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 The baseline information summarized in this chapter was obtained from published and unpublished materials; interviews with local, state, and federal agencies; and field and laboratory studies conducted in the Proposed Action area.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.

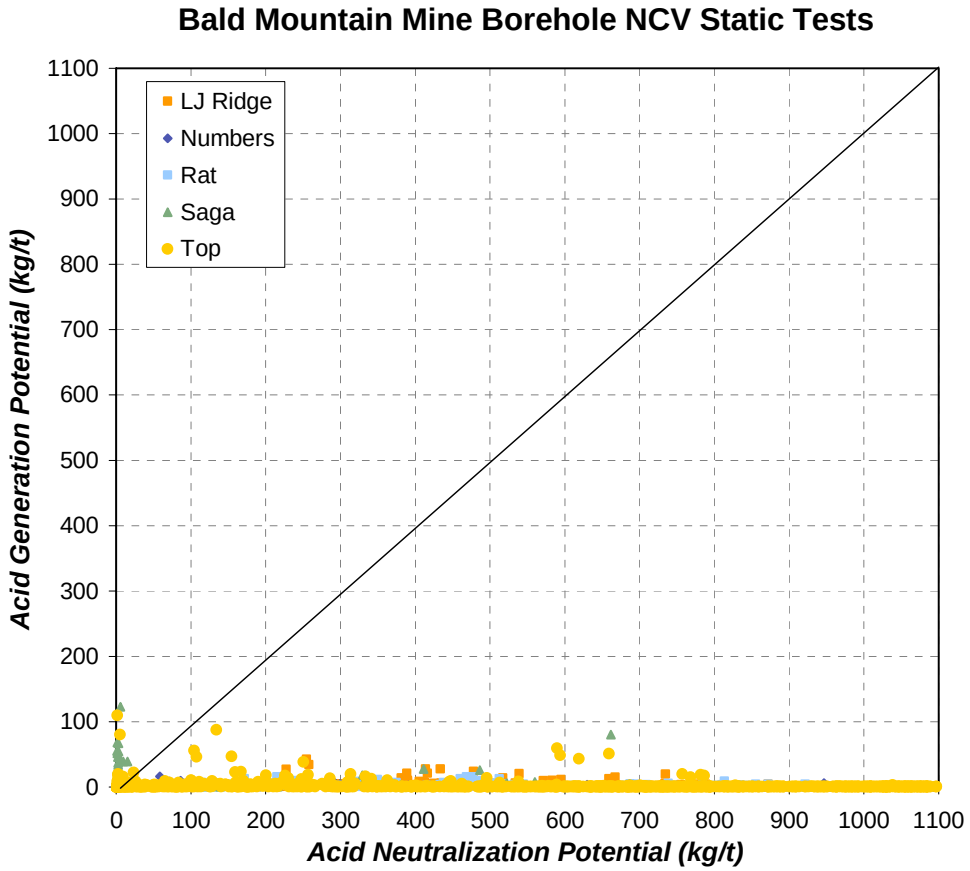
Static acid base accounting testing, Meteoric Water Mobility Procedure analyses, and kinetic testing of materials to be mined as part of the Proposed Action were completed and are reported in SRK Consulting (SRK, 2003; Schafer, 2008 and 2009) and portions of quarterly Water Pollution Control Permit reports 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.