyed for archaeology, 2,198 acres have been surveyed within the last 10 years, and 1,119 acres were surveyed more than 10 years ago. Figure 3-21 shows the locations of cultural surveys within the Proposed Action area. Additionally, 100 acres have been reserved for future exploration activities but the location for such exploration has yet been specifically identified. Surveys over ten years in age should be evaluated for their adequacy in accordance with the existing statewide Protocol Agreement between the Nevada State Historic Preservation Office and the BLM or the existing Programmatic Agreement for the subject undertaking.

Cultural resources that may be affected by the Proposed Action are summarized in Table 3-35, and cultural resource surveys in the proposed Plan of Operations are shown in Figure 3-21.

TABLE 3-35 CULTURAL RESOURCES

	Total Acres	Acres Not Surveyed	Acres Surveyed < 10 yrs	Acres Surveyed > 10 yrs	# Identified Prehistoric Sites*	# Identified Historic Sites*	Total Site Locations
Plan of Operations	16,465	4,095	7,896	4,474	270	109	329
Proposed Action Disturbance	3,920	503	2,198	1,119	95	30	108

*The total number of "site locations" is smaller than the total of "historic" and "prehistoric" sites as it includes as single "sites" localities where there are both historic and prehistoric items.

Figure 3-21 Cultural Resources

3.19.1 Prehistoric Resources Affected Environment

The BMM is located in east-central Nevada, a portion of the western Great Basin within a high altitude valley system grading to a steep mountain zone. Humans first occupied this region more than about 5,000 years before the present. The evidence for these earliest people is scant and consists exclusively of the occasional presence of a stone stemmed or northern side-notched spear or atlatl (throwing stick) point. By 5,000 to 3,000 years ago, the human use of this region appears to have intensified only slightly, perhaps due to environmental disruptions characterized by increasing temperatures and reduced rainfall. Such a warming trend would be particularly burdensome in an area with so little surface water. A measure of the area's use can be calculated by dividing the number of projectile points by the number of years each period lasted (Kautz and Simons, 2005). This evidence suggests that during the entire prehistoric period, Bald Mountain usage was similar to occupational intensity patterns elsewhere throughout the western Great Basin (Kelly, 2001; Kelly and Bevill, 2003; Miller and Elston, 1979; Zeier, 1985; Thomas, 1983a, 1988; Thomas and Bettinger, 1976; Wegener and Hintzman, 2004). Accordingly, it appears that sites were quite common between 3,000 and 1,300 years before the present and peaked in number by about 1,300 to 700 years before the present. Finally, the number of sites appears to have dropped off again between 700 and 150 years before the present, by which time contact with Euroamerican culture had changed Native American lifeways significantly.

Elsewhere within eastern Nevada, two customary high altitude economic models have been suggested. One is a "low density intercept strategy hunting pattern" in which low numbers of hunters pursued upland game more than 1,000 years ago (Thomas, 1983b). The other is a much later residential village pattern such as at the seasonally occupied village atop Mount Jefferson in the Toquima Range of northern Nye County (Thomas, 1982). However, neither of these patterns is present within the Bald Mountain uplands. Rather, the Bald Mountain settlement system is dominated by surface stone flake scatters, which comprise 88 percent of all Bald Mountain sites. These are followed by the presence of small lithic quarries where raw stone was acquired, comprising another 6 percent of the total. Not surprising for a mountainous zone, the ratio of flaked stone tools such as points, knives, and so on to the considerably rarer ground stone tools is 99 to 1. This suggests that the bulk of human food-getting behavior was dedicated to the renewal of the prehistoric hunters' tool kits and the acquisition of raw materials, particularly fine-grained, quarried, tool stone. Essentially, the Bald Mountain area appears to have served only as an area occasionally passed through during prehistoric times and not to have been subject to long-term settlement or village life. Instead, larger groups of people were settled in more productive zones such as Huntington Valley, the west side of Newark Valley, and the Ruby Marshes.

This interpretation of limited use is reinforced by analyzing the composition of the flaked stone collections. For example, comparing flake reduction stages with bifacial tool stages at the various sites suggests that throughout prehistory the small quarry sites at Bald Mountain are characterized by cruder tool forms and flakes than are common at the majority of surface lithic scatters. In the lithic scatters, the size and nature of the flakes indicate that final tools like arrowheads were manufactured there, just the opposite of what was found at the quarries. These findings suggest that final tools were finished at the locations commonly referred to as "surface lithic scatters." Though some of the smaller lithic scatters may represent individual hunter's kill sites and/or butchering stations, direct evidence of Bald Mountain hunting such as hunting blinds, deadfalls, equipment caches, rock art, or traps are entirely missing from the Bald Mountain region.

3.19.2 Prehistoric Resources Environmental Consequences

Proposed Action

Anticipated environmental impacts to prehistoric sites include the possibility of disturbance of known and unknown prehistoric sites in the Proposed Action area as described below.

Twenty-six completed cultural resource projects extend into the proposed disturbance area, which is composed of 3,920 acres of disturbance. Of these acres, 1,095 acres have been surveyed over 10 years ago, 2,176 acres have been surveyed within the last 10 years, and 503 acres have not been surveyed yet.

These 26 cultural resource projects have resulted in the discovery and evaluation of 94 prehistoric archaeological sites. Of these, 16 (21 percent) also contain historic-aged artifacts. Seven of these sites have been deemed eligible for nomination to the National Register of Historic Places, all of which are complex flake and stone tool scatters that may contain buried artifacts. Three sites have already been mitigated, and four small sites have not been relocated. Fifteen prehistoric sites remain unevaluated, and the remaining 64 sites have been determined not eligible for nomination to the National Register. Any areas that have not yet had an archaeological survey would be surveyed prior to any project impacts, and all eligible sites that may be impacted by the Proposed Action would be treated as specified in the Programmatic Agreement (Appendix J). Direct impacts to prehistoric resources would be avoided or minimized by implementing the Design Features listed in Table 2-13, and the BLM Best Management Practices as discussed in Appendix D.

Alternative A - Backfill Alternative

The reduction of disturbed areas with this alternative is 434 acres. The total number of prehistoric sites present within this alternative footprint has been reduced by three non-eligible sites (one of these also contains historic materials). No other changes would result should this alternative be chosen.

Alternative B - Mooney Basin Heap Leach Pad Alternative

The reduction of disturbed areas with this alternative is 105 acres, which would reduce the number of impacted prehistoric sites by three: two non-eligible sites and one site that remains unevaluated as to its National Register status. All three sites have been described and evaluated within the last 10 years.

No Action Alternative

This alternative would have no effect on cultural resources other than those described in previous NEPA documents.

3.19.3 Historic Resources Affected Environment

The historic context for the Bald Mountain Mining District (Kautz et al., 2004) includes six themes that address research needs in the local area: Native Americans in the ethnographic present, exploration and emigration, the military, transportation and communication, mining, and ranching and agriculture. However, it has become apparent that Bald Mountain historic sites are almost entirely devoted to the theme of mining (Kautz and Simons, 2005). It follows that the historic roads encountered within the district owe their origin and maintenance to mining activities. The common roadside can scatters are almost entirely a consequence of the activities of miners. Features normally associated with ranching such as local corrals and fence lines are there to accommodate the animals used in mining or mineral exploration, while local domestic cabins are all dedicated to use by local miners (Kautz and Simons, 2005).

Mining in the district began slowly during the late 19th century with limited placer mining by Chinese immigrants near Water Canyon followed by the establishment of three mines on Little Bald Mountain and on a pass between Water and Cherry canyons during the early 1880s (Hill, 1916). However, Paher (1970) suggests that only one mine produced during the remainder of the century. The only documented community in the mining district was the small and dispersed locality of Joy, probably begun about 1875 (Hall, 1994) and expanded as the mining district prospered.

Mining expanded once again during the 1905 to 1907 period, during which capitalized mining commenced, numerous claims were filed, and interest was displayed by outside investors such as Nevada capitalist George Wingfield. In 1907, the Copper Basin Mining and Smelting Company shipped 50,000 pounds of ore by rail to Salt Lake City, though company ownership had changed as a result of the "panic of 1907." Joy became a company town during this early mining period with a continuous population of between 50 and 75 persons. A small, seasonally occupied mining campsite that was misnamed "Bald City" was excavated by Kimball in 2004 with the result that two occupations, dating to 1905-1918 and 1928-1942, were identified. The site consisted of the Copper Basin Mining and Smelting Company's sawmill and several small trash scatters, privies, and tent flats.

Between 1939 and 1942, the Pioneer Copper Mine was the active mining property within the district; it was owned by operators living in Ely. Placer Amex acquired an option on claims in the Bald Mountain Mining District in 1976, with subsequent discoveries in the late 1970s and 1980s, but actual mining operations did not really begin until the mid 1980s at the Top Pit. Other operators worked various areas in the district including Alligator Ridge, Casino/Winrock, Little Bald Mountain Mines, and the Yankee Mine. All these were purchased by Placer Dome U.S. in 1993. Instead of placer or shaft type mining, open pits are used today, together with in-house reclamation programs that are often concurrent with mining operations. Finally, Placer Dome was acquired by Barrick Gold Corporation in April 2006.

Twenty-nine historic sites have been located within the Proposed Action Area, of which only one, a historic miner's cabin, is deemed eligible for the National Register. With the exception of a single 1950s hunters' camp, the remaining historic sites all relate to the mining theme.

3.19.4 Historic Resources Environmental Consequences

Proposed Action

Anticipated environmental impacts to historic resources include the possibility of disturbance to known and unknown historic sites in the Proposed Action area, as described below.

There are 29 historic period archaeological sites located within the Proposed Action area, and 16 (55 percent) of these also contain prehistoric materials. Of these historic sites, one—a historic miner's cabin—has been determined eligible for nomination to the National Register. One non-eligible historic site has been destroyed, one non-eligible site has not been relocated, and one historic site has been mitigated. Additionally, one historic site remains unevaluated, leaving 24 non-eligible historic period sites within the Proposed Action area. All eligible historic sites that may be impacted by the Proposed Action would be treated in accordance with the Programmatic Agreement. Direct impacts to historic resources would be avoided or minimized by implementing the Design Features listed in Table 2-13, and the BLM Best Management Practices as discussed in Appendix D.

Visual impacts to the Pony Express Trail as addressed in the visual resource section, are limited, and would be less noticeable following mine reclamation. Color and texture changes

would remain indefinitely. A historic period ranch owned by the mine would not be affected by the Proposed Action.

Alternative A - Backfill Alternative
This alternative would result in the reduction of the historic-aged sites affected by the expansion by two non-eligible historic sites (one of these sites also contains prehistoric materials). All have been evaluated less than 10 years ago.

Alternative B - Mooney Basin Heap Leach Pad Alternative
The reduction of disturbance due to the Mooney Basin Leach Heap Pad Alternative would not change the impact to historic sites described above for the Proposed Action.

No Action Alternative
This alternative would have no effects on cultural resources other than those disclosed in previous NEPA documents (BLM, 1995a).

3.20 Native American Religious Concerns

3.20.1 Native American Religious Concerns Affected Environment

Ethnographic resources include sites or areas of concern to Native American groups either for heritage or religious reasons. The BLM followed general procedures and guidance for Native American Consultation as outlined in BLM Manual H-8120-1 (BLM, 2004d). On April 13, 2007, letters soliciting information from Native American Tribes and inviting the Tribes to enter into consultation for the Proposed Project were sent by the BLM to eight Tribal governments: Summit Lake Paiute Tribe, Winnemucca Intertribal Council of Nevada, Moapa Tribal Business Council, Duckwater Shoshone Tribe, Sparks Indian Colony, Ely Shoshone Tribe, and Timbisha Shoshone Tribal Office, and Bishop Fort Independence Paiute Community Council. The BLM regularly holds Native American coordination meetings with local tribes. The BLM discussed the proposed project with the Ely Shoshone Tribe and Duckwater Shoshone Tribe during a Native American coordination meeting on March 22, 2007. Phone contacts were made to the following tribes on April 11, 2007 to discuss the upcoming public scoping meetings: Ely Shoshone Tribe, Wells Band of the Te-Moak Tribe of the Western Shoshone, Elko Band of the Te-Moak Tribe of the Western Shoshone, and the Western Shoshone Defense Project. The Confederated Tribes of the Goshute Indian Reservation was also contacted on May 7, 2007 inviting them to attend the public scoping meeting and express concern. Comments received are located in Appendix C.

According to Section 3.19 of this FEIS and the report *Ely Resource Management Plan/EIS Ethnographic Studies Technical Report General Report* (Woods Cultural Research, LLC., 2003), no traditional cultural properties or Executive Order 13007 (Executive Order on the Indian Sacred Sites) sites have been identified within the Proposed Action area that might be impacted by the Proposed Action or any of the alternatives.

3.20.2 Native American Religious Concerns Environmental Consequences

Proposed Action
No traditional cultural properties or Executive Order 13007 (Executive Order on the Indian Sacred Sites) sites have been identified within the Proposed Action area that might be impacted by the Proposed Action or any of the alternatives. Therefore, no impacts to Native American religious concerns are anticipated from the Proposed Action.

Alternative A – Partial Backfill Alternative
This alternative would have the same effect as the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would have the same effect as the Proposed Action.

No Action Alternative
This alternative would have the same effect on Native American Religious Concerns as the Proposed Action.

3.21 Hazardous and Solid Waste/Hazardous Materials

Assumptions for Analysis
The assumption made for the hazardous and solid waste/hazardous materials analysis is the following:

- The majority of truck transportation is expected to come from the two access routes listed in Section 3.21.1.

3.21.1 Hazardous and Solid Waste/Hazardous Materials Affected Environment

The affected environment for hazardous materials and solid and hazardous waste includes air, water, soil, and biological resources that could be potentially affected by an accidental release during transportation to and from the Proposed Action area and during storage and use on the project site.

A list of primary fuels and reagents is provided in Table 3-36, and the current chemical storage locations are shown in Figure 2-1 and 2-2 for the BMM and Mooney Basin Operations Area. As discussed in Section 2.3.1, there are three access routes to the Proposed Action area. Bulk chemicals would typically be transported to the site on trucks via one of the following access routes:

- State Route 278 from Carlin to Eureka, U.S. Highway 50 from Eureka to the east to State Route 892 (Strawberry Highway) to the BMM operations; or

- From Ely via U.S. Highway 50 to Long Valley Road to the Mooney Basin Operations Area.

Bulk chemicals and supplies are not typically transported from Elko via Highway 228 (Figure 1-1). There are no current restrictions on delivery times, and no restrictions are proposed.

A hazardous substance, as identified by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 is defined in the following statutes:

- Clean Water Act, Sections 307(a) and 311;
- Resource Conservation and Recovery Act, Section 3001;
- Clean Air Act, Section 112; and
- Toxic Substances Control Act, Section 7.

Pursuant to regulations promulgated under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended by the Superfund Amendments and Reauthorization Act of 1986, release of a reportable quantity of a hazardous substance to the environment must be reported within 24 hours to the National Response Center (40 Code of Federal Regulations part 302). Nevada Administrative Code 445A.347 also requires immediate reporting of a release of a reportable quantity of a hazardous substance to the Nevada Division of Emergency Management. The Nevada Division of Environmental Protection's Water Pollution Control Permit program also includes requirements for reporting as soon as possible,

TABLE 3-36 SUMMARY OF PRIMARY FUELS AND REAGENTS

Substance	Average Annual Usage Existing Operations[1]	Average Annual Usage Proposed Operations[1]	Proposed Deliveries Per Year	Proposed Storage Amount	Storage Method	Location of Material	How Material Is Used
Diesel Fuel & Gasoline	3,800,000 gallons	7,500,000 gallons	365	25,000 gallons	Bulk Tank	Fuel Islands	Equipment fuel
Ethylene Glycol	2,500 gallons	4,500 gallons	4	1,500 gallons	Bulk Tank	Truck Shop	Equipment coolant
Methanol	3,500 gallons	5,000 gallons	1	5,000 gallons	Bulk Tank	Fuel Island	Drill lubricant
Propane	210,000 gallons	270,000 gallons	22	15,000 gallons	Bulk Tank	Admin Areas	Heating
Sodium Cyanide	360,000 gallons	550,000 gallons	208	20,000 gallons	Bulk Tank	Process Plants	Metals recovery
Ammonium Nitrate Fuel Oil (ANFO/PRILL)	450,000	750,000	26	25 tons	Bulk Silos	Truck Shop Area	Blasting operations
Sodium Hydroxide (liquid caustic soda)	160,000	200,000	6	5,000 gallons	Bulk Tank	Process Plants	Solution pH control
Calcium Oxide (Pebble Lime)	29,000 tons	41,000 tons	1,460	100 tons	Bulk Silos	Near Leach Pads	Ore pH control
Hydrochloric Acid	20,000	30,000	3	10,000 gallons	Bulk Tank	Process Plants	Process operations

[1] Pounds per year unless otherwise specified.

but no later than 24 hours, to the Nevada Division of Environmental Protection, Bureau of Corrective Actions. The BMM and Mooney Basin Operations Area have existing Spill Contingency Plans and Emergency Response Plans that address response to hazardous material spills (including hazardous waste), notification procedures, and spill cleanup procedures for on- and off-site incidents.

The BMM and Mooney Basin Operations Area have had incidental spills of fuels and hazardous materials during previous mining and mineral exploration activities, which were reported to the appropriate agencies. The reported spills have been mitigated to the satisfaction of the appropriate agencies, and the contaminated materials have been disposed of in accordance with state and federal regulations.

As described in Section 2.3.11, Nevada Division of Environmental Protection, Bureau of Waste Management regulates the hazardous waste program in the State of Nevada as prescribed in Nevada Revised Statutes 400. Hazardous waste management is subject to specific requirements that are dependent upon the amount of hazardous waste produced at a facility in a calendar month. The BMM and Mooney Basin Operations Area are jointly classified as a Small Quantity Generator of hazardous waste as defined by the Resource Conservation and Recovery Act. A Small Quantity Generator generates between 100 and 1,000 kilograms (220 and 2,200 pounds, respectively) of hazardous waste in a month. This generator status is required to adhere to specific on-site management, transportation, record keeping, and reporting requirements. For disposal of hazardous materials, the BMM and Mooney Basin Operations Area temporarily store hazardous wastes and then transport them to an off-site Resource Conservation and Recovery Act program-approved recycler or treatment and disposal facility. All hazardous wastes are currently stored, packaged, and manifested in compliance with all applicable state and federal regulations.

Non-hazardous, solid waste is currently managed on-site in a Class III waivered landfill as discussed in Section 2.3.11. This facility is constructed and managed in accordance with all applicable state regulatory requirements. A new Class III waivered landfill would also be constructed on a portion of the Saga rock disposal facility. The location of the facility is shown on Figure 2-6.

3.21.2 Hazardous and Solid Waste/Hazardous Materials Environmental Consequences

Proposed Action

Anticipated environmental impacts from hazardous and solid waste and hazardous materials include the possibility of accidental release from on-site storage and use areas, or during transportation to or from the site, as described below.

The Proposed Action would continue to utilize the transportation routes analyzed in the BMM EIS (BLM, 1995a), as described in Sections 2.3.1 and 3.21.1. The impacts associated with the Proposed Action would involve the continuation of the hazardous material and waste management practices currently in use and previously analyzed through NEPA. It is anticipated that the Proposed Action would not result in a change to the current classification of Small Quantity Generator of hazardous waste.

Process chemicals and fuel would continue to be transported by truck along the highways in the region, using both routes identified in Section 2.3.9 (Figure 1-1). Trucks would also continue to transport small quantities of hazardous waste on an infrequent basis. The Proposed Action would result in an increase in mine production and an increase of 10 to 15 percent in deliveries

of process chemicals and fuel. Transporters would continue to comply with all applicable state and federal regulations governing the transportation of hazardous materials and waste.

The existing Class III waivered landfill would be expanded, or a second landfill located in the Proposed Action area would be permitted and opened, to accommodate non-hazardous waste generated by the Proposed Action. Antifreeze, lead-bearing wastes, waste oil, and used solvent would continue to be recycled at approved off-site facilities. The production of these materials is anticipated to increase by approximately 25 to 40 percent under the Proposed Action.

Fuel storage would continue in aboveground tanks with secondary containment structures capable of containing 110 percent of the volume of the largest tank. Engineering controls, which help to reduce exposure to potential hazards through isolation/containment (including leak detection) of fuel and chemicals during storage and use, in addition to actions included in the Spill Contingency Plan (BMM, 2009) and the Emergency Response Plan (BMM, 2009) reduce the risk of an on-site chemical or fuel release. Therefore, the risk of chemical or fuel release to the environment would continue to be more likely during transportation operations to and from the Proposed Action area.

Disposal of hazardous materials is discussed below.

Probability of a Release

Process chemicals, fuel, and waste materials could be accidentally released during transport to and from the Proposed Action area. The Proposed Action would require the continuation of transport to the BMM Operations of the materials and quantities shown in Table 3-36. The Proposed Action would increase the quantities of primary fuels and reagents from those currently utilized at BMM operations as shown in Table 3-36. The associated truck deliveries for the Proposed Action are described below.

The probability of a truck accident involving hazardous materials was estimated in the 1995 EIS (BLM, 1995a) using national accident statistics from 1983 to 1992, haul distances, and the number of deliveries estimated per year. This information has been updated and analyzed to include national accident statistics for truck shipments of hazardous materials (FMCSA, 2001). The primary emphasis in this analysis has been placed upon the release of liquid material that could pose an immediate human health hazard or an off-site contaminant hazard, which is consistent with the methods used in the 1995 EIS. The estimated deliveries of liquid sodium cyanide, diesel fuel, and hydrochloric acid have therefore been included in this analysis.

The probability of a truck accident that would result in the release of the selected hazardous materials was calculated using the national rate of releases per mile traveled. The travel route distance is 75 miles. The calculated life-of-mine truck deliveries are as follows: diesel fuel – 4,368; hydrochloric acid – 36; and liquid sodium cyanide – 2,496. The release probability was calculated over a mine life of 12 years. Table 3-37 shows the data used to calculate the release probability.

The results of the analyses (Table 3-38) show the probability of a release for each chemical is as follows: sodium cyanide – probability of 44.5 in 1,000; diesel fuel – probability of 162.6 in 1,000; hydrochloric acid – probability of 0.4 in 1,000. These results indicate a fairly low probability of an accidental release of hazardous materials to the environment during the estimated life of the Proposed Action. National accident statistics for flammable and combustible materials (diesel fuel) indicate a higher incidence of release per mile of travel than the other two categories used in this analysis. The probability of a release to the environment in a populated area is estimated to be approximately 100 times less than the estimates shown in Table 3-38

due to the fact that one mile of the 75-mile route is located within a developed area. Based upon the small quantities of hazardous waste that would be generated by the Proposed Action, an accident resulting in a release to the environment is not anticipated.

TABLE 3-37 HAZARDOUS MATERIAL NATIONAL ACCIDENT RATE PER MILE

HAZARDOUS MATERIAL CATEGORY	HAZMAT MILES	TOTAL HAZMAT ACCIDENTS	HAZMAT ACCIDENT RATE ACCIDENT/MILE
2.3 – Poison Gas	50,000,000	12.020	2.38753E-07
3 – Flammable & Combustible	2,800,000,000	1,379.021	4.96414E-07
8 – Corrosive	1,900,000,000	257.000	1.32109E-07

Source: Federal Motor Carrier Safety Administration, Comparative Risks of Hazardous Materials and Non-Hazardous Materials Truck Shipment Accidents/Incidents, March 2001.

TABLE 3-38 HAZARDOUS MATERIAL PROBABILITY OF TRANSPORTATION RELEASE

HAZARDOUS MATERIAL CATEGORY	NUMBER OF LIFE OF MINE TRUCK DELIVERIES	LOADED TRUCK HAUL DISTANCE PER TRIP	ACCIDENTS PER MILE1	RELEASE PROBABILITY
Sodium Cyanide (2.3)	2,496	75	2.38753E-07	0.0445
Diesel Fuel (3)	4,368	75	4.96414E-07	0.1626
Hydrochloric Acid (8)	36	75	1.32109E-07	0.0004

[1] The rate is based upon the Haz Mat Category of the Chemical shown in Table 3-36.

Perennial water sources along the State Route 892 transportation route include the following:

- Water Canyon drainage;
- Cold Creek Reservoir, Cold Spring, and Cold Creek;
- Minoletti Spring;
- Goicoechea Ranch Pond and unnamed spring;
- Unnamed springs (Section 34, Township 22 North Range 55 East; Sections 15, 22, and 34, Township 21 North, Range 55 East; Sections 3, 10, 15, 22, 27, and 34, Township 20 North, Range 55 East);
- Strawberry Ranch Springs;
- May Creek;
- Sadler and Water Canyon drainages;
- Stock pond Section 30, Township 18 North, Range 55 East; and
- Several irrigation wells along State Route 892.

These perennial water sources either cross or are within 0.25 mile of the 75-mile long State Route 892 route and thus have potential to be affected by a release. Only one spring (North Spring in Section 31, Township 19 North, Range 59 East) is within 0.25 mile of the Long Valley Road from U.S. Highway 50 to Mooney Basin.

Effects of a Release

The environmental effects of a release would depend on the substance, quantity, timing, and location of the release. The potential for off-site releases during transportation is calculated for hazardous substances only and does not indicate a volume or location. The event could range from a minor oil spill on the project site where cleanup equipment would be readily available to a large fuel or chemical spill during transportation. Some of the chemicals could have immediate adverse effects on water quality and aquatic resources if a spill were to enter a flowing stream or a spring/wetland area. However, considering the transport routes, the probability of a spill

entering a wetland or other waterway would be low. Therefore, it is unlikely that spills of these materials would impact waterways.

As stated previously, the primary emphasis in this analysis is placed upon the release of liquid material that could pose an immediate human health hazard or an off-site contaminant hazard (hydrochloric acid, diesel fuel, and sodium cyanide). However, other fuels and reagents would continue to be delivered to the BMM operations and stored on site. These other fuels and reagents include ethylene glycol, methanol, propane, ammonium nitrate, sodium hydroxide, and calcium oxide (Table 3-36). The delivery of these materials also represent a potential for an off-site release during transportation but would not pose the same threat to human health or cause the same level of potential adverse effects on water quality or aquatic resources. Deliveries of these fuels and reagents are subject to the same response, reporting, and cleanup procedures as the chemicals that receive primary emphasis in this analysis.

Hydrochloric acid spills that occur on the ground or in water would have the potential to impact local populations of aquatic and terrestrial life through the oxidizing action that destroys plant and animal cells. An acid spill into a waterway would have the potential to migrate from the initial spill site. Rapid response to any spills and subsequent cleanup actions would result in no lasting damage to the environment.

A release of diesel fuel to the ground would have the potential to impact vegetation and could ignite, causing a range fire. A spill into a waterway would cause contamination of water and soil, likely affecting local aquatic populations. With rapid response and cleanup actions, diesel contamination would not increase hydrocarbons in soils, surface water, or groundwater.

The effect of a sodium cyanide release would be more variable than a release of diesel fuel or hydrochloric acid and would depend on the amount of the release, the location of the release (e.g., dry upland area, wetland area, or flowing stream), the organisms exposed, and the chemical conditions at the release location. The release of sodium cyanide would likely cause the poisoning of aquatic and/or terrestrial species depending on exposure and concentrations. Environmental effects of a cyanide spill would be limited in extent and time of contamination due to the natural degradation of cyanide in the environment.

Public Safety

Any large-scale release of these chemicals could have implications for public health and safety. The location of the release would again be a primary factor in determining its importance. However, the probability of a release is low, as is the probability of a release in a populated area. Therefore, it is not anticipated that a release involving a severe effect to human health or safety would occur during the life of the project.

In the event of a release during transport, the commercial transportation company would be responsible for first response and cleanup. Local and regional law enforcement and fire protection agencies also may be involved to secure the site and protect public safety. In the event of an accident involving hazardous substances, the carrier must notify local emergency response personnel as described in Section 2.3.11. The release of a reportable quantity of a hazardous substance must be reported to the appropriate state and federal agencies within the specified time frames. The BMM North Operations Area Project Emergency Response Plan (BMM, 2009) would include a plan for the response of mine resources to off-site transportation hazardous material releases.

Alternative A – Partial Backfill Alternative
This alternative would not result in any change in transportation, storage, use, and disposal of hazardous material compared with the Proposed Action.

Alternative B – Mooney Basin Heap Leach Pad Alternative
This alternative would not result in any change in transportation, storage, use, and disposal of hazardous material compared with the Proposed Action.

No Action Alternative
This alternative would consist of continued mining and processing at BMM and Mooney Basin Operations Area under currently permitted authorizations. The actual duration of the project would be dependent upon site-specific economic conditions. Continued mining and mineral processing would involve the transportation, handling, storage, use, and disposal of hazardous material. Deliveries of hazardous materials and waste to and from BMM and Mooney Basin Operations Area would continue until the activities in these authorizations are complete. There would be no change to the types and amounts of hazardous substances used during the project operation. Therefore, the existing delivery frequency would remain unchanged.

3.22 Proposed Mitigation

The Proposed Action includes Design Features and Best Management Practices, which serve to mitigate the range of impacts of the proposal. Appropriate mitigation has thus been incorporated, and no additional mitigation is proposed in response to anticipated impacts.

3.23 Other Environmental Consequences

3.23.1 Relationship between the Short-term Use of the Environment and the Maintenance of Long-term Productivity

Many of the impacts associated with the Proposed Action would be short-term and would cease following successful reclamation. However, decreases in long-term soil and vegetation productivity in reclaimed areas are expected. Long-term soil and vegetation productivity under the action alternatives is expected to be generally the same as under the Proposed Action.

3.23.2 Irreversible or Irretrievable Commitments of Resources

Construction and operation of the BMM North Operations Area Project could result in either the irreversible or irretrievable commitment of certain resources. “Irreversible” is a term that describes the loss of future options. It applies primarily to the effect of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long periods of time. “Irretrievable” is a term that applies to the loss of production, harvest, or use of natural resources. For example, livestock forage production from an area is lost irretrievably while an area is serving as a mining area. The production lost is irretrievable, but the action is not irreversible. If the use changes and the mine is reclaimed, it is possible to resume forage production. Irreversible and irretrievable impacts of the Proposed Action area are summarized in Table 3-39.

TABLE 3-39 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES OF THE PROPOSED ACTION

Resources	Irreversible Impacts	Irretrievable Impacts	Explanation
Surface Water	No	No	No impacts to surface water are anticipated.

Resources	Irreversible Impacts	Irretrievable Impacts	Explanation
Groundwater	No	No	Once the project is complete and groundwater pumping has ceased, groundwater levels would rebound to original or near original static water levels.
Geology and Minerals	Yes	Yes	Once mineral reserves are mined, they would no longer be available for future production.
Paleontology	No	No	No disturbance to significant or critical paleontological resources is expected.
Soils	Yes	No	Soils from disturbed areas would be salvaged for use in reclaiming other areas. The soil structure would be permanently altered by salvaging and stockpiling the soil for reuse.
Vegetation	Yes	Yes	A total of 540 acres of vegetation would be lost as a result of the permanent open pits.
Special Status Plant Species	No	No	No impacts to special status species are expected.
Non-Native Invasive Species	No	No	Successful reclamation Design Features and Best Management Practices designed to exclude and treat noxious weeds from the BMM North Operations Area Project would minimize impacts from noxious weeds. Invasive species would have an increased opportunity to establish in disturbed areas. Design Features, Best Management Practices, and successful reclamation would minimize these impacts.
Wildlife	Yes	Yes	A total of 540 acres of wildlife habitat would be lost as a result of the permanent open pits. There is the potential for the mine facilities to act as a barrier in a portion of the deer migration corridor during operations.
Migratory Birds	Yes	Yes	A total of 540 acres of habitat would be lost as a result of the permanent open pits.
Special Status Animal Species	Yes	Yes	A total of 540 acres of habitat would be lost as a result of the permanent open pits. Approximately 312 acres of this disturbance would be in potential pygmy rabbit habitat. Disturbance in other areas such as pinyon-juniper would include displacement due to mining activities.
Wetlands, Riparian Zones, and Waters of the U.S.	No	No	No impacts to wetlands, riparian zones, or Waters of the U.S. are expected.
Range Resources	Yes	Yes	There would be a temporary loss of 98 animal unit months throughout the life of the project and a permanent loss of 14 animal unit months.
Wild Horses	Yes	Yes	A total of 540 acres of range would be lost as a result of the permanent open pits. Short-term disturbance would include displacement due to mining activities.
Land Use and Access	Yes	Yes	There would be irreversible and irretrievable impacts to 540 acres of public access and land as a result of open pits.
Recreation	No	Yes	The disturbance as a result of the open pit development would create a minimal loss of recreation area.
Air Quality	No	Yes	Emissions from the project would not deteriorate the existing air quality in the Proposed Action area.
Visual Resources	No	Yes	Impacts to visual resources would result from the expansion of the existing operations. Successful reclamation procedures at the end would partially return the visual continuity.
Noise	No	No	Noise is not considered irreversible because it would cease when mining operations ceased.

Resources	Irreversible Impacts	Irretrievable Impacts	Explanation
Socioeconomics	Yes	No	The economic wealth generated from the production and further use of the gold resources underlying the BMM North Operations Area Project would be irreversible. The jobs, income, and taxes created over the life of the project reflects irreversible resource commitment to achieve such production but also represents a measure of economic benefits associated with the project.
Environmental Justice	No	No	No impacts to environmental justice are expected.
Cultural Resources	Yes	Yes	Disturbance of cultural sites would result in the permanent loss of site context. Cultural sites would be treated in accordance with the Programmatic Agreement.
Native American Religious Concerns	No	No	No impacts to Native American Religious Concerns are expected.
Hazardous and Solid Waste/Hazardous Materials	No	No	The probability of a release of chemicals or fuel during transport is low with an even lower potential for a spill to occur in a sensitive area. Small spills of chemicals and/or fuels are more likely to occur on the mine site and thus have short-term impacts to soils and possibly vegetation. Mitigation of these spills would eliminate any lasting impacts to resources.

3.23.3 Unavoidable Adverse Impacts

Implementation of Design Features (Table 2-13) and BLM Best Management Practices (Appendix D) would reduce most adverse impacts that would result from the Proposed Action. Unavoidable adverse impacts (residual impacts) that would remain are summarized below by resource. Unavoidable adverse impacts for the action alternatives would be the same as those for the Proposed Action, except where specifically noted.

Groundwater

The current groundwater withdrawal rate would increase to approximately 80 million gallons a year, for a total of approximately 180 million gallons a year. No unavoidable adverse impacts are anticipated to wells in Newark and Huntington valleys, seeps and springs within the Plan of Operations boundary, or Ruby Lake National Wildlife Refuge.

Soils

Approximately 3,920 acres of disturbance would occur, permanently altering the soil structure and impeding soil development while the soil is stockpiled for future use.

Vegetation

Approximately 3,920 acres of disturbance would occur. Following reclamation, vegetation community types might differ from those originally present.

Non-Native Invasive Species

Approximately 3,920 acres of disturbance would occur, increasing the potential for noxious weeds to become established and dispersed off-site and along transportation routes.

Wildlife

Approximately 3,920 acres of disturbance to wildlife habitat would occur, resulting in a temporary loss of habitat until the disturbed areas can be successfully reclaimed. Reclaimed areas might differ from the original vegetation communities to the benefit of some species and the detriment of others. Approximately 540 acres of habitat would be lost permanently as a result of the expanded pits. Wildlife displaced from disturbed areas would be forced into

adjacent habitats, increasing the potential for competition with resident individuals. Wildlife could be at greater risk of collisions with vehicles, and smaller and less mobile animals could suffer direct mortality during land clearing activities. Seasonal movement of mule deer herds could be impeded to some degree.

Migratory Birds

Approximately 3,920 acres of disturbance to migratory bird habitat would occur, resulting in a temporary loss of habitat until the disturbed areas can be successfully reclaimed. Reclaimed areas might differ from the original vegetation communities to the benefit of some species and the detriment of others.

Special Status Wildlife Species

Disturbance could occur on the margins of occupied pygmy rabbit habitat. Other disturbance could reduce foraging habitat for ferruginous hawks and burrowing owls. The reduction in pinyon-juniper woodland would reduce nesting habitat for the pinyon jay, juniper titmouse, and other forest-dependent and cavity-nesting species.

Range Resources

Approximately 3,920 acres of disturbance to rangeland would occur, possibly resulting in a reduction in stocking level, depending on other range condition factors. Disturbed areas would be reclaimed and the impact would be temporary for all but approximately 540 acres of pit expansion, which would be permanently lost.

Wild Horses

Approximately 3,920 acres of disturbance to the Triple B Herd Management Area would occur, resulting in a reduction in available forage. Disturbed areas would be reclaimed and the impact would be temporary for all but approximately 540 acres of pit expansion, which would be permanently lost. Wild horses could be affected by increased disturbance from vehicles and equipment, blasting, potential collisions with vehicles, and interference with herd movements.

Land Use and Access

Public access to active mining areas would be restricted until mining ceases and reclamation is complete. There would be an increase in traffic on mine access roads and the need for additional road maintenance.

Recreation

Recreational access to active mining areas would be restricted until mining ceases and reclamation is complete.

Air Quality

Impacts to air quality from additional mine development activities include slight increases in tailpipe and fugitive dust emissions from additional deliveries and construction. It is estimated that increased PM_{10} and sulfur dioxide emission would be negligible and there would be an increase of less than one ton per year each of carbon monoxide, nitrogen oxide, and volatile organic compounds. Fugitive dust is expected to increase by approximately 78 tons per year. There would be a total of 57.7 pounds of mercury emissions as a result of thermal source emissions and fugitive emissions.

Visual Resources

During active mining, the additional disturbance would create a strong visual contrast with the surrounding landforms and vegetation. Following recontouring and successful reclamation, the

contrast would be reduced so that it would not attract the attention of viewers. Some permanent alterations to the landscape such as open pits would remain.

Noise
The Proposed Action would result in additional blasting and construction noise in the mine vicinity and a minor increase in traffic-related noise along access routes. Noise impacts would cease following reclamation and closure of the mine.

Socioeconomics
The staffing level under the Proposed Action would increase to a maximum of 325 employees, which represents a 50 percent increase over current employment. White Pine County would be the recipient of the mine's ad valorem tax payments and would receive a share of the net proceeds tax. The additional revenue would assist White Pine County in stabilizing its finances. All three counties (White Pine, Eureka, and Elko) would benefit from local spending by residents employed by the mine. Initially at least, most new employees from outside the analysis area would likely reside in Elko. County services should be adequate for the anticipated increase in population.

Cultural Resources
The Proposed Action would result in the loss of all prehistoric and historic archaeological sites directly impacted by construction and/or maintenance of the expanded mining facilities. Any archaeological sites experiencing impacts from either the Proposed Action or alternatives, and deemed eligible for inclusion in the National Register of Historic Places, would be mitigated in accordance with the Programmatic Agreement (Appendix J).

Hazardous and Solid Waste/Hazardous Materials
During the life of the Proposed Action there would be a low probability of an accidental release of hazardous materials during transport. Approximately six miles of the 75 miles of access routes cross sensitive resource areas with potential to release a hazardous substance into a wetland or riparian area. The environmental effects of a release would depend on the substance, quantity, timing, and location. The effects would range from minor for a spill at the project site (equipment immediately available to limit spill) to a large spill during transport that could immediately impact water quality and aquatic life, if spilled into a flowing stream. The likelihood of a major spill into a flowing stream is low.

3.23.4 Incomplete or Unavailable Information

The following identifies resources where information was either incomplete or unavailable for use in development of the FEIS. Only those resources where deficient information was identified are listed. The Council of Environmental Quality regulations provide direction on how to proceed with the preparation of the FEIS when information is incomplete or unavailable. The following sections provide the necessary data to address the Council on Environmental Quality regulations with regard to incomplete or unavailable information. As indicated below, none of the incomplete or unavailable information identified was critical to the impact analysis in this FEIS.

Water Resources
Incomplete Information – The deep bedrock hydrogeology of the study area is unknown.

Relevance of Incomplete Information – The lack of specific data associated with the deep bedrock hydrogeology is unlikely to significantly affect the impact analysis because all existing and proposed pits are and would be above the identified bedrock groundwater system. Exploration drilling did not identify any major groundwater control structures within the proposed

ore bodies to be mined using open pit techniques. In addition, the existing production wells are within an unconfined alluvial aquifer and there are no other users within five miles of the existing production wells.

Summary of Existing Information – Data used in the analysis is based primarily on exploration drilling data, existing pit data, U.S. Geological Survey groundwater data, and data from the existing production wells. Data used to predict impacts to groundwater quality are based on results from sampling and analysis of existing waste rock and ore, and materials obtained during the exploration program.

Approach to Evaluate Impacts – Neither existing nor proposed pits would intersect the deep bedrock aquifer based on exploration data, thus no impacts to quantity of water are anticipated (no dewatering required). Potential impacts to quality of water are addressed in Chapter 3 and based on existing analytical data from waste rock and ore samples.

Modeling of the potential cone of depression around the existing production wells was completed based on test data collected from the existing production wells. The modeled cone of depression was mapped with the closest existing wells to the BMM. This data was used to determine the potential impacts from the increased production from the existing wells.

Conclusion – The lack of information on the deep bedrock hydrogeology did not significantly affect the impact analysis, primarily due to the fact that the bedrock system would not be intercepted by the existing nor proposed pits.

Non-native Invasive Species

Incomplete Information – A complete survey for non-native invasive species that are not listed as noxious weeds has not been performed for the entire Proposed Action area.

Relevance of Incomplete Information – Surveys for non-native invasive species are labor intensive and expensive, and generally become obsolete in a short period due to the speed with which weeds can expand in the new areas.

Summary of Existing Information – Existing data used in the analysis of impacts included data from the biological baseline report (SRK, 2007), the BLM GIS database (BLM, 2007a), and the Tri-County Weeds Program (Tri-County Weeds, 2007). The majority of this data provides information on noxious weeds, although some mention of the presence of non-native invasive species is provided. However, neither the locations of the non-native species nor the prevalence of these species are provided in these reports and reference material.

Approach to Evaluate Impacts – The approach to developing the impact analysis primarily focuses on the potential for additional establishment of non-native invasive species in newly disturbed areas. Because of the speed of which many of these species become established on disturbed ground, the analysis assumes the potential for all disturbed ground to be at risk for non-native invasive species establishment. Based on this assumption along with the implementation of the design features, the potential impacts are developed.

Conclusion – The lack of specific data on the current extent and locations of non-native invasive species within or adjacent to the Proposed Action area was not critical for the analysis of the potential impacts. Potential impacts were based on the assumption that all existing and new disturbance is at risk for non-native invasive species establishment and that design features (Table 2-13) and BLM Best Management Practices (Appendix D) implemented by Barrick, would eliminate or reduce the risk of the potential impacts.

Recreation
Incomplete Information – Actual recreation usage (the number of hunters, off-road vehicles, etc.) is unknown and there is no mechanism for obtaining such detailed information. Therefore, it is not possible to know the exact number of recreational users that would be affected.

Relevance of Incomplete Information – The exact number of recreation users around the Proposed Action area is not critical to the analysis because recreational use is relatively light due to the distance from population centers and the lack of features (water sources, established trails, etc.) that would attract large number of recreational users.

Summary of Existing Information – Some recreational use activity is known for some areas in the vicinity of the Proposed Action including Loneliest Highway Recreation Management Area, Cold Creek Reservoir, Garnet Hill Rockhounding Area, and Illipah Reservoir. These areas would typically have higher use due to established recreational activities (rockhounding, fishing, boating, etc.).

Approach to Evaluate Impacts – The knowledge of light recreational usage in the area surrounding the Proposed Action is adequate for estimating potential recreational impacts on the Proposed Action. Knowing that the area does not support heavy recreational use and that there is a significant amount of adjacent public lands for recreational use, is sufficient information to identify the potential impacts of the Proposed Action.

Conclusion – Although the exact number of recreational users of the area is not known, the existing information about recreational use was sufficient for the impact analysis.

Air Quality
Incomplete Information – No monitoring data exist for air pollutant concentrations in the direct impact analysis area. It was not feasible to collect this information because a minimum of several years of data would be needed for the data to be meaningful and it is not common nor required for mines or sources below the prevention of significant determination major source threshold to collect this type of data.

Relevance of Incomplete Information – Due to the remote nature of the Proposed Action area and lack of other pollutant sources in the area, the lack of air pollutant concentration data from the site would not result in significant changes to the impact analysis. Regional source data used for the analysis is likely more conservative (higher concentrations) than what actually exist at the Proposed Action area due to potential impacts from urban areas upwind of the regional source data area, and was accepted as such by the Nevada Division of Environmental of Protection.

Summary of Existing Information – Regional data from several sources were used to represent the expected conditions of the project area. The regional data was selected based on the Proposed Action area being very remote from urban and industrial areas. Specific pollutants from the regional data used in the analysis are likely conservative due to the location of one of the source data (Barstow, California), which are likely impacted by pollutants within the Los Angeles basin.

Approach to Evaluate Impacts – The approach to the impact analysis would not differ if site specific data was used instead of the regional data. The same modeling approach would be used because the regional data is assumed to represent background conditions onsite and in the vicinity.

Conclusion – The lack of site specific pollutant data would not change the approach of the impact analysis nor significantly change the results of the impact analysis. The regional data is likely to be more conservative than actual site specific data.

Socioeconomics

Incomplete Information – Two areas of potentially incomplete data were identified during the development of the socioeconomic baseline data and impact analysis:

- Information that could potentially impact the accuracy of the IMPLAN model used in the analysis included data that is self-reported to government agencies. Self-reporting depends on the judgment of respondents to classify and report new information; and

- Legally mandated privacy requirements prevent disclosure of proprietary economic data. This is a particular problem in small, rural economies, where because of the limited number of businesses, disclosure of some data could reveal proprietary information.

Relevance of Incomplete Information – With regard to the self-reporting data, the differences in judgment from individuals required to report data may result in data-reporting inconsistencies. This is typically a deficiency inherent in the most data collection processes. In dealing with proprietary information, the IMPLAN model attempts to fill in these data gaps through the use of state averages; however, some inaccuracies are likely to occur.

Summary of Existing Information – The most recent available public socioeconomic information was obtained from the state of Nevada, Elko County, White Pine County, Eureka County, and the communities within these counties.

Approach to Evaluate Impacts – The data obtained on socioeconomic conditions for each county and the main communities within those counties were used in the IMPLAN model. This model then estimated the economic impact associated with the Proposed Action. As indicated above, the self-reporting data inaccuracies and information that is unavailable due to proprietary issues would likely result in some inaccuracies with the IMPLAN model. However, the best readily available public information was used to determine the socioeconomic impacts.

Conclusion – Although some inaccuracies in the socioeconomic data may be present, the best available socioeconomic data was used in the impact analysis.

3.23.5 Relationship between the Short-Term Uses of the Human Environment and the Maintenance and Enhancement of Long-Term Productivity

This section provides the tradeoffs between short-term impacts and long-term impacts to environmental resources that would occur with implementation of the Proposed Action.

Short-term adverse impacts associated with the Proposed Action would include the temporary loss of vegetation, loss of soil productivity, temporary increase in erosion potential and sedimentation in ephemeral drainages, potential increase of non-native invasive species, loss of wildlife habitat and displacement of wildlife, temporary loss of grazing resources for livestock and wild horses, slight increases in fugitive dust emissions and other emissions from other sources, loss of public access to additional lands for recreation and other uses, temporary noticeable changes to the viewshed, and an increase in noise.

Short-term beneficial impacts would include continued employment for the local communities and generation of tax revenue for White Pine County and spending revenue in Elko, Eureka, and White Pine counties.

Long-term impacts are highly dependent on the success of reclamation. Since successful reclamation is required as part of the reclamation permit, it is anticipated there would be minimal long-term impacts. Long-term impacts to resources would vary with some changes in vegetation resulting in beneficial impacts to wildlife. This includes the long-term productivity of vegetation as a result of conversion from pinyon-juniper woodland to grass-shrub habitat. The grass-shrub habitat would provide better long-term forage for wildlife, primarily deer. There would be a long-term loss of soil productivity due to the disturbance of the soil structure, which may result in a change in vegetation productivity. There would be a permanent loss of habitat that would result from pit expansion. This would result in a long-term loss of area for productive vegetative growth and for forage for wildlife and livestock.

3.23.6 Energy Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

As with current operations, two sources of energy would be used during the operation of the Proposed Action. These are electricity supplied through existing power lines and liquid fuels used for mobile equipment and generators. Electricity supplied through existing power lines is used for lighting, powering process equipment, and power for the buildings including the office, maintenance shops, warehouse, and other facilities. One new facility, the maintenance shop at the Top/Sage Pit complex, is proposed to be constructed under the Proposed Action. A new power line and substation would be constructed to supply power to the maintenance shop. Power requirements for the Proposed Action would be slightly higher than the current needs. No new major facilities are planned that would result in a significant increase in the power demand.

There may be an increase in fuel consumption for additional equipment needed for the Proposed Action. This potential increase in fuel consumption may be offset by better fuel efficiency as a result of newer equipment being used under the Proposed Action. In addition, Barrick would implement conservation measures to minimize the use of fuel at the mine site. This would have a dual benefit by reducing both emissions and costs.

3.23.7 Adverse Energy Impact

BLM Instruction Memorandum No. 2002-053 directs that the adverse impacts of decisions on “energy development, production, supply, and/or distribution” be considered. This project does not include nor would it impact energy development, production, supply, and/or distribution.

3.23.8 Natural or Depletable Resource Requirements and Conservation Potential of Alternatives and Mitigation Measures

It is the nature of mining to develop depletable resources by removal of ore and processing the ore to remove the identified mineral. In the case of Bald Mountain, the depletable resource is gold and silver contained within the ore. All the identified alternatives analyzed within this FEIS would not differ in the extraction of the depletable resource.

3.23.9 Urban Quality, Cultural Resources, and the Design of the Built Environment, Including the Reuse and Conservation Potential of Various Alternatives and Mitigation Measures

The Proposed Action identified in the Plan of Operations and this FEIS and the alternatives analyzed would have no effect on urban quality or the built environment. There are some

historic and cultural resources that have been identified within the Plan of Operations boundary. Potential impacts to these resources would be handled in accordance with the Programmatic Agreement between the project proponent and the BLM. There would only be minor changes to the anticipated impacts to historic and cultural resources with implementation of the alternatives, due to the slightly less surface disturbance associated with the alternatives.

Chapter 4
Cumulative Effects

4.1 Introduction

As required under NEPA and the regulations implementing NEPA, this section analyzes potential cumulative impacts from past, present, and reasonably foreseeable future actions combined with the Proposed Action within the cumulative effects study area specific to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as "the impact which results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 Code of Federal Regulations 1508.7).

This analysis focuses on cumulative impacts of the Proposed Action and other actions both within and outside of the Proposed Action area. A qualitative description of the differences in cumulative impacts between those associated with the Proposed Action and those with other alternatives is included.

Nevada BLM Instruction Memo NV-90-435 specifies that impacts must first be identified for the Proposed Action (i.e., the proposed BMM North Operations Area Project) before cumulative impacts with other actions can occur.

As related to the Proposed Action, cumulative impacts are addressed for the following resources:

- Water Resources;
- Geology and Minerals;
- Paleontology;
- Soils;
- Vegetation;
- Non-native Invasive Species;
- Wildlife (including Migratory Birds and Special Status Species);
- Migratory Birds;
- Wetlands and Riparian Areas;
- Range Resources;
- Wild Horses;
- Land Use and Access;
- Recreation;
- Air Quality;
- Visual Resources;
- Noise and Vibration;
- Socioeconomics;
- Cultural Resources; and
- Hazardous and Solid Waste/Hazardous Materials.

Since no direct or indirect impacts to special status plant species, federally-listed animal species, Environmental Justice, and Native American Religious Concerns associated with the Proposed Action were identified in the discussion in Chapter 3, they are not addressed in the cumulative impacts discussion.

4.1.1 Time Frame for Analysis

The reasonably foreseeable time frame for the cumulative impact analysis is 25 years. Twenty-five years represents 10 years of the anticipated life of the mine and an additional 15 years for reclamation (earthwork, revegetation, and stabilization of process fluids). The actual time frame for reclamation activities, primarily the stabilization of process fluids, can range between five years and more than 20 years. An average of 13 years was used for this cumulative impact analysis.

For the purposes of this analysis and under federal regulations, “impacts” and “effects” are assumed to have the same meaning and are interchangeable. The cumulative effects analysis was accomplished through the following steps:

- Step 1: Establish appropriate geographical areas for analysis by resource;
- Step 2: Identify all past, present, and reasonably foreseeable future actions relevant to the resources in the cumulative effects study areas;
- Step 3: Summarize the effects of the Proposed Action in conjunction with past, present, proposed, and reasonably foreseeable future actions;
- Step 4: Provide a cumulative impacts conclusion; and
- Step 5: Discuss the variation in cumulative impacts between the Proposed Action and other alternatives.

4.1.2 Interrelated Projects

Interrelated projects are defined for this FEIS as activities that could interact with the Proposed Action in a manner that would result in cumulative impacts. Interrelated projects have been grouped as past, present, and reasonably foreseeable future actions. The interrelated projects are listed and described below. Table 4-1 quantifies surface disturbance characteristics of each project that is relevant to cumulative impacts. Surface disturbance characteristics were selected to describe the interrelated projects because it allows the combined surface disturbance impacts of interrelated projects to be totaled. The interrelated projects are shown in Figures 4-1 and 4-2, and Table 4-2 identifies potential interactions among the interrelated projects and resources. The geographic area for the cumulative impacts analysis is determined primarily by the locations of the interrelated projects and the interactions with potentially affected resources.

Past Actions

Sierra Pacific Power Company Falcon to Gonder Power Line

The Sierra Pacific Power Company Falcon to Gonder Transmission Project involved the construction of a new 345 kilovolt power line, generally located between Ely and Dunphy, Nevada (BLM, 2001a). The power line was constructed in 2003, is approximately 180 miles long, has a construction disturbance width of 160 feet, and consists of steel H-frame towers. For the purposes of this analysis, it is assumed approximately 25 miles of the power line is within the air/water resources cumulative effects study area, approximately 27 miles of the power line is within the wildlife cumulative effects study area, and 24.5 miles of the power lien is within the wild horse cumulative effects study area. Based on a 160-foot right-of-way width the corridor associated with the power lines within the different cumulative effects study areas is estimated to include 485 acres (air/water), 524 acres (wildlife), and 475 acres (wild horse).

TABLE 4-1 PAST, PRESENT, PROPOSED, AND REASONABLY FORESEEABLE FUTURE INTERRELATED ACTIONS FOR THE BMM NORTH OPERATIONS AREA PROJECT CUMULATIVE EFFECTS AREAS

Interrelated Projects	Air Quality, Water Resources, Soils, Non-Native Invasive Species, and Vegetation Cumulative Effects Study Area	Paleontology, Geology and Minerals, and Noise and Vibration Cumulative Effects Study Area	Wildlife Cumulative Effects Study Area	Cultural Resources Cumulative Effects Study Area	Visual, Recreation, and Land Use and Access Cumulative Effects Study Area	Range Cumulative Effects Study Area	Wild Horse Cumulative Effects Study Area	Hazardous and Solid Waste/Hazardous Materials Cumulative Effects Study Area	Socioeconomic Cumulative Effects Study Area
CESA Area (Acres)	**2,070,965**	**199,258**	**1,794,903**	**775,114**	**317,038**	**356,666**	**1,233,000**		**19,347,840**
Interrelated Action	**Surface Disturbance (acres)**								
Past Actions									
SPPCo Falcon to Gonder Power Line	485	**	524	**	**	**	475.2	**	*
Oil & Gas Wells[1]	105	6	72	24	9	33	78	**	*
Illipah Mine	200	**	200	**	**	**	200	**	*
Highway 50 Corridor	290	**	375	**	**	**	**	412	*
Gravel Pits [2]	166	17	165	40	29	58	90	**	*
Casino/Winrock Mine	200	200	200	200	200	200	200	**	*
Yankee Mine	450	450	450	**	**	450	450	**	*
Bellview Project	5	**	5	5	5	**	**	**	*
Cherry Springs Canyon Exploration Project	1	**	1	1	1	**	**	**	*
Overland Pass Exploration Project	3	**	3	3	3	**	3	**	*
Alligator Ridge Project	593	593	593	**	593	593	593	**	*
Little Bald Mountain Mining Project	28	28	28	28	28	28	28	**	*
Golden Butte Mine	**	**	**	**	**	**	175	**	*
White Pine Mine	274	274	274	274	274	274	274	**	*
Socioeconomics-Specific Projects	**	**	**	**	**	**	**	**	*

Interrelated Projects	Air Quality, Water Resources, Soils, Non-Native Invasive Species, and Vegetation Cumulative Effects Study Area	Paleontology, Geology and Minerals, and Noise and Vibration Cumulative Effects Study Area	Wildlife Cumulative Effects Study Area	Cultural Resources Cumulative Effects Study Area	Visual, Recreation, and Land Use and Access Cumulative Effects Study Area	Range Cumulative Effects Study Area	Wild Horse Cumulative Effects Study Area	Hazardous and Solid Waste/Hazardous Materials Cumulative Effects Study Area	Socioeconomic Cumulative Effects Study Area
Disturbance Subtotal	**2,800**	**1,568**	**2,890**	**575**	**1,142**	**1,636**	**2,566.2**	**412**	
Present Actions									
BMM	3,418	3,418	3,418	3,418	3,418	3,418	3,418	3,418	*
Mooney Basin Operations Area	742	742	742	742	742	742	742	742	*
Oil & Gas Wells[1]	15	3	9	3	**	3	9	**	*
BMM Regional Exploration Plan	210	210	210	210	210	210	210	210	*
Little Bald Mountain Mining Project	1	1	1	1	1	1	1	**	*
Little Bald Exploration Plan	11	11	11	11	11	11	11	**	*
Silver State Fiber Optic Line	70	**	**	**	**	**	**	103	*
Notices Of Intent	50	50	50	50	50	0	50	**	*
Socioeconomics-Specific Projects	**	**	**	**	**	**	**	**	*
USFS Fuel Treatment Project	500	**	500	500	500	**	500	**	*
Disturbance Subtotal	**5,017**	**4,435**	**4,941**	**4,935**	**4,932**	**4,385**	**4,941**	**4,473**	
Reasonably Foreseeable Future Actions									
BMM NOAP (Proposed Action)	3,920	3,920	3,920	3,920	3,920	3,920	3,920	3,920	*
Alligator Ridge Mining Project	600	600	600	**	600	600	600	**	*
Midway Gold – Pan Mining Project	50	**	**	**	**	**	**	**	*
Limousine Butte Exploration Plan	**	**	**	**	**	**	88	**	*
Yankee Mining	400	400	400	**	**	400	400	**	*

Interrelated Projects	Air Quality, Water Resources, Soils, Non-Native Invasive Species, and Vegetation Cumulative Effects Study Area	Paleontology, Geology and Minerals, and Noise and Vibration Cumulative Effects Study Area	Wildlife Cumulative Effects Study Area	Cultural Resources Cumulative Effects Study Area	Visual, Recreation, and Land Use and Access Cumulative Effects Study Area	Range Cumulative Effects Study Area	Wild Horse Cumulative Effects Study Area	Hazardous and Solid Waste/Hazardous Materials Cumulative Effects Study Area	Socioeconomic Cumulative Effects Study Area
Wind Energy Projects	1,020	**	**	1,020	**	**	1,020	**	*
Oil & Gas Wells[1]	15	3	9	3	**	3	9	**	*
Socioeconomics-Specific Projects	**	**	**	**	**	**	**	**	*
Disturbance Subtotal	**6,005**	**4,923**	**4,929**	**4,943**	**4,520**	**4,923**	**6,037**	**3,920**	
Natural Processes									
Wildland Fire	*	*	*	*	*	*	*	*	*
Spread of Noxious/Invasive Weeds	*	*	*	*	*	*	*	*	*
Expansion of Pinyon and Juniper Trees and other Woody Species	*	*	*	*	*	*	*	*	*
Spread of Forest Insects and Diseases	*	*	*	*	*	*	*	*	*
Disturbance Total	**13,822**	**10,926**	**12,760**	**10,453**	**10,594**	**10,944**	**13,544**	**8,805**	

** The project not present within the CESA for this resource.
* The project is present within this CESA.
[1] Assumes 3 acres of disturbance for each past or present well.
[2] Acreage determined from BLM Shape Files 2008.

TABLE 4-2 INTERACTIONS BETWEEN RESOURCES AND INTERRELATED PROJECTS

Interrelated Projects	Water Resources	Geology and Mineral	Paleontology	Soils	Vegetation Resources	Non-Native Invasive Species	Wildlife	Wetlands, Riparian Zones, and Waters of the U.S.	Range Resources	Wild Horses	Land Use and Access	Recreation	Air Quality	Visual Resources	Noise and Vibration	Socioeconomics	Environmental Justice	Cultural Resources	Native American Religious Concerns	Hazardous and Solid Waste/Hazardous Materials
Past Actions																				
SPPCo Falcon to Gonder Power Line					X	X	X	X								X				
Oil & Gas Wells					X	X							X	X	X	X		X	X	
Illipah Mine	X			X	X	X	X	X		X			X			X				
Highway 50 Corridor					X	X	X	X					X			X				X
Gravel Pits	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Casino/Winrock Mine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Yankee Mine	X	X	X	X	X	X	X	X	X	X			X		X	X				
Bellview Project	X			X	X	X	X	X			X	X	X	X		X		X	X	
Cherry Springs Canyon Exploration Project	X			X	X	X	X	X			X	X	X	X		X		X	X	
Overland Pass Exploration Project	X			X	X	X	X	X		X	X	X	X	X		X		X	X	
Alligator Ridge Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Little Bald Mountain Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Golden Butte Mine										X						X				
White Pine Mine	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Socioeconomics-Specific Projects																X				
Present Actions																				
BMM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Mooney Basin Operations Area	X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	X
Oil & Gas Wells					X	X	X			X		X	X		X	X		X	X	
BMM Regional Exploration Plan	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X
Little Bald Mountain Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Little Bald Exploration Plan	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	
Silver State Fiber Optic Line				X	X	X		X				X	X			X				
Notices Of Intent		X	X	X	X	X	X	X	X	X			X	X	X	X		X	X	
Socioeconomics-Specific Projects																X				
USFS Fuel Treatment Project	X			X	X	X	X	X		X	X	X	X	X		X		X	X	

Interrelated Projects	Water Resources	Geology and Mineral	Paleontology	Soils	Vegetation Resources	Non-Native Invasive Species	Wildlife	Wetlands, Riparian Zones, and Waters of the U.S.	Range Resources	Wild Horses	Land Use and Access	Recreation	Air Quality	Visual Resources	Noise and Vibration	Socioeconomics	Environmental Justice	Cultural Resources	Native American Religious Concerns	Hazardous and Solid Waste/Hazardous Materials
Reasonably Foreseeable Future Actions																				
EnXco / Power Partners Wind Project N82424					X	X							X			X		X	X	
BMM NOAP (Proposed Action)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
Alligator Ridge Mining Project	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Midway Gold - Pan Mining Project	X			X	X	X	X		X				X			X				
Limousine Butte Exploration Plan	X									X						X				
Yankee Mining	X	X	X	X	X	X	X	X	X	X			X		X	X				
Wind Energy Projects	X				X	X				X			X			X		X	X	
Oil & Gas Wells					X	X	X		X	X			X		X	X		X	X	
Socioeconomics-Specific Projects																X				
														X						
Natural Processes																				
Wildland Fire	X			X	X	X	X	X	X	X	X	X	X	X				X		
Spread of Noxious/Invasive Weeds	X			X	X	X	X	X	X	X	X	X		X						
Expansion of Pinyon and Juniper Trees and other Woody Species					X	X	X		X	X	X	X		X					X	
Spread of Forest Insects and Diseases					X	X	X	X	X	X	X	X		X					X	

Oil and Gas Wells

Numerous past (pre-2001) oil and gas notices have been filed in the region. The locations of past oil and gas notices are shown on Figure 4-1. Disturbance associated with each well is based on approximately three acres.

Illipah Mine

The Illipah Mine is currently inactive and is located approximately four miles north of Antelope Summit on U.S. Highway 50 and approximately 30 miles south of the BMM area. Several companies have conducted exploration in the area of the mine over the last 10 years. It is estimated that the mine site encompasses approximately 200 acres of disturbance (Wilson, 2008).

Highway 50 Corridor

U.S. Highway 50 is a paved two-lane highway located south of the project area. The highway follows portions of the Pony Express Trail and Lincoln Highway. It includes a 200-foot right-of-way with an approximate disturbance width of 100 feet. The highway forms the southern boundary of the wildlife cumulative effects study area for a distance of approximately 31 miles and is within the air, water resources, soils, vegetation, and non-native invasive species cumulative effects study area for approximately 24 miles.

Gravel Pits

Seventy-one sand and gravel (material) pits were identified adjacent to highways and in the valleys surrounding the project area. The majority of these pits are abandoned, and several more are inactive. Past gravel pits and their locations in proximity to the cumulative effects study area are shown in Figure 4-1. Approximate disturbance associated with the gravel pits is provided in Table 4-1.

Casino/Winrock Mine

The Casino/Winrock Mine consists of two inactive mine sites, Casino (north of the Proposed Action boundary) and Winrock (northeast of the BMM North Operations Area Project boundary). The mine sites include a combined heap leach facility (the Casino/Winrock leach pad) located north of the Winrock Mine. These inactive mines are located at the extreme south end of Ruby Valley, in northwest White Pine County, Nevada. Activities resulted in approximately 200 acres of disturbance; all disturbance except for approximately 33 acres of pits has been reclaimed.

Yankee Mine

The Yankee Mine is located along the west flank of Long Valley near the southern-most edge of the Bald Mountain Mining District. An extensive drilling program was conducted by Amselco Exploration, Inc. in early 1984. Activities in the late 1980s and mid-late 1990s included open pit mining and the construction of associated waste rock disposal areas, a heap leach facility, roads, and ancillary facilities. There were several operators at the Yankee Mine prior to the Placer Dome U.S. purchase in August 1993. Currently, Barrick controls the Yankee Mine and its associated facilities. The mine consists of a six-million-ton heap leach facility, three associated process ponds, a central processing plant, 17 pits, and several waste rock stockpiles. Mining ceased at the Yankee Mine in 1998 with ongoing processing occurring until the spring of 1999. Secondary heap leaching was concluded in April 2000. Past disturbance is estimated at 450 acres.

Bellview Project

The Western States' Bellview Project was a proposed open pit mine with cyanide heap leaching. The project is located in Walker Canyon, on USFS administered lands on the west flank of the southern Ruby Mountains. The project was proposed in 1991 and is located in

Figure 4-1 Cumulative Effects Study Area

Figure 4-2 Socioeconomic Cumulative Effects Study Area

portions of Sections 2 and 3, Township 25 North, Range 56 East, and in portions of Sections 34 and 35, Township 26 North, Range 56 East. Mining was proposed for 1992 and early 1993 but never proceeded beyond the exploration phase (SRK, 2008). Disturbance in the area is estimated to include approximately five acres of reclaimed exploration roads.

Cherry Springs Canyon Exploration Project

Barrick Gold Exploration's Cherry Springs Exploration Project was proposed on USFS administered lands north of Overland Pass, on the western flank of the southern Ruby Mountains. The project was approved in 1998 with a Categorical Exclusion from the USFS. The project area is located in Sections 15, 22, and 26, Township 25 North, Range 56 East. Barrick Gold Exploration proposed to drill up to six exploration holes over a two-week period in 1998. The project temporarily affected approximately one acre. Reclamation was proposed for the same year as the project (1998).

Overland Pass Exploration Project

The Overland Pass exploration project was proposed by Cordex Exploration Co., on USFS administered lands north of Overland Pass. The project was approved in 1998 with a Categorical Exclusion from the USFS. The project area is located in Sections 19, 20, 29, and 30, Township 25 North, Range 57 East. Cordex proposed to drill up to 11 exploration holes and construct associated sumps. The project would utilize overland travel and affect approximately 3.2 acres. Reclamation was proposed and was assumed to be completed the same year as the project (1998).

Alligator Ridge Project

The Alligator Ridge Project area is located approximately 11 miles south of Barrick's Mooney Basin Operations in portions of Township 22 North, Range 57 East. The Alligator Ridge Mine is located at the southern tip of the Ruby Mountains. Bald Mountain Mining, Inc. acquired the property and facilities from the original owner and operator, USMX, Inc., in 1993. The Alligator Ridge Mine comprised seven open pits, waste rock facilities, a mill and tailings impoundment, and a heap leach facility. Mining activities at the Alligator Ridge Mine ceased in mid-1987. Approximately seven million tons of ore were leached, and about 500,000 tons were milled. Leaching continued from 1987 through 1990 by BMM, and secondary leaching was continued by USMX, Inc. through 1993. From 1993 to 1997 leaching operations were conducted by BMM. Cessation of production occurred in 1997, and ongoing closure and reclamation activities were largely completed by 2000. The project area included a total permitted disturbance area of 593 acres, including eight open pits. All disturbance, except for approximately 100 acres in pits, has been reclaimed.

Little Bald Mountain Mining Project

The Little Bald Mountain Mine is located in Bourne Canyon, south of the existing BMM and Mooney Basin Operations. New Dynasty Mines (U.S.), Inc. commenced exploration activities at the Little Bald Mountain Mine site in 1984. However, mining and ore processing on heap leach pads did not occur until 1985 and continued through 1991 with re-leaching occurring until 1992. The 1995 BMM Expansion EIS states that mining disturbance at the Little Bald Mountain Mine, just south of the BMM, was 28 acres. In December 1992, a Plan of Operations and Reclamation Permit Application were submitted by New Dynasty Mines (U.S.) Inc. The Plan of Operations was subsequently revised in March 1993 as part of the land package that included Dynasty Basin (SRK, 2008). The mine was later acquired by Placer Dome U.S. in 1993. Cessation of mining occurred in 1992, with heap rinsing on-going until 1995. The final permanent closure plan and design for the site was carried out in the summer of 1998 (SRK, 2004).

Golden Butte Mine
The Golden Butte Mine is located in Township 23 North, Range 61 East and consisted of an open pit and heap leach operation. The mine resulted in approximately 175 acres of disturbance; all disturbance except for approximately 20 acres of open pit has been reclaimed.

White Pine Mine
The White Pine Mine is an inactive, reclaimed mine located approximately five miles north of the Proposed Action boundary in portions of Sections 35 and 36, Township 25 North, Range 57 East. The mine includes a total of 274 acres of disturbance, including four open pits and three backfilled pits.

Socioeconomics-Specific Projects
The cumulative effects study area for socioeconomics encompasses Elko, Eureka, and White Pine counties, an area of approximately 30,000 square miles. It is not feasible to list every project that has contributed to social and economic conditions in the study area. However, major past projects in the area that should be mentioned. The Rain Mine, which is located approximately 10 miles southeast of Carlin, Nevada. The Rain Mine is no longer in operation and is currently being reclaimed. The Tonkin Springs Mine, which is located in the Simpson Park Mountains, was operated by U.S. Gold Corporation. The mine is no longer in operation.

Past Natural Processes within the Cumulative Effects Study Area
Wildland Fire
There have been several wildland fires within the cumulative effects study area and vicinity. Approximately 13,208 acres within the vegetation cumulative effects area and 13,097 acres within the wildlife cumulative effects area have burned within the last eight years.

Spread of Non-native Invasive Weeds
Non-native invasive weeds have been progressively spreading in the cumulative effects study area. The entire cumulative effects study area has not been formally surveyed for non-native invasive weeds that are not designated as noxious, so an estimated acreage cannot be determined.

Expansion of Pinyon and Juniper Trees and other Woody Species
Over the past 150 years, pinyon and juniper trees have spread into shrublands and grasslands and are expected to continue expansion.

Spread of Forest Insects and Diseases
Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

Present Actions
BMM and Mooney Basin Operations Area
Present actions at BMM and the Mooney Basin Operations Area are described in Chapter 2 of this document. Current authorized disturbance is 4,165 acres; however, to date only 3,418 have been disturbed.

Oil and Gas Wells
Locations of the currently operating oil and gas wells and past notices for oil and gas wells are shown on Figure 4-1. Currently, there are five wells within the vicinity of the proposed project. Oil and gas wells are estimated to disturb approximately three acres each (Wilson, 2008).

BMM Regional Exploration Plan

BMM proposes up to 210 acres of exploration disturbance; however, only 70 acres would be disturbed at any one time based on reclamation bond limitations and requirements. Locations of drill sites and cross-country travel routes would be dependent on geological conditions and the results of ongoing drilling; thus BMM cannot predict where disturbance would occur. This exploration project is anticipated to occur through 2014 (SRK, 2008).

Little Bald Mountain Mining Project

Previous operations associated with the Little Bald Mountain Mining Project are described above. In January 2006, BMM submitted an Environmental Assessment (BLM, 2006c) for the Little Bald Mountain Mine Plan of Operations to the BLM, which was approved on December 13, 2006 (BLM, 2006c). The amendment allows for re-opening the existing portal for underground exploration activities, which involves disturbance of approximately one acre of previously disturbed/reclaimed land.

Little Bald Exploration Plan

The Little Bald Mountain Mine is the site of a small, permitted underground exploration operation. This operation has not yet begun. The project would result in 11 acres of disturbance.

Silver State Fiber Optic Line

The Silver State Fiber Optic Line is a communications line constructed parallel to the highway right-of-way between Salt Lake City, Utah, and Reno, Nevada. Within the cumulative effects study area, the line is located adjacent to U.S. Highway 50. The fiber optic line has a total permitted disturbance width of 25 feet (Sierra Pacific Power Company has a 10-foot right-of-way; AT&T has a 15-foot right-of-way width). Approximately 23 miles of the fiber optic line fall within the air, water, soils, non-native invasive species, and vegetation cumulative effects study areas.

Notices of Intent

Several hundred Notices of Intent have been filed over much of the project area and on lands to the south. Up to five acres of disturbance may occur under a notice, though actual disturbance would in many cases be less. The majority of these notices are closed, cancelled, expired, or withdrawn. Approximately 10 notices are active within the BLM Elko District Office portion of the cumulative effects study area. If it is assumed five acres of disturbance occurred under each notice, then approximately 50 acres of additional disturbance would occur.

Socioeconomics-Specific Projects

As mentioned previously, it is not feasible to list every project that contributes to social and economic conditions in the study area because it encompasses such a large area. Some of the larger projects in the study area include the Ruby Hill Mine, which is located west of the town of Eureka, Nevada, on private lands and lands administered by the BLM (BLM, 2005d). As mentioned above, the Tonkin Springs Mine is closed but additional exploration is taking place in and near the mine site. The Robinson Mine is an open pit copper and gold mine located approximately seven miles west of Ely, Nevada. The property was mined from the late 1800s to 1978 and then again from 1986 to 1999. The Robinson Mine recently reopened and is operated by Quadra Mining. Numerous other mines are in operation within the cumulative effects study area. The Elko County Railport is located six miles east of Elko, south of Interstate 80, and north of the Humboldt River along the Union Pacific rail line. At completion, the railport is estimated to produce up to 1,500 jobs in the Elko area (SPPCo, 2006).

United States Forest Service Fuel Treatment Project
USFS, Ruby Mountain Ranger District conducted a Fuel Treatment Project in the fall of 2008. The project was located on the west slopes of the Ruby Mountains generally located between Cherry Spring Canyon and Walker Canyon. The purpose of the project was to treat approximately 500 acres of pinyon/juniper encroachment into sagebrush communities on the southern end of the Ruby Mountains with prescribed fire and mechanical treatment. The project broke up fuel continuities and improved the quality of habitat in the project area for mule deer and other wildlife species. Burning occurred in the fall of 2008.

Present Natural Processes within the Cumulative Effects Study Area
Wildland Fires
Natural and human caused fires continue to be a threat to vegetation.

Spread of Non-native Invasive Weeds
Several species of non-native invasive weeds are found throughout the cumulative effects study area. These species are expected to continue to spread on both private and public lands throughout the cumulative effects study area.

Expansion of Pinyon and Juniper Trees and other Woody Species
Pinyon and juniper trees continue to expand into shrublands and grasslands.

Spread of Forest Insects and Diseases
Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

Reasonably Foreseeable Future Actions
BMM North Operations Area Project (Proposed Action)
The Proposed Action is described in detail in Chapter 2 of this document. There would be a disturbance of approximately 3,920 acres with expansion of existing pits and waste rock dumps and process areas.

Alligator Ridge Mining Project
Mining may occur at the Alligator Ridge Mine in the future. Reasonably foreseeable mining-related disturbance is estimated at approximately 600 acres.

Midway Gold-Pan Mining Project
Midway Gold-Pan Mining Project is an exploration project south of U.S. Highway 50 that could develop into a 50-acre mine.

Limousine Butte Exploration Plan
The Limousine Butte Exploration Plan is located in the vicinity of Alta Gold's Golden Butte Mine, located in northern White Pine County. The exploration project proposed up to 88 acres of disturbance occurring within a 27,000-acre plan area.

Yankee Mine
The Yankee Mine is currently reclaimed and in closure; however, a 143-hole exploration program is proposed for the area. Mining may occur at the Yankee Mine in the future. Reasonably foreseeable mining disturbance is estimated at approximately 400 acres.

Wind Energy Projects
Based on current interest in wind energy development, it is projected by the BLM that three 200-megawatt wind farms would be developed during the next 20 years somewhere within the

cumulative effects study areas. Based on information in the Draft Ely Resource Management Plan/EIS (BLM, 2005c), each wind farm is assumed to have approximately 340 acres of permanent disturbance. Assuming three wind farms would be developed, this action would have approximately 1,020 acres of disturbance. Disturbance would largely occur along mountain ridgelines.

Oil and Gas Wells
Reasonably foreseeable oil and gas well exploration (estimated at five wells) is expected to occur in the future (Wilson, 2007).

Socioeconomics-Specific Projects
As mentioned previously, it is not feasible to list every reasonably foreseeable project that could contribute to social and economic conditions in the study area because it encompasses such a large area. Larger future actions in the study area include the Mount Hope Mine, a proposed molybdenum mine northwest of Eureka, Nevada, with an estimated 53-year mine life. The White Pine Energy Station is a proposed coal-fired electric power generating plant that would be constructed on a 1,300-acre site in Steptoe Valley north of Ely. The White Pine Energy Station would include two 500- to 800-megawatt power generation units with a total combined electrical capacity ranging from 500 megawatts to 1,600 megawatts. The project life is expected to be 40 years or longer. The Ely Energy Center is a NV Energy proposed coal-fired power generation facility to be located north of Ely. When fully built out, the project would have a total generating capacity of 2,500 megawatts. Newmont Mining Corporation has submitted a DEIS for the Emigrant Project, which is located approximately 10 miles south of Carlin, Nevada, on both public and private land and would consist of an open pit mine, waste rock disposal facilities, an oxide leach facility, borrow material areas, haul roads, and exploration activities (BLM, 2005e). Other noteworthy projects include the White Pine County Airport expansion, the Egan Range Wind Generating Project, and the Clark, Lincoln, and White Pine counties groundwater development project proposed by the Southern Nevada Water Authority.

Reasonably Foreseeable Natural Processes within the Cumulative Effects Study Area
Wildland Fire
The area burned by wildland fire would continue to vary greatly from year to year.

Spread of Non-native Invasive Weeds
Several species of non-native invasive species are found throughout the cumulative effects study area. These species are expected to continue to spread on both private and public lands throughout the cumulative effects study area.

Expansion of Pinyon and Juniper Trees and Other Woody Species
Over the past 150 years, pinyon and juniper trees have spread into shrublands and grasslands and are expected to continue expansion.

Spread of Forest Insects and Diseases
Several years of drought in western states have resulted in severe stress on pinyon pines. Trees have become more susceptible to insect infestations.

4.1.3 General Assumptions for Cumulative Impact Analysis

The following are general assumptions made for all resources in the cumulative impacts analysis:

- Analysis is based on the assumption that all interrelated projects are approved and completed as projected;

- Analysis is based on a time frame for Proposed Action reclamation activities to be completed 13 years after mining activities cease.

- Based on information in the Draft Ely Resource Management Plan/EIS (BLM, 2005c), each wind farm is assumed to have approximately 340 acres of permanent disturbance.

If applicable, other resource-specific assumptions are included at the beginning of each resource section. If none are included, only the general assumptions apply.

4.2 Water Resources

The affected environment for water resources within and directly surrounding the project area is discussed in Section 3.2. Since the cumulative effects study area for water resources is much larger than the Proposed Action boundary, additional information on the area is included herein. The cumulative effects study area comprises four hydrographic basins: Huntington, Ruby, Long, and Newark valleys (Figure 4-1). Ruby, Long, and Newark valleys are topographically closed basins, while Huntington Valley drains north into the Humboldt River. Ruby and Huntington valleys are designated groundwater basins, and Long and Newark valleys are undesignated groundwater basins. The surface water within these basins consists primarily of springs and ephemeral drainages. There are minor amounts of perennial surface water (e.g., Ruby Lake and Marshes, Huntington Creek, and Newark Lake); however, most surface water either evaporates or infiltrates at some point along its flow path.

4.2.1 Assumptions for Analysis

Surface Water and Groundwater

Assumptions for analysis for the cumulative effects to surface water and groundwater are the same as indicated in Chapter 3.

4.2.2 Geographic Area for Analysis

Surface Water

The cumulative effects study area for surface water resources encompasses four hydrographic basins: in the Humboldt River Basin Region, Huntington Valley Basin (Basin Number 47), and, in the Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). The cumulative effects study area for water resources incorporates natural watershed boundaries associated with the Proposed Action (Figure 4-1). The four basins cover an area of approximately 2,070,965 acres.

Surface water in Ruby Valley drains to Ruby and Franklin lakes. Surface water in Long Valley drains toward a small playa in the center of the valley. The majority of surface water in Long Valley infiltrates or evaporates prior to reaching the playa. Surface water in Newark Valley drains to Newark Lake. Surface water in Huntington Valley drains to Huntington Creek, which then drains into the South Fork of the Humboldt River. Huntington Creek is considered a perennial drainage. Ruby Lake and Newark Lake have water year-round, largely due to localized springs that are adjacent to the lakes. There are limited perennial surface water features in Long Valley, with the majority of Long Valley dry by the end of the summer. The seeps and springs within the general project vicinity are discussed in Section 3.2.

Groundwater

The cumulative effects study area for groundwater resources encompasses the same four hydrographic basins as described above for surface water: in the Humboldt River Basin Region, Huntington Valley Basin (Basin Number 47), and, in the Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). These four basins cover an area

of approximately 2,070,965 acres. The cumulative effects study area for water resources incorporates natural watershed boundaries associated with the proposed project.

Drinking Water

The cumulative effects study area for drinking water is the same as the study area for both surface water and groundwater.

4.2.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Surface Water

Potential cumulative effects to surface water resources within the cumulative effects study area could occur from mining operations and exploration activities, oil and gas exploration, fuel treatment projects, livestock grazing, and projects having direct surface disturbance. Projects located within the water resources cumulative effects study area are discussed in Section 4.1.2 and summarized in Table 4-1.

In general, all projects within the cumulative effects study area involving surface disturbance have the potential to impact surface water quality and quantity, primarily through increased sedimentation as a result of the removal of vegetation and disturbance to the soil structure. All authorized past, present, proposed, and reasonably foreseeable future actions in the cumulative effects study area that have associated surface distance and are located on public lands would be required to implement Best Management Practices (Appendix D), which are part of the BLM Ely District Resource Management Plan. Use of Best Management Practices would help to stabilize soils and reduce sedimentation to surface waters in the cumulative effects study area. Impacts from all actions identified in the cumulative effects study area are anticipated to be limited to the life of each project and the localized nature of each project.

Due to the limited surface water resources in the Proposed Action area compared with other areas of the cumulative effects study area and to the minimal impact to surface water from the Proposed Action with implementation of Best Management Practices developed by the BLM (Appendix D) and Design Features selected by Barrick (Table 2-13), the Proposed Action would have only a limited impact on surface water quality or quantity within the cumulative effects study area.

Groundwater

The impacts to groundwater resources directly associated with the Proposed Action are discussed in Section 3.2. Potential cumulative effects to groundwater resources within the cumulative effects study area could occur from mining operations and exploration activities, oil and gas exploration, and any other projects where the groundwater is intercepted. Projects located within the water resources cumulative effects study area are discussed in Section 4.1.2 and summarized in Table 4-1.

Past and present mining and mineral exploration activities in the cumulative effects study area have disturbed approximately 6,472 acres. This disturbance includes existing mines and exploration disturbance and Notices of Intent, as well as existing gravel pits. Other past and present actions within the water resources cumulative effects study area include utilities and road disturbances (approximately 1,345 acres). Since the power lines and roads do not intercept the water table, there have been no known impacts to groundwater from these projects. Reasonably foreseeable future mining actions include disturbance of approximately 4,970 acres which includes the 3,920 acres of disturbance from the Proposed Action. Mining operations would require use of groundwater for processing operations and may intercept groundwater during open pit mining. Other reasonably foreseeable future actions within the water resources cumulative effects study area include wind energy projects. These projects

would disturb approximately 1,020 acres. The power lines, roads, and wind energy projects do not intercept the water table and are therefore not anticipated to impact the groundwater resources.

A concern has been raised regarding the impact on the Ruby Lake National Wildlife Refuge of the increased groundwater production from the Mooney Basin wells associated with the Proposed Action. Impacts to the Ruby Lake National Wildlife Refuge are not anticipated (Osterberg, 2007), primarily due to the fact that the Mooney Basin wells are located in Newark Valley and are not within Ruby Valley. Ruby Valley is a designated basin, while Newark Valley is an undesignated basin. The sources of recharge for the Ruby Lake National Wildlife Refuge and for the Mooney Basin wells are different. Between 1999 and 2003, the U.S. Geological Survey conducted a study of the hydrogeology and water resources of Ruby Valley (USGS, 2005a). The report states that the major sources of recharge to the Ruby Lake National Wildlife Refuge are the springs discharging directly west of the lake. These springs are fed by precipitation in the mountains to the west. The carbonate rocks transmit the water down-slope to the east where they discharge as springs along a localized fault system at the base of the mountains. The U.S. Geological Survey report states that there is no measurable component of recharge to the Ruby Valley from the south. According to the report, the area to the south and east are theorized as actual discharge points for the groundwater from Ruby Valley.

Current activities impacting groundwater quality and quantity include irrigation in all four hydrographic basins but primarily in Huntington and Ruby valleys. Irrigation is the primary use of groundwater in both Huntington and Ruby valleys. The Proposed Action is not projected to impact groundwater quality or quantities in Ruby Valley; thus no cumulative impacts to groundwater in that valley would occur. Cumulative impacts associated with Huntington Valley, where under the Proposed Action additional groundwater would be withdrawn, are expected to be minimal because there are no other groundwater users within five miles of the existing groundwater wells and the aquifer utilized for existing BMM wells is a large, unconfined alluvial system. In addition, no significant decreases in the groundwater levels have been observed at the BMM wells since they were drilled, and the calculated zones of depression, based on the assumptions in Section 4.2.1, do not impact any other water users.

The level of impacts from the current BMM and Mooney Basin Operations Area are discussed in Section 3.2. The impacts to groundwater due to mining from other identified projects are not known at this time as many of these projects are still in the exploration and planning phases and may or may not go forward toward development. If other mining projects do proceed to the operation phase, additional groundwater resources would be used. This would result in impacts to the basin from which the groundwater is withdrawn. It is likely that groundwater use from additional mining projects would occur in the two undesignated basins of Long Valley and Newark Valley and that these other operations would be smaller than the Proposed Action, thus requiring less water for operations. The proposed withdrawal rate of 550 acre-feet per year combined with the additional use from these mining operations would result in minimal cumulative impacts to the groundwater quality since the foreseeable mining operations are much smaller than the Proposed Action.

NEPA compliance would be required for all proposed future actions, and NEPA compliance would address direct, indirect, and cumulative impacts to groundwater quality and quantity. All future mining operations would also be required to comply with state and federal regulations; therefore, impacts from contaminants to groundwater quality would not be likely to occur. Increases in groundwater pumping, in addition to what is proposed by BMM, are unknown at this time.

4.2.4 Cumulative Impacts Conclusion

Surface Water

Based on current knowledge of projects within the water resources cumulative effects study area, the cumulative impact to seeps and springs would be minimal with the addition of the Proposed Action. Most of the impacts to seeps or springs by past, present, and future actions would be localized to disturbed areas and limited to the life of each project. Most projects are required to follow Best Management Practices developed by state, federal, and private companies so impacts to surface water from past, present, and reasonably foreseeable actions would be minimized with the use of Best Management Practices.

Groundwater

Cumulative effects to groundwater in the cumulative effects study area would consist of increased groundwater withdrawals from wells. Effects from wind energy projects, power line projects, or fuels treatment projects would be negligible since they would not intercept the water table. Surface disturbance actions within the cumulative effects study area are listed in Table 4-1. Minimal cumulative impacts to the groundwater are anticipated.

4.2.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Surface Water

Alternative A would decrease disturbance associated with the BMM since some of the waste rock would be placed in the open pits. Cumulative impacts to surface water resources would be reduced since there would be less surface disturbance and less potential for surface erosion. Cumulative impacts associated with Alternative B would be the same as with the Proposed Action. The movement of the heap leach pad would have no varying impacts on the surface water resources. Under the No Action Alternative, cumulative impacts to the cumulative effects study area would not exceed those already authorized.

Groundwater

Alternative A would decrease disturbance associated with the BMM since some of the waste rock would be placed in the open pits. Cumulative impacts to groundwater resources would be the same as with the Proposed Action since the level of production would remain the same. Under Alternative B, movement of the heap leach pad would result in a larger amount of ore being processed at the 2/3 Heap Leach Pad Since the Mooney Basin Heap Leach Pad is located in Long Valley, cumulative impacts to groundwater resources in Long Valley would be less under Alterative B. Cumulative impacts under the No Action Alternative would not exceed those already authorized.

4.3 Geology and Minerals

4.3.1 Geographic Area for Analysis

The cumulative effects study area for the geology and minerals resource is shown in Figure 4-1 and includes the southern end of the Ruby Mountains. The cumulative effects study area was chosen to represent the local geologic environment. The southern Ruby Mountains were chosen because the geology is very similar throughout. The valleys were chosen to be the boundaries because Basin and Range faulting has created a significant change in the geology visible at the surface and in the areas below the surface that would be impacted by the Proposed Action and the other included projects. The geologic setting is discussed in Section 3.3. The geology and minerals resource cumulative effects study area includes approximately 199,258 acres.

4.3.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Past projects within the geology and minerals cumulative effects study area have disturbed approximately 1,568 acres, and present projects within the cumulative effects study area boundary have disturbed approximately 4,435 acres (Table 4-1). Reasonably foreseeable future actions are expected to disturb approximately 4,923 acres. Future actions include the Proposed Action, wind energy projects, Alligator Ridge Mine, Yankee Mine, and oil and gas wells. The only projects anticipated having impacts to the geology and minerals are the mining and oil and gas projects. The other projects are not anticipated to impact geologic and mineral resources.

The contribution of the Proposed Action to cumulative effects on geology and mineral resources would be the removal of approximately 200 million tons of ore and 830 million tons of waste rock. Waste rock would be placed in areas where it would not impede future access to mineral resources. The other foreseeable future mining projects are small in comparison with the Proposed Action. The foreseeable future actions operated by Barrick are currently in exploration, and the amounts of ore and waste to be mined are not known at this time. Future oil and gas wells would impact geology by removing oil and gas resources but would not affect precious metals resources.

4.3.3 Cumulative Impacts Conclusion

The cumulative effects anticipated in the cumulative effects study area for geology and minerals would be the removal of ore resources. The Proposed Action would add cumulatively to the ore being removed throughout the cumulative effects area and would contribute to the location and possible extraction of additional ore resources in the future.

4.3.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Alternative A would involve partial backfilling of up to six open pits. This would lead to less surface disturbance and the potential to limit future access to economic resources. The proposed pit configurations are based on current market conditions. Future market conditions may make it possible to process ore that is currently not profitable. By backfilling the pits, the ore would be unavailable for future mining without significant expense. Alternative B would require processing of some of the ore at another location. The extent of mining would be the same, and the cumulative impacts to the geologic and minerals resources would also be the same. Under the No Action Alternative, mining would end in 2009 and there would be no impacts other than those already authorized.

4.4 Paleontology

4.4.1 Geographic Area for Analysis

The cumulative effects study area for paleontology is the same as the cumulative effects study area for geology since the paleontological resources are linked to certain geologic formations.

4.4.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Fossils associated with the cumulative effects study area are abundant, and none have been classified as rare or important. Contingency measures to be implemented in the event of unexpected discoveries of potentially valuable paleontological resources in the Proposed Action area are contained in Section 3.4. The Proposed Action, past, present, and foreseeable future actions are therefore unlikely to contribute to cumulative impacts to paleontological resources.

4.4.3 Cumulative Impacts Conclusion

Because no rare and important paleontological resources are known to be present in the Proposed Action area, and because contingency plans are in place in the event that any are discovered, the actions are not likely to contribute to cumulative impacts to paleontological resources.

4.4.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be a slight reduction in the potential to impact paleontological resources under the two action alternatives because of less ground disturbance. Under the No Action Alternative there would be no impacts other than those already authorized.

4.5 Soils

4.5.1 Geographic Area for Analysis

The cumulative effects study area boundary for soil resources is 2,070,965 acres and encompasses four hydrographic basins, as described in Section 4.2. Based on Natural Resources Conservation Service Soil Surveys, approximately 400 soil associations occur within western White Pine County, approximately 500 soil associations occur within Elko County, and approximately 370 associations occur within the soil resource cumulative effects study area. The physical and chemical properties of the soils that occur within the cumulative effects study area boundary are discussed in detail in the Soil Surveys of White Pine and Elko counties. The location and extent of each soil association is illustrated on the orthographic base maps included in the soil surveys.

4.5.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the soils cumulative effects study area from past actions total 2,800 acres, the impact from present actions totals 5,017 acres, and the impact from reasonably foreseeable future actions totals 6,005 acres. Many of the past projects are in various stages of reclamation; present and reasonably foreseeable future project disturbance is also likely to be reclaimed in full or in part. Natural processes that could impact soil resources within the cumulative effects study area include wildland fire, the spread of forest insects and diseases, and the spread of non-native invasive weeds. Past wildland fire activities has impacted approximately 13,208 acres or 0.6 percent of the cumulative effects study area.

Ground disturbance can affect soils by removing them from productive use as a result of burying or excavating them and by altering infiltration and erosion as a result of compaction or changes in topography. Disturbed soils can increase both wind and water erosion and are more susceptible to establishment of non-native invasive weeds. These potential impacts can be reduced by reclaiming disturbed areas and restoring them to productive use. The Proposed Action would contribute to cumulative effects on soils by disturbing approximately 3,920 acres. Impacts would be minimized by stockpiling soil and reclaiming disturbed areas as discussed in Chapter 2.

There is the potential for process chemicals, fuel, and waste materials to be accidentally released during transport within the cumulative assessment area, resulting in a cumulative impact to soils. The probability and impacts of such a release is discussed in Section 4.19.

4.5.3 Cumulative Impacts Conclusion

Existing, proposed, and reasonably foreseeable actions within the cumulative impacts area total approximately 13,822 acres of disturbance, or about 0.7 percent of the analysis area. Additional

impacts to soils have occurred as a result of natural processes that are likely to continue into the future. The Proposed Action would add to cumulative impacts by disturbing approximately 3,920 acres; however, disturbed soils would be reclaimed in most cases of permitted projects unless permanent structures and developments occur. Over time, disturbed soils from natural events such as fires will recover and become productive. Cumulative impacts to soils would be minimal.

4.5.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Alternative A would reduce disturbance by approximately 434 acres and Alternative B would reduce disturbance by approximately 105 acres compared with the Proposed Action, resulting in a proportional decrease in impacts to soils. Under the No Action Alternative there would be no contribution to cumulative impacts to soils other than those previously authorized.

4.6 Vegetation Resources

4.6.1 Geographic Area for Analysis

The cumulative effects study area boundary for vegetation resources encompasses the four hydrographic basins as identified under the water resources and soil cumulative effects study areas. Watershed boundaries are appropriate to use because watersheds can influence regional vegetation. In addition, the BLM Ely District currently manages resources by watershed.

Plant and soil interrelationships are such that characteristics of one would intimately affect the characteristics of the other (i.e., composition and structure) over time. This being the case, they should be treated at the same scale. Therefore, the same boundary is used for both vegetation and soils cumulative effects study areas.

The cumulative effects study area for vegetation includes approximately 2,070,965 acres. Impacts to vegetation within the cumulative effects study area result from mining, other industrial activities, increased traffic, maintenance of existing roads, grazing, and wildland fires.

The information used to compile vegetation communities within the cumulative effects study area was taken from data collected for the Southwest Regional Gap Analysis Program (USGS, 2005b). The gap data were broken down into several detailed community types. For this analysis, the gap community types were grouped into the 11 community types listed below and in Table 4-3. Gap data were also used to compile invasive and non-native species and are discussed in Section 4.7.3.

The pinyon-juniper woodland community, big sagebrush community, and low sagebrush community (combined here as the sagebrush community) and the mountain brush community are discussed in Section 3.6, and the wetland/riparian community is discussed in Section 3.9. The largest vegetation community components of the cumulative effects study area are the pinyon-juniper community (16.0 percent) and the sagebrush community (60.5 percent) (Table 4-3).

The conifer woodland vegetation community type typically occurs between 4,000 and 12,000 feet above mean sea level. This vegetation community type can consist of a mixture of limber pine (*Pinus flexilis*), lodgepole pine (*Pinus contorta*), ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), fir (*Abies* spp.), spruce (*Picea* spp.), pinyon pine (*Pinus monophylla)*, and juniper (*Juniperus osteosperma)* in the overstory. Common understory plants include serviceberry (*Amelanchier alnifolia*), chokecherry

(*Prunus virginiana)*, snowberry (*Symphoricarpos albus),* Woods' rose (*Rosa woodsii*), blue wildrye (*Elymus glaucus*), bluegrass (*Poa* sp.), needlegrass (*Achnatherum* spp.), needle and thread grass (*Hesperostipa comata*), yarrow (*Achillea millefolium*), and aster (*Aster* spp.)

TABLE 4-3 VEGETATION COMMUNITY TYPES WITHIN THE CUMULATIVE EFFECTS STUDY AREA

CATEGORY	ACREAGE WITHIN THE CUMULATIVE EFFECTS STUDY AREA	PERCENT OF CUMULATIVE EFFECTS STUDY AREA
Conifer woodland	34,090	1.6
Pinyon/Juniper Woodland	329,994	16.0
Mountain Brush	15,463	0.7
Sagebrush	1,253,349	60.5
Desert scrub	242,652	11.9
Grasslands	52,122	2.5
Riparian/Wetland/Meadow*	36,028	1.7
Agriculture	8,343	0.4
Non-Native Invasive Species	52,145	2.5
Water	2,491	0.1
Barren	44,288	2.1
Total	**2,070,965**	**100**

* Discussed further in Section 4.9.

The mountain brush vegetation type typically occurs between 2,000 and 9,000 feet above mean sea level. This vegetation community type includes woodlands and shrublands dominated by mountain mahogany (*Cercocarpus ledifolius*), mountain big sagebrush, and antelope bitterbrush (*Purshia tridentata).* Other species common within this vegetation type include manzanita (*Arctostaphylos*), currant (*Ribes*), snowberry, and scattered pinyon and juniper.

The desert scrub community type is found at elevations between 5,900 and 6,400 feet above mean sea level. Dominant plants found within this community include rabbitbrush (*Chrysothamnus nauseosus*), iodinebush (*Allenrolfea occidentalis*), shadscale (*Atriplex confertifolia*), black greasewood (*Sarcobatus vermiculatus),* alkali sacaton (*Sporobolus airoides*), inland saltgrass (*Distichlis spicata*), winterfat (*Ceratoides lanata*), bud sagebrush (*Artemisia spinescens*), black sagebrush (*Artemisia arbuscula,* var. *nova*), ephedra (*Ephedra nevadensis*), fourwing saltbush (*Atriplex canescens*), snakeweed (*Gutierrezia sarothrae*), Indian ricegrass (*Oryzopsis hymenoides*), bottlebrush squirreltail, Sandberg's bluegrass, needle and thread grass, buckwheat, phlox (*Phlox*), and globemallow (*Sphaeralcea* sp.). Winterfat can be dominant in this community type.

The grassland vegetation type typically occurs at elevations of 4,750 to 7,600 feet. This vegetation type is dominated by perennial bunchgrasses and drought-resistant shrubs. Indian ricegrass and needle and thread grass are the dominant species with scattered shrubs such as sagebrush, shadscale, snakeweed, winterfat, and ephedra species also present (USGS, 2005).

The agriculture community type includes all land being actively tilled, pasture land, areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, and areas used for the production of annual crops (USGS, 2005b).

The non-native invasive species vegetation type includes areas that are dominated by introduced annual and/or biennial grass and forb species such as halogeton (*Halogeton glomeratus*), kochia (*Kochia scoparia*), Russian thistle, cheatgrass, Canada thistle, bull thistle,

pepperweed (*Lepidium* spp.), and Scotch thistle (USGS, 2005b). Non-native invasive species are discussed further in Section 4.7.

Water areas are covered or inundated with standing water with less than 25 percent cover by soil or vegetation (USGS, 2005b).

Barren areas are dominated by bare ground with less than 10 percent vegetative cover. Barren areas within the cumulative effects study area include bedrock, scree, cliffs, washes, playas, sand dunes, and mined and quarried areas (USGS, 2005b).

4.6.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The great majority of interrelated projects in Table 4-1 have associated ground disturbance that would impact vegetation. The combination of the Proposed Action as well as past, present, and reasonably foreseeable future actions would impact a total of 13,822 acres (or 0.7 percent) of vegetation community types within the cumulative effects study area. The majority of the area disturbed would be revegetated once the projects have been completed, and a portion of past disturbance has already been successfully revegetated. However, these areas are not always revegetated with the same species that were previously established, possibly changing the number and diversity of plant species. Some vegetation community types such as pinyon-juniper woodland could take decades to recover, or they may be permanently changed to other community types such as sagebrush or grassland.

Wildland fires have burned approximately 13,208 acres within the vegetation cumulative effects study area in the last eight years. This represents approximately 0.6 percent of the vegetation cumulative effects study area. Exacerbating the problem is that burned areas typically are invaded by non-native invasive species that can alter the fire regime. The trend appears to be toward increasing numbers of fires of greater intensity.

The Proposed Action would contribute to cumulative effects on vegetation, mainly by disturbance of up to 3,920 acres. Most of this disturbance would be temporary because all but the pit expansions would be reclaimed. Projects on public land generally incorporate measures to identify special status species and avoid or mitigate impacts to the extent possible. Because the Proposed Action would not impact any special status species or potential habitat, no contribution to cumulative impacts on special status species is anticipated.

4.6.3 Cumulative Impacts Conclusion

Impacts from past, present, and reasonably foreseeable future activities within the cumulative effects study area including the Proposed Action would be a loss of vegetation during disturbance and a potential increase in non-native invasive species as discussed in Section 4.7. The described past, present, and reasonably foreseeable future activities would impact approximately 0.7 percent of the vegetation within the cumulative effects study area. The majority of this land would be reclaimed, resulting in reduced cumulative impacts to vegetation. Reclaimed areas would differ in species composition for a number or years, and sometimes permanently as compared with initial conditions.

4.6.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only minor differences in cumulative effects to vegetation under either of the two action alternatives because of the small reduction in ground disturbance. There would be no contribution to cumulative effects under the No Action Alternative other than those already authorized.

4.7 Non-Native Invasive Species

4.7.1 Geographic Area for Analysis

The non-native invasive species cumulative effects study area, which shares the same boundary as vegetation resources, includes the four hydrographic basins surrounding the project area. Weeds do not stop at fence lines, at property lines, at county borders, or when the soil type changes. Weeds move along several vectors, the most common ones being roads, human activity, and water flow. The boundaries of the watersheds encompass these vectors around the project area, and the likelihood of non-native invasive species moving outside of those boundaries is more limited.

4.7.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Land-disturbing and transportation activities within the cumulative effects study area that can increase chances of spreading existing non-native invasive species (including noxious weeds) populations include mining and other ground-disturbing activities, increased traffic, maintenance of existing roads, grazing, recreation, and wildland fires (Table 4-1). Previously disturbed areas within the cumulative effects study area create the potential for non-native invasive species to spread. Noxious weed species in the cumulative effects study area are found along roadways, drainages, and disturbed areas. The distribution of non-native invasive species around the Proposed Action area is shown in Figure 3-11. Non-native invasive and noxious weed species mapped within the cumulative effects study area include black henbane, bull thistle, Canada thistle, hoary cress, leafy spurge (*Euphorbia esula*), musk thistle, poison hemlock (*Conium maculatum*), Russian knapweed (*Acroptilon repens*), salt cedar (*Tamarix* spp.), Scotch thistle, spotted knapweed, diffuse knapweed (*Centaurea diffusa*), tall whitetop (*Lepidium latifolium*), and water hemlock (*Cicuta maculata*). Other non-native invasive species that probably occur within the cumulative effects study area that have not been mapped include halogeton, kochia, Russian thistle, and cheatgrass. Approximately 52,145 acres, or 2.5 percent, of the cumulative effects study area contain some level of non-native invasive species infestation to the extent that they were identifiable in the gap information (USGS, 2005b).

Impacts from past activities have facilitated the spread of noxious species, especially along transportation routes, drainages, and disturbed areas. Because many activities that occur within the cumulative effects study area do not implement an invasive and non-native noxious weed management plan, establishment of these species is likely to continue in the watersheds.

Impacts from other non-native invasive species would be realized through the Proposed Action and other interrelated action within the cumulative effects study area. These species, such as cheatgrass, readily establish in disturbed and burned areas. Past disturbed and burned areas throughout the cumulative effects study area have created an opportunity for these invasive species to spread.

4.7.3 Cumulative Impacts Conclusion

Establishment of non-native, invasive species would likely occur under the Proposed Action and other interrelated projects. However, the spread of noxious weeds would be minimized through Best Management Practices required for most permitted activities.

These impacts would be realized through the spread of invasive species due to an increase in transportation from project areas, combined with recreation and other activities within the cumulative effects study area. Natural processes such as wildland fire have the potential to disturb large areas, contributing to the opportunity for new non-native invasive species infestations throughout the burned areas. Any increase in human activity within a region will usually result in the opportunity to spread noxious weeds. However, there is also an increased

awareness to implement Best Management Practices and reclamation criteria to control their spread which can help minimize the cumulative effect.

4.7.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in cumulative effects from non-native invasive species under either of the two action alternatives. The No Action Alternative would reduce potential total disturbance by 3,920 acres, thereby reducing the area susceptible to non-native invasive species invasion.

4.8 Wildlife, Migratory Birds, and Special Status Animal Species

4.8.1 Geographic Area for Analysis

The cumulative effects study area for wildlife, migratory birds, and special status animals encompasses NDOW Big Game Hunt Units 102, 103, and 108 of Management Area 10. These units include migration corridors and winter range areas for mule deer and habitat for elk that could be affected by the project. The area also includes portions of the hydrographic basin that encompasses the Ruby Lake National Wildlife Refuge. The wildlife cumulative effects study area encompasses approximately 1,794,903 acres (Figure 4-1).

4.8.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the wildlife cumulative effects study area from past actions is 2,890 acres; the impacts from present actions is 4,941 acres; and the impacts from reasonably foreseeable future actions is 4,929 acres. The total disturbance from these projects (12,760 acres) is less than one percent of the study area. The wildlife habitats affected are those typically found at low to middle elevations, mainly a mix of big sagebrush and pinyon-juniper vegetation types. Many of the past projects are in various stages of reclamation; present and reasonably foreseeable future project disturbance is also likely to be reclaimed in full or in part. Natural processes that could impact wildlife resources within the cumulative effects study area include wildland fire, the spread of forest insects and diseases, pinyon and juniper encroachment into sagebrush habitats, and the spread of non-native invasive weeds.

Wildland fires have affected approximately 13,097 acres (0.7 percent) of the wildlife study area in the past eight years. Fires have occurred in the northwestern and northeastern portions of the project area and lands north of Cherry Spring. Affected habitats include pinyon-juniper woodland and smaller amounts of big sagebrush.

It could take decades for disturbed pinyon-juniper woodland habitat to be restored to pre-disturbance condition, a process that is uncertain because it can be altered by management actions, fire, and other factors. Reclamation would initially establish shrubland and grass habitats that could benefit mule deer, sage-grouse, sage thrashers, and Brewer's sparrows. Other species such as juniper titmice, blue-gray gnatcatchers, plumbeous vireos, and black-throated gray warblers would be affected by the loss of pinyon-juniper woodland. In addition to loss of habitat, past, present, and reasonably foreseeable future actions could affect wildlife species by displacement because of the presence of humans, direct mortality from vehicle collisions, and interference with migration routes.

Potential impacts of the Proposed Action to wildlife, migratory birds, and special status species are discussed in detail in Section 3.8. The primary contribution of the Proposed Action to cumulative effects would result from disturbing approximately 3,920 acres of sagebrush and pinyon-juniper habitat. Not all of this area would be disturbed at one time, and reclamation

would be implemented in stages, reducing the potential impact. The reclamation process would likely result in at least a temporary change in plant species composition, particularly in the case of pinyon-juniper woodland. The proposed disturbance is a small proportion of the study area, and vast amounts of similar wildlife habitat would remain on adjacent public land.

Projects on public land generally incorporate measures to prevent the destruction of active migratory bird nests, eggs, and/or young. Under the Proposed Action these impacts would be avoided by performing land-clearing activities outside of the avian breeding season. In the event that surface disturbance must take place during the avian breeding season, a qualified wildlife biologist would survey the areas of proposed disturbance immediately prior to the disturbance. Consistent with current practice, if active nests or evidence of nesting is found or observed, a buffer zone would be established around the nest area to prevent the destruction or disturbance of nests until young have fledged. The Proposed Action would therefore have a minimal impact on migratory birds.

The increase in traffic to and from the mine by employees and deliveries of materials and equipment could have cumulative impacts on wildlife by increasing the risk of injury and mortality by collisions with vehicles. In addition, the Proposed Action could interfere with wildlife migration, particularly mule deer. Proposed Design Features described Table 2-13 would minimize this potential impact.

The contribution of the Proposed Action to cumulative impacts on special status species would be minimal, as described in Section 3.8.6.

4.8.3 Cumulative Impacts Conclusion

Cumulative impacts to wildlife, including migratory birds, and special status species, occur primarily through the disruption of habitat. Many of the projects would have a temporary impact that would last until the disturbed land has been reclaimed. Cumulative impacts would result from the presence of humans, potential interference with migratory movements, and the increased risk of injury and mortality from vehicle collisions. The change in cumulative impacts to wildlife with the addition of the Proposed Action is small, especially since state and federal permitted activities within the cumulative effects area are required to minimize and mitigate any potential effects.

4.8.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The Partial Backfill Alternative would reduce impacts resulting from the Proposed Action by approximately 434 acres (less than 1 percent of the wildlife cumulative effects study area). This would be a minor decrease in loss of habitat and the amount of wildlife displacement that could occur. The Mooney Basin Heap Leach Pad Alternative would reduce impacts by approximately 105 acres compared with the Proposed Action. Under the No Action Alternative there would be no contribution to cumulative effects other than those already authorized.

4.9 Wetlands, Riparian Zones, Waters of the U.S.

4.9.1 Assumptions for Analysis

The following assumption is made for analysis for the cumulative effects to wetland, riparian zones, and waters of the U.S.:

- The U.S. Army Corps of Engineers would concur with the findings of the waters of the U.S. delineation, which found that drainages in the project area are isolated and do not share a significant commerce connection with identified waters of the U.S. (JBR, 2008).

4.9.2 Geographic Area for Analysis

The 2,070,965-acre cumulative effects study area for wetlands, riparian zones, and waters of the U.S. is the same as that for water resources and was chosen for the same reasons as those provided in Section 4.2.2.

Wetlands and riparian zones are limited and represent important habitats in the xeric environment of the Great Basin. Few wetlands (none of which are under the jurisdiction of the U.S. Army Corps of Engineers) and no riparian areas are found in the Proposed Action area, but large wetland areas exist at the Ruby Lake Marshes in Ruby Valley, northeast of the Proposed Action area. Relatively large wetland and open water areas also exist in Newark Valley southwest of the Proposed Action area. Huntington Creek is a perennial stream located northwest of the Proposed Action area. Long Valley, to the southeast, supports limited areas of perennial waters or riparian areas (a short reach of Long Valley Slough, east of Long Valley Road, is mapped as a perennial water). Tetra Tech (2007) surveyed springs in and near the survey area and farther south in the Ruby Mountains. These surveys included sites along the west edge of the Ruby Mountains in eastern Newark Valley, two springs on the western side of Newark Valley, and several springs east of the project area in the Maverick Springs Range. While not included in the Tetra Tech surveys, a number of springs, some supporting perennial streams, are located farther north in the Ruby Mountains, north of Overland Pass.

4.9.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Most of the interrelated actions in the cumulative effects study area are either fully or partially on public land. In recognition of the special value of streams and wetlands, land use authorizations for such projects typically include measures to identify, avoid, and mitigate impacts to wetlands, riparian areas, and waters of the U.S. The Proposed Action would not contribute to cumulative effects on wetlands because disturbance to the few wetlands in the Proposed Action area would be avoided.

4.9.4 Cumulative Impacts Conclusion

The Proposed Action would not contribute to cumulative impacts on wetlands, riparian zones, or waters of the U.S. Future actions might have the potential to impact wetlands, riparian zones, or waters of the U.S.; however, these actions cannot be quantified due to the lack of descriptive data for each project. All future projects on public lands would be evaluated on an individual basis.

4.9.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no impact to wetlands, riparian zones, or waters of the U.S under either of the action alternatives. Under the No Action Alternative there would be no impacts other than those already authorized.

4.10 Range Resources

4.10.1 Geographic Area for Analysis

The cumulative effects study area for range resources encompasses the Warm Springs grazing allotment. This boundary was selected because all the range resources affected by the Proposed Action fall within this boundary and because range resources are managed on an

allotment basis. The area of the range resource cumulative effects study area is approximately 356,666 acres.

4.10.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the range resources cumulative effects study area from past actions totals 1,636 acres; the impact from present actions totals 4,385 acres; and the impact from reasonably foreseeable future actions totals 4,923 acres. Based on these numbers of disturbed acreages, a maximum reduction of 278 animal unit months would result, based on an average stocking rate of 40 acres per animal unit month. This reduction assumes that none of the past or present disturbances have been reclaimed, but many of the past projects are in various stages of reclamation; present and reasonably foreseeable future disturbance is also likely to be reclaimed in full or in part. In addition to these actions, the study area has been affected by natural processes such as wildland fire, expansion of pinyon and juniper trees into range habitat, spread of non-native/invasive weeds, and spread of forest insects and disease. These natural processes are likely to continue into the future.

The contribution of the Proposed Action to cumulative effects on grazing would be an additional 3,920 acres of disturbance. Based on an average stocking rate of 40 acres per animal unit month, this much disturbance at one time could result in a reduction of 98 animal unit months. However, disturbed areas are proposed to be reclaimed in stages, reducing the impact on grazing. As disturbed land is reclaimed it would be re-evaluated to determine productivity, and the stocking level would be adjusted as necessary. Only the approximately 540 acres of pit expansion that would not be reclaimed would cause a permanent loss of grazing land.

4.10.3 Cumulative Impacts Conclusion

The Proposed Action combined with the other past, present, and future projects, would contribute to cumulative impacts by reducing available Animal Unit Months. However, many projects within the cumulative effects study area are temporary and would require reclamation. Past, present, and future actions would result in a temporary loss of a maximum of 278 animal unit months within the 356,666 acre cumulative effects study area. There would be some permanent loss of Animal Unit Months. Fires reduce the available Animal Unit Months most significantly compared to most project proposals, and this loss is also of a temporary nature. At the conclusion of some projects, such as mining, more Animal Unit Months will be available in sites that had restricted access, but a small permanent loss would occur with open pits that were not reclaimed. However, this could be offset by increased grazing opportunities through reclamation and a change in vegetation type from woodland to more grasses and forbs. Overall, the cumulative impact on grazing is minimal.

4.10.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The reduction in ground disturbance under either of the two action alternatives would result in a proportional reduction in cumulative impacts to range resources. The reduction would likely be inconsequential considering the size of the cumulative effects study area. With the No Action Alternative there would be no impact on range resources other than those already authorized.

4.11 Wild Horses

4.11.1 Geographic Area for Analysis

The cumulative effects study area for wild horses consists of the Triple B Herd Management Area. The Herd Management Area boundary encompasses approximately 1,233,000 acres, including the majority of the project area.

4.11.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

As shown in Table 4-1, ground disturbance within the wild horses cumulative effects study area from past actions totals 2,566 acres; the impact from present actions totals 4,941 acres; and the impact from reasonably foreseeable future actions totals 6,037 acres. Many of the past projects are in various stages of reclamation; present and reasonable foreseeable project disturbance is also likely to be reclaimed in full or in part. Based on the amount of range available to wild horses and continued management by the BLM to control the numbers of wild horses, cumulative impacts to wild horses would be negligible. Although rare, mortalities to wild horses could also occur from collisions with vehicle.

The study area has also been affected by natural processes such as wildland fire, expansion of pinyon and juniper trees into range habitat, spread of non-native/invasive weeds, and spread of forest insects and disease. These natural processes are likely to continue into the future.

4.11.3 Cumulative Impacts Conclusion

Past, present, and reasonably foreseeable future actions would potentially affect 13,544 acres of habitat, or about 1.1 percent of the Herd Management Area. However, most of the disturbance would be reclaimed and range productivity would be restored. For the most part, the impacts would be temporary. There would be some permanent loss of forage due to open pits and permanent structures. The 3,920 acres of disturbance that would result from the Proposed Action is only 0.3 percent of the Herd Management Area. With reclamation of disturbed areas, the contribution of the Proposed Action to cumulative effects on wild horses would be negligible.

4.11.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only minor differences in impacts to wild horses under either of the two action alternatives because of a small reduction in total disturbance. With the No Action Alternative there would be no effects on wild horses other than those already authorized.

4.12 Land Use and Access

4.12.1 Geographic Area for Analysis

The cumulative effects study area for Land Use and Access encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1). The land use and access study area boundary includes the major access routes to the project area. This boundary follows State Route 892 to the east, Long Valley Road to the west, Harrison Pass to the north, and Buck Pass to the south. These routes would most likely be used for access to the area.

4.12.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Land use in the cumulative effects study area consists mainly of ranching, mining, recreation, and wildlife habitat. The past, present, and reasonably foreseeable future actions in the cumulative effects study area (described in Table 4-1) are most likely to impact Land Use and Access by disturbing rangeland and wildlife habitat, increasing traffic on the major access routes, and restricting public access. Total estimated surface disturbance in the cumulative effects study area is approximately 10,594 acres (3.3 percent). Mining-related projects have the greatest potential impact because they restrict access for incompatible uses such as grazing and recreation. Restricted access to mining areas continues until active mining ceases and reclamation is complete. The amount of land with restricted access as a result of mining varies

with each project, depending on the area currently being used for operations and the area in various stages of reclamation.

The Proposed Action would contribute to cumulative effects on land use and access by disturbing approximately 3,920 acres (1.2 percent of the study area), restricting public access to active mining areas, potentially interfering with other BLM land use authorizations, and increasing traffic on public roads. Road impacts would be partially offset by maintenance performed by Barrick during the life of the mine. It is anticipated that any conflicts with other BLM land use authorizations could be resolved by negotiation. The effects of land disturbance would be mostly temporary, lasting until reclamation is complete. Approximately 540 acres of pit expansion would not be reclaimed, resulting in permanent loss.

4.12.3 Cumulative Impacts Conclusion

The contribution of the Proposed Action to the cumulative effects of land use and access is noticeable, but temporary for the most part. Following reclamation, some features within the cumulative effects study area, such as open pits, could change land use and access long-term. For example, the open pits would be equipped with berms and warning signs to provide for public safety and limit access, while still being within an area open to grazing, wildlife use, and hunting. The type of recreational experience may change with the added attraction (for some) of viewing open pits rather than a pristine environment. Wildlife use may change favoring those that can make use of the cliffs within the pit and slightly displacing other wildlife species. With the exception of these types of changes, cumulative impacts to land use and access would be temporary and minimal in the long-term.

4.12.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in cumulative effects to Land Use and Access under either of the two action alternatives. There would be no contribution to cumulative impacts to land use and access under the No Action Alternative other than those already authorized.

4.13 Recreation

4.13.1 Geographic Area for Analysis

The cumulative effects study area for recreation encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1) and is the same as the land use and access cumulative effects study area. The area within the cumulative effects study area is bounded by the major transportation routes that would be used to access the area surrounding the project area for recreation.

4.13.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Recreational resources in the cumulative effects study area include the Pony Express Trail and the Ruby Mountain Ranger District. Hunting, hiking, and off-road vehicle use are the dominant recreational activities in the cumulative effects study area. Off-road vehicle use in eastern Nevada has been increasing rapidly because of increasing population size and closure of other sensitive areas (BLM, 2007b). The effects of past, present, and reasonably foreseeable future actions on recreation in the cumulative effects study area (described in Table 4-1) result mainly from restricted access as a result of mining-related projects. Public access to mines must be restricted for safety reasons as long as the mines are in operation. Notices of intent and oil and gas projects could also affect recreation although they are probably less important than mining projects because of the smaller area involved. Approximately 9,594 acres of land could be

removed from access for public recreational purposes as a result of present and reasonably foreseeable future actions. For the most part the impacts would be temporary for all but unreclaimed pits that would remain inaccessible for recreation. Hunting could be affected indirectly as a result of cumulative impacts to game animal habitat and movement patterns.

The Proposed Action would contribute to cumulative effects on recreation by restricting access to active mining areas. Even if the entire 3,920 acres were restricted, only 1.2 percent of the cumulative effects study area would be affected by the Proposed Action, and the effect would be temporary. Increased traffic on public roads is not anticipated to affect access to public lands for recreation. Indirect effects on game animals are unlikely to have a measurable effect on hunting.

4.13.3 Cumulative Impacts Conclusion

The cumulative effects on recreation in the study area would be minimal and temporary for most projects, except for permanent loss of pit expansion acreage that is not reclaimed. The pits may in themselves become a recreational viewing area. The principal impact on recreation would result from those projects that restrict access to recreational users of public lands. Hunting is currently among the most prevalent recreational activity within the cumulative effect study area. The impact of increased traffic and indirect effects on game animals should be minimal.

4.13.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only negligible differences in impacts to recreation under either of the two action alternatives. Under the No Action Alternative there would be no impact on recreation other than already authorized.

4.14 Air Quality

4.14.1 Geographic Area for Analysis

The cumulative effects study area for air quality encompasses four hydrographic basins: Huntington Valley Basin (Basin Number 47); and Central Region, Newark Valley Basin (154), Long Valley Basin (175), and Ruby Valley Basin (176). These four basins cover an area of approximately 2,070,965 acres. The cumulative effects study area for air incorporates natural watershed and air quality boundaries associated with the proposed project.

4.14.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Industrial Activity within the Cumulative Effects Study Area

Historic development, as documented in Table 4-1, includes fairly extensive mining or mineral exploration activity including at least a dozen identified mining or exploration projects. Other historic projects include limited oil and gas well development, several gravel pits, the U.S. Highway 50 corridor, and the Falcon to Gonder Power Line. Those projects accounted for approximately 2,800 acres of disturbed ground. Historic vegetation management efforts included grazing and limited prescribed burning.

Currently, the only operating mine in the cumulative effects study area other than those included in the BMM Proposed Action is the Little Bald project. There is also exploration occurring around the proposed BMM and the Little Bald project. One oil and gas well field is operational, and the Silver State Fiber Optic Line is being developed through the cumulative effects study area. Disturbance within the cumulative effects study area from the present actions is approximately 5,017 acres. Of that total, 4,165 acres are associated with the BMM and Mooney Basin Operations Area activities. Most of the described activity, with the exception of the oil and

gas development and the fiber optic line (85 acres of disturbance), occur in higher elevations above residential areas. Land management agencies maintain grazing programs with the goal of maintaining vegetation integrity, which can help minimize dust generation. The agencies are becoming more aggressive in using prescribed fires as a land management tool.

Foreseeable activity in the cumulative effects study area is presented in Table 4-1 and discussed in the sections that follow. Most activities, with the exception of gravel pits and potential oil and gas development, are or would be at elevations well above the valleys where sensitive receptors (human residences) are located. Disturbance within the cumulative effects study area associated with other mines and potential wind energy projects, in combination with potential ground disturbance from the Proposed Action for the reasonably foreseeable future, would be approximately 6,005 acres. Disturbed ground would allow the wind to lift and transport fugitive dust. The mining activities would also generate fugitive dust from material transport and storage efforts during their operational life spans. Reclamation to minimize wind erosion and disturbed ground would be expected after the operational life span of each project. Because these activities would generally occur at higher elevations than sensitive receptors and dust generation volumes would be small compared with the distance to sensitive receptors, the cumulative impact of the high elevation operations, including the proposed project, would be expected to be mostly minor in areas of public activity or exposure. Ground disturbance in the lower elevations associated with utility corridors and other listed ground disturbances increase soil wind erosion and would continue to do so in the future until reclamation is successful. The impacts are typically localized and minor for all but the largest areas of disturbance, which tend to be away from areas of regular human activity. Past, present, and reasonably foreseeable gravel production generates dust that could lead to moderate impacts in the immediate vicinity. Those activities are generally at lower elevations, preferably sited away from sensitive receptors including residences and areas of regular human activity.

Air quality modeling was performed to estimate mercury deposition in the cumulative effects study area and beyond by Air Sciences (2008) using the Environmental Protection Agency Regional Modeling System for Aerosols and Deposition and regional and national mercury emissions and monitoring data. The AggreGATOR program was used as a tool to interpret the Regional Modeling System for Aerosols and Deposition modeling results. The model results indicated that cumulative impact from all industrial activity in the western United States was generally less than one tenth of global background mercury levels. BMM mercury emissions represented over 1 percent of all mercury depositions in only the hydrologic basins immediately northwest and northeast of the facility, with a maximum impact of 4.4 percent of cumulative mercury deposition. The cumulative impact of all gold mines reached 10 percent of all mercury deposition in only three hydrologic basins 50 to 150 miles northwest of the BMM. Cumulative impacts of all gold mines in the cumulative effects study area remain under 10 percent of all mercury deposition in all hydrologic basins.

Figure 4-3 provides the mercury deposition contributions from BMM's mercury emissions as a percentage of the total deposition (including global background) to each watershed in Nevada. Figure 4-4 provides the mercury deposition contributions from the mercury emissions from all Nevada gold mines to each watershed in Nevada. As shown by Figures 4-3 and 4-4, the deposition contribution from the gold mines is localized. For example, the mercury deposition from BMM drops off to less than one percent at two watersheds distance from the mine (Air Sciences, 2008).

Figure 4-5 provides the mercury deposition contributions from the global background to each watershed in Nevada. The global background accounts for 66 percent to 97 percent of the total deposition in each watershed (Air Sciences, 2008).

The one potential industrial activity in the cumulative effects study area that has the potential to have moderate impacts on sensitive human receptors is the addition of five oil and gas exploration wells and possible subsequent development or expansion of two existing wells. The BLM has issued a number of leases within the valley floor locations in the cumulative effects study area. Current drilling activity is minimal, with only 15 acres of ground disturbed in the cumulative effects study area. Drilling activities typically include a few weeks to one month construction phase during which ground disturbances and construction activity could have a moderate impact on air quality approximately one mile downwind from the well site and within approximately 100 yards of primary access routes. During operational exploratory drilling, large diesel engines typically power the drilling rig, and any gas discovered is either vented into the air or is flared off until processing equipment can be put in place. Exploratory drilling typically occurs over a three-month period. During that period, moderate air quality impacts are possible within a couple of miles of the well site as well as within 100 yards of the primary access routes. Flaring or gas venting at sites that show development potential could result in moderate air quality impacts one half mile from the well. Production of oil and/or gas reserves would take some time to get started but would represent an ongoing activity for the life of the well. The extent of moderate impacts from a production well site depends on the volume of oil or gas found, how it is stored or processed on-site, how it is transported off-site, and whether there are existing power lines or new power lines or all equipment must be run on diesel or gas. Production wells beyond moderate size are not expected in or near the cumulative effects study area. The area of moderate impact for potential oil and gas field development would therefore be expected to be limited to within a two-mile radius around developed well sites and within 100 yards of primary access routes.

The traffic increase generated by increases in industrial activity in the cumulative effects study area has the potential for moderate air quality impacts within approximately 150 yards of dirt or gravel roads.

Cumulatively, current projects inside and outside the cumulative effects study area are understood to have an overall minor impact on air quality, though impacts can be moderate in the near vicinity of individual projects. Foreseeable projects could extend the extent of moderate impacts to cover the areas around a larger number of project sites, or potentially over larger areas, if or when project sizes or areas of activity expand.

Industrial Activity outside the Cumulative Effects Study Area

Coal-fired power plants currently exist north and northwest of the project cumulative effects study area. New coal-fired power plants have been proposed in Steptoe Valley, a few valleys to the east of the cumulative effects study area, and in other locations regionally. Numerous other mining operations are currently active in the areas surrounding the cumulative effects study area or could potentially be active in surrounding hydrographic basins, most at higher elevation locations. Nevada Division of Environmental Protection review of air quality permits indicate that those projects individually do not have significant impacts in this project's cumulative impact area and that their cumulative impacts do not exceed incremental thresholds established by the federal Prevention of Significant Deterioration program. Cumulatively, current projects inside and outside the cumulative effects study area are understood to have a minor impact on air quality. Foreseeable projects could bring cumulative impacts from regional sources intermittently to moderate levels.

Figure 4-3 Bald Mountain Mercury Deposition Contributions to Watershed (Percent of Total)

Figure 4-4 Mercury Deposition Contributions to Watershed from all Nevada Gold Mines

Figure 4-5 Mercury Deposition Contributions to Watershed from Global Background (Percent of Total)

Industrial Activity outside the Cumulative Effects Study Area
Coal-fired power plants currently exist north and northwest of the project cumulative effects study area. New coal-fired power plants have been proposed in Steptoe Valley, a few valleys to the east of the cumulative effects study area, and in other locations regionally. Numerous other mining operations are currently active in the areas surrounding the cumulative effects study area or could potentially be active in surrounding hydrographic basins, most at higher elevation locations. Nevada Division of Environmental Protection review of air quality permits indicate that those projects individually do not have significant impacts in this project's cumulative impact area and that their cumulative impacts do not exceed incremental thresholds established by the federal Prevention of Significant Deterioration program. Cumulatively, current projects inside and outside the cumulative effects study area are understood to have a minor impact on air quality. Foreseeable projects could bring cumulative impacts from regional sources intermittently to moderate levels.

Land Management and Regional Growth
Federal land management decisions, including fire management and energy development, could affect air quality in the cumulative effects study area. Fire management activities would be expected to have little effect region-wide but could affect local areas. The USFS Fuel Treatment Project affected 500 acres in the cumulative effects study area. Controlled burning is used as part of the fuels treatment project. Smoke generated during the prescribed burn had intermittent impacts on local air quality, but the prescribed burns prevent more significant impacts of larger, potentially catastrophic fires that could otherwise occur. Impacts of foreseeable wind energy and oil and gas exploration have been discussed. Expansions or contractions of those programs are possible in the future. Most of those projects would be located above valley floors, distant from sensitive receptors, so would be less likely to impact the human activity area. Developments by individual landowners in the valleys or expanded oil and gas leasing activity in the valleys would have more potential to affect air quality in areas of human exposure.

Cumulative air quality impacts are anticipated to be minor throughout the cumulative effects study area. With foreseeable new projects, impacts to region-wide air quality are expected to remain minor. However, isolated pockets of moderate impacts are possible near potential oil and gas development, vehicle access routes, mining projects, and regional coal-fired power plants (if multiple plants come on line in the future).

Cumulatively, current projects inside and outside the cumulative effects study area are anticipated to have an overall minor impact on air quality, though impacts can be moderate in the near vicinity of individual projects. Reasonably foreseeable future actions could extend moderate impacts to areas around a larger number of project sites or potentially over larger areas if or when project sizes or areas of activity expand.

4.14.3 Cumulative Impacts Conclusion
The cumulative effects would result in moderate impacts to ambient air quality in the vicinity. The anticipated industrial activity within the cumulative effects study area would be expected to have moderate contribution to the isolated areas around their activity area. Cumulative regional industrial source impacts in the cumulative effects study area, including the impacts of all current mines and power plants, represent well under 10 percent of total mercury deposition. Global background airborne mercury supplies more than 90 percent of mercury deposition (Air Sciences, 2008). Land management activities and regional growth would likely result in minor impacts to ambient air quality across the rest of the cumulative effects study area over the long term, though intermittent actions such as prescribed fire could be expected to briefly result in

moderate or possibly major impacts locally. The results of ambient air quality modeling showed compliance with those applicable impacts at all locations (Appendix H).

4.14.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no meaningful change in cumulative impacts to air quality under the two action alternatives. Under the No Action Alternative there would be no impact on air quality other than that already authorized.

4.15 Visual Resources

4.15.1 Geographic Area for Analysis

The cumulative effects study area for Visual Resources encompasses 317,038 acres of the south Ruby Mountains and portions of Huntington Valley, Newark Valley, and Long Valley (Figure 4-1). It encompasses the area that could be visually impacted by the Proposed Action and includes the majority of viewpoints from which disturbance would be seen.

4.15.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The portion of the cumulative effects study area north of the Elko-White Pine county line is in the BLM Elko District. Recreational users of the Ruby Mountains and Ruby Lake National Wildlife Refuge (public land administered by the USFS and U.S. Fish and Wildlife Service, respectively) could be more sensitive to visual impacts to the natural landscape because of the scenic views. The portion of the cumulative effects study area south of the Elko-White Pine county line is within the boundaries of the Egan Field Office of the BLM's Ely District. Most of the BLM Ely District land in the cumulative effects study area is within Visual Resource Management Class III or IV. However, the land within one mile of the Pony Express Trail in the central portion of the cumulative effects study area is designated Visual Resource Management Class II (BLM, 2008d). The Pony Express Trail could attract viewers that are sensitive to visual impacts that would alter the historic setting of the trail.

Past and present mining projects and other land-disturbing activities (e.g., fires, grazing, farming, roads) in the cumulative effects study area have resulted in visual impacts that can be seen by viewers in the cumulative effects study area, including portions of the Pony Express Trail. The USFS Fuel Treatment Project disturbed approximately 500 acres of pinyon-juniper woodland, creating a visual contrast that would last until new vegetation has established. The Proposed Action would add to these impacts, as described in Chapter 3. These visual impacts would last until the disturbed land was successfully reclaimed.

If implemented, the reasonably foreseeable future mining projects and other activities presented in Table 4-1 could affect visual resources by removal of vegetation or changing vegetation communities. The Alligator Ridge Mine and Yankee Mine are too far south of the Pony Express Trail to be visible from this sensitive viewing area. However, other mining projects would likely be visible, at least in part. The effects of mining projects would last until active mining is completed and the disturbance was successfully reclaimed, although color and texture changes resulting from the change in vegetation communities would last much longer. The oil and gas wells described in Table 4-1 would likely be seen from only a small area and would have a much smaller effect on visual resources.

4.15.3 Cumulative Impacts Conclusion

Visual resources in the cumulative effects study area have been affected by past, present, and reasonably foreseeable future actions. Projects that could have impacts visible from the Pony

Express Trail are the most problematic since this is the most visually sensitive area within the cumulative effects study area. The Proposed Action would add cumulatively to the disturbances seen within the long range viewshed of this trail, but would not impact the one mile buffer of the Class II management area around the trail. The great majority of cumulative impacts would last until natural vegetation has become established in disturbed areas, which could take many years. Until then, form and color change would be apparent with altered vegetation communities. Open pits and structures associated with some proposed actions would be permanent. Most of the disturbances in the study area, including the Proposed Action, are within Class III and IV visual resource management areas. Class IV allows for strong contrast, while Class III allows for moderate contrast. Most of the Class III designations are along travel routes most visible to the public. These areas are also subject to periodic developments where the final design and/or reclamation should be such that only moderate visual contrast would occur, thus preserving the overall aesthetic appeal of the region. The Proposed Action would add cumulatively to these disturbances.

4.15.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be only inconsequential differences in impacts to Visual Resources under either of the two action alternatives. Under the No Action Alternative there would be no impact on visual resources other than that already authorized.

4.16 Noise and Vibration

4.16.1 Geographic Area for Analysis

The cumulative effects study area for Noise and Vibration is the same as the geology and minerals cumulative effects study area because the primary additional noise sources within the area would most likely be from additional mining activity that would take place within the geology and minerals boundary. It encompasses approximately 199,258 acres.

4.16.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

There has been historic mining activity in the southern Ruby Mountains, including Bald Mountain. Historic projects besides BMM include the Casino/Winrock Mine, Little Bald Mountain, Alligator Ridge and Yankee mines, and White Pine Mine. All of these except BMM are inactive mines. Exploration that could lead to future mining activity is being undertaken throughout the cumulative effects study area. BMM proposes up to 400 acres of exploration. A resumption of mining is reasonable foreseeable at the Alligator Ridge Mine, and a 143-hole exploration program is being proposed for the Yankee Mine. Extensive exploration within the Barrick claim block is likely in the future. Mining activities would generally occur at elevations well above public activity or exposure, far from sensitive receptors in valley locations. Because of their dispersed locations, exploration activities are not expected to add much more direct noise impact to populated areas with sensitive receptors, except for intermittent blasting or air travel sounds. Those projects could increase traffic levels in the valleys and supporting communities to yield noise impacts at or within 100 yards of access or supply roadways. Numerous simultaneous mining operations in close proximity could have moderate impacts on nearby ranches and moderate to occasionally significant impacts along access roads.

One exploration oil well exists within the cumulative effects study area. Numerous others exist in close proximity to the cumulative effects study area. BLM has issued leases for oil and gas exploration in the valleys of the cumulative effects study area. Development associated with those leases has been limited to date, but lease holders have the right to drill exploratory wells and would be expected to bring those wells into production if exploration indicated a sufficient resource. Those leases include valley floor locations that have a chance of being close to

human activity areas and sensitive receptors in valley locations. Locations within one mile of an exploratory well or along primary access roads can experience moderate noise impacts during the construction and exploration stage, which typically lasts three to four months at a specific site. If exploration confirmed a find, production of oil and gas could cover a larger area and extend moderate noise impacts a couple of miles beyond the perimeter of the well field and at least 100 yards from primary access routes.

There have been a few gravel pits historically in the cumulative effects study area and more in the broader area around the BMM. Those pits are generally located along highways or main roads in easily accessible areas. Operation of existing and new gravel pits in the cumulative effects study area is anticipated in the future. Those gravel operations can have moderate noise impacts for between one quarter to one half mile, possibly longer in valleys where air and noise movement are channeled. Noise impacts should be considered in siting a gravel pit, which should reduce the number of such activities close enough to areas of regular human activity to minimize the noise impacts.

4.16.3 Cumulative Impacts Conclusion

Cumulative impacts would generally lead to minor noise increase across the cumulative effects study area. However, due to the isolated nature of the projects, no significant impacts to noise levels at sensitive receptors are anticipated. In most locations, noise impacts associated with projects throughout the cumulative effects study area would be small in comparison with natural background noise levels.

4.16.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

The variation in noise effects among the action alternatives is inconsequential. Under the No Action Alternative there would be no impact on noise levels other than those already authorized.

4.17 Socioeconomics

4.17.1 Geographic Area for Analysis

The cumulative effects study area for socioeconomics encompasses White Pine, Eureka, and Elko counties (Figure 4-2). The cumulative effects study area for socioeconomics was selected because all of the BMM employees would reside in one of these three counties.

4.17.2 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The economies of the three counties are dependent to a large degree on mining activity, which is determined to a large extent by the market price for gold, silver, and other extracted minerals. Consequently, economic activity tends to cycle between boom and bust. When mineral prices are high, employment and wages rise and a shortage of skilled workers develops. Home prices tend to rise as new employees move into the area and local businesses profit from increased spending. A drop in mineral prices or other limitations on mine development result in a reversal of this process; employment and spending fall and local businesses falter. This cyclical pattern is detrimental to the counties' financial stability and their ability to plan for the future and provide reliable services to the community.

Mining is likely to be the dominant industry in northeastern Nevada for the foreseeable future, and the counties can suppress the boom and bust cycle only by increasing economic diversity. Elko County is the most diversified of the three. Tourism spending in White Pine County has been increasing, and additional spending, independent of mining, comes from the State Prison

and federal, state, and local government offices. The economy of Eureka County is dominated by mining and will probably remain so for the foreseeable future.

The economy of Elko County is much larger than the economies of Eureka and White Pine counties. Existing mines in the county include Capstone Mine (produces gold and silver, operated by Newmont), Jerritt Canyon Mine (produces gold and silver, operated by Queenstake Resources), Meikle Mine (produces gold and silver, operated by Barrick), Midas Mine (produces gold and silver, operated by Newmont), Pilot Peak Lime Plant (produces limestone and lime, operated by Graymont Western), Tonkin Spring Mine (produced gold, currently closed with exploration by U.S. Gold) Rain Mine (produces gold, operated by Newmont), and Rossi Mine-Dunphy Mill (produces barite, operated by Halliburton Energy Services/Baroid). Newmont just finished constructing a 200-megawatt coal-fired power plant in the Carlin Trend area; excess capacity would be sold to a local utility. Even though most of the new employees of the Proposed Action are expected to reside in Elko County, the number of employees is small enough that the contribution to cumulative effects on socioeconomic conditions in the county would be minor.

The most significant recent effect on the White Pine County economy has come from renewed activity in the Robinson Mining District, a project that has largely restored the soundness of the county's finances. Several other reasonably foreseeable major projects have been proposed for White Pine County. These include the White Pine County Airport expansion, the Egan Range Wind Generating Project, the Clark, Lincoln and White Pine counties groundwater development project proposed by the Southern Nevada Water Authority, the Ely Energy Center proposed by Nevada Power and Sierra Pacific Power Company, and the White Pine Energy Station proposed by LS Power. These major projects have the potential to transform White Pine County's finances and reduce the effect of mining-related economic cycles. The projects could have major impacts on population size, housing, schools, and demand for utilities and county services such as road maintenance, law enforcement, and fire protection. A shortage of skilled workers could also develop (Rajala, 2007). When viewed in this context, the contribution of the Proposed Action to cumulative effects on the economy of White Pine County would be relatively minor.

In Eureka County the Betze-Post and Ruby Hill mines are operated by Barrick and the Eastern Nevada Operations mine is operated by Newmont. The proposed Mount Hope molybdenum mine, which is located about 23 miles northwest of Eureka, is projected to begin operation in 2010. The Mount Hope Mine would be the largest and one of the highest grade molybdenum projects in the world. The mine has 1.3 billion pounds of proven and probable reserves and a projected life of 53 years. The Mount Hope Mine could account for nearly eight percent of the annual global molybdenum supply. The Mount Hope Mine would have a significant impact on the socioeconomic resources of Eureka County. An estimated 800 people are anticipated to be employed during the construction of the mine and associated facilities, and 400 people during operation. This project would have a significant positive impact on Eureka County but could present problems such as inadequate housing and increased demand for sewage treatment, water, and other County services. The addition of the Proposed Action would have a much smaller impact to County services but would add to the overall cumulative impact to Eureka County. The contribution of the Proposed Action to cumulative effects on socioeconomics in Eureka County would be minimal compared with the existing and proposed mining projects.

4.17.3 Cumulative Impacts Conclusion

The Proposed Action would contribute to cumulative effects on socioeconomics by increasing employment, income, and the demand for housing, schools, law enforcement, fire protection, and other services and infrastructure. When viewed in the context of much larger existing and

reasonably foreseeable future actions in the cumulative effects study area, the contribution of the Proposed Action to cumulative impacts would be relatively minor.

4.17.4 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

There would be no measurable differences in impacts to socioeconomic conditions under either of the two action alternatives. Under the No Action Alternative there would be no contribution to cumulative impacts on socioeconomic conditions other than those already authorized.

4.18 Cultural Resources

4.18.1 Assumptions for Analysis

Assumptions for analysis for the cumulative effects to prehistoric resources include:

- The density of prehistoric and historic sites within areas that have not yet experienced archaeological survey are based solely upon the density of sites elsewhere within the Bald Mountain Mining District with similar landforms, soils, and floristic relationships (Kautz and Simons, 2005).

4.18.2 Geographic Area for Analysis

The cumulative effects study area for cultural resources has been created from maps that describe the overall territories occupied by both prehistoric and historic mining populations. This area is approximately 1,211 square miles and encompasses 775,144 acres. Prehistorically, this area has been based on the Middle Archaic to Late Prehistoric migration pattern within the region as suggested by Steward (1938) and actually tested archaeologically by Thomas (1971).

4.18.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

The existing Programmatic Agreement between the BLM and the Nevada State Historic Preservation Office has added to the archaeological study and knowledge of the region, while allowing most significant cultural resources to be avoided or mitigated (BLM, 1995b).

Four National Register of Historic Places-eligible prehistoric archaeological sites are located within the BMM Proposed Action area. Additionally, 16 unevaluated sites (15 prehistoric, 1 historic) are present in the Proposed Action area. These 16 unevaluated sites will have to be revisited and evaluated for their National Register status. As projected mining activities would result in an impact to archaeological sites prior to any ground-disturbing activities at or near an eligible site, they would be mitigated as specified in the Programmatic Agreement. Also, any exploration or development activity within 150 meters of any National Register of Historic Places-eligible or unevaluated archaeological site would be monitored by a federally permitted archaeologist to protect the site's integrity.

Past, present, and reasonably foreseeable future surface disturbance for the cultural resources cumulative effects area include past mining and proposed gold mining within approved areas as well as past and future oil and gas wells, Casino Winrock and Little Bald Mountain gold mining projects, and wind energy projects (Table 4-1). These latter non-mining projects account for fewer than 10 percent of the acres reserved for mining. As with all federal undertakings, these development activities will be guided by cultural resource laws designed to mitigate the effects of projects on archaeological and architectural resources.

4.18.4 Cumulative Impacts Conclusion

With reference to Table 4-1, the total acreage projected to experience surface disturbance within the cumulative effects study area for cultural resources within the foreseeable future is 14,373 acres, or approximately 1.9 percent of the cumulative effects study area. Cumulative impacts to the archaeological site resource can be estimated by calculating the number of archaeological sites that would be impacted by these estimated disturbances as the outcome of dividing total acreage by the average number of surveyed acres per site (14,851/38). The resulting number is an estimate predicting that approximately 390 archaeological sites may be cumulatively affected by past, present, and future actions.

4.18.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Cumulative impacts to prehistoric and historic resources, as estimated using the assumed density of sites discussed above, would be little different under any of the action alternatives. In contrast, selection of the No Action Alternative would result in no additional impacts to prehistoric and historic resources other than those already authorized.

4.19 Hazardous and Solid Waste/Hazardous Materials

4.19.1 Assumptions for Analysis

The following assumption was made for analysis of the cumulative effects to hazardous and solid waste/hazardous materials:

- The risk of a reportable spill amount or fuel released to the environment is more likely during transportation than during storage or use.

4.19.2 Geographic Area for Analysis

The hazardous and solid waste/hazardous materials cumulative effects study area consists of the project area, which includes storage and on-site disposal areas, and the transportation routes analyzed in this document and shown on Figure 4-1.

4.19.3 Impacts of the Past, Present, and Reasonably Foreseeable Future Actions

Past projects that received chemical shipments on the routes analyzed in this DEIS include the Yankee Mine, the White Pine Mine, and the Casino/Winrock Mine. These properties were responsible for operating in accordance with applicable regulations, and there are no known current environmental impacts from the delivery of chemicals along the analyzed transportation routes from these operations.

The BMM and Mooney Basin Operations Area currently receive chemical shipments and store hazardous materials and waste on the property in accordance with applicable local, state, and federal requirements as described in this document. Other present actions which may involve the analyzed transportation routes include mineral exploration activities, oil and gas wells, and maintenance activities on the Silver State Fiber Optic Line. These activities bring increased vehicle traffic and may involve the transport of small amounts of chemicals to the sites for use in mining exploration, oil and gas production, and fiber optic maintenance activities. Increased traffic on the access roads also increases the potential for vehicle collision with a supply vehicle.

The reasonably foreseeable future actions shown in Table 4-1 could cause an increase in vehicular traffic on the analyzed transportation routes. New mining projects would require chemical deliveries to support construction, mining, and processing activities. Wind energy projects would require the mobilization of construction equipment, fuel, and possibly other

chemicals needed for construction equipment. The construction of production oil and gas wells would require material storage and transportation for the life of the projects.

4.19.4 Cumulative Impacts Conclusion

The cumulative impacts on hazardous waste are mainly due to industrial projects and especially mining. Therefore, the Proposed Action is one of the larger potential contributors within the cumulative effects study area. The increase in some hazardous waste shipment quantities and the extension of the delivery time period (10-year life-of-mine) would slightly increase and extend the risk period for the release of a hazardous substance as previously described in Chapter 3. The transport of hazardous materials for the Proposed Action represents a continuation (with some quantity increase) of shipments for the BMM and Mooney Basin Operations Area. The Casino/Winrock, Yankee, and White Pine mining projects, which previously received chemical shipments on routes analyzed in this document, are no longer active operations. An increase in traffic associated with the Proposed Action and other reasonably foreseeable future actions would increase the likelihood of vehicle collisions on the access roads, thus possibly increasing the probability of accidents resulting in a release of a hazardous material.

With the continued, proper implementation of the Emergency Response Plan for on- and off-site incidents and Design Features as described in Table 2-13, cumulative impacts associated with storage, use, and transportation of hazardous materials are not anticipated.

4.19.5 Variation in Cumulative Impacts between the Proposed Action and Other Alternatives

Cumulative impacts for the action alternatives would be the same as those analyzed for the Proposed Action. The No Action Alternative would result in no impacts other than those already authorized.

Chapter 5
Consultation and Coordination

5.1 Public Participation Summary

Public involvement is an important part of the environmental analysis under the NEPA process. Federal agencies are required to make “diligent efforts” to involve the public early and often in preparing and implementing their NEPA procedures, to inform the public by providing public notice of NEPA-related hearings, public meetings, and availability of documents, and to solicit appropriate information from the public (40 Code of Federal Regulation 1506.6).

The goal of the public involvement process is to foster public understanding of the Proposed Action and allow participation in the analysis and decision-making process regarding the proposed BMM North Operations Area Project DEIS. The BLM prepared this EIS to analyze environmental effects of the Proposed Action and a reasonable range of alternatives. The public is being afforded the opportunity to review and comment on the DEIS. “Public” refers to interested citizens, organizations, Native American tribes, and other governmental agencies.

There are a number of opportunities for the public to provide input in the EIS process including the following:

- Project Proposal: A revised Plan of Operations was submitted in February 2009.

- Project Scoping/Issues Identification: A Notice of Intent to prepare an EIS for the BMM North Operations Area Project was published in the Federal Register on March 30, 2007. The Notice of Intent announced scoping meetings to be held in the neighboring communities of Ely, Elko, and Eureka, Nevada, and invited scoping comments to be submitted to the BLM. Scoping meetings were held in Elko, Ely, and Eureka, Nevada, on May 7, 8, and 9, 2007, respectively. The closing date for acceptance of public comments was May 25, 2007, with the entire public scoping period being open for 56 days. Public notices were published in the Elko Daily Free Press and Ely Daily Times and were also posted in multiple locations in Ely, Elko, and Eureka.

- Data Collection: All resources and analytical data used in the analysis have been made available to the public so they have had the opportunity to review and analyze the same body of data as the EIS Team (excluding confidential materials under the Freedom of Information Act).

- Development of Alternatives: The BLM has considered public input in development of project alternatives. Based on public input and discussion with the EIS Team, a reasonable range of alternatives has been analyzed that appropriately responds to issues identified during the scoping process. The EIS team consisted of the BLM, Barrick, NDOW, and JBR Environmental Consultants, Inc.

- DEIS: The DEIS described the affected environment, potential environmental impacts, and reasonable mitigation measures in plain language and graphics so decision makers and the public could readily understand this information. The BLM invited the public to comment on the DEIS.

- FEIS: Following review of the DEIS, the EIS Team analyzed and responded in writing to public comments on the DEIS in the FEIS. The BLM made appropriate additions and/or corrections necessary to respond to public input on the DEIS. Copies of the FEIS were be provided to the same breadth of public that received the DEIS.

- Record of Decision: The Record of Decision states how the selected alternative addresses public issues as well as other factors. Copies of the Record of Decision will be provided to the same breadth of public that received the FEIS. As part of the FEIS, the public has been provided instructions on how a member of the public who is adversely affected by the decision may appeal the decision to the Interior Board of Land Appeals.

5.1.1 DEIS Scoping

Public participation in the development of the BMM North Operations Area Project DEIS focused on identification of issues and concerns with features of the project and development of alternatives. Key elements to date in obtaining the public input with the process include the following:

- Mailing List: A mailing list was developed to include members of the public, agencies, and organizations with interest in the project. The original project mailing list developed in March 2007 is provided in Appendix B. The project scoping statement, Notice of Availability of the DEIS and FEIS, and any other project updates or information will be sent to those on the mailing list. This list will be updated over time and includes the interested public, as well as others that respond to public notices of the project analysis.

- Scoping Statement: In March 2007, a scoping statement (letter) was prepared and sent to all parties on the mailing list. This statement provided an overview of the BMM North Operations Area Project Plan of Operations, identification of preliminary issues, the times, dates, and locations of three separate scoping meetings, a request for written comments, directions on how to submit scoping comments, and identification of BLM contacts. A copy of the scoping letter (March 2007) is included in Appendix B of this document.

- Notice of Intent: A Notice of Intent to prepare an EIS was developed by the BLM Egan Field Office, reviewed by the BLM Nevada State Office, BLM Washington Office, and Department of Interior, and published on March 30, 2007, in the Federal Register. The publication of the Notice of Intent initiated the formal 30-day scoping period. A copy of the Notice of Intent is included in Appendix B of this document.

- Legal Notice/News Release: A legal notice of the BMM North Operations Area Project Plan of Operations was prepared by the BLM, published in the Elko Daily Free Press and Ely Daily Times, and distributed to locations in Ely, Elko, and Eureka. A news release was also distributed to the appropriate publications. Copies of the legal notice and news release are included in Appendix B of this document.

- Scoping Meetings: Scoping meetings were held in Elko, Ely, and Eureka, Nevada. These were informal open houses where information on the NEPA process and project specifics were displayed with posters, handouts, and presentations. Representatives of BLM, NDOW, and Barrick attended the meetings. Public attendees at the meetings were asked to sign a register and invited to provide scoping comments. A list of the public attendees is provided in Table 5-1. No additional meetings were scheduled or requested during the scoping process. Other future meetings may be held, as

necessary during the development of the EIS, between the BLM and interested individuals, agencies, and organizations to obtain additional input.

TABLE 5-1 INDIVIDUALS PRESENT AT THE PUBLIC SCOPING MEETINGS

Name	Organization
Herb Ley	BMM
Richard Curnow	BMM
Marti Collins	USFWS – Ruby Lake National Wildlife Refuge
Rich Weber	JBR Environmental Consultants, Inc.
Dave McClure	BMM
George Fennemore	Barrick Gold Corporation – Cortez Gold Mines
Steve Schoen	Barrick North America
Pete Kowalewski	Tetra Tech
Diane Rice	Wells Fargo
Tom Rice	BMM
Lou Schack	Barrick North America
Dan Callaghan	BMM
Scott Holmes	Barrick
Jeffrey Merchant	Parsons Behle & Latimer
Tina Reynolds	BMM
Scott Wilson	Scott E. Wilson Consulting
Nick Atiemo	BMM
Val Sawyer	SRK Consulting
Rory Lamp	Nevada Department of Wildlife
Dave McClure	BMM
Judy Overton	Eureka County, Department of Natural Resources
Jon Overton	Nevada Resource Advisory Council
Jim Ithurralde	Eureka County Commissioner
Don Harris	Midway Gold Corp.
John Pekrul	Barrick North America
Rob Geskey	Elevation Technical Services
Dave McClure	BMM
Tom Bath	Bath Lumber

5.1.2 Public Comment on DEIS

The Notice of Availability was published in the Federal Register on December 19, 2008 (Volume 73 Number 245) for the BMM North Operations Area Project DEIS starting the public comment period. The public comment period lasted 45 days from December 19, 2009 until February 2, 2009.

- Legal Notice/News Release: A news release was prepared by the BLM Ely District office announcing the start of the 45-day public comment period, identifying the time and locations of public comment meetings, and inviting public comment on the North Operations Area DEIS. This news release was posted on the BLM Ely District web page on December 19, 2008 and published in The Ely Times on December 13, 2008. An announcement with this information was published in the Elko Daily Free Press on January 2, 3, and 5, 2009.

- Public Meetings: Three public comment meetings were held during the public comment period. These meeting were held in Ely, Nevada on January 6, 2009; Elko, Nevada on January 7, 2009; and in Eureka, Nevada on January 8, 2009. Project information was presented in an open house format at these meetings with BLM and Barrick

representatives present to discuss concerns and answer questions. Table 5-2 lists individuals present at these meetings.

- Public Comments: Individuals, public agencies, and non-profit organizations submitted 17 letters containing comments on the DEIS. The comments received and responses to these comments are contained in Appendix C.

TABLE 5-2 INDIVIDUALS PRESENT AT THE PUBLIC COMMENT MEETINGS

Ely, Nevada Meeting, January 6, 2009	
Curt Lee	Bill Wilson
Dave McClure	Matt Zietlow
Steve Shoen	Sheri Wysong
Elko, Nevada Meeting January 7, 2009	
David Peirce	Joe Giraudo
Teresa Conner	Stephanie Stoeberl
Nick Atiemo	Val Sawyer
Chet Littledyke	Larson R. Bill
Andy Cole	Jason Bill
Amanda Steensen	Cheryl Mose-Temoke
Caleb McAdoo	Julie Bill
Dave McClure	Ken Mow
Lou Schack	Pat Rogers
Eureka, Nevada January 8, 2009	
Jake Tibbitts	Cliff Krall
Zach Spencer	Jim Brady
Wade Bohrn	Dave McClure
Bob Stephenson	Gina Solari
Jim Ithurralde	Randy Buffington
Tyler Hilkwich	Evan Verkade
Jon Kamensky	Paul Clark
Chris Kamensky	Debbie Clark

5.2 Criteria and Methods by Which Public Input Is Evaluated

All comments received during initial scoping were recorded and summarized in a Summary of Public Input (Table 1-3). The written comments are part of the Project Administrative Record.

The DEIS with a cover letter was mailed to those who commented during initial scoping and those on the mailing list who have indicated their desire to receive a copy. The cover letter advised the recipient of the process to submit comments on the DEIS, the time frames for submitting comments, the time and place of any planned public meetings, and the contact person for additional information. 40 Code of Federal Regulations 1502-1508 requires that a mandatory number of copies be sent to specific agencies.

A Notice of Availability of the DEIS was provided by the BLM to the Environmental Protection Agency to publish in the Federal Register. This Notice of Availability was reviewed by the BLM Nevada State Office, BLM Washington Office, and Department of Interior before being submitted to the Environmental Protection Agency. The publication date of the Notice of Availability began a minimum 45-day public comment period on the DEIS. The BLM also published a Notice of Availability for the DEIS in the same newspapers that published the Scoping Legal Notice. This notice announced the availability of the DEIS for review and comment and advised how to submit comments on the DEIS, the time frames for submitting

comments, the time and place of any planned public meetings, and the contact person for additional information. A copy of the DEIS was made available on the BLM Ely District web page.

When the Notice of Availability for the DEIS was published, public meetings were held to receive comments on the draft. Each comment received on the DEIS was recorded and analyzed for its content to develop comment points. .Complete and objective responses to each public comment were developed as a separate section (Appendix C) of the FEIS. The content of the DEIS was modified as required to respond to substantive comments received and to develop the FEIS. The comments or public concern statements on the DEIS and the agencies' responses to same are included in the FEIS (Appendix C).

The FEIS was mailed to all those on the mailing list who have indicated their desire to receive a copy and to those who commented during scoping or on the DEIS. The FEIS cover letter briefly explains that a FEIS has been prepared for the BMM North Operations Area Project, describes whether it modifies or replaces the DEIS, describes any major changes in alternatives from the DEIS, and describes when the Record of Decision is anticipated to be released. 40 Code of Federal Regulation 1502-1508 requires that a mandatory number of copies be sent to specific agencies.

A Notice of Availability of the FEIS has been provided by the BLM to the U.S. Environmental Protection Agency to publish in the Federal Register in the same manner as described above for the DEIS and is posted on the BLM Ely District Office website.

The Record of Decision will be mailed to all those on the mailing list who have indicated their desire to receive a copy and to those who received the FEIS. The Record of Decision will include an explanation of the appeals process. A legal notice announcing the availability of the Record of Decision will be published in the same newspapers that published the Scoping Legal Notice. Any appeal of the Record of Decision filed by the public will be responded to in a timely manner.

5.3 List of Agencies, Organizations, and Persons to Whom Copies of this Statement are Sent

A hard copy or electronic version of the Bald Mountain Mine North Operations Area Project FEIS was sent to the individuals and organizations listed in Table 5-3. Hard copies of the FEIS were also available at the BLM Ely District office and at the BLM Egan Field Office web page.

TABLE 5-3 LIST OF RECIPIENTS TO RECEIVE THE FEIS

White Pine County Library	Washoe County Library
Wells Branch Library	Elko County Library
Eureka Branch Library	Karen Rajala White Pine County Economic Diversification Council
John Hadder Great Basin Resource Watch	Todd Suessmith Nevada Division of Environmental Protection
Richard A. Orr Sustainable Grazing Coalition	Nevada Department of Administration Nevada State Clearinghouse
Steven Tuttle	Martha Collins Ruby Lake National Wildlife Refuge
Tom Bath Bath Lumber Co.	Don Harris Midway Gold Corp.

Diane Rice Wells Fargo	Judy Overton Eureka County Department of Natural Resources
John Overton Eureka County Natural Resource Advisory Commission	Jim Ithurralde Eureka County Commissioners
Matt Zietlow Barrick Bald Mountain Mine	Bureau of Land Management Ely District Office
Bureau of Land Management Elko District Office	Bureau of Land Management Battle Mountain District Office
Brian Amme Bureau of Land Management Nevada State Office	Katie Miller Nevada Department of Wildlife
Terry Svalberg Bridger-Teton National Forest Pinedale Ranger District	Barbara Ott USFS Teams
Sue Howle USFS Teams	Office of Environmental Policy & Compliance Oakland Region
U.S. Environmental Protection Agency Office of Federal Activities	Gwen Wilder U.S. Department of the Interior Office of Environmental Policy & Compliance
U.S. Department of the Interior Natural Resources Library	U.S. Department of the Interior Office of NEPA
Bureau of Land Management Planning Office	National Operations Center Division of Resource Services
Bureau of Reclamation Denver Federal Center	Assistant Director, Endangered Species U.S. Department of the Interior Fish and Wildlife Service
Chief, Environment Operations & Analysis Branch U.S. Department of the Interior Minerals Management Service	Division of Environmental Compliance National Park Service
Environmental Affairs Program U.S. Geological Survey	Office of Deputy A/S of the USAF
Chief, Planning Division South Pacific Division U.S. Army Corps of Engineers	Office of Environmental Compliance
U.S. Department of the Interior Office of External & Intergovernmental Affairs	Advisory Council on Historic Preservation
Jeanne Geselbracht Environmental Protection Agency Region 9	State Historic Preservation Office
Nevada Office Director U.S. Fish and Wildlife Service	U.S. Department of the Interior Bureau of Land Management Washington Office
David Gonzales Te-Moak Tribe of the Western Shoshone	Renae Pete Cedar City Band of Paiutes
Rupert Steele Confederate Tribes of the Goshute Indian Reservation	Jeannine Borchardth Indian Peaks Band
Jerry Millet Duckwater Shoshone Tribe	Glenn Rogers Shivwits Band of Paiutes
Diane Buckner Ely Shoshone Tribe	Alfreda Mitre Las Vegas Paiute Tribe
Ona Sequndo Kaibab Band of Paiute Indians	Lora Tom Paiute Indian Tribe of Utah
John C Carpenter, Assemblyman Nevada State Legislature	Pete Goicoechea
John Hickman, Mayor City of Ely	Jane Feldman Sierra Club

Kathryn Landreth The Nature Conservancy	Jimmie Dale Lee
Stephen Marich City of Ely	Katie Fite Western Watersheds Project
Paul B. Aguirre NV Energy	Jerry Koglitz National Planning and Permitting Directory Technical Knowledge and Innovation
Valerie J. Randall AECOM Environmental	Larson R. Bill TeMoak South Fork and Western Shoshone Defense Project
Kenneth Moss	Emiliano McClane South Fork Band Environmental
Patrick Rogers	Larry Kibby Elko Indian Colony
South Fork Band Council South Fork Indian Reservation	Intentionally Left Blank

5.4 Persons, Groups, and Agencies Consulted

Barrick North America

Bob Brock	Nevada Lands Manager
Tasha Liebsack	Land Department
Ben Patterson	Ranch Manager
Steve Schoen	Manager of Permitting
Bill Upton	Environmental Director
Matt Zietlow	Environmental Manager

Elevation Technical Services

Rob Gelsky

Enviroscientists, Inc.

Rich Delong President

Mine Mappers, Inc.

Steve Osterberg, Ph.D., P.G.

Native American Tribes Receiving Letters Soliciting Information

Ely Shoshone Tribe
Confederated Tribes of the Goshute Indian Reservation
Duckwater Shoshone Tribe
Cedar City Band of Paiutes
Te-Moak Tribes of the Western Shoshone
Kaibab Band of Paiute Indians
Indian Peaks Band
Shivwits Band of Paiute Tribe
Paiute Indian Tribe of Utah
Las Vegas Paiute Tribe
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5.5 List of Preparers

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BUREAU OF LAND MANAGEMENT, EGAN FIELD OFFICE (CONTINUED)		
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Tony Wasley	Game Biologist	16 years' experience
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Chapter 6
References, Abbreviations, Acronyms, Glossary, and Index

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6.2 Abbreviations and Acronyms

BLM	Bureau of Land Management
BMM	Bald Mountain Mine
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act of 1969
USFS	United States Forest Service

6.3 Glossary

Act. The National Environmental Policy Act, as amended (42 U.S.C. 4321, et seq.), which is also referred to as “NEPA.”

Acid mine drainage. Water from pits, underground workings, and waste rock containing free sulfuric acid. The formation of acid drainage is primarily due to the weathering of iron pyrite and

other sulfur-containing minerals. Acid drainage can mobilize and transport heavy metals which are often characteristic of metal deposits.

Acre. A unit of land measure equal to 43,560 square feet.

Acre-foot. The amount of water or sediment volume which covers an acre of land to a depth of one foot; an acre-foot is equal to 325,851 gallons, or 43,560 cubic feet.

Affecting. Will or may have an effect on.

Animal Unit Month. The amount of forage required by one cow and calf, or their equivalent, for one month. Approximately 800 pounds of air-dried feed (26 pounds per day).

Aquifer. A zone, stratum, or group of strata acting as a hydraulic unit that stores or transmits water in sufficient quantities for beneficial use.

Cooperating Agency. Any federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in Section 1501.6. A state or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe, may by agreement with the lead agency become a cooperating agency.

Cumulative Impact. The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Darcy's Law. A generalized relationship of flow in porous media stating that the volumetric flow rate is a function of the flow area, elevation, fluid pressure, and a proportionality constant.

Deposit. A natural accumulation, such as precious metals, minerals, coal, gas, oil, etc., that may be pursued for its intrinsic value; gold deposit.

Designated basin. Groundwater basin where permitted groundwater rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration.

Dewatering. The removal or extraction of water from a pit, tunnel, or other conduit containing volumes of water.

Dike. A tabular body of igneous rock that cuts across the structure of adjacent rocks or cuts massive rocks.

Doré. Metal alloy composed of gold, silver, and other precious metals. Bullion containing unseparated metallic gold and silver.

Downgradient. In relation to any fixed point with regard to the direction of drainage or flow, downgradient is at a lower point of elevation than the chosen observation point and thus downward in relation to the direction of flow.

Drawdown. Vertical distance that a water elevation is lowered or the pressure head is reduced due to the removal of water from the same system.

Drill pad. An earthen platform/bench created to provide stable support for a drill rig during drilling activities.

Effects include:
(a) Direct effects, which are caused by the action and occur at the same time and place.

(b) Indirect effects, which are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate and related effects on air, water, and other natural systems, including ecosystems.

Effects and impacts as used in these regulations are synonymous. Effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.

Environmental Document. Includes the documents specified in Sec. 1508.9 (environmental assessment), Sec. 1508.11 (environmental impact statement), Sec. 1508.13 (finding of no significant impact), and Sec. 1508.22 (notice of intent).

"Environmental impact statement" means a detailed written statement as required by section 102(2)(C) of the Act.

Ephemeral drainage. A channel or drainage that flows only in direct response to precipitation or snow melt. Such flow is usually of short duration.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitation creep.

Exploration. The search for economic deposits of minerals, ore, gas, oil, or coal through the practices of geology, geochemistry, geophysics, drilling, shaft sinking, and/or mapping.

Feasible. Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

Federal Agency. All agencies of the federal government. It does not mean the Congress, the Judiciary, or the President, including the performance of staff functions for the President in his Executive Office. It also includes, for purposes of these regulations, states and units of general local government and Indian tribes assuming NEPA responsibilities under section 104(h) of the Housing and Community Development Act of 1974.

Felsic. Igneous rocks having abundant light-colored minerals (quartz, feldspars, feldspathoids, muscovite).

Forage. All browse and non-woody plants that are available to livestock or game animals for grazing or harvestable for feed.

Fugitive dust. Dust particles suspended randomly in the air from road travel, excavation, and rock-loading operations.

Geochemistry. The study of the distribution and amounts of the chemical elements in minerals, ores, rocks, soils, water, and the atmosphere and their circulation in nature, on the basis of the properties of their atoms and ions.

Geotechnical. A branch of engineering that is essentially considered with the engineering design aspects of slope stability, settlement, earth pressures, bearing capacity, seepage control, and erosion.

Groundwater. Water found beneath the land surface in the zone of saturation below the water table.

Growth media. All materials, including topsoil, specified soil horizons, vegetative debris, and organic water, which are classified as suitable for stockpiling and/or reclamation.

Haul road. A road used by trucks that have a capacity of 50-tons or more to haul ore and waste rock from an open pit mine to other locations.

Heap leaching. An ore extraction method used for moderate to high grade ores; involves placing the ore-bearing materials in a mound and then “washing” by percolation of waters which dissolve constituents from the rock and thus extract soluble minerals.

Heavy metals. A group of elements, usually acquired by organisms in trace amounts, that are often toxic in higher concentrations; includes lead, mercury, molybdenum, nickel, copper, cobalt, chromium, iron, silver, etc.

High Density Polyethylene. A high density man-made material used for liners. This material deforms with a low probability of puncturing or splitting. Seams are heat welded instead of glued, thus preventing rupture.

Human Environment. Shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. (See the definition of “effects” (Sec. 1508.8).) This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

Hydraulic conductivity. A measure of the ability of rock or soil to permit the flow of groundwater under a pressure gradient; permeability.

Lead Agency. The agency or agencies preparing or having taken primary responsibility for preparing the environmental impact statement.

Leaching. The process of applying a chemical agent that bonds preferentially and dissolves into solution the precious metals in an ore. The precious metal complexes or binds to the solution, which is then called a “pregnant” solution. The pregnant solution is collected for processing to recover the precious metals.

Locatable minerals. Generally refers to hardrock minerals on Public Domain lands or National Forest System lands reserved from the Public Domain that are mined and processed to recover metals such as gold and copper, chemical grade limestone, and asbestos.

Long-term. The future beyond reclamation.

Major Federal Action. Includes actions with effects that may be major and which are potentially subject to federal control and responsibility. “Major” reinforces but does not have a meaning independent of “significantly” (Sec. 1508.27). Actions include the circumstance where the responsible officials fail to act and that failure to act is reviewable by courts or administrative tribunals under the Administrative Procedure Act or other applicable law as agency action.

(a) Actions include new and continuing activities, including projects and programs entirely or partly financed, assisted, conducted, regulated, or approved by federal agencies; new or revised agency rules, regulations, plans, policies, or procedures; and legislative proposals (Secs. 1506.8, 1508.17). Actions do not include funding assistance solely in the form of general revenue-sharing funds distributed under the State and Local Fiscal Assistance Act of 1972, 31 U.S.C. 1221 et seq. with no federal agency control over the subsequent use of such funds. Actions do not include bringing judicial or administrative civil or criminal enforcement actions.

(b) Federal actions tend to fall within one of the following categories:
Adoption of official policy, such as rules, regulations, and interpretations adopted pursuant to the Administrative Procedure Act, 5 U.S.C. 551 et seq.; treaties and international conventions or agreements; formal documents establishing an agency's policies which will result in or substantially alter agency programs.

Adoption of formal plans, such as official documents prepared or approved by federal agencies which guide or prescribe alternative uses of federal resources, upon which future agency actions will be based.

Adoption of programs, such as a group of concerted actions to implement a specific policy or plan; systematic and connected agency decisions allocating agency resources to implement a specific statutory program or executive directive.

Approval of specific projects, such as construction or management activities located in a defined geographic area. Projects include actions approved by permit or other regulatory decision as well as federal and federally assisted activities.

Material balance. A calculation of material inputs versus outputs in a process system. The law of conservation is assumed by which mass cannot be destroyed or created spontaneously.

Milling. The general process of separating the valuable constituent (gold) from the undesired or non-economic constituents of the ore material.

Mine pit. Surface area from which ore and waste rock are removed.

Mineral entry. The filing of a mining claim upon Public Domain or related land to obtain the right to any minerals it may contain. Valid mining claims may be purchased in full (patented) under the 1872 mining law, as amended.

Mining claim. A portion of the Public Domain or related lands which a miner, for mining purposes, takes and holds in accordance with mining laws.

Mitigation. Mitigation includes:
(a) Avoiding the impact altogether by not taking a certain action or parts of an action.
(b) Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
(c) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
(d) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.
(e) Compensating for the impact by replacing or providing substitute resources or environments.

NEPA Process. All measures necessary for compliance with the requirements of section 2 and Title I of NEPA.

Nexus. Used in this document in the context of determining whether a tributary stream is protected under the Clean Water Act. A significant nexus analysis assesses the flow characteristics and functions of the tributary and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream traditional navigable waters. The assessment also considers hydrologic and ecologic factors.

Non-designated Basin. Not a Designated Basin (see definition for Designated Basin).

Notice of Intent. A notice that an environmental impact statement will be prepared and considered. The notice shall briefly:

(a) Describe the proposed action and possible alternatives.

(b) Describe the agency's proposed scoping process including whether, when, and where any scoping meeting will be held.

(c) State the name and address of a person within the agency who can answer questions about the proposed action and the environmental impact statement.

“Proposal” exists at that stage in the development of an action when an agency subject to the Act has a goal and is actively preparing to make a decision on one or more alternative means of accomplishing that goal and the effects can be meaningfully evaluated. Preparation of an environmental impact statement on a proposal should be timed (Sec. 1502.5) so that the final statement may be completed in time for the statement to be included in any recommendation or report on the proposal. A proposal may exist in fact as well as by agency declaration that one exists.

Open pit mining. A type of mining that involves excavation of the ore or minerals above ground by removing the overburden and extracting the mineral beneath. The result of the mining operation is an “open pit.”

Ore. A mineral or group of minerals present in sufficient value as to quality and quantity which may be mined at a profit.

Patented claims. Private land which has been secured from the U.S. Government by compliance with the laws relating to such lands.

Permeability. The property or capacity of a porous rock, sediment, or soil for transmitting a fluid; it is a measure of the relative ease of fluid flow under unequal pressure.

pH. Symbol for the negative common logarithm of the hydrogen ion concentration (acidity) of a solution. The pH value of 7 is considered neutral. A pH value below 7 indicates acidity, and a pH value above 7 indicates alkalinity or a base.

Plan of Operations. A detailed description presenting the methods, timing, and contingencies to be used during the operation of the Project. A document required from any person proposing to conduct mineral-related activities which utilize earth-moving equipment and which will cause disturbance to surface resources.

Potentiometric surface. The surface that represents the level to which water will rise in a tightly cased (sealed) well.

Precious metal. Any of the less common and highly valuable metals; gold, silver, platinum.

Pregnant solution. The resulting metal-laden solution collected from the leaching process which contains dissolved metal values. The precious metals values are recovered from this pregnant solution, which then becomes the barren solution that is typically refortified and reintroduced to the leaching circuit.

Reclamation. Returning disturbed land to a form and productivity in conformity with a predetermined land management plan or a government-approved plan or permit.

Record of Decision. A document separate from but associated with an Environmental Impact Statement which states the decision, identifies all alternatives, specifying which were environmentally preferable, and states whether all practicable means to avoid environmental harm from the alternative have been adopted and, if not, why not (40 CFR 1505.2).

Relationships between short-term use and long-term productivity. Relationships which tie short-term use to the long-term condition and viability of a given resource value (an example would be the long-term effects of overgrazing on range productivity and condition).

Rock disposal area. Also called waste rock disposal area or stockpile area; an area where waste rock (loose or consolidated rock material that overlies a mineral deposit) is placed during mining either temporarily or permanently.

Scope. Consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements (Secs.1502.20 and 1508.28). To determine the scope of environmental impact statements, agencies shall consider three types of actions, three types of alternatives, and three types of impacts. They include:

(a) Actions (other than unconnected single actions) which may be:
Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they:
(i) Automatically trigger other actions which may require environmental impact statements.
(ii) Cannot or will not proceed unless other actions are taken previously or simultaneously.
(iii) Are interdependent parts of a larger action and depend on the larger action for their justification.

Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement.

Similar actions, which, when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency may wish to analyze these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement.

(b) Alternatives, which include:
No action alternative.
Other reasonable courses of actions.
Mitigation measures (not in the proposed action).

(c) Impacts, which may be: (1) Direct; (2) indirect; (3) cumulative.

Sensitive Receptor. A property or areas where impacts to the site could affect existing (or formally and definitive planned) populations or ecological areas especially sensitive to impacts. *For this report this definition refers to air, noise, and visual resources.*

Short-term. Short-term is defined as the life of the Proposed Action through closure and reclamation (2020).

Significantly. As used in NEPA, requires considerations of both context and intensity:
(a) Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant.

(b) Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action. The following should be considered in evaluating intensity:

1) Impacts that may be both beneficial and adverse. A significant effect may exist even if the federal agency believes that on balance the effect will be beneficial.

2) The degree to which the proposed action affects public health or safety.

3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a

cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

8) The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

9) The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

10) Whether the action threatens a violation of federal, state, or local law or requirements imposed for the protection of the environment.

Sill. A tabular igneous intrusion that parallels the planar structure of the surrounding rock.

Stock. An igneous intrusion that is less than 40 square miles in surface exposure, is usually but not always discordant, and resembles a batholith except in size.

Stockpile. An accumulation of ore, stone, or other mined or quarried material.

Surface water. Water found in ponds, lakes, inland seas, streams, and rivers or above the ground surface.

Third-party contractor. An independent firm contracted by a government agency to perform work related to a proposed action or another organization; due to the financial and contractual arrangements governing such relationships, the third-party contractor has no financial or other interest in the decision to be reached on the project.

Transmissivity. The rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient.

Undesignated Basin. Groundwater basin where permitted groundwater rights are less than the estimated average annual recharge.

Upgradient. In relation to any fixed point with regard to the direction of drainage or flow, upgradient is at a higher point of elevation than the chosen observation point and thus upward in relation to the direction of flow.

Volcanic Intrusive. Igneous rock that has intruded into a pre-existing rock formation, usually occurs while intrusive rock is in magma form.

Waste rock. A non-ore rock that is removed to access the ore zone. It contains no gold or contains gold below the economic cutoff level and must be removed to gain access to the ore zone.

Watershed. The entire land area that contributes water to a particular drainage system or stream.