CHAPTER 2
ALTERNATIVES
INCLUDING THE PROPOSED ACTION

CHAPTER 2.0 Alternatives Including the Proposed Action

2.1 Introduction

The Plan of Operations and Reclamation Plan for the proposed Phoenix Project have been submitted by BMG to the BLM, Battle Mountain Field Office, in compliance with 43 CFR 3809 and 3715. This chapter describes the proposed Phoenix Project as described by BMG in the Plan of Operations, Reclamation Plan, and supporting plans (Proposed Action), as well as the No Action alternative analyzed in this EIS, and a list of other potential alternatives that were considered but eliminated from detailed analysis. This chapter also includes a comparative impact analysis of the project alternatives and identifies the BLM's preferred alternative.

2.2 Existing Facilities and Disturbance

The Copper Canyon area of the Battle Mountain Mining District has a long history of minerals production dating back to the initial discovery of copper ore in 1864. Mining and beneficiation operations have been conducted through a steady succession of owners/operators and production periods. Mineral development in the Battle Mountain range has included mining and shipping of copper ores in the 19th century, mining and milling of copper ores in the early 20th century, intermediate precious metal lode mining throughout the first half of this century, placer dredge operations in the 1940s and early 1950s, copper mining and flotation milling from 1940 through the 1970s, mining and recovery of precious metal ores beginning in the late 1970s and continuing through 1993, and mining and heap leaching of disseminated precious metal ores beginning in 1990 and continuing through the present.

Mining operations in Copper Canyon have been conducted on a combination of public lands administered by the Battle Mountain Field Office of the BLM and private lands that are now owned by BMG. ***Figure 2-1*** illustrates the current surface land ownership of the project area. Most of the existing facilities, particularly those from historic mining activities, are entirely on private land; other facilities are on a mixture of public and private land. Existing disturbance covers approximately 2,778 acres.

The Copper Canyon area includes mining facilities from more than a century of copper and precious metals mining. Existing mine facilities consist of open pits, waste rock facilities, a heap leach pad, milling and tailings facilities, ore and growth media stockpiles, and ancillary facilities. The existing facilities and disturbance (as of December 31, 1998) are illustrated in ***Figure 2-2***. The existing facilities in the Copper Canyon area include the following:

Open Pits

- Fortitude
- Northeast Extension
- Iron Canyon
- East Copper
- Sunshine
- Midas
- Tomboy
- Minnie
- Canyon Placer

Waste Rock Facilities

- North Fortitude
- East Fortitude
- South Fortitude
- Northeast Extension
- Iron Canyon
- Copper Leach and Waste
- Copper A
- Copper B
- Sunshine
- Canyon Placer
- Natomas Placer
- Bonanza
- South Canyon
- East Copper
- North Tomboy
- Tomboy/Minnie

Ore Stockpiles

- Fortitude
- Northeast Extension
- Minnie

Tailings Facilities

- Gold Tailings Facility
- Copper Tailings Facility

Other Facilities

- Reona Heap Leach Pad/Beneficiation Facility
- Reona Growth Medium Stockpile
- Mill Area and Gold Plant
- Bioremediation Facility
- Solid Waste Landfill
- Copper-Iron Launder Area
- Evaporation Ponds
- Administration Office Area
- Maintenance and Warehouse Facilities
- Clay Borrow Area
- Access, Exploration, and Haul Roads
- Utility Corridors
- Fencing

BMG has been mining and beneficiating precious metal ores in Copper Canyon since 1985. The most recent plan of operations for the Copper Canyon area was for the Reona Project, approved by the BLM in 1994. Existing facilities that are part of the Reona Project include the South Canyon and Midas pits (also referred to collectively as the Midas Pit) and the Sunshine Pit; the Natomas, South Canyon, Bonanza, and Sunshine waste rock facilities; the Reona Heap Leach Pad and related facilities; and roads and other facilities for moving and processing ore. BMG suspended mining from the active pits in January 1998, although leaching of ore from the Reona Project continues.

BMG currently is conducting exploration activities to further delineate existing, or to identify future, ore deposits and reserves. BMG also is maintaining the site, including conducting environmental monitoring, closure and reclamation activities, as well as planning for the Phoenix Project. There are currently approximately 20 employees working at the existing operation.

2.3 No Action Alternative

2.3.1 Regulatory Framework

Current mining operations, as well as closure and reclamation of inactive facilities, are governed by a combination of State of Nevada and federal environmental and reclamation laws and regulations. Environmental requirements for current operations are addressed in the Reona Plan of Operations, Reona Reclamation Plan, and the BMG permits for air and water quality. Closure and reclamation obligations for the non-Reona facilities are described in BMG's 1993 Reclamation Plan (WESTEC 1993) and under the terms of the Water Pollution Control Permit for the Battle Mountain Complex issued by the State of Nevada. (Brown and Caldwell 1997). The Reclamation Plan was submitted to the Nevada Division of Environmental Protection (NDEP) to comply with the requirements of Nevada's reclamation statute, which requires reclamation of mining operations on all lands, private and public. The 1993 Reclamation Plan was the first site-wide reclamation plan for the Battle Mountain Complex. The site-wide Water Pollution Control Permit was first issued in 1992 and was renewed by NDEP in 1997.

NDEP uses the term closure in a particular way, which is different from BLM's usage. As used by NDEP, closure is when chemical stabilization of a mine site has been achieved after mining activity ceases. NDEP's closure requirements primarily address stabilization of process and non-process components, solid and liquid process mine waste, pits, waste rock facilities, ore stockpiles, and any other associated mine components that, if not properly managed during operation and closure, could potentially lead to degradation of the environment. BLM typically uses the term closure in a more conventional sense, referring to the act of closing any phase of a mining operation when further operations are not intended. BLM considers closure complete when all closure and reclamation obligations have been met, regardless of elapsed time. For purposes of the discussion in this chapter, closure refers to BMG's obligations to stabilize mine facilities to prevent degradation of the environment under the Water Pollution Control Permit issued by NDEP. Reclamation is used to refer more generally to the physical stabilization of site facilities.

In connection with renewal of its site-wide Water Pollution Control Permit, BMG has submitted to NDEP a Work Plan and Schedule of Compliance for closure of the facilities in Copper Canyon (Brown and Caldwell 1997). The initial work plan was submitted pursuant to the 1992 site-wide permit and approved by NDEP in 1993 (1993 Work Plan), and a revised work plan was submitted when the permit was renewed in 1997 (1997 Work Plan). BMG's obligations for closing existing facilities under the Nevada Water Pollution Control Program are described in the 1997 Work Plan, together with annual closure status reports, which are submitted to NDEP as a requirement of the work plan. Under this program, BMG has mapped and surveyed the Battle Mountain Complex property, identified specific

Phoenix Project

Figure 2-1

Surface Management Status

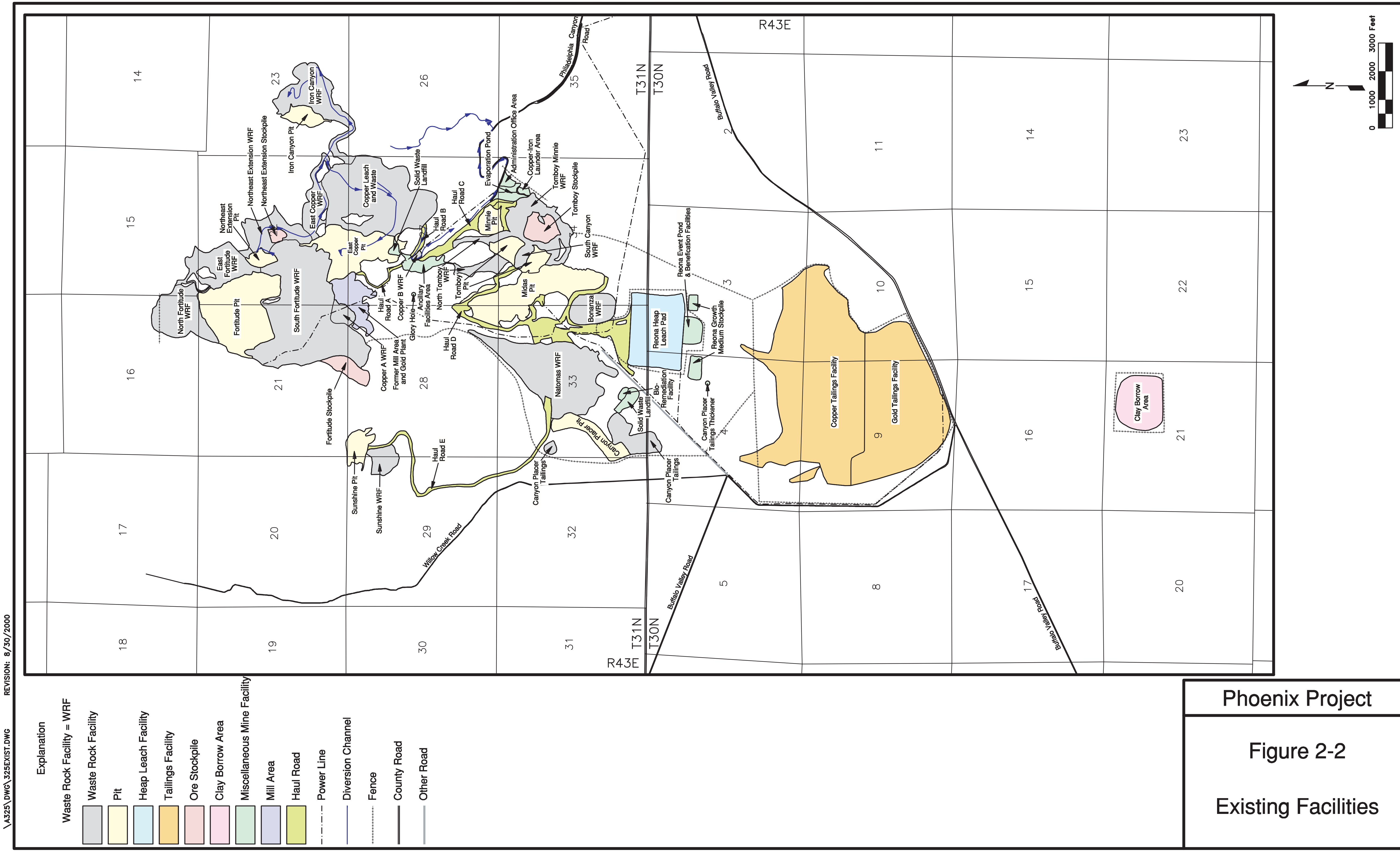

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Figure 2-2

Existing Facilities

mine units, and then characterized those units into one of several mining or beneficiation unit types, including mine waste units, tailings disposal area, mine pit units, mine beneficiation units, maintenance units, and others. BMG then performed source inventories for each of these units, using material characterization protocols suitable for each type of unit, given its operational history, use, and contained materials (e.g., waste rock characterization is performed using acid-base accounting and, where appropriate, meteoric water mobility procedures) to identify whether the nature of the material in an individual unit has the potential to be a source of pollutants that could degrade surface or ground water quality.

Units that were determined not to have the potential to degrade surface or ground water (e.g., oxide waste rock facilities), have been reclaimed or identified as ready for reclamation. Units that have the potential to degrade surface or ground water quality are then evaluated to identify an appropriate closure or mitigation strategy. This requires a more detailed site-specific characterization, including an evaluation of local hydrogeology, hydrochemistry, and ground water quality. As part of this process, BMG has submitted several individual facility or unit-specific work plans to NDEP describing closure work to be accomplished at such facilities. Facility-specific work plans have been prioritized to address those areas that are most likely to be potential sources of pollutants. In the Copper Canyon Area, BMG has submitted work plans for the tailings disposal area, Iron Canyon area, Philadelphia Canyon area, Minnie Pit, hydrocarbons in soils, and the tailings line. These work plans focus on mitigating ground water impacts beneath the tailings facility, identifying or mitigating other potential impacts to ground water, and preventing impacts from stormwater runoff from the other facilities.

The copper and gold tailings disposal areas have been addressed in some detail under the requirements of the NDEP Water Pollution Control Permit. These tailings disposal areas were originally subject to a monitoring and mitigation plan submitted to NDEP on October 13, 1992, that was directed toward characterizing the extent of an area of total dissolved solids (TDS), primarily chlorides, in the ground water beneath the tailings facility. After the chloride plume was characterized and modeled in 1993 (Simon Hydro-Search 1993b), BMG implemented mitigation measures to maximize the use of impacted ground water in mining operations. Then in 1996, pursuant to the 1993 Work Plan, BMG submitted to NDEP the Fortitude Tailings Disposal Area Mitigation Options Report (BMG 1996a), which further characterized the chloride plume and evaluated mitigation options. BMG proposed to extract approximately 2,000 gallons per minute (gpm) to contain the plume and reduce the levels of TDS in the ground water. Ground water pumped from the chloride plume is currently being used for dust suppression at the site. BMG must report annually to NDEP on the status of the chloride plume mitigation program in connection with the annual closure status report.

The 1997 Work Plan provided that facility-specific work plans for those facilities that would be disturbed or significantly affected by the Phoenix Project would be deferred pending permitting decisions on the Phoenix Project because the Phoenix Project would provide for closure and reclamation of these units under the Plan of Operations and related permits. Thus, if the Phoenix Project is approved by BLM and NDEP, the requirements of new reclamation plans and permits associated with the Phoenix Project would supercede those from the 1997 Work Plan and 1993 Reclamation Plan. Similarly, the facilities that are part of the Reona Project—the Bonanza, South Canyon, and Sunshine pits; the Sunshine and Natomas waste rock facilities; and the Reona Heap Leach Pad—are not included in the 1997 Work Plan, but are addressed separately in a Reona Project Amendment to BMG's Water Pollution Control Permit. The Reona Project facilities that are not part of the Phoenix Project would be closed and reclaimed as descried in this section and in the reclamation plan for the Reona Project (WESTEC 1993).

2.3.2 Continuing Operations, Closure, and Reclamation

Under the No Action alternative, current mining operations would continue as they are currently authorized by the BLM and State of Nevada. The proposed new and expanded facilities that comprise the Phoenix Project would not be built. Upon completion of currently permitted mining operations, the existing facilities identified in Section 2.2 would be closed and reclaimed in accordance with current permits and applicable federal and state closure and reclamation requirements. After closure and reclamation, the total area that had been subject to mining and reclamation would be approximately 2,822 acres. The postreclamation topography for the Copper

Canyon area under the No Action alternative is illustrated in ***Figure 2-3***.

The facilities and operations that comprise the No Action alternative are listed and described in Section 2.2 and illustrated in ***Figure 2-2***. Impacts of the existing operations that comprise the No Action alternative have been described in prior NEPA documents:

- Environmental Assessment for the Copper Basin/Copper Canyon Project (EA N64-EA9-92) (BLM 1989)
- Reona/Copper Canyon Project Environmental Assessment (N64-E40-51) (BLM 1990)
- Iron Canyon Project Final Environmental Assessment (EA N64-EA1-55) (BLM 1991a)
- Five Exploration Areas Environmental Assessment (EA N64-EA1-14) (BLM 1991b)
- Reona Project Environmental Assessment (EA N64-EA3-61) (BLM 1993)

Subsequent to the Reona Project Environmental Assessment, BLM has approved several modifications to the Reona Project, which are included in the No Action alternative. All of these documents are available for review at the BLM's Battle Mountain Field Office.

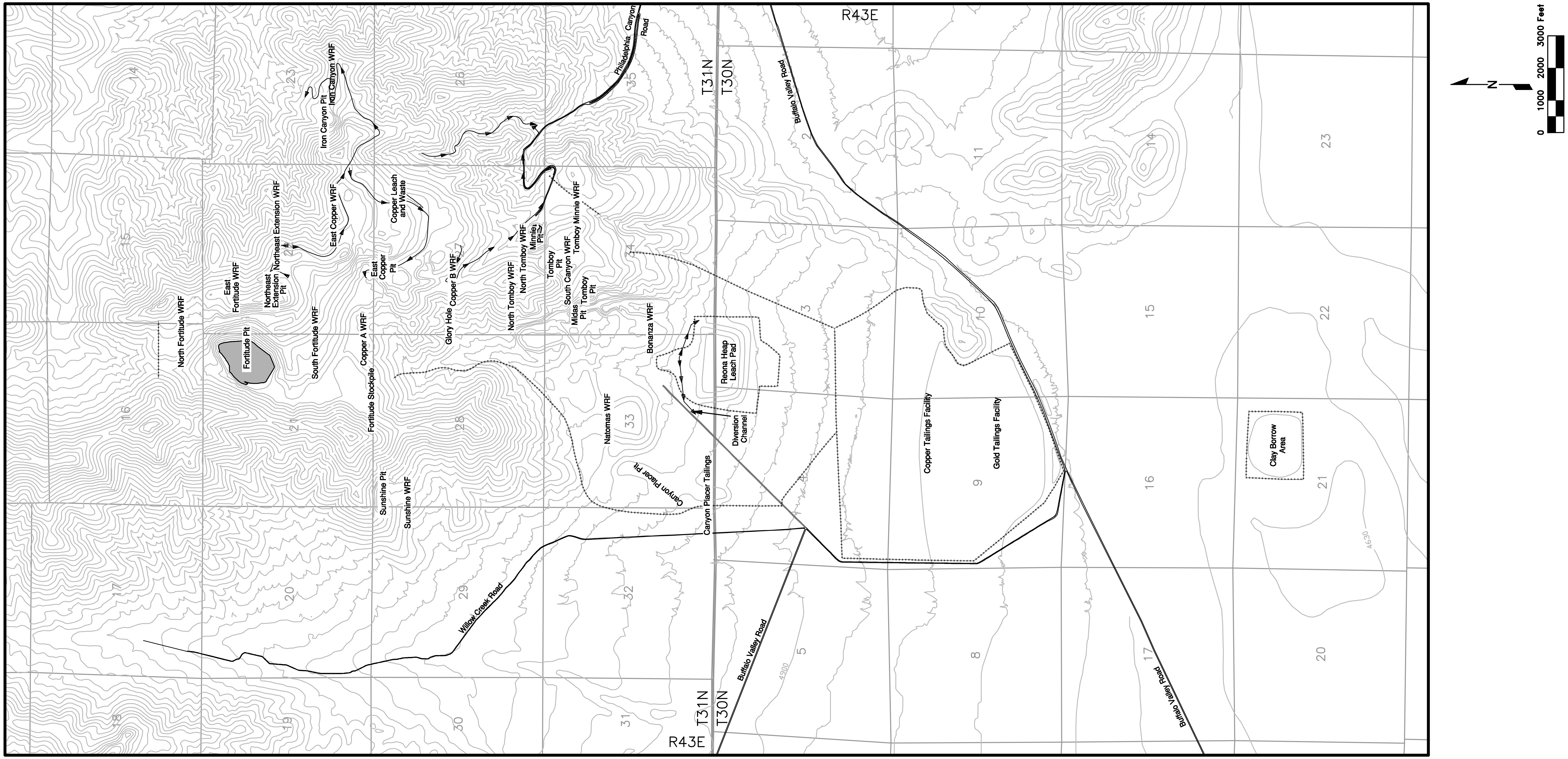
The No Action alternative would include completion of the Reona Project as currently permitted, and closure and reclamation of the Reona Project facilities in accordance with the Reona Reclamation Plan and permits. The No Action alternative also would include closure and reclamation of the other existing facilities in Copper Canyon in accordance with the closure and reclamation plans and requirements described in Section 2.2.

Further mining under the Reona Project Plan of Operations could include deepening the Sunshine Pit and expanding the Midas Pit, placement of additional waste rock on the Natomas and Sunshine waste rock facilities, possible backfilling of the Tomboy and Minnie pits with additional waste rock, and leaching of additional ore on the Reona Heap Leach Pads. It is estimated that the additional mining could be completed in approximately 6 months; however, the actual timing and duration of any further mining under the Reona Project would depend upon economic factors including gold and silver prices, equipment availability, and mining and processing costs.

Closure and reclamation of the Reona Project facilities would be implemented during the 5 years after operations were completed. Facilities would be closed in accordance with the Reona Project Amendment to BMG's Water Pollution Control Permit and reclaimed pursuant to the Reclamation Plan that was approved by BLM in connection with the Reona Plan of Operations.

The Reona Reclamation Plan requires that waste rock facility slopes be recontoured to form slopes no steeper than 2.5 horizontal:1 vertical. Recontoured slopes and the flat surfaces of the dumps would be revegetated. Growth media would be applied to some slopes prior to revegetation. Open pits would be left in their final mining configuration. Fences and rock or waste rock material safety berms would be built along the margin of the pits over 100 feet back from the highwall edge to protect public safety. Haul roads would be recontoured, ripped and scarified, water barred, covered with growth media, and revegetated. The leach pad and event pond would be reclaimed as required by BLM's Cyanide Management Plan and Nevada's water quality regulations. The heap leach pad would be rinsed to achieve NDEP standards, then resloped to allow for placement of growth medium and reseeding. After rinsing, the solutions in the event pond would be evaporated, then sediments would be tested for hazardous characteristics. Any hazardous sediments would be removed and disposed of according to applicable regulations. The liner material would be removed and buried in the pond area, which would be backfilled or reshaped to prevent water collection. The Reona Plan of Operations also requires monitoring during and after closure and reclamation.

The non-Reona facilities would be closed and reclaimed in accordance with the 1997 Work Plan, the 1993 Reclamation Plan, and other applicable requirements. Those facilities that have been the subject of facility-specific work plans under the 1997 Work Plan would be closed in accordance with those requirements. Reclamation would follow closure under the NDEP permits. Those facilities that are determined to have little or no potential to degrade surface or ground water quality would be reclaimed. Mine units that have not been subject to a facility-specific work plan would be further characterized, and, if those facilities show a



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Explanation

Waste Rock Facility = WRF

County Road

Other Road

Diversion Channel

Fence

Pit Lake Water Level[1]

~Fortitude Pit Elevation = 6050 Feet
~Minnie Pit Elevation = 5649 Feet

[1] At Model Year 400

Phoenix Project

Figure 2-3

No Action Alternative Postreclamation Topography potential to degrade surface or ground water, a closure work plan would be submitted to NDEP and BLM.

Under the requirements of the Water Pollution Control Permit and related work plans, BMG will continue to manage low quality surface water runoff from Butte Canyon, Iron Canyon, and Philadelphia Canyon waste rock and copper heap leach facilities by collection, evaporation, treatment, and/or land application. BMG also will continue to manage surface water accumulation in existing pits, including the Fortitude, Midas, and Minnie pits, through monitoring followed by collection and treatment and/or land application, if appropriate.

The Reclamation Plan for the non-Reona facilities imposes similar requirements to those in the Reona Reclamation Plan. The 1993 Reclamation Plan considers and addresses 1) reclamation requirements, 2) water quality issues under NDEP water quality permits, 3) postmining land uses, and 4) storm water permitting and management. The 1993 Reclamation Plan notes that close coordination between the closure and reclamation plans will be required to achieve optimal final site stabilization and closure.

The 1993 Reclamation Plan describes reclamation measures for all types of facilities. Waste rock facilities would be resloped to an overall slope of approximately 2.5 horizontal:1.0 vertical and revegetated. Slopes of waste rock facilities would be terraced to act as sediment and moisture traps. Only material that exhibits a net neutralization potential (NNP) equal to or greater than zero would be used as cover material or growth medium for waste rock facilities. Any remaining ore stockpiles would be reclaimed in the same manner as waste rock facilities, and incorporated into the reclamation of the waste rock facilities, where possible. Open pits would not be resloped or backfilled, but safety fencing or berms would be installed. The tailings facility would be recontoured to a 1 percent grade, and the surface would be compacted to provide a hydraulic barrier. Above the compacted surface, an 18- to 24-inch drain layer would be placed to reduce infiltration and prevent erosion. The drain layer would be covered with growth media and revegetated. The natural Copper Canyon drainage would be diverted around the reclaimed tailings disposal facility (WESTEC 1993).

Reclamation of the tailings facility would be coordinated with ongoing chloride plume mitigation activities under the Water Pollution Control Permit and the Fortitude Tailings Disposal Area Mitigation Options Report (BMG 1996a). Roads would be resloped, ripped, and revegetated. Mine buildings on public land would be dismantled and removed or disposed of on the site. Mine buildings on patented lands could be secured in place if they are deemed to be viable structures for future exploration and mining. Materials and equipment would be removed from the site or buried on the site. Any unreclaimed surface disturbances related to exploration activities (roads and drill pads) would be reclaimed through resloping (where necessary) and revegetation. A final site drainage plan would be implemented to prevent erosion of reclaimed slopes. Postreclamation monitoring would include revegetation surveys. If required by NDEP or BLM, water quality from the closed heaps, waste rock dumps, and copper heap leach facilities also would be monitored as set forth in the final closure plan (WESTEC 1993).

The objectives of closure and reclamation are to inhibit potential degradation of ground and surface water, re-establish a vegetative cover, establish habitats compatible with livestock and wildlife grazing on revegetated lands, promote long-term physical stability of reclaimed features, and protect public safety and health. The Reclamation Plan also recognizes that, given the extensive mineralization in the area, further exploration and mineral development may occur in the future. Therefore, in developing reclamation measures, the plan also considers protection of future mineral exploration and development opportunities in the area (WESTEC 1993).

Closure and reclamation requirements in the 1997 Work Plan and 1993 Reclamation Plan would be supplemented, or modified if necessary, by current closure and reclamation requirements that have changed since those documents were written. For example, in August 2000, BLM and NDEP issued revised guidance for water management for hardrock mining sites. This guidance includes specific procedural and substantive requirements for closing and reclaiming heap leach pads. Recent revisions to other BLM and NDEP regulations and guidance may be applicable to the Copper Canyon facilities and would be incorporated into the No Action alternative at the time that existing facilities are closed or reclaimed.

2.4 Proposed Action

BMG submitted a Plan of Operations and Reclamation Plan (Plan of Operations) to the BLM on August 17, 1994, and updated this plan in December 1994, January 1997, January 1999, and September 2000 to incorporate additional information developed in the interim. The following documents provide supplemental information to BMG's Plan of Operations:

- Contingent Long-term Groundwater Management Plan (Brown and Caldwell 2000c) ***and associated long-term contingency fund (BMG 2001)***
- Waste Rock Management Plan (Brown and Caldwell 2000d)
- Water Resources Monitoring Plan (Brown and Caldwell 2000e)
- Postreclamation Conceptual Stormwater Management Design (Brown and Caldwell 2000f)
- Stormwater Pollution Prevention Plan (Brown and Caldwell 2000g)
- Fugitive Dust Control Plan (BMG 2000b)

The proposed project is shown in ***Figure 2-4***, and the acreage of existing and new surface disturbance associated with the proposed project is shown in ***Table 2-1***. The maximum extent of disturbance (acres) during operations would not exist because of pit backfilling and concurrent reclamation. ***Table 2-2*** identifies the proposed mining schedule, amounts of ore and waste rock to be mined, and waste rock facility destinations. The proposed activities and facilities are discussed in the following sections.

2.4.1 Mining

During the prefeasibility stage of the Phoenix Project planning, BMG evaluated alternative mining techniques, including underground and open-pit mining of the Phoenix Project deposits. It was determined that underground mining of the Phoenix Project was not feasible because of geotechnical, safety, and economic considerations. Thus, the Plan of Operations proposes open-pit mining for the Midas, Iron Canyon, Reona, and Phoenix pits.

2.4.1.1 Open Pits

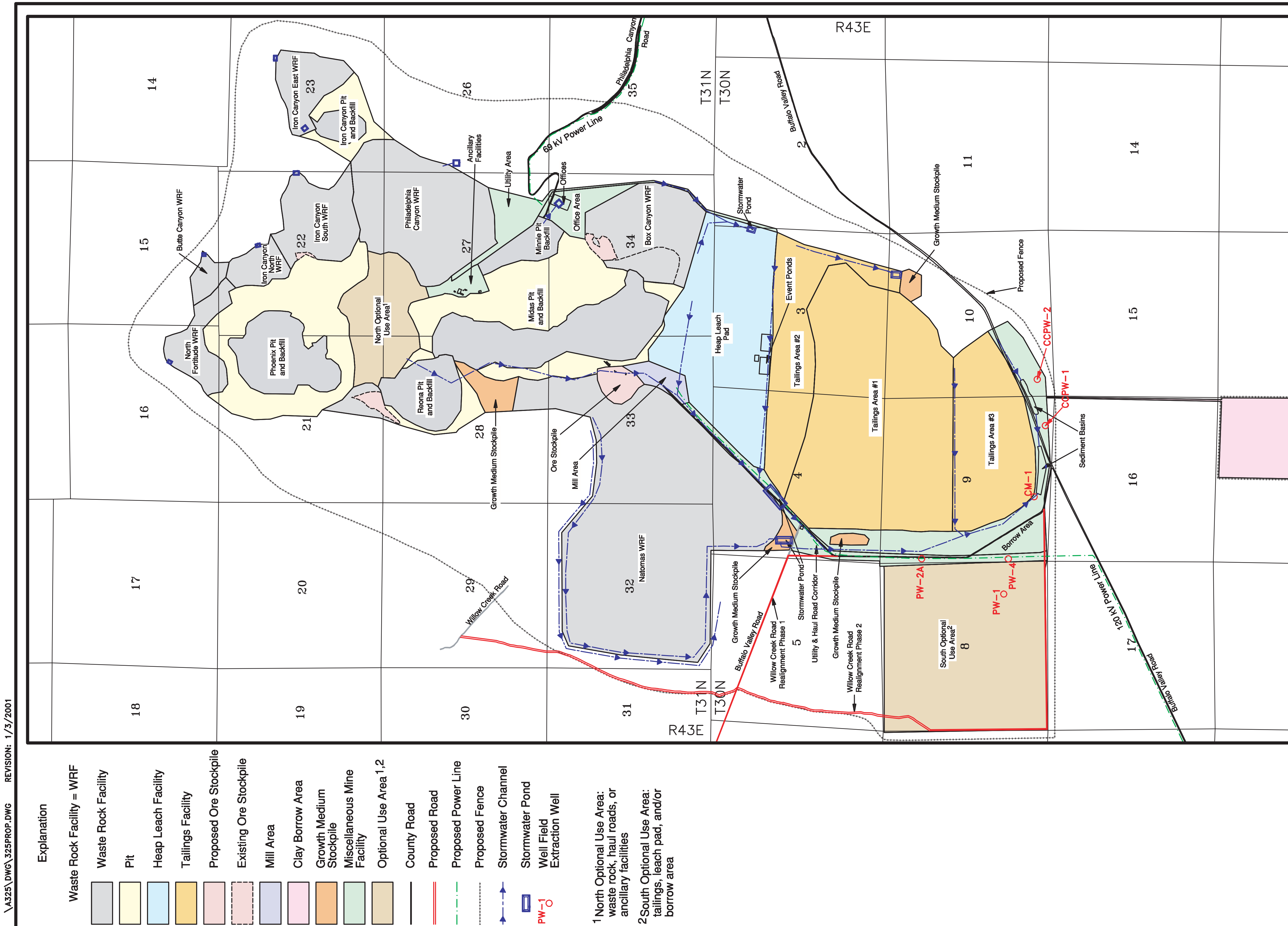
The Phoenix Project would include mining four open pits and excavating and beneficiating existing ore stockpiles associated with previous Tomboy, Northeast Extension, and Fortitude mining operations.

Each of the pits would be mined using conventional open-pit mining methods consisting of drilling, blasting, loading, and hauling. The pits would be mined with 15- to 75-foot benches, having overall pit slope angles varying from 45 to 55 degrees. Mining of the deposits would produce mill ore feed and heap leach grade ores for beneficiation within the proposed crushing, grinding, milling, and heap leach operations, respectively.

Open-pit mining would be accomplished using conventional rotary blast hole or hammer-percussion drilling and ammonium nitrate and fuel oil explosives. Rock within the mine area would be drilled with diesel-powered rotary drills using an average of 15-foot centers, although this spacing could be subject to change based on rock hardness and the degree of fracturing. Broken ore and waste rock material would be removed from the pit area along haul roads and transported to the proper storage or disposal area depending upon the mineralization of the material. Rubber-tired front-end loaders, hydraulic shovels, and haul trucks would be used to excavate and haul ore and waste rock. Track-mounted rotary drills and dozers; rubber-tired motor patrols, dozers, and water trucks; and assorted support vehicles also would be used in the pits. The proposed mining equipment is listed in ***Table 2-3***.

Before operations begin, undisturbed surface areas associated with the proposed pits would be stripped of available growth media, provided that adequate depth exists and topographic constraints do not inhibit safe stripping. The availability and suitability of growth media for salvage is limited. Salvaging growth media would involve grubbing the growth media and vegetation within the proposed areas of disturbance. Salvage operations would be limited to those areas with at least 6 inches of available growth medium and slopes not greater than 2 horizontal:1 vertical.

Table 2-4 indicates the pit floor elevations and approximate highwall dimensions associated with the proposed open pits.



Phoenix Project

Figure 2-4

Proposed Action

Table 2-1
Existing, No Action Alternative, and Proposed Action Surface Disturbance (acres)

Project Component	Existing[1]			No Action Alternative[2]			Proposed Action[3]		
	Private	Public	Total	Private	Public	Total	Private	Public	Total
Postreclamation Pit Highwalls[4]									
Midas[5]	83.8	28.8	112.6	125.8	30.5	156.3	216.4	73.0	289.4
Phoenix	-	-	-	-	-	-	188.5	64.1	252.6
Reona	f-	-	-	-	-	-	0.0	17.1	17.1
Iron Canyon	17.0	0.0	17.0	17.0	0.0	17.0	17.0	0.0	17.0
Sunshine	0.0	20.4	20.4	0.0	20.4	20.4	-	-	-
Fortitude	126.8	3.3	130.1	126.8	3.3	130.1	-	-	-
Northeast Extension	10.3	0.0	10.3	10.3	0.0	10.3	-	-	-
East Copper	79.2	0.0	79.2	79.2	0.0	79.2	-	-	-
Canyon Placer	32.2	1.0	33.2	32.2	1.0	33.2	-	-	-
Minnie	14.8	1.6	16.4	14.8	1.6	16.4	-	-	-
Tomboy	20.5	8.5	29.0	20.5	8.5	29.0	-	-	-
Subtotal	**384.6**	**63.6**	**448.2**	**426.6**	**65.3**	**491.9**	**421.9**	**154.2**	**576.1**
Pit Backfill Facilities[4]									
Midas Pit Backfill	-	-	-	-	-	-	185.4	100.0	285.4
Phoenix Pit Backfill	-	-	-	-	-	-	165.4	31.3	196.7
Reona Pit Backfill	-	-	-	-	-	-	13.2	109.5	122.7
Iron Canyon Pit Backfill	-	-	-	-	-	-	46.8	25.3	72.1
Minnie Pit Backfill	-	-	-	-	-	-	44.1	7.7	51.8
Subtotal							**454.9**	**273.8**	**728.7**
Stockpiles									
Fortitude	0.0	19.0	19.0	0.0	19.0	19.0	0.0	33.4	33.4
Northeast Extension	5.2	0.0	5.2	5.2	0.0	5.2	-	-	-
Tomboy	1.3	20.6	21.9	1.3	20.6	21.9	-	-	-
Ore Stockpile	-	-	-	-	-	-	28.9	0.0	28.9
Subtotal	**6.5**	**39.6**	**46.1**	**6.5**	**39.6**	**46.1**	**28.9**	**33.4**	**62.3**
Waste Rock Facilities									
Iron Canyon North	-	-	-	-	-	-	44.8	2.6	47.4
Iron Canyon South	-	-	-	-	-	-	109.2	30.2	139.4
Iron Canyon East	-	-	-	-	-	-	14.5	75.5	90.0
Iron Canyon	39.9	37.0	76.9	39.9	37.0	76.9	-	-	-
Box Canyon	-	-	-	-	-	-	43.4	170.5	213.9
Butte Canyon	-	-	-	-	-	-	1.7	25.0	26.7
Philadelphia Canyon	-	-	-	-	-	-	343.7	0.0	343.7
Natomas	100.7	11.5	112.2	100.7	11.5	112.2	292.5	704.6	997.1
Sunshine	0.0	19.6	19.6	0.0	19.6	19.6	-	-	-
North Fortitude	65.7	0.4	66.1	65.7	0.4	66.1	60.9	23.2	84.1
Canyon Placer	37.4	7.1	44.5	37.4	7.1	44.5	-	-	-
South Fortitude	182.8	63.2	246.0	182.8	63.2	246.0	-	-	-
Bonanza	19.6	15.6	35.2	19.6	15.6	35.2	-	-	-
South Canyon	8.3	0.3	8.6	8.3	0.3	8.6	-	-	-
Natomas Placer	14.6	28.9	43.5	14.6	28.9	43.5	-	-	-
Copper Leach	182.6	0.0	182.6	182.6	0.0	182.6	-	-	-
East Copper	33.0	0.1	33.1	33.0	0.1	33.1	-	-	-
North Tomboy	23.8	2.7	26.5	23.8	2.7	26.5	-	-	-
Tomboy/Minnie	17.8	37.6	55.4	17.8	37.6	55.4	-	-	-
Northeast Extension	43.5	0.0	43.5	43.5	0.0	43.5	-	-	-
East Fortitude	46.8	8.4	55.2	46.9	8.4	55.3	-	-	-
Copper Waste A	12.1	0.0	12.1	12.1	0.0	12.1	-	-	-
Copper Waste B	1.4	0.0	1.4	1.4	0.0	1.4	-	-	-
Subtotal	**830.0**	**232.4**	**1,062.4**	**830.1**	**232.4**	**1,062.5**	**910.7**	**1,031.6**	**1,942.3**
Tailings Facilities									
Tailings Area #1	-	-	-	-	-	-	547.2	274.0	821.2
Tailings Area #2	-	-	-	-	-	-	181.7	87.0	268.7
Tailings Area #3	-	-	-	-	-	-	301.1	5.1	306.2
Gold Tailings Disposal Area	303.4	0.0	303.4	303.4	0.0	303.4	-	-	-
Canyon Placer Tailings Thickener	0.0	0.4	0.4	0.0	0.4	0.4	-	-	-
Copper Tailings Disposal Area	378.5	102.4	480.9	378.5	102.4	480.9	-	-	-
Subtotal	**681.9**	**102.8**	**784.7**	**681.9**	**102.8**	**784.7**	**1,030.0**	**366.1**	**1,396.1**

Table 2-1 (Continued)

Project Component	Existing[1]			No Action Alternative[2]			Proposed Action[3]		
	Private	Public	Total	Private	Public	Total	Private	Public	Total
Growth Media Stockpiles									
Section 4 (adjacent Natomas Waste)	-	-	-	-	-	-	0.0	14.2	14.2
Section 4 (within Tailings Borrow Area)	-	-	-	-	-	-	0.0	9.3	9.3
Section 28 (adjacent Reona Pit)	-	-	-	-	-	-	0.0	36.6	36.6
Section 10 (S.E. of Tailings Area #2)	-	-	-	-	-	-	0.0	13.1	13.1
Reona Growth Media Stockpiles	4.2	8.1	12.3	4.2	8.1	12.3	-	-	-
Subtotal	**4.2**	**8.1**	**12.3**	**4.2**	**8.1**	**12.3**	**0.0**	**73.2**	**73.2**
Other									
Clay Borrow Area	64.8	0.0	64.8	64.8	0.0	64.8	463.2	5.6	468.8
Borrow Area (adjacent tailings, excluding stockpile area)	-	-	-	-	-	-	176.3	52.3	228.6
Office Area	0.0	3.7	3.7	0.0	3.7	3.7	2.9	50.2	53.1
Evaporation Pond Area	0.8	9.0	9.8	0.8	9.0	9.8	-	-	-
Solid Waste Landfill (Section 27)	3.1	0.0	3.1	3.1	0.0	3.1	-	-	-
Heap Leach Pad	91.0	20.3	111.3	91.0	20.3	111.3	303.5	168.3	471.8
Reona Event Pond and Beneficiation Facilities	13.9	0.0	13.9	13.9	0.0	13.9	-	-	-
Bioremediation Facility	2.3	0.0	2.3	2.3	0.0	2.3	-	-	-
Solid Waste Landfill Area (Section 33)	8.3	0.0	8.3	8.3	0.0	8.3	-	-	-
Old Mill Area and Gold Plant	38.4	0.0	38.4	38.4	0.0	38.4	-	-	-
New Phoenix Mill Area Site	-	-	-	-	-	-	30.7	0.0	30.7
Ancillary Facilities Area	13.8	0.0	13.8	13.8	0.0	13.8	25.0	0.0	25.0
Iron Launder Plant	0.0	2.1	2.1	0.0	2.1	2.1	-	-	-
North Optional Use Area	-	-	-	-	-	-	173.4	7.2	180.6
South Optional Use Area (Section 8)	-	-	-	-	-	-	0.0	641.9	641.9
Utility and Haul Road Corridor	-	-	-	-	-	-	43.4	53.3	96.7
Utility Corridor	-	-	-	-	-	-	53.8	11.5	65.3
Haul Roads	100.5	47.3	147.8	100.5	47.3	147.8	-	-	-
Total Disturbance in all Categories[6]:	**2,244.1**	**528.9**	**2,773.0**	**2,286.2**	**530.6**	**2,816.8**	**4,118.6**	**2,922.6**	**7,041.2**
Willow Creek County Road Reroute	4.3	0.8	5.1	4.3	0.8	5.1	23.0	3.9	26.9
Buffalo Valley Power Line	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.1	3.0
Philadelphia Canyon Power Line	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.0	2.3
Subtotal[7]	**4.3**	**0.8**	**5.1**	**4.3**	**0.8**	**5.1**	**26.2**	**6.0**	**32.2**
Total Disturbance in all Categories:	**2,248.4**	**529.7**	**2,778.1**	**2,290.5**	**531.4**	**2,821.9**	**4,144.8**	**2,928.6**	**7,073.4**

[1]Existing disturbance as of December 31, 1998; see Figure 2-2.
[2]See Figure 2-3.
[3]See Figure 2-4.
[4]The total proposed area of disturbance of each pit is obtained by adding the postreclamation pit highwall area with the pit backfill facility area.
[5]To obtain the total proposed area of disturbance for the Midas Pit, add 40.2 acres that are backfilled with Box Canyon waste to the Midas postreclamation pit highwall and Midas Pit backfill facility areas.
[6]Total acreage of disturbance inside the Phoenix Project boundary.
[7]Total acreage of disturbance associated with rights-of-way outside the Phoenix Project boundary.

Table 2-2
Anticipated Ore and Waste Rock Extraction Schedule

Project Year	Material Moved (1,000 tons)					Material Placed	
	Materials Source	Leach Grade Ore	Mill Grade Ore	Mined Waste Rock	Pre-existing Waste Rock	Waste Rock Facility Destination	Tonnage (1,000 tons)
1	Phase 1 Phoenix	0	356	8,440	2,280	North Fortitude	5,000
						Iron Canyon North	1,737
						Butte Canyon	1,294
						Iron Canyon South	2,689
	Midas (south)	270	1,318	1,824	665	Box Canyon	2,489
	Reona	198	0	3,422	915	Utility Corridor fill	2,000
						Leach Pad fill	2,337
2	Phase 1 Phoenix	0	2,293	23,677	2,486	Iron Canyon South	21,191
						Iron Canyon North	4,972
	Midas (south)	1,595	3,271	10,902	702	Box Canyon	11,604
	Midas (north)	0	0	1,220	216	Natomas	1,436
3	Phase 1 Phoenix	0	437	8,329	385	Iron Canyon South	5,493
						Philadelphia Canyon	3,221
	Midas (north)	120	974	9,320	1,009	Natomas	10,329
	Midas (south)	3,645	2,219	18,528	242	Box Canyon	18,770
	Midas Stockpile	0	1,007	0	0		0
4	Midas (north)	1	235	1,715	92	Natomas	1,807
	Midas (south)	2,877	1,447	34,998	2,431	Box Canyon	9,042
						Minnie Pit backfill	4,824
						Natomas	19,808
						Leachpad fill	3,755
	Fortitude Stockpile	0	2,476	0	231	Natomas	231
5	Midas (north)	143	990	7,471	425	Natomas	7,896
	Midas (south)	1,977	1,716	31,309	17	Natomas	23,326
						Tailings construction	8,000
	Tomboy Stockpile	0	1,063	0	210	Natomas	210
	Fortitude Stockpile	0	516	0	15	Natomas	15
	N.E. Extension Stockpile	0	236	0	222	Philadelphia Canyon	222
6	Midas (north)	303	1,170	8,163	208	Natomas	8,371
	Midas (south)	519	4,772	30,330	0	Natomas	30,330
7	Midas (north)	339	762	6,233	110	Natomas	6,343
	Midas (south)	0	3,672	34,910	0	Natomas	29,410
						Tailings construction	5,500
8	Midas (north)	3,044	4,411	24,290	408	Natomas	18,813
						Rehandle Stockpile (Fortitude)[1]	5,885
	Midas (south)	0	909	6,849	0	Natomas	6,849
	Phase 1 Phoenix	0	328	4,483	235	Philadelphia Canyon	4,718
9	Midas (north)	5,048	4,612	30,905	230	Midas (south) Pit backfill	31,135
	Phase 1 Phoenix	0	366	4,678	294	Philadelphia Canyon	4,972
10	Midas (north)	4,192	4,481	23,753	0	Midas (south) Pit backfill	23,753
	Phase 1 Phoenix	0	1,073	10,241	501	Philadelphia Canyon	10,742
	Reona	67	0	1,697	252	Midas (south) Pit backfill	1,949

Table 2-2 (Continued)

Project Year	Material Moved (1,000 tons)					Material Placed	
	Materials Source	Leach Grade Ore	Mill Grade Ore	Mined Waste Rock	Pre-existing Waste Rock	Waste Rock Facility Destination	Tonnage (1,000 tons)
11	Midas (north)	2,196	4,148	11,674	0	Midas (south) Pit backfill	11,674
	Phase 1 Phoenix	0	1,579	10,746	450	Philadelphia Canyon	11,196
	Reona	350	0	4,485	443	Midas (south) Pit backfill	4,928
12	Midas (north)	9	1,787	1,955	0	Midas (south) Pit backfill	1,955
	Phase 1 Phoenix	0	3,095	16,970	649	Philadelphia Canyon	5,880
						Midas (south) Pit backfill	11,739
	Reona	1,170	0	19,924	271	Midas (south) Pit backfill	3,986
						Midas (north) Pit backfill	3,494
						Rehandle Stockpile (Fortitude)[1]	12,715
13	Phase 1 Phoenix	0	5,637	23,395	1,638	Midas (north) Pit backfill	21,539
						Philadelphia Canyon	3,494
	Reona	785	43	15,619	0	Midas (north) Pit backfill	15,619
14	Phase 1 Phoenix	0	2,301	12,661	2,411	Midas (north) Pit backfill	15,072
	Reona	2,619	77	23,992	0	Midas (north) Pit backfill	14,515
						Rehandle Stockpile (Fortitude)[1]	9,477
	Tomboy Stockpile	0	1,395	0	90	Natomas	90
15	Phase 1 Phoenix	0	1,903	13,410	2,823	Natomas	16,233
	Reona	10,454	1,977	18,969	0	Natomas	18,969
	Tomboy Stockpile	0	1,057	0	90	Natomas	90
16	Phase 1 Phoenix	0	2,371	30,448	7,674	Natomas	38,122
	Reona	6,358	742	2,355	0	Natomas	2,355
	N.E. Extension Stockpile	0	1,502	0	500	Natomas	500
17	Phase 1 Phoenix	0	3,999	40,396	7,193	Reona Pit backfill	47,589
	N.E. Extension Stockpile	0	493	0	74	Reona Pit backfill	74
	Tomboy Stockpile	0	457	0	90	Reona Pit backfill	90
18	Phase 1 Phoenix	0	7,032	41,061	648	Reona Pit backfill	41,709
19	Phase 1 Phoenix	0	5,194	40,370	25	Reona Pit backfill	4,008
						Natomas	36,387
20	Phase 1 Phoenix	0	4,219	41,464	0	Natomas	41,464
21	Phase 1 Phoenix	0	5,539	32,054	48	Natomas	23,520
						Rehandle Stockpile (Fortitude)[1]	8,582
22	Phase 1 Phoenix	0	4,936	11,455	0	Rehandle Stockpile (Fortitude)[1]	11,455
23	Phase 1 Phoenix	0	4,422	12,384	0	Rehandle Stockpile (Fortitude)[1]	12,384

Table 2-2 (Continued)

Project Year	Material Moved (1,000 tons)					Material Placed	
	Materials Source	Leach Grade Ore	Mill Grade Ore	Mined Waste Rock	Pre-existing Waste Rock	Waste Rock Facility Destination	Tonnage (1,000 tons)
24	Phase 1 Phoenix	0	2,186	7,027	0	Natomas	7,027
	Phase 2 Phoenix	0	1,948	4,292	1,237	Phase 1 Phoenix Pit backfill	5,529
	N.E. Extension Stockpile	0	551	0	35	Phase 1 Phoenix Pit backfill	35
25	Phase 2 Phoenix	0	3,414	6,504	1,228	Phase 1 Phoenix Pit backfill	7,732
	Phase 3 Phoenix	0	2,554	9,266	7,535	Phase 1 Phoenix Pit backfill	16,801
	Iron Canyon	0	12	2,746	0	Iron Canyon East	2,746
26	Phase 2 Phoenix	0	1,816	6,969	1,993	Phase 1 Phoenix Pit backfill	8,962
	Phase 3 Phoenix	0	3,007	13,909	1,966	Phase 1 Phoenix Pit backfill	15,875
	Iron Canyon	0	136	5,385	0	Iron Canyon East	5,385
27	Phase 2 Phoenix	0	422	2,197	71	Phase 1 Phoenix Pit backfill	2,268
	Phase 3 Phoenix	0	3,446	11,449	0	Phase 1 Phoenix Pit backfill	11,449
	Iron Canyon	0	653	9,030	0	Iron Canyon East	9,030
28	Phase 3 Phoenix	0	360	150	0	Phase 1 Phoenix Pit backfill	150
	Iron Canyon	0	540	3,274	0	Iron Canyon East	3,274
	Rehandle Stockpile (Fortitude)[1]	0	0	0	60,750	Phase 1 Phoenix Pit backfill	36,444
						Phase 3 Phoenix Pit backfill	14,906
						Iron Canyon Pit backfill	4,700
						Iron Canyon East	4,700

[1]The Rehandle Stockpile (Fortitude) refers to temporary storage of waste rock materials in the Fortitude Stockpile facility prior to redistribution to other facilities for use in pit backfilling or waste rock capping.

Table 2-3
Surface Mine Equipment

Equipment	Quantity
Haul Trucks (150-ton class)	19
Haul Trucks (85- to 100-ton class)	8
Hydraulic Shovels (~23-cubic yard)	2
Wheel Loaders	4
Bulldozers (tracked and rubber tired)	9
Motor Graders	3
Water Trucks	3
Ingersol Rand DM45 Drills	6
Fuel Trucks	4
Lube Trucks	4
Support Trucks	4

Table 2-4
Pit Floor Elevations and Pit Dimensions

Pit	Existing Elevation (amsl)	Final Elevation (amsl)	Dimension[1] (feet)
Midas	5,085	4,530	8,400 x 4,700
Iron Canyon	5,810	5,560	2,900 x 2,100
Reona	NA	4,910	3,500 x 2,700
Phoenix	5,770 (Fortitude)	4,990	7,100 x 5,000

[1]Approximate dimensions of highwall.
NA = Not Applicable.

Midas Pit

The Midas Pit would be expanded and deepened from the current pit floor elevation of 5,085 feet amsl to a final elevation of 4,530 feet amsl using standard bench mining techniques. Slope stability testing and previous operational experience associated with the Midas Pit area indicate that 20- to 40-foot bench heights and 40- to 55-degree overall pit slope angles would be achievable. Upon completion of mining, portions of the Midas Pit would be completely backfilled with waste rock (see ***Figure 2-5***).

Iron Canyon Pit

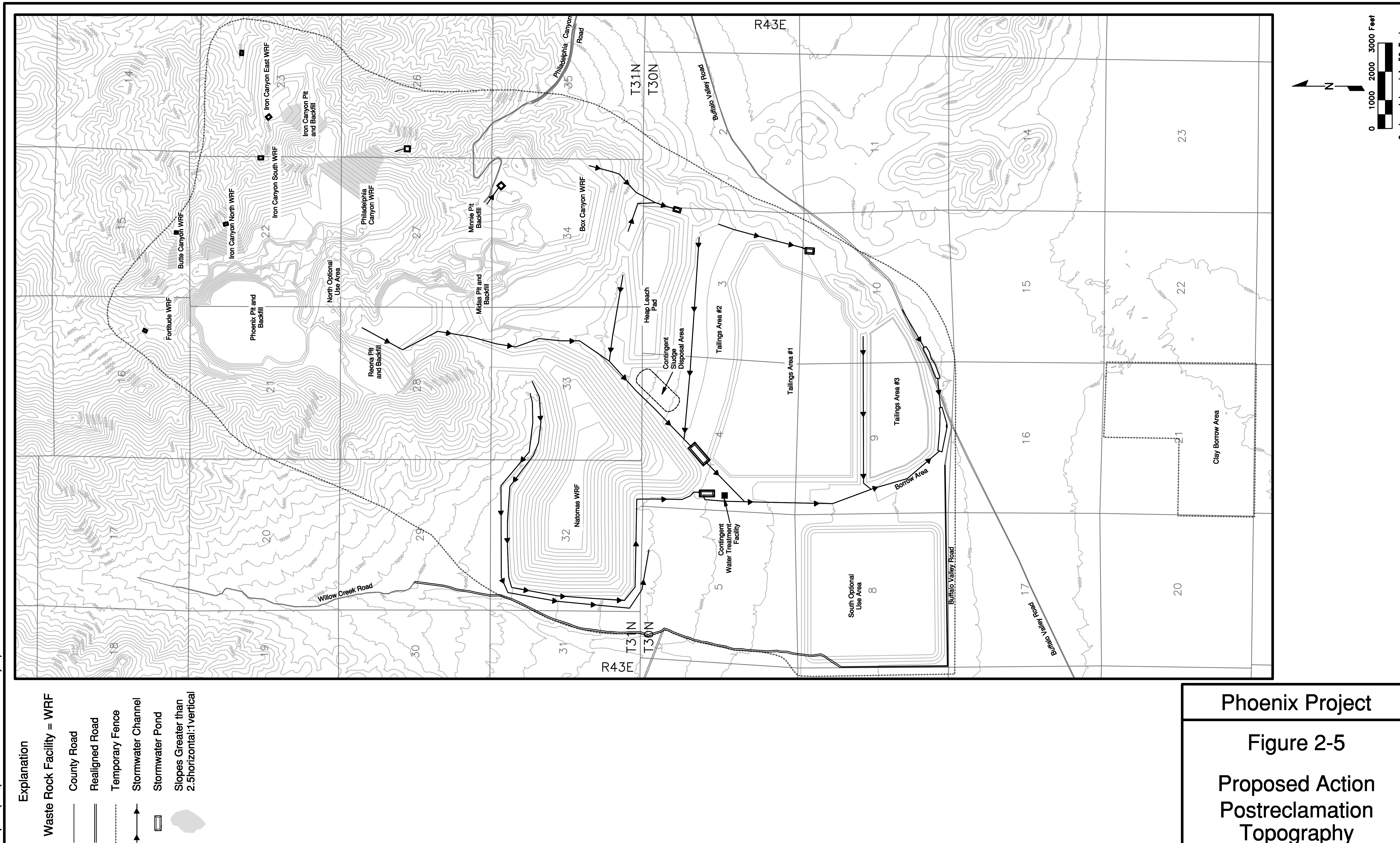
Using standard bench mining techniques, the existing Iron Canyon Pit would be deepened from the current pit floor elevation of 5,810 feet amsl to an elevation of 5,560 feet amsl. Slope stability testing and previous operational experience associated with the Iron Canyon Pit indicate that 20- to 40-foot bench heights and 40- to 55-degree overall pit slope angles would be achievable for the Iron Canyon Pit. Once mining is complete, the Iron Canyon Pit would be completely backfilled with waste rock (see ***Figure 2-5***).

Reona Pit

This new pit would be mined to the 4,910-foot elevation amsl using standard bench mining techniques. Previous experience at other pits indicates that 20- to 40-foot bench heights and 40- to 55-degree overall pit slope angles also would be achievable for the Reona Pit. Pit slopes in the area adjacent to the existing waste rock dumps would be maintained at 38 degrees (i.e., the angle of repose). Upon completion of mining, the Reona Pit would be completely backfilled with waste rock (see ***Figure 2-5***).

Phoenix Pit

Mining of the Phoenix Pit would include the previous Fortitude and Northeast Extension pit areas. Standard bench mining techniques would be used to mine this pit to a 4,990-foot elevation amsl. Slope stability studies and past operational experience indicate that 20- to 40-foot bench heights and overall pit slope angles ranging from



Phoenix Project

Figure 2-5

Proposed Action Postreclamation Topography

40 to 55 degrees would be achievable. Upon completion of mining, the Phoenix Pit would be partially backfilled with waste rock to an elevation of approximately 6,060 feet amsl (see ***Figure 2-5***).

2.4.1.2 Pit Dewatering

Three of the proposed open-pit operations (Reona, Phoenix, and Midas) would penetrate ground water during active mining. Therefore, dewatering wells and pit-floor sumps would be operated during this time. BMG proposes to construct pit dewatering wells while developing the mining facilities. Portable pumping equipment would be used during operations to pump any water collected in sumps located within the pit. Water from the dewatering operations would be delivered as make-up water for the proposed milling and heap leach operations and used as a roadway dust suppressant. Over the life of the project, dewatering rates for the Reona Pit are projected to reach 100 gpm, rates for the Phoenix Pit are projected to range from 500 to 2,500 gpm, and rates for the Midas Pit are projected to range from 25 to 500 gpm. Dewatering rates for individual pits would vary over time.

Upon completion of mining operations, backfill would be placed in the Reona, Phoenix, and Midas open pits to an elevation above the projected postmining ground water level in the vicinity of each pit. As a result, no open water would exist in the pits following completion of mining. The Iron Canyon Pit is above the existing and projected postmining ground water level; therefore, backfilled material placed in the Iron Canyon Pit would not be affected by ground water recovery.

2.4.1.3 Ore Stockpile Excavation

Excavation of the existing low-grade gold stockpiles associated with the previous Tomboy, Northeast Extension, and Fortitude Pit operations would be completed using rubber-tired loading and hauling equipment. Since the stockpiles consist of in situ broken ore, no drilling or blasting equipment would be used; however, should difficult excavation conditions be experienced, track-mounted dozer equipment would be used to feed the broken ore to the loading equipment.

2.4.2 Waste Rock Facilities

Proposed Phoenix Project waste rock facilities include new facilities, existing facilities, and open pits (***Figure 2-4***). The total capacity of these proposed facilities is approximately 910 million tons of waste rock.

Backfilling the Phoenix, Iron Canyon, Midas, and Reona pits with waste rock and surface deposition of waste rock would be conducted in a sequential manner to optimize materials handling through the life of the Phoenix Project. Potentially acid-generating waste rock placed beneath the postmining water table would be amended with lime, limestone, or other materials as appropriate. The existing Minnie Pit also would be backfilled with waste rock. Backfilled pits would be regraded, capped with benign and/or amended waste rock or other materials, and revegetated.

The total capacity of each proposed waste rock facility is presented in ***Table 2-5***. Waste rock areas would be constructed in variable vertical lift heights from as shallow as 20 feet to as high as 200 feet (dependent upon dump area). In all circumstances, lift heights would not exceed 200 vertical feet. Construction of the waste rock facilities and backfilling of the pits also would result in variable postreclamation slope gradients ranging from 2 horizontal:1 vertical to 3 horizontal:1 vertical. The variability of both facility thickness and final slopes would depend on local topography and previously constructed copper leach/waste rock facilities and gold waste rock facilities. The majority of the waste material generated would be used as cover material on existing copper waste rock/leach facility sites, gold waste rock facilities, and to backfill the pits.

Waste rock facility construction would be monitored by mine operations personnel during dumping and lift placement to ensure that placement and construction techniques are followed closely. Proposed mining of the ore bodies would expose transitional and sulfide bearing ores and waste rock that potentially could generate acid through weathering of certain rock types. These rock units are visually distinguishable from other rock types, making field identification possible. To further verify the identification, BMG proposes to conduct net acid-generating analyses on blast drill hole samples as mining progresses into these distinct rock units. These analyses would be used to determine a particular rock's chemical nature upon final placement. Benign or oxide waste rock cover would be placed to promote revegetation and evapotranspiration and to minimize meteoric water infiltration. The benign or oxide cover material would be identified by

Table 2-5
Proposed Waste Rock Facilities

Waste Rock Facility	Total Waste Rock Facility Capacity (tons x 1,000)
Surface Facilities	
Box Canyon	41,905
Iron Canyon North	6,709
Iron Canyon South	29,373
Iron Canyon East	25,135
Butte Canyon	1,294
Philadelphia Canyon	44,445
North Fortitude	5,000
Natomas	349,931
Subtotal	503,792
Pit Backfill Facilities	
North Midas	70,239
South Midas	91,119
Reona	93,470
Phoenix	120,151
Iron Canyon	4,700
Minnie	4,824
Subtotal	384,503
Facility Construction	
Leach Pad	6,092
Utility Corridor	2,000
Tailings Facility	13,500
Subtotal	21,592
TOTAL	909,887

static and kinetic testing procedures to ensure the material is benign or net neutralizing with respect to potential acid generation.

A portion of the transitional or sulfidic waste rock scheduled for placement in backfilled pits would be placed below the projected postmining ground water elevations. Submerging waste rock in pit backfill facilities below the postmining water table is intended to eliminate contact with atmospheric oxygen and limit the production of acidic solutions. However, as ground water within the backfilled pits recovers, residual oxygen that may become entrained in the waste rock during handling and pit backfilling may react with ground water and sulfides to generate acidic leachate.

BMG proposes to mitigate the potential adverse environmental effects of this initial ground water contact with the waste rock by amending the submerged waste rock with hydrated lime or limestone. Biological amendments may be used as an alternative provided that bench- and field-scale testing demonstrates adequate neutralization and control of potential acid generation and metals mobility. The appropriate lime amendment rate would be based on the NNP of the submerged waste rock and the predicted degree of oxidation. Guidelines for amendment rates for submerged pit backfill materials have been provided by neutralization tests conducted by Exponent (2000a). A revegetated cap would be constructed over all waste rock facilities, including backfilled pits, to maximize the moisture storage capacity and evapotranspiration components of the cap water balance. This is intended to reduce the flux of meteoric water into reclaimed facilities. BMG has developed a Waste Rock Management Plan (Brown and Caldwell 2000d) delineating potential acid-generating material and oxide/benign material within the perimeters of the various pit facilities.

The availability of growth media in the area to be disturbed by project operations is limited. However, when available, the growth media would be dozed, recovered by loader and haul trucks, and transported to either concurrent reclamation sites for immediate deposition or stockpiled for future placement. Since a large portion of the proposed project occurs on previously disturbed areas, growth media may not be available for redistribution over all disturbance areas. As an alternative, BMG proposes to use a 5-foot cover of capping material (see Section 2.4.18, Growth Media Management) during reclamation to promote revegetation and inhibit meteoric water infiltration. This cover would be amended with organic and inorganic nutrients to establish microbial communities and encourage vegetation growth. Further descriptions of these materials and amendments are presented in Water Resources (Section 3.2.1.4), Soils and Reclamation (Section 3.3.1.2), and the reclamation plan portion of the Plan of Operations. Considerable experience revegetating similar materials has been gained by BMG at the Reona and Copper Basin areas nearby.

During operations, drainage ditches along the uphill margins of the waste rock facility surfaces would be maintained to prevent precipitation collection and inhibit sheet erosion along the downgradient slope surfaces. The use of berms, straw bales, or sedimentation/retention ponds to channel and control flow velocities also would be used, when necessary. BMG has developed a conceptual postmining stormwater management design that would be used to develop specific Best Management Practices to address drainage during site reclamation.

2.4.3 Optional Use Areas

BMG has identified two optional use areas (***Figure 2-4***) for flexibility in developing additional waste rock capacity, processing facilities, or borrow areas. The North Optional Use Area, located in the former mill area, could be used for a waste rock facility, haul roads, or the existing ancillary facilities. The South Optional Use Area, encompassing Section 8 in Township 30 North, Range 43 East, could be used as a tailings facility, heap leach pad, and/or borrow area.

2.4.4 Clay Borrow Area

BMG proposes to expand the existing quarter-section borrow area where clay-rich alluvial borrow materials previously have been extracted for construction purposes onto private land in Section 21 of Township 30 North, Range 43 East. BMG proposes to haul these borrowed materials to the Phoenix Project using the existing roadway (as shown in ***Figure 2-4***) through Section 16 of Township 30 North, Range 43 East. BMG has secured a revised agreement with the private land owner to expand the facility.

2.4.5 Roads and Utility Corridor

The existing Buffalo Valley and Philadelphia Canyon roads would continue to be the main access routes onto the site (***Figure 2-4***). Existing access roads and exploration roads would be used for haul roads, to the extent possible. New haul roads would be constructed for the proposed Phoenix, Reona, Midas, and Iron Canyon pits. The county road to the Willow Creek reservoirs would be relocated around the Natomas waste rock facility and optional use area, as shown in ***Figure 2-4***. All mine roads, both internal pit and external mine waste rock facility locations, would be developed to an operating width of 80 to 120 feet (dependent upon mining area and equipment used). Construction techniques would ensure compliance with all Mine Safety and Health Administration regulations. Road grades would be limited to overall gradients of 13 percent or less with ramp sections typically not to exceed 20 percent.

Roadway drainage would be intercepted by haul road drainage channels that would be incorporated within the roadway construction to promote drainage along the inside edge of the roadway. These channels would guide precipitation and run-off to the nearest outlets or sedimentation collection ponds. The combined use of these channels with temporary***, certified weed-free*** straw bale diversions and other velocity controls, such as sedimentation ponds, would contain sediment transport during run-off from high precipitation events.

The haul road between the Midas Pit and the Reona Pit (to be used primarily for pit backfill operations) would cross Copper Canyon. Culverts would be installed in the drainage crossing. The inlets of culverts would extend a few feet into the drainage channel with riprap being placed selectively around the inlet area to prevent erosion. Culverts would be placed at a grade of approximately 1 percent to facilitate drainage. Each culvert installation would be designed to convey the calculated flow associated with a 10-year storm event. The combination of the installed riprap apron and downgradient silt fences would contain any sediment transport during run-off associated with high precipitation events.

Water would be used to suppress ambient roadway emissions (i.e., dust). In addition to water, magnesium chloride would be used as a dust suppressant agent. As described in BMG's Fugitive Dust Control Plan (BMG 2000b), inclement roadway conditions (e.g., snow and ice) would be controlled by plowing and sanding the various haul and access road surfaces. Sand or gravel for these operations would be collected from either an on-site supply or purchased from an outside supplier. Identification of any new gravel sources would be coordinated and, if necessary, approved through the appropriate authorizing agencies.

2.4.6 Mineral Processing

During the prefeasibility stage of mine planning and during the review and updating of the Plan of Operations since 1994, BMG evaluated alternative mineral processing options. Factors considered in the evaluation of process alternatives included ore grade, geologic controls on ore zones, bulk of mineralization to be mined, mineralogy, extractive metallurgy, process efficiency, and economic considerations. Process methods evaluated ranged from milling all of the ore with no heap leaching, to leaching all of the ore with no milling. Process designs that relied exclusively on heap leaching or milling were eliminated because they did not efficiently recover metals from all of the ore. The Plan of Operations allocates ore to the heap leach pad or mill based on the amenability of metals to recovery by these processes. Differences in mill process design, including changes in the milling circuits, were also considered but eliminated based on metallurgical evaluation of the ore showing that these processes were less efficient in recovering metals.

The newly constructed mill would have a nominal daily throughput rate of approximately 25,000 tons per day. The mill circuit would be designed as a zero-discharge system using concrete containment structures to protect against the discharge of materials and chemicals from the mill into the environment. Pipes, tanks, and other features in the mill area that contain or convey beneficiation process solutions would be located within containment areas. Sumps within containment areas would collect any spilled solution to be pumped back into the beneficiation circuit.

2.4.7 Mill Ore Crushing

Run-of-mine ore would be delivered to either the primary crusher pocket or an adjacent stockpile (***Figure 2-4***). Ore would be fed from the crusher pocket to a primary crushing system for initial size reduction. Feed rates to the crushing plant would be up to approximately 1,500 tons per hour (a nominal 25,000 tons per day). Water sprays and baghouse-type dust collection would be provided to control dust at material transfer points within the primary crusher circuit.

Crusher operations would be scheduled for 24 hours per day, 365 days per year. Crusher production from the primary crushing facility would be conveyed to a coarse ore stockpile and then to the primary grinding feed conveyor. This conveyer would be covered between the reclaim tunnel and the mill building to minimize dust emissions. Cement and lime would be added to the ore on the grinding feed conveyer to provide protective alkalinity for subsequent beneficiation. Water sprays, baghouse collection, or a similar type of dust control equipment would be provided at material transfer points in the grinding system. Conveyers would be covered for additional dust control.

All necessary construction and operating permits would be obtained from the NDEP Bureaus of Mining Regulation and Reclamation and Air Quality prior to construction and startup of the new milling facility.

2.4.8 Mill Ore Grinding

Crushed ore received from the primary crusher would be conveyed to a SAG mill for primary grinding. Ore, water, and steel grinding balls would be tumbled in this large diameter cylindrical mill to reduce the ore particles to a finer size. The term semi-autogenous refers to the fact that both larger component pieces of ore and steel balls perform as grinding media to produce smaller ore particles.

Secondary grinding would be performed in up to two ball mills where the ore slurry would be ground finer by the action of steel grinding balls.

The discharge from both the SAG grinding mill and ball mills would be pumped to a bank of cyclones that would separate the ore that is ground fine enough for subsequent beneficiation. Coarser material would be returned to the ball mills for further grinding.

2.4.9 Metals Recovery

Gold, silver, and copper recovery from the ore would occur from a proposed three-circuit beneficiation design (see ***Figure 2-6***). The circuits include gravity separation to produce a gold concentrate, flotation to produce a copper-gold-silver concentrate for further offsite processing, and beneficiation of a portion of the flotation tailings in a carbon-in-leach (CIL) cyanide circuit to recover additional gold and silver.

Carbon from the CIL circuit would be beneficiated at an on-site stripping, electrowinning, and refining facility (gold plant) to produce the gold-silver doré for further refinement off the site. Native gold collected by the gravity separation circuit also would be refined into doré in the gold plant. In addition, carbon would be re-activated at the gold plant for re-use in the CIL circuit.

In the gravity separation circuit, the finely ground ore would pass through a cyclone in which water would be sprayed into the ore countercurrent to the flow of the ore. The water spray, in conjunction with the cyclone, would direct the heavier gold to the sides of the circuit where it would be collected for smelting. The remaining ore would concentrate in the center of the cyclone and would be removed for further beneficiation in the flotation circuit. No reagents would be used in the gravity circuit.

Following gravity separation, the ore would be transferred to the initial flotation circuit, referred to as the Rougher Flotation Circuit. In this circuit, soap- and alcohol-based reagents would be added to the ore, and air would be forced up from under the ore flow. The reagents would coat the mineral-bearing sulfide ore causing the ore to cling to the passing air bubbles. The mineral-rich ore would collect on the top of the ore flow and be physically separated from the gangue material. The gangue material would be piped to the tailings impoundment.

The concentrated ore would be further crushed in a ball mill, and the finely ground concentrate would be separated into copper-rich concentrate and non-copper concentrate in the secondary flotation circuit. The copper concentrate would be dried and shipped to an off-site smelter to recover the copper. The gold and silver in the non-copper concentrate would be recovered in the carbon-in-leach circuit.

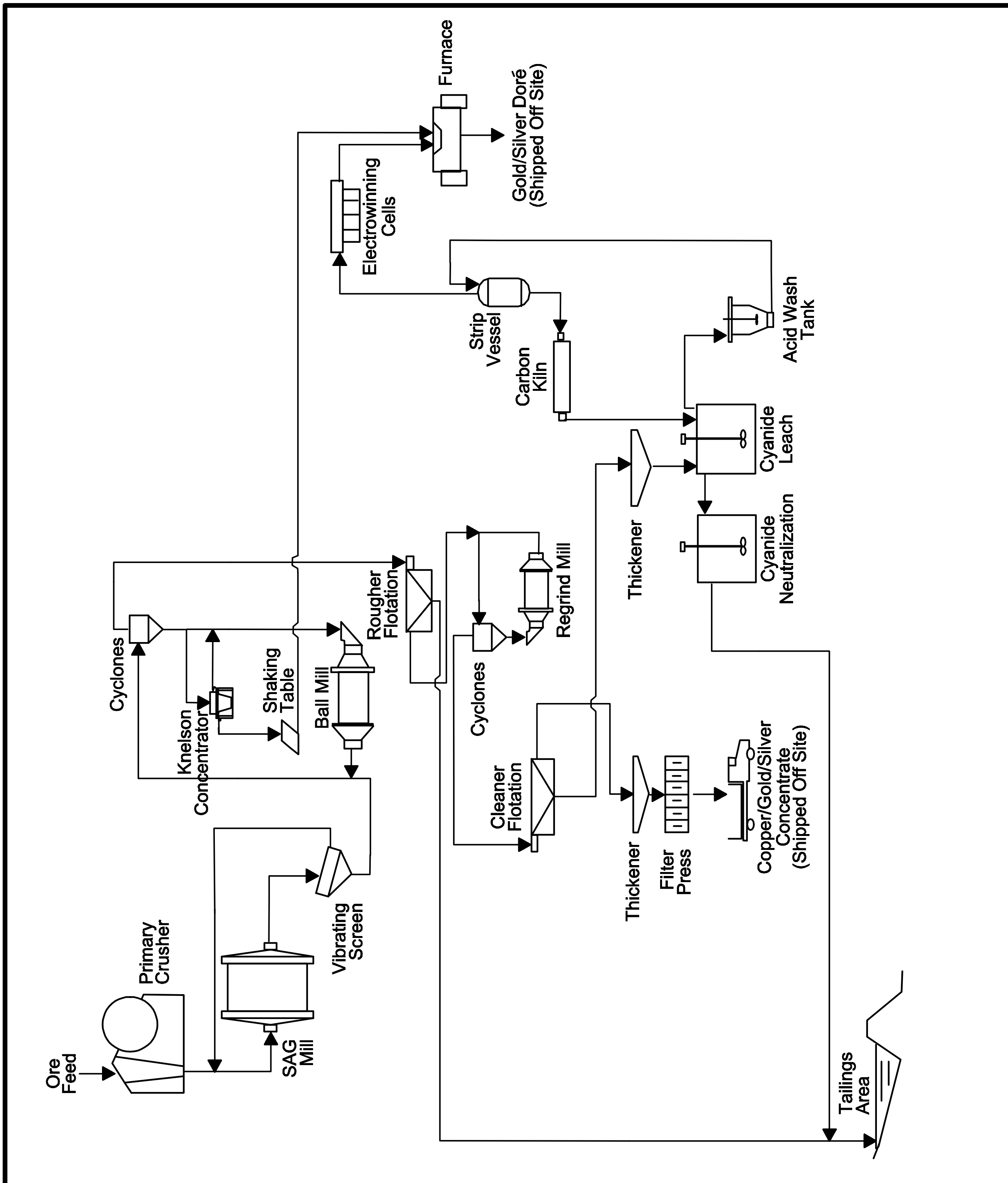
The non-copper concentrate material from the secondary flotation circuit would be a screened and ground ore slurry containing recoverable quantities of precious metals. A screened and ground ore slurry typically contains approximately 25 percent solids by weight. This material must be thickened to provide a slurry that can be suspended in the agitated leaching and carbon adsorption operations. Thickening also reduces tank requirements to provide adequate retention time, and allows for the recovery and reuse of excess water in the grinding circuit. Flocculent would be added to the slurry that feeds the thickener. Flocculent is a polymer that binds very fine particles together with larger particles to speed settling and improve clarity of water recovered in the thickener overflow.

The solids would settle to the bottom of the thickener and be removed as a slurry containing approximately 50 percent solids by weight. The thickened slurry would then move on to the leaching circuit.

Leaching operations would be conducted within newly designed and constructed facilities, providing primary and secondary containment to capture, retain, and return all leaching solutions to the leaching circuit. Leaching would be performed in a series of newly constructed agitated steel tanks located within a concrete secondary containment. Dilute sodium cyanide solution added to the tanks would dissolve the precious metals from the ore. Small quantities of lead nitrate would be added to the leaching circuit to accelerate the leaching rate and reduce cyanide consumption. The leach tanks would be sparged with compressed air to provide oxygen required for the leaching reaction. Milk-of-lime would be added to the leach circuit, as required, to control alkalinity in the circuit.

The last several stages (tanks) of leaching would contain granular activated carbon providing carbon-in-leach recovery of the precious metal concentrations contained within the leach solution. As gold and silver are dissolved from the ore, the precious metal concentrations would be adsorbed by the activated carbon. This process would recover the dissolved gold and silver, separating it from the ore slurry and concentrating it nearly 2,000 times.

In-tank screens would allow slurry to pass from tank to tank, while retaining the carbon in each



Phoenix Project

Figure 2-6

Mill Facility Process Flow Diagram

tank. Periodically, carbon would be transferred from tank to tank, counter to the slurry flow. Fresh or regenerated carbon would be added to the last tank while carbon from the first tank, loaded with up to 100 ounces of gold per ton, would be pumped to the gold recovery circuit. Moving carbon opposite to the flow of slurry would allow the carbon with the lowest gold loading to contact slurry with the lowest concentration of precious metals, and conversely, carbon with the highest precious metal loading to contact slurry with the highest concentration of precious metals. This counter-current arrangement maximizes adsorption efficiency.

After the last carbon-in-leach tank in the circuit, the slurry would pass over a safety screen and report to the neutralization circuit. Safety screen openings would be sized slightly smaller than the in-tank screens to recover any carbon that has migrated through the in-tank screens. Carbon fines would be recovered and shipped off the site to a custom refining facility to recover the precious metal concentrations.

Loaded carbon from the carbon-in-leach circuit would be washed of slurry on a vibrating screen and then deposited in an acid wash vessel. A dilute acid solution would be circulated through the carbon to remove any calcium carbonate scale, which inhibits precious metals recovery. Once the acid wash is completed, the acid would be pumped to a tank where it would be neutralized with lime before it is pumped to tails. The carbon would be water rinsed and transferred to a carbon-stripping vessel.

During stripping, a dilute caustic and cyanide solution would be pumped up through the carbon bed at elevated pressure and temperature. Under these conditions, gold and silver would be desorbed from the carbon into solution. Strip solutions would exit the stripping vessel and pass through heat exchangers to recover energy and cool the solution. This pregnant strip solution would pass through electrowinning cells where gold and silver are plated out. The barren strip solution from the electrowinning circuit would be recycled back to the stripping vessel, and the loop would continue until most of the precious metals are removed from the carbon.

After stripping, the carbon would be transferred from the stripping vessel to the kiln circuit for thermal reactivation. Stripped carbon would be directly heated in a reducing atmosphere to enhance adsorption properties. The carbon would then be screened to remove any fines that may have been generated and returned to the carbon-in-leach circuit.

Periodically, the electrowinning cells would be cleaned. Gold and silver that have plated out would be collected, and this material then would be mixed with fluxes and melted. Doré buttons or bars would be cast and sent off the site for further refining. Minor amounts of slag that contain gold, silver, and impurities would be returned to the beneficiation circuit to recover the remaining precious metals.

The proposed Phoenix crushing and milling circuit would be constructed near the existing Reona heap leach pad in the area depicted in ***Figure 2-4***. Most of the previous primary crusher, secondary crusher, ball mill, and other former mill facilities have been removed. The remaining facilities, including a thickener, gold plant, and concrete foundations, will be removed or buried in place in compliance with NDEP requirements.

2.4.10 Neutralization

Tailings from the carbon-in-leach circuit would be neutralized using the INCO process or an alternative technology. The INCO process is performed in agitated tanks. The process uses sulfur dioxide in combination with air as an oxidant and milk-of-lime for pH control. Compressed air and sulfur dioxide are bubbled through the slurry in the presence of a soluble copper catalyst to neutralize the cyanide ion. Milk-of-lime is added to maintain the optimum pH for the process.

Alternative cyanide neutralization technologies being investigated include substituting ammonium bisulfite for sulfur dioxide in the INCO process or injecting Caro's acid (a mixture of sulfuric acid and hydrogen peroxide) directly into the tailings pump box. Each of these processes would neutralize the weak acid dissociable cyanide in the tailings to levels safe for wildlife.

Once neutralized, the slurry would be piped to the lined tailings facility. At the disposal area, the solids would settle from the slurry, and the solution would be recovered from the reclaim ponds and recycled back to the mill.

2.4.11 Tailings Pipeline

Once neutralized for cyanide, mill tailings would be conveyed to the tailings facility through a contained overland pipeline. The pipeline would be designed to provide both primary and secondary containment of the neutralized tails. Containment design would be provided by a pipe within a pipe or a pipe in a lined ditch, such that secondary containment would be provided immediately adjacent to the primary pipeline.

2.4.12 Tailings Facilities

2.4.12.1 Construction

The tailings facilities would be constructed, in part, over the existing inactive tailings area (***Figure 2-4***). Construction on top of existing inactive tailings would minimize surface disturbance and provide a cap for the inactive tailings. Construction would take place in three phases over the life of the facility. Each of the three phases would require an embankment constructed in an upstream fashion. The three phases would be constructed of alluvial borrow material from one of several borrow sites adjacent to the tailings facility. Final constructed embankment slope topography would be approximately 2.5 horizontal:1 vertical.

The facilities would be constructed with a low permeability soil barrier upon which a linear low density polyethylene synthetic geomembrane liner would be placed. The liner system would be designed to provide a containment system permeability of 1×10^{-11} centimeters per second. An underdrain system of perforated piping and drain rock over the liner would enhance tailings dewatering and minimize hydraulic head on the liner. The drain piping would be routed to collection sumps with pumps to recycle the underdrain solutions to the reclaim water pond on top of the facilities.

2.4.12.2 Operation

The tailings facility would be designed to operate as a zero-discharge facility using a thin layer, sub-aerial tailings deposition method. Initial deposition (Phase 1) would occur from across the main (south) embankment to allow the coarser tailings to build a foundation for the upstream raises. Tailings deposition would occur from spigots located at the perimeter of each phase as it is constructed. Once a beach has been formed, spigoting would focus on directing the reclaim water pool toward the reclaim barge pumps. The free water pool would be managed to prevent contact with the main embankment. As the tailings beaches are formed, spigoting would progress farther around the perimeter of the facilities. A 5-foot freeboard would be maintained to contain the 100-year storm event during all phases of construction and operation.

In order to allow for upstream construction of the first phase, spigoting would be controlled to allow for a higher beach on the south side of the impoundment and then would be switched primarily to the north side during construction of the raise.

Once construction of the initial phase is completed, Phase 2 deposition would be initiated. Spigoting would occur across the south embankment to allow the coarser tailings to form a foundation for the final phase. As the beach develops along the south embankment, the spigoting would progress around the perimeter until spigoting is cycling the entire perimeter. The spigoting would be managed to maintain the free water pool around the reclaim barge pumps and to prevent the free water from contacting the main embankment. A 5-foot freeboard would be maintained to contain the 100-year storm event. The subsequent construction of the Phase 3 portion of the tailings facility would be completed in the same fashion described for the Phase 2 construction.

All necessary construction and operating permits would be obtained from the NDEP Bureau of Mining Regulation and Reclamation, Nevada Division of Water Resources, and NDOW before construction and startup of the new tailings facilities.

2.4.13 Heap Leach Design

Leach grade ores mined during the Phoenix Project would be transported to the existing zero-discharge heap leach facility, which would be expanded as shown in ***Figure 2-4***. The leach pad expansion design includes an 80-mil high-density polyethylene liner on a clay bed with a leak detection/collection system placed under the primary high-density polyethylene liner. Borrow material for the clay bedding would be excavated from a source on private land in Section 21, Township 30 North, Range 43 East (***Figure 2-4***). Excavation of the borrow area would require grubbing of 0.8 foot of growth medium and a 2-foot excavation of the underlying clay material. Transportation access would be provided along an existing roadway.

A friction layer or an upper bedding material would be excavated from the existing copper tailings area. The placement of this material would serve to increase the friction properties between the clay bedding layer and the high-density polyethylene liner. No new surface disturbance would be associated with the excavation of this material. Existing roadways would be used to transport the material from the copper tailings area to the proposed construction area. A geonet leak detection layer placed between the primary and secondary liner surfaces would provide primary liner leak detection.

With expansion of the heap leach pad, an additional event pond would be required for emergency solution containment. This pond would be constructed near the existing Reona event pond, and an overflow connecting the two ponds would transport excess solution to the event pond. The event pond would be constructed with a 60-mil high-density polyethylene primary and secondary geomembrane liner system. A high-density polyethylene leak detection layer would be placed between the primary and secondary liner surfaces to provide primary liner system leak detection, as required by Nevada Administrative Code 445.24364. The facility's open solution surfaces would be covered with bird balls, bird netting, or other suitable measures to protect avian wildlife. The facility would be fenced with an 8-foot-high wildlife fence to protect large terrestrial wildlife.

Leach grade ores would either be transported to the existing crushing facility pocket (and adjacent ore stockpile area) or directly to the leach pad as run-of-mine material. Either the existing, a new, or a contract crushing facility would be used to crush the ore. Agglomerated ore from the crusher would be conveyed and stacked on the leach pad.

Run-of-mine ore not scheduled for crushing would be transported directly to the leach pad and end-dumped onto the pad for subsequent beneficiation. Lime would be added to the run-of-mine ore to buffer leach pad solution acidity. Scheduling of crushed leach ore and run-of-mine leach ore delivery would be determined by the precious metal content and the leachability characteristics of the ore.

2.4.14 Heap Leach Beneficiation Facilities

Beneficiation activities associated with the Phoenix heap leach expansion would be conducted using the existing Reona beneficiation facilities. These facilities include the barren, lean, and pregnant leach tanks; the carbon adsorption tanks; the event pond; and all delivery/transportation piping and pumping equipment currently in place. All beneficiation solutions would be contained within a primary pipe, tank, pond, and/or structure, each of which would be contained within either a secondary geomembrane or concrete containment. All facilities presenting open solution surfaces, such as the event pond and the solution staging tanks, would be covered with bird netting or other suitable measures to protect migratory birds. The existing facilities are, and all new facilities would be, fenced with an 8-foot-high wildlife fence to protect large terrestrial wildlife.

Leachate collected from the pad would be transported to the beneficiation facility through high-density polyethylene piping. This piping would be carried in a secondary containment ditch constructed with a 5-foot bottom width, 3 horizontal:1 vertical side slopes, and a 5-foot depth. Secondary containment of the ditch would be provided by an 80-mil high-density polyethylene liner.

2.4.15 Reagent Storage

The following reagents would be required to operate the proposed mining, milling, and heap leach facilities:

1. Ammonium nitrate as a blasting agent. Ammonium nitrate would be stored in appropriate silos at one or more of the mining facilities.

2. Lime to control pH and agglomeration of the ore. It would be delivered via approved access routes to silos by bulk delivery trucks.

3. Sodium cyanide for in-tank and heap leaching operations. Liquid sodium cyanide solution would be delivered to the site by truck. Liquid cyanide solution would be received (30 percent composition) in a contained tanker and would be transferred to an on-site storage vessel for introduction into the system. The

on-site storage vessel would be located within concrete secondary containment. In addition, solution transfer from the transport tanker to the on-site storage vessel would be conducted within concrete secondary containment. Daily visual inspection of the storage vessel would be conducted by operating personnel to ensure the vessel's integrity. Concrete secondary containment for the vessel would be designed at 110 percent of the vessel's maximum storage capacity.

4. Activated carbon for recovery of the precious metals from solution. Loaded carbon would be stripped and reused.

5. Scale control reagents. The specific reagent or reagents to be used has not been determined. A bulk delivery system and storage tank are most likely.

6. Caustic soda for pH control. A 50 percent solution would be delivered to the site by truck and transferred to a storage tank. The storage tank would be located within concrete secondary containment capable of containing 110 percent of the tank's maximum storage capacity. The caustic soda would be introduced to the recovery circuit from the storage tank.

7. Muriatic acid for carbon stripping operations. A 33 percent hydrochloric acid solution would be delivered to the site by truck or tanker and transferred to a storage tank. The storage tank would be located within concrete secondary containment capable of containing 110 percent of the tank's maximum storage capacity. The muriatic acid would be introduced to the carbon strip circuit from the storage tank.

8. Lead nitrate for mill leaching. The material would be received in either 100-pound buckets or larger containers as flow-bins. The material would be delivered to the site by truck.

9. Oxygen to aerate the presentation and carbon-in-leach tanks would be supplied by an on-site oxygen plant. Oxygen supply to the tanks would be provided as a gas.

10. Bulk deliveries of hydrocarbon products consisting of diesel fuel, gasoline, hydraulic fluids, and various viscosities of motor oil for equipment maintenance and operation. These materials would be delivered to the site either by truck or tanker and would be transferred to on-site storage vessels. The on-site storage vessels would be located within concrete secondary containment to prevent possible introduction into the environment. Concrete containment for the storage vessels would be designed at 110 percent of the largest storage vessel's maximum storage capacity.

The various reagents would be mixed or added to the solution circuits in vessels that would be located within contained facilities. All areas where hazardous or reactive materials are stored would be marked with appropriate signs in accordance with Mine Safety and Health Administration and U.S. Environmental Protection Agency regulations. All hazardous materials vessels would be located within concrete secondary containment areas at the Phoenix and Reona beneficiation plants. The plants and reagent storage areas would be located within the property perimeter fencing and/or a specific wildlife fencing. All reagent storage and containment facilities would be designed in accordance with the requirements of the State of Nevada Water Pollution Control Permit.

An Emergency Response Plan (Terracon 2000) has been prepared to address spills or other possible incidents involving hazardous materials. The annual amounts of the primary reagents and other supplies that are projected to be used to operate mine facilities are provided in ***Table 2-6***.

2.4.16 Ancillary Facilities

2.4.16.1 Offices

Current administrative offices, maintenance shops, communications facilities, and laboratories associated with the existing operations would be used to support the proposed Phoenix Project. Office and change room facilities would be expanded to accommodate staffing increases. To accommodate the larger haulage equipment to be used with the Phoenix Project, the mine maintenance shop would be heightened and expanded. The existing warehouse also would be expanded to hold a larger inventory. Any additional buildings constructed would be painted to blend with colors of the landscape.

2.4.16.2 Electrical Power

Because the Phoenix Project would require additional electrical power supply, new 120-kilovolt

Table 2-6
Hazardous Substances

Substance	Normal Delivery Size	Anticipated Shipping Origin	Approx. Daily Max. Usage	Operational Use	Storage Area	Solid/ Liquid	Normal Delivery Format	On-site Storage Volume
Aerophine 3418A	22 tons	Welland, Ont	1.5 tons	flotation promoter	mill building	liquid	bulk	22 tons
Ammonium nitrate	20 tons	Elko	27.5 tons	blasting agent	mining area	solid	bulk	75 ton silo
Antifreeze	2,000 gal	Elko	500 gal	coolant	tank farm	liquid	bulk	two 2,000 gal tanks
Antiscalent	4 drum pallet	Winnemucca	5 gal	heap leach	heap leach	liquid	20 gal drums	100 gal
Antiscalent	4 drum pallet	Winnemucca	5 gal	carbon stripping	mill building	liquid	20 gal drums	100 gal
Carbonic methyl cellulose	1 ton	Salt Lake City	0.5 ton	flotation depressant	mill building	solid	bags	10 tons
Diesel fuel	10,000 gal	Elko	23,300 gal	fuel and blasting agent	tank farm	liquid	bulk	two 20,000 gal and one 10,000 gal tanks
Dithiophosphinate	4 drum pallet	Salt Lake City	1.5 tons	flotation	mill building	liquid	45 gal drums	4,500 gal
Flocculent	1.1 tons	Salt Lake City	35 lb	thickening aid	mill building	solid	bags	1.1 tons
Fluxes	1,500 lbs	Elko	100 lbs	smelting	mill building	solid	25 lb bags	3,000 lbs
Gasoline	10,000 gal	Elko	375 gal	fuel	tank farm	liquid	bulk	5,000 gal tank
Granulated carbon	10 tons	Elko	1 ton	carbon stripping	mill building	solid	1 ton bag	10 tons
Grease	20 drums	Elko	300 gal	lubricant	tank farm	solid	55 gal drums	ten 55 gal drums
Hydraulic oil	1,000 gal	Elko	20 gal	hydraulic fluid	mine shop	liquid	10 totes	ten 100 gal totes
Hydrochloric acid	20 tons	Reno	200 gal	carbon stripping	mill building	liquid	bulk	7,000 gal tank
Lime	20 tons	Salt Lake City	90 tons	flotation depressant and pH control	mill building	solid	bulk	400 ton silo
Methyl isobutyl carbinol	6,000 gal	Salt Lake City	1.5 tons	flotation frother	mill building	liquid	bulk	9,000 gal tank
Motor oils	5,000 gal	Elko	2,000 gal	lubricant	tank farm	liquid	bulk	four 10,000 gal tanks
Nitric acid	4 drum pallet	Elko	10 gal	carbon stripping	mill building	liquid	20 gal drums	300 gal tank
Pebble lime	20 tons	Reno	55 tons	heap leach	Midas Pit area	solid	bulk	150 ton silo
Potassium amyl xanthate	10 tons	Salt Lake City	1 ton	carbon stripping	mill building	solid	bags	7 tons
Sodium cyanide	20 tons	Elko	11 tons	heap leach	heap leach	liquid	solid	25,000 gal tank
Sodium cyanide	20 tons	Elko	200 gal	carbon stripping	mill building	liquid	bulk	8,500 gal tank
Sodium cyanide	6,000 Gal	Elko	35 tons	leaching of gold	mill building	liquid	bulk	15,000 gal
Sodium hydroxide	20 tons	Reno	100 gal	heap leach	heap leach	liquid	bulk	6,000 gal tank
Sodium hydroxide	20 tons	Reno	400 gal	carbon stripping	mill building	liquid	bulk	10,000 gal tank
Sodium sulfite	22 tons	Salt Lake City	15 tons	carbon stripping	mill building	solid	bags	60 tons
Sulfur dioxide	20 tons	Salt Lake City	To be determined	cyanide neutralization	mill building	liquid	bulk	100 tons
Used antifreeze	NA	Site	500 gal	recycle	tank farm	liquid	NA	2,000 gal tank
Used oil	NA	Site	2,200 gal	recycle	tank farm	liquid	NA	10,000 gal tank

Source: BMG 2000e.
NA – Not applicable.

and 69-kilovolt power lines would be constructed to the mine site. The 120-kilovolt power line would consist of installing a tap onto Sierra Pacific Power Company's existing 152-kilovolt power line in Buffalo Valley, then constructing a single-pole staggered tangent power line northeasterly to the mine site (***Figure 2-4***). The 69-kilovolt power line would consist of installing a tap on Sierra Pacific Power Company's existing 69-kilovolt power line near the mouth of Philadelphia Canyon, then constructing a single-pole staggered tangent power line along the Philadelphia Canyon road to the mine site (***Figure 2-4***).

It is anticipated that BMG will secure the necessary rights-of-way for the power lines and possibly assign them to the power provider at a later date. Although the party responsible for constructing and operating the power lines has not yet been determined, the impacts associated with the power lines are examined and disclosed in this EIS.

In addition to constructing the proposed 120-kilovolt power line and substation, ancillary electrical distribution feed lines would be necessary from the 120-kilovolt substation. A 13.8-kilovolt distribution line from the new substation would feed the Reona crusher switchgear. Another distribution line would feed off the existing 13.8-kilovolt distribution line at the proposed reclaim booster pump site along the northwest corner of the proposed Phoenix tailings area. This line would proceed from this site to the north end of the tailings facility to provide electricity to the reclaim barge pumps.

In addition to these distribution line modifications, several short spans of distribution lines would be required to feed the mill and gold plant facilities. All distribution line construction would be single-pole installations with single and dual-arm construction.

2.4.16.3 Water Supply

The average consumptive water use of the Phoenix Project would be approximately 3,000 to 5,000 gpm. Makeup water for mining, beneficiation, and nonpotable water supplies would be appropriated from the existing surface water diversions along Willow Creek; existing PW-1, PW-2A, PW-4, and CM-1 ground water wells (***Figure 2-4***); from proposed ground water wells CCPW-1 and CCPW-2 (***Figure 2-4***); from proposed dewatering wells; and from stormwater run-off from areas such as Philadelphia, Iron, and Butte canyons. As required by Nevada law, BMG has obtained water rights from the Nevada State Engineer.

Makeup water from the chloride mitigation program would be used within the mill and heap leach circuits, as applicable. This water would be appropriated from ground water wells CM-1, CCPW-1, and CCPW-2. Any remaining balance of the chloride mitigation program pump-back water would be used to suppress dust on the existing tailings facility. Mill and heap leach make-up water from these wells would be pumped to the tailings reclaim booster station for incorporation into the circuit. Water to be used for dust suppression on the tailings facility would be piped to the facility and applied along the tailings surface using irrigation- type sprinkler heads. Dust suppression system operations would be designed to maximize dust control and water evaporation operations.

Water from the Duval (PW) production wells and pit areas would be pumped and delivered to these operations via pipeline. Make-up water for the milling and leach circuit would be delivered to the beneficiation plants and added to the solution circuit on an as needed basis.

2.4.16.4 Refuse and Sewage Disposal

The existing sewage disposal system at Copper Canyon would be used for the majority of the nonpotable water discharge. Small septic tank systems would be installed at the proposed crushing and milling operations in accordance with State of Nevada standards.

A Class III – waivered landfill currently exists immediately northeast of the Ancillary Facilities Area in Section 27 (***Figure 2-2***); this landfill would continue to be used for the Phoenix Project. Refuse from the project area would be contained in dumpsters located at the crushing, milling, office, and beneficiation facilities prior to disposal in the landfill or transport to the town of Battle Mountain landfill. All non-hazardous solid waste would be disposed of in either the on-site landfill or off-site at a licensed Class III landfill. Used tires would be disposed of in a licensed landfill (on- or off-site) or recycled at an off-site facility.

2.4.16.5 Fencing and Site Security

During operations, public access would be restricted within the proposed project area by perimeter fencing, gates, appropriate signage, and natural barriers. Mining areas undergoing reclamation would be fenced, as necessary, to control public access and/or to facilitate revegetation. Postreclamation, a physical barrier and/or livestock exclusion fencing would remain along the open-pit crests. BMG would have personnel or contract security personnel continuously on the site throughout the operating life of the project.

2.4.17 Employment

BMG plans to operate the proposed project on a year-round basis for up to 28 years and to conduct final reclamation activities for up to an additional 5 years. Postreclamation monitoring would continue following reclamation. BMG does not foresee any periods of extended non-operation at this time. If BMG anticipates a period of extended non-operation, a more detailed plan for operations during such a period would be submitted to the BLM and NDEP.

A short-term in-migration of approximately 300 to 350 construction employees is anticipated during the 12- to 18-month construction period. BMG anticipates a total operations work force of approximately 250 to 270 employees during the projected life of the project. This work force would include employees currently employed by BMG (20 employees) and approximately 230 to 250 new employees. It is anticipated that most of the new employees would be from local and surrounding areas.

An estimated annual payroll for the total BMG operation, including benefits, would be approximately $12,700,000. In addition, taxation income to Lander County would be generated from the project from net mine proceeds, real and personal property taxation, and sales taxes.

2.4.18 Growth Media Management

Large portions of the proposed facilities (i.e., pits, waste rock facilities, crusher, haul roads) would be constructed on lands previously disturbed or lands with very shallow and/or sandy saline growth media.

Because of extensive previous disturbance, topographic conditions, and materials composition, growth media would be collected from areas that have adequate volumes (greater than 6 inches) and where topographic conditions promote safe excavation. Areas delineated for possible growth media salvage include the Midas Pit, Reona Pit, tailings facility, leach pad construction area, and portions of the surface-deposited waste rock facilities. Along these areas, growth media would be salvaged, loaded on haul trucks, and either transported to concurrent reclamation projects or stockpiled for future reclamation use.

Stockpiled growth media would be stabilized using either seeding with an interim seed mix, as recommended and approved by the BLM, or chemical stabilization using a biodegradable soil stabilizer, such as lignon sulfonate. Use of any soil stabilizer would only be conducted after appropriate regulatory approval. Seeding would be attempted in the late fall of the year in which the stockpile is completed or in early spring of the next year. Chemical stabilization, if selected, would be conducted once the stockpile is completed and at any time after soil material is extracted from the stockpile for reclamation use. To further minimize wind and water erosion, diversion channels and/or berms would be constructed around the stockpiles as needed to prevent erosion from overland run-off. Best Management Practices, such as silt fences or staked straw bales, also may be used to control sediment transport. Stockpile locations would be indicated with signs identifying the material to prevent possible use of the material for other purposes.

BMG proposes to use oxide, benign, and/or amended waste rock or other suitable material (i.e., capping material). This material would be used with the waste rock facilities and would incorporate an upper 5-foot lift/cover to promote and establish revegetation. With the placement of this cover material along the recontoured configurations of the waste rock facilities, considerable quantities of fine material would be generated. Experience associated with such placement activities at the site has demonstrated that such waste rock placement and fines generation usually provides an adequate seedbed for establishing vegetation.

In areas where growth media are available or in those areas where growth media are recommended for closure purposes, growth media would be applied to a depth of approximately 12 inches. In those areas where growth media are not available and a suitable seedbed substrate is present, capping material would be used as the growth substrate, and seeding activities coupled with nutrient supplement would be conducted along this substrate. Both organic and inorganic amendments would be used to establish adequate nutrient and microbial environments to promote revegetation.

2.4.19 Air Emission Controls

Appropriate modifications to the existing Class II Air Quality Operating Permit (AP 1041-0220) have been made for additional facilities permitted as part of the proposed project. Best Management Practices would be used to control fugitive dust, as identified in the Fugitive Dust Control Plan (BMG 2000b). For example, water trucks would apply water to haul roads and other disturbed areas to control fugitive dust, as necessary. A chemical dust suppressant (such as magnesium chloride) also may be applied to the access and haul roads. Some areas may be seeded with an interim seed mix to reduce fugitive dust emissions from non-vegetated surfaces.

Point source emissions would be managed with pollution control devices, such as baghouses and wet scrubbers, to collect particulate and other air contaminant emissions. Combustion emissions on mobile equipment would be managed by pollution control devices installed by equipment manufacturers. All equipment would be installed, operated, and maintained in good working order to maintain emissions within permit limitations.

2.4.20 Erosion and Sediment Control

BMG would use Best Management Practices to limit erosion and reduce sediment in precipitation run-off from proposed project facilities and disturbed areas during construction, operation, and reclamation. These Best Management Practices may include, but are not limited to, diverting and routing stormwater using accepted engineering practices, such as diversion ditches; and installing erosion control devices, such as sediment traps, silt fences, straw bales, and rock or gravel cover.

In addition, revegetating disturbed areas would reduce the potential for wind and water erosion. Following construction activities, areas such as significant cut and fill embankments and growth media stockpiles would be seeded as soon as it is practical and safe. Concurrent reclamation would be maximized to the extent practicable to accelerate revegetation of disturbed areas. All sediment and erosion control measures would be inspected periodically, and repairs would be performed as needed.

2.4.21 Reclamation

2.4.21.1 Reclamation Schedule

Table 2-7 is a projected schedule for completing closure and reclamation activities. Reclamation of some project components identified in the EIS would be conducted concurrently with ongoing operations to the extent reasonably possible. Concurrent reclamation would include earth work and reseeding Those components that cannot be concurrently reclaimed would be reclaimed following successful demonstration of closure, as required by NDEP and BLM. Final closure of mining and beneficiation components would be completed before reclamation proceeds; thus, the reclamation schedule has been developed to take into consideration anticipated closure characterization and/or neutralization activities that might be proposed or required prior to physically stabilizing the component through surface land reclamation.

Reclamation schedules for the heap leach facility, the event pond, and the tailings facilities include the time required for residual solutions to be evaporated. BMG estimates that adequate drainage and consolidation of the tailings materials will require 24 to 36 months prior to reclamation.

2.4.21.2 Reclamation Goals

Reclamation goals for the proposed Phoenix Project are designed and integrated to provide both short-term and long-term chemical and physical stabilization of the project area. Short-term goals include interim reclamation activities and management practices to maintain soil and vegetative cover, provide for public safety, and promote wildlife and livestock protection within or adjacent to the active reclamation operations.

Long-term goals of reclamation seek the establishment of a postmining environment that is compatible with existing and proposed land uses. Specific postmining land use objectives and reclamation goals include the following:

- Closure activities to inhibit potential environmental degradation, complimented with reclamation cover and revegetation of mining and beneficiation facilities to protect surrounding resources

Table 2-7
Anticipated Reclamation Schedule

Project Component	Completion Year[1]
Pit Backfill Facilities	
Midas Pit Backfill	15
Phoenix Pit Backfill	29
Reona Pit Backfill	20
Iron Canyon Pit Backfill	29
Minnie Pit Backfill	5
Waste Rock Facilities	
Box Canyon	5
Iron Canyon North	3
Iron Canyon South	4
Iron Canyon East	29
Butte Canyon	2
Philadelphia Canyon	13
North Fortitude	29
Natomas	29
Tailings Facilities	
Tailings Area #1	13
Tailings Area #2	13
Tailings Area #3	22
Growth Media Stockpiles	
Section 4 Growth Medium (adjacent to Natomas Waste Rock Facility)	31
Section 4 Growth Medium (within tailings borrow area)	31
Section 28 Growth Medium	31
Section 10 Growth Medium	31
Other	
North Optional Use Area	31
South Optional Use Area	32
Phoenix Mill Area	30
Leach Pad	23
Borrow Area (adjacent tailings, excluding stockpile area)	31
Utility and Haul Road Corridor	31
Utility Corridor	31
Office Area	31
Ancillary Facilities Area	31
Clay Borrow Area	31

[1]Number of years following project initiation.

- Re-establishment of vegetative cover
- Permanent protection of air, surface water, and ground water resources
- Protection of public safety and health
- Design of land configurations compatible with existing watersheds that promote long-term physical stability
- Re-establishment of an aesthetically pleasing environment providing visual quality and recreational opportunities
- Protection of future mineral exploration and development activities in the area

2.4.21.3 Postreclamation Land Use

Mineral exploration, mining, wildlife habitat, and livestock grazing have been the primary uses of the public land in or adjacent to the proposed Phoenix Project area over the past 130 years. The anticipated postmining land uses associated with the Phoenix Project would be similar to the premining land uses. The primary land uses would continue to be livestock forage production and grazing, wildlife habitat, and mineral exploration and development. Unless otherwise directed by federal land managers, BMG would return essentially all public lands to wildlife habitat and livestock grazing with the exception of the unreclaimed pit highwalls. Similarly, the designated postmining land uses for private lands would generally be wildlife habitat; however, the postmining land uses for certain specific private lands may be further mineral exploration and development.

2.4.21.4 Revegetation Guidelines

A revegetation program for recontoured or prepared reclaim sites within the project area would be implemented using a combination of revegetation techniques. These techniques would promote the establishment of revegetated communities, providing plant life diversity and soil cover stability. Seeding of the prepared seed beds would be performed using drill or broadcast seeding techniques coupled with cultural treatments, as necessary, to complement revegetation efforts. Concurrent reclamation efforts would be established to minimize the need for growth media stockpiling and maximize direct growth media salvage and transport to active reclamation areas. Direct growth media transport and application would assist in reducing potential nutrient and microbial loss associated with stockpiling operations.

To complement and support reclamation/ revegetation efforts and to promote reclamation development, a reclamation monitoring program ***including revegetation pilot test plots*** would be developed for the proposed Phoenix Project. This ***program*** would be targeted to examine, review, and determine concurrent reclamation practices, cultural treatments, and techniques to promote successful site reclamation. Annual monitoring evaluations would be conducted to assess reclamation parameters associated with growth media management or supplements, seed bed preparation, seed mixtures and distribution rates, nutrient enhancement, noxious weed introduction, and other cultural treatments. Data and information generated by the periodic evaluations would be used to assess reclamation effectiveness, refine reclamation techniques, and determine the ability of BMG to achieve proposed standards of success.

BMG has developed a noxious weed program designed to control or eradicate perennial noxious weed populations using either physical, biological, or chemical methods. The implementation of the program has been coordinated with the BLM and/or NDEP.

Growth Media Management

Please see Section 2.4.18.

Seed Mixtures

Table 2-8 lists the proposed reclamation seed mixtures and application rates for revegetating land disturbances associated with the proposed project.

These seed mixtures were developed in cooperation with consulting rangeland scientists; NDOW; NDEP, Bureau of Mining Regulation and Reclamation; and the BLM for the Reona Project. The proposed seed mixtures and/or application rates could be subject to modification as a result of ongoing reclamation monitoring and refinement of the BMG reclamation program, or due to the lack of availability of any single species in any given year.

The Phoenix Project covers a range of elevations, from approximately 4,000 feet to 7,000 feet. It is expected that certain species will be varied in the recommended seed mix for site-specific locations based on elevation and aspect. An approximate elevation of 5,500 feet amsl would be used as the threshold between the higher and lower elevation seed mixes. For example, bitterbrush, a recommended species for reclamation, would be used in test plots at the higher elevations of the project area and, if successful, would be used to revegetate large disturbed areas at the higher elevations. Any modifications to the proposed seed mixtures would be made only after consultation with and approval by the appropriate agencies.

The proposed seed mixtures are composed primarily of seed species native to the region, with limited proposed introduced species to provide interim soil stability. The seed mixtures would contain a complement of grasses, forbs, and shrubs to re-establish a diverse plant community within the reclaimed areas. Proposed revegetation species are drought tolerant, promote evapotranspiration, and would provide palatable forage for livestock and wildlife species within the region. The seed mixtures were developed to include plant species that would establish viable communities along reclaimed slopes with a range of soil textures.

The proposed seed mixtures would be applied at an average drill rate application of 17.5 pounds of pure live seed per acre or a broadcast application rate of approximately 26 pounds per acre of reclaimed area. The average annual precipitation at the project site is approximately 8 inches as reflected by on-site precipitation collection and data records maintained over the past 20 years of operations. Application rates would allow adequate revegetation establishment within the annual moisture regime.

Seeding Techniques

Seed distribution along the reclaimed sites would be accomplished using various methods and equipment, depending upon topographic features and soil conditions. A combination of drill seeding methods, chisel plows, broadcast seeding methods, and/or other conventional agricultural seeding techniques would be used.

Drill or plow equipment would be operated so that planting furrows would be parallel to slope contours. Establishing the horizontal furrows would result in micro-catchment areas for moisture and would minimize surface flow velocities associated with precipitation events that could result in erosion and rilling of the reclaimed surface.

The broadcast seeding methods that may be used include tractor equipment fitted with fargo seed boxes, hydroseeding, tractor herd seeding, and/or hand cyclone broadcast seeding. Where broadcast seeding would be used, the seed bed would be prepared by shallow ripping, dozer tracking, raking, or chaining techniques. Final seed bed preparation would be conducted by placing seed bed furrows parallel to slope contours, which would provide micro-catchment areas and assist in controlling run-off.

Table 2-8
Reclamation Seed Mixture and Application Rate

Species	Drill Seed Rate[1] (pounds of pure live seed/acre)
Low Elevation Seed Mix	
Indian ricegrass (*Oryzopsis hymenoides*)	1
Bottlebrush squirreltail (*Elymus elymoides*)	1
Great Basin wildrye (*Leymus cinereus*)	2
Sandberg bluegrass (*Poa sandbergii*)	2
Alfalfa (*Medicago sativa* VAR. *spreador III*)	0.5[2]
Mulesear (*Wyethia amplexicaulis*)	1
Arrowleaf balsamroot (*Balsamorhiza sagittata*)	1
Great Basin lupine (*Lupinus* spp.)	1
Fourwing saltbrush (*Atriplex canescens*)	2
Shadscale saltbrush (*Atriplex confertifolia*)	2
Winterfat (*Ceratoides lanata*)	1
TOTAL	14.5
High Elevation Seed Mix	
Pubescent wheatgrass (*Elytrigia intermedia* ssp. *tricophorum*)	4
Crested wheatgrass (*Agropyron desetorum*)	0.5[2]
Great Basin wildrye (*Leymus cinereus*)	1.5
Palmer penstemon (*Penstemon palmeri*)	0.5
Alfalfa (*Medicago sativa* VAR. *spreador III*)	0.5[2]
Prostrate summer cypress (*Kochia prostrata*)	1
Rubber rabbitbrush (*Chrysothamnus nauseosus*)	1
Douglas rabbitbrush (*Chrysothamnus viscidiflorus*)	1
Bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. s*picata*)	4
Idaho fescue (*Festuca idahoensis*)	1
Big bluegrass (*Poa ampla*)	1
Sandberg bluegrass (*Poa sandbergii*)	1
Beeplant (*Cleome serrulata*)	2
Wyoming big sagebrush (*Artemisia tridentata* ssp. *tridentata*)	0.75
Fourwing saltbrush (*Atriplex canescens*)	0.75
TOTAL	20.5

[1]Broadcast seed application rates will be 1.5 times the drill seed application rates.
[2]Early contemporaneous revegetation would be monitored, and final seed mixtures would be evaluated and modified depending on monitoring results.

Because of the limited quantities of growth media available, BMG proposes to use capping material (see Section 2.4.18, Growth Media Management) as the seedbed substrate along a majority of the surfaces to be reclaimed. Along with using this material, conventional broadcast seeding methods would be used to distribute the seed. Because of the limited precipitation within the project area, BMG proposes to seed when climatic conditions are most favorable for germination, emergence, and seedling survival. To take advantage of the most favorable conditions, seeding is proposed to be conducted primarily during late fall and early winter. Site conditions, combined with topographic features and soil conditions, would determine the optimum seeding time and seeding methods employed. Seeding would take place in accordance with concurrent reclamation objectives and the overall reclamation schedule (***Table 2-7***). Seeding would not be inordinately delayed due to climatic conditions.

Seedbed Amendments

All growth media and substrate would be evaluated for pH, nitrogen, phosphorus, and potassium levels prior to seeding, and reclamation progress would be evaluated to determine if seed bed amendments are necessary. Amendments would be composed of either natural organic materials or inorganic supplements designed to be incorporated with the seedbed substrate to enhance nutrient content and microbial populations. Amendments may include organic and inorganic fertilizers, livestock waste, and/or mulches, as deemed appropriate.

Evaluations of organic material derived from livestock waste or other organic materials from which noxious weed seeds may be introduced to the site would be conducted prior to reclamation use to ensure infestations of weed populations are not introduced to the reclaimed site. The use of amendments would be evaluated with individual growth media or waste material substrates, and an appropriate amendment would be determined for the individual site or material. Fertilizers would be limited to only those substrates that demonstrate considerable nutrient or microbial deficiencies so that annual volunteer weed species are minimized.

Mulch covers generally are used in reclamation efforts to assist in maintaining soil temperatures, to encapsulate soil moisture, to reduce potential wind and water erosion and, in the case of organic mulches, to enhance revegetation potential by introducing limited quantities of organic supplements and nutrients to the final seed bed. However, applying certain mulches may be problematic because of the potential to introduce noxious weed populations and because of moisture wicking effects. For these reasons, BMG would examine site-specific soil conditions prior to applying mulches. Interim applications of mulch or fiber blankets may be used to control areas of potentially high soil erosion until revegetated plant communities are established.

Fencing

Protection from livestock grazing would be provided during initial revegetation. This protection would be incorporated with the project property perimeter fencing at the initiation of mining and beneficiation operations. Use of the property perimeter fencing during active operations and reclamation would not only protect emerging and developing vegetation from livestock, but also would provide for public safety and property security during the operating life of the project. The fencing would consist of a BLM-approved four-strand barbed wire construction along the periphery of the proposed operating site. These fences would be installed prior to or at the time the mining and/or other associated operations are initiated within the delineated site. The fences would remain in place ***for use by the BLM and the private land owner subject to the grazing management plan (see Section 3.3.4)***.

2.4.21.5 Postreclamation Topography

Postreclamation topography for disturbances associated with the proposed Phoenix Project is illustrated in ***Figure 2-5***. Postreclamation topography would be consistent with reclamation goals and proposed postmining land uses. Recontouring would be conducted to enhance postreclamation physical stability, improve drainage patterns to control surface run-on and run-off, and to enhance revegetation.

Heap Leach Facility

Expansion of the existing heap leach facility is proposed to beneficiate additional heap leach grade ores from Phoenix Project mining. The leach pad would be recontoured to ***flatten the north and south slopes to 3 horizontal: 1 vertical, and the east and west slopes to 2.7 horizontal:1 vertical (Golder Associates 2001b)*** to optimize reclamation efforts. The final reclaimed slope would appear as a low hill approximately 240 feet high. In addition, the top of the recontoured leach pad would be sloped to promote run-off without erosion.

Waste Rock Facilities

Because proposed surface-deposited waste rock facilities would be constructed over previous disturbances (principally existing inactive waste rock and copper leach facilities), final postmining topography would be determined on a site-by-site basis and would vary from 2 horizontal:1 vertical to 3 horizontal:1 vertical, depending upon the final waste rock configuration. Proposed waste rock facilities and the associated acreage of slopes steeper than 2.5 horizontal:1 vertical would include the Butte Canyon (14.4 acres), Iron Canyon North (28.4 acres), Iron Canyon Pit Backfill (23 acres), and Philadelphia Canyon (55.2 acres) facilities (***Figure 2-5***). The total acreage of these four facilities with slopes greater than 2.5 horizontal:1 vertical (121.0 acres) represents approximately 6 percent of the total proposed waste rock facility disturbance and approximately 2 percent of the total proposed Phoenix Project disturbance. Reclamation designs for lift heights and final slope configurations also would be influenced by local natural topography, sensitive resources (e.g., waters of the U.S.), existing facilities, and concurrent reclamation activities. During facility reclamation, 10- to 15-foot-wide benches would be constructed, as necessary, to control run-off.

Open Pits

A large portion of the waste rock generated by the Phoenix Project would be used to backfill the Phoenix, Midas, Iron Canyon, Reona, and Minnie pits. Reclamation recontouring would eliminate sharp topographic breaks between the backfilled area and adjacent disturbed and undisturbed topographic features. Final postreclamation topography would be designed to prevent the collection of precipitation or run-off in the backfilled pits.

The backfilled pits would be left in their final mining configuration above the final backfilled elevation. Although each pit is designed to be stable during proposed mining operations, some postmining pit wall erosion can be expected. Erosion would modify the appearance of the highwall and the margins of the pit backfill, which should enhance the postmining topographic appearance of these facilities.

Tailings Facilities

After dewatering, the proposed tailings facilities would be recountoured as necessary to facilitate drainage. The tailings surfaces would be recountoured to enhance surface runoff and minimize infiltration through maintenance of a minimum 0.5 percent surface grade. Surface runoff would be collected and routed through engineered spillways in the tailings embankments to sediment basins. Nominal 2-foot caps would be constructed to promote revegetation and evapotranspiration of precipitation. The revegetated caps would minimize infiltration of meteoric water into the facilities. The tailings embankments would have a final slope of approximately 2.5 horizontal: 1 vertical.

Structures and Roads

All crushing, milling, beneficiation, and ancillary structures would be dismantled. These sites, along with roadways, would be recontoured to blend with the surrounding topography to the extent practicable. Haulage and access roadways would be recontoured to re-establish natural drainage patterns. Roadway berms and loose, unconsolidated material below roadway cuts would be reconfigured to blend the roadway surface with adjacent topography.

2.4.21.6 Waste Rock Facility and Stockpile Reclamation

Waste Rock Facilities

Concurrent reclamation of waste rock facilities would be conducted where site conditions and mine plans allow, and would be implemented after each lift is completed. Capping material would be placed as a nominal 5-foot cap over the final contoured surface areas. This cap would be constructed to promote revegetation and evapotranspiration of precipitation. The revegetated cap would, therefore, minimize infiltration of meteoric water into the facility, resulting in reduced moisture conditions within the facility. Concurrent reclamation practices along waste rock facility slope faces that do not present topographic constraints would provide a reclaimed slope angle of approximately 2.5 horizontal: 1 vertical. Topographical breaks and run-off diversions would be provided by installing 10- to 15-foot-wide constructed benches every 200 feet of vertical height. Constructed benches would be completed with approximately 1 percent gradients to allow precipitation to be shed or transported toward common drainages constructed along the peripheries of the facilities. Benches would be sloped toward the waste rock facility face to control precipitation run-off, reduce precipitation flow velocities, and diminish the potential for soil erosion along slope faces of the facility.

Backfilling operations associated with the Midas, Phoenix, Reona, Iron Canyon, and Minnie pits would be completed to enhance topographic diversity of the site and minimize surface water collection basins.

Backfill would be placed in the open pits to an elevation above the projected postmining ground water level in the vicinity of the pit. Submerging waste rock in pit backfill facilities below the postmining water table is intended to eliminate contact with atmospheric oxygen and limit the potential for producing acidic solutions. A revegetated cap would be constructed over the backfilled pits to maximize the moisture storage capacity and evapotranspiration components of the cap water balance. This is intended to reduce the flux of meteoric water into reclaimed facilities.

The buffer zone between the revegetated cap and the submerged waste rock in the Phoenix Pit would preclude ground water from reaching the cap, since the thickness of this zone would accommodate potential postmining fluctuations in ground water elevations resulting from variable climatic conditions. The Phoenix Pit also would include run-off control structures around the interface between the reclaimed cap and the highwall.

For those pits that would be completely backfilled, waste rock would be deposited above the top of virtually all of the pit highwalls and would be recontoured to a final reclamation topography of approximately 2.5 horizontal:1 vertical. At the backfilled pits, only isolated pit highwalls would remain. Capping material would be placed as a nominal 5-foot cap over the final contoured surface area. This cap would be constructed to promote revegetation and evapo-transpiration of precipitation. The revegetated cap would, therefore, minimize infiltration of meteoric water into the facilities, resulting in reduced moisture conditions within the facilities. The backfilled pits (Reona and Midas pits) also would have a sufficient thickness of waste rock between the revegetated cap and the steady-state ground water elevation to prevent ground water from reaching the cap.

Recontoured waste rock facilities would be seeded with the proposed seed mix presented in ***Table 2-8*** using the techniques identified in Section 2.4.21.4.

Ore Stockpiles

The proposed run-of-mine ore stockpile adjacent to the crusher dump pocket would be exhausted upon completion of the project. Once this ore feed stockpile is eliminated, the area would be ripped or scarified to eliminate surface compaction and recontoured to blend with the adjacent topography. The recontoured surface would be seeded with the proposed seed mix presented in ***Table 2-8*** using the techniques identified in Section 2.4.21.4.

Should any stockpiled ore remain in the live run-of-mine or mill feed stockpiles at the completion of operations, it would be loaded, transported, and placed at the heap leach pad for incorporation with reclamation activities at that facility. Any remaining ore in the existing ore stockpiles would be further characterized, recontoured, and reclaimed in place.

2.4.21.7 Tailings Facilities Reclamation

The operational configuration of the combined Tailings Areas #1 and #2 would consist of unsaturated tailings beaches sloping at an average grade of approximately 0.75 percent down to the edge of the tailings decant pond. The tailings surface under the pond would be relatively flat (approximately 0.25 percent grade). The reclaimed tailings facility would maintain the tailings beaches in their original configuration to take advantage of the existing drainage pattern toward the area of the decant pond while minimizing unnecessary regrading activities. After drying out the tailings decant pond, the pond area would be backfilled with waste rock until a grade of 0.5 percent is achieved sloping back toward the tailings beaches. Storm water collection ditches located at the approximate perimeter of the backfilled decant pond area would collect storm water runoff from both the tailings beaches and the backfilled decant pond area and route it off of the tailings facility through engineering spillways in the tailings embankments.

The backfilled decant pond area would be located in the southeast corner of Tailings Area #1. The curved storm water collection channels inside the tailings facility would be located at the historic shoreline of the decant pond. Following reclamation (***Figure 2-5***), storm water would flow from northwest to southeast off the naturally draining tailings beach areas and from southeast to northwest off of the backfilled decant pond area. The curved storm water collection channels would then direct storm water off of the tailings facility through engineering spillways in the south and east tailings embankments.

Reclamation of Tailings Area #3 would have a similar construction with flow being collected internal to the facility and then being directed off of the facility through collection channels exiting the facility through engineered spillways in the east and west tailings embankments.

Once tailings facilities have been reshaped into the desired configurations, a minimum of 2-foot thickness of capping material would be placed to promote revegetation and evapotranspiration of precipitation and to minimize infiltration of meteoric water. The capping material would be evaluated for nutrient and biological constituents to determine if amendments are necessary to promote successful revegetation. The reshaped and capped tailings facilities would then be revegetated.

A number of options are available for managing fluid that may continue to drain from the tailings facilities after reclamation is conducted. Fluid may be evaporated using forced evaporation equipment (i.e., snowmaking equipment) located on a portion of the tailings area that would not be reclaimed until after fluid management activities are complete. Given acceptable water quality and/or adequate attenuation capabilities of nearby alluvial materials, fluid may be land applied or infiltrated using infiltration basins or buried networks of perforated piping. Fluid also could be evaporated in lined ponds similar to the existing Copper Canyon Evaporation Pond. Other management options include active (i.e., chemical) and passive (i.e., biological) water treatment technologies.

The facilities would be seeded with the proposed seed mix in ***Table 2-8*** using the techniques identified in Section 2.4.21.4.

The tailings pipeline and utility corridor also would be closed and reclaimed. Reclamation would include neutralizing the pipeline either with fresh water, calcium hypochlorite, hydrogen peroxide, or other suitable chemical oxidation rinse procedures. Neutralization would be determined by analyzing the final rinsate from the pipeline. Upon successful neutralization of the pipeline, the pipeline and other facilities (i.e., tailings boost station, power distribution lines) would be disassembled or demolished, and the materials would be disposed of in accordance with federal, state, and local regulations. The corridor would be recontoured using either track-mounted dozers or backhoes to blend the area with the adjacent topography. The disturbance would be revegetated using the seed mix presented in ***Table 2-8*** and the techniques identified in Section 2.4.21.4.

2.4.21.8 Heap Leach Facility Reclamation

At present, heap stabilization consists of rinsing the leached ore with neutralized leach solution or fresh water. Other stabilization methods are being evaluated and may be used at the time BMG closes the heap leach facility. BMG would develop and submit to NDEP and the BLM a final closure plan for the heap leach facility at least 2 years prior to closure as required by the NDEP Water Pollution Control Permit and regulations.

Following the conclusion of metal recovery, the heap leach pad would be closed, pending solids and draindown characterization. Leach pad closure would take place concurrently with and following the termination of metal recovery operations. As the metal recovery grades diminish toward the end of the operation, the addition of sodium cyanide to the circuit would be curtailed. Solutions with reduced cyanide concentrations would continue to be circulated through the system to recover residual precious metal values and other weak acid dissociable (WAD) cyanide metal complexes using the carbon adsorption plant. This final phase of operation would assist in the recovery of residual precious metal values as well as initiate removal of other WAD-cyanide metal complexes from the circuit.

Closure procedures may consist of 1) flushes ***with barren solution*** and subsequent circulation to reduce cyanide concentration until the effluent concentration is less than 0.2 mg/L WAD cyanide; and/or 2) the use of chemical or biological attenuation to reduce cyanide concentrations. Laboratory testing and actual flushing of existing leach pad facilities at other operations has demonstrated it requires approximately one ton (240 gallons) of ***recycled barren solution*** per ton of ore to adequately rinse leach pad ore. Leach pad closure practices are designed to meet relevant BLM and NDEP requirements.

Closure of the spent heap materials would be considered successful when the pad effluent exhibits the following qualities: pH between 6 and 9, WAD cyanide concentrations below 0.2 mg/L, and the concentration levels for other constituents do not have the potential to degrade waters of the State. Once BMG, BLM, and NDEP agree the heap has been successfully stabilized or materials characterization demonstrates no potential to impair waters of the State, final closure and reclamation of the leach pad and associated facilities would begin.

Recontouring of the stabilized heap would commence when the spent ore has sufficiently dried to allow equipment access. The drying period is expected to be several months. The leach pad would then be regraded to final slope configurations of approximately 3 horizontal: 1 vertical, the top surface would be regraded to promote runoff, 6 inches of cover material would be placed, and the entire heap revegetated. Management of fluid that might continue to drain from the reclaimed heap would be accomplished using the methodologies described in Section 2.4.21.7 for management of fluids draining from tailings facilities. Upon submittal of a final permanent closure plan prior to facility decommissioning, BMG may propose other closure methods.

The heap would be seeded with the proposed seed mix presented in ***Table 2-8*** using the techniques identified in Section 2.4.21.4.

2.4.21.9 Event Pond and Ditch Reclamation

Once the appropriate regulatory agencies agree that the heap leach pad has been successfully neutralized, excess fluids would be evaporated using the event pond. Any solid or semi-solid materials remaining in the pond after the remaining fluids have evaporated would be sampled and characterized. Based on the analytical results, the remaining solid or semi-solid material would be bound in concrete and either buried in place with the pond liner or disposed of according to applicable federal, state, and local regulations.

If on-site disposal is used, the synthetic liners would be sufficiently perforated to allow free-flow of any collected fluids. The liner surface would be folded into the interior of the pond, and the pond would be backfilled and contoured to prevent surface water ponding. The pond area would be scarified and seeded with the seed mixture presented in ***Table 2-8*** using the techniques identified in Section 2.4.21.4.

Solution collection ditches associated with the heap leach recovery circuit would be reclaimed in a similar fashion. If necessary, contaminated liners would be removed and disposed of according to federal, state, and local regulations, and the ditch areas would be recontoured to blend with the surrounding topography. If on-site disposal is used, the synthetic liner would be perforated and left in place, and ditches would be covered and regraded to establish free drainage. The reclamation procedures for the solution ponds and ditches are consistent with the requirements of Nevada Administrative Code 445.242 through 445.24388.

2.4.21.10 Reclamation Constraints Caused by Moisture Content

Reclamation schedules for the Phoenix Project heap leach facility, the event pond, and the tailings facility have been developed taking into consideration time constraints associated with moisture content. The time required to reclaim the event pond would depend upon the rate at which residual solution balances can be evaporated and on the future demands for use of the pond in conjunction with pumpback operations associated with the current tailings facility. BMG estimates that approximately 12 to 18 months would be needed to drain the solution pond to the point at which backfilling can commence once heap neutralization and pumpback operations have been deemed successful. This time constraint has been built into the reclamation schedule (***Table 2-7***). Solution pond moisture content should not adversely affect reclamation activities.

Based on operating experiences associated with heap leach facilities throughout the mining industry, BMG estimates that regrading of the pad facility could begin within 3 to 6 months following successful neutralization of the facility. This time constraint has been taken into account in developing the reclamation schedule. Heap moisture content should not adversely affect reclamation activities.

The reclamation schedule for the tailings facility also has been developed considering time constraints that may arise from moisture content. The area would not be closed until the surface is consolidated sufficiently to support track-mounted and wheel-mounted equipment. BMG estimates that adequate drainage and consolidation of the tailings material would require approximately 24 to 36 months. Tailings moisture should not adversely affect reclamation activities.

2.4.21.11 Roadway Reclamation

The Philadelphia Canyon, Copper Canyon, and Buffalo Valley county roads and the Copper Canyon and Willow Creek roads would remain following reclamation. All other roads would be ripped and reclaimed to the approximate adjacent slope contours following cessation of mining and closure activities. All berms and ditches would be eliminated unless required to maintain site drainage. Roadway surfaces not requiring recontouring would be ripped 3 to 5 feet to loosen the compacted surface. Recontouring would be accomplished using track-mounted dozers or track-mounted hydraulic backhoes. Revegetation would be consistent with Section 2.4.21.4.

Drainages that were altered by the construction of the roadway network would be reconstructed to facilitate drainage. This would reduce erosion potential resulting from precipitation run-off. Any culverts would be removed unless the BLM and/or NDEP requests they be left in place.

Upon completion of all reclamation activities, BMG would ensure that public access has been restored to BLM-administered public lands. Access restoration would be coordinated with the BLM and would coincide with wildlife protection activities, as necessary.

2.4.21.12 Reclamation Drainage Plan and Sediment Control

BMG would provide the State of Nevada with an amendment to its existing Stormwater Pollution Prevention Plan and Monitoring Plan under the general discharge permit for stormwater discharge associated with mining disturbances (existing Permit No. GNV0022225 or its successor). In accordance with the proposed general permit, BMG would prepare, submit, and implement Best Management Practices designed to control or monitor stormwater discharges. The purpose of the Stormwater Pollution Prevention Plan is to identify potential stormwater pollution sources and, when practicable, to identify control measures to reduce their impact. The Stormwater Pollution Prevention Plan includes a site map delineating stormwater controls, drainage areas and associated discharge points, ground cover, buildings and other structures, and a description of planned facility Best Management Practices for stormwater pollution control. The Stormwater Pollution Prevention Plan addresses drainage and sediment control for the proposed Phoenix Project facilities/disturbances and the existing project facilities. Sediment control would be completed on a component-by-component basis, as it relates to reclamation design.

2.4.21.13 Reclamation of Beneficiation Areas and Ancillary Facilities, and Disposition of Equipment

Closure of all beneficiation and ancillary facilities would be conducted in compliance with applicable federal, state, and local regulations. Non-hazardous materials, such as scrap lumber, construction materials, and metal, would be disposed of in a permitted Class III landfill, a Class III waivered landfill, or disposed of off the site at an approved and permitted facility for such products. Reagents, chemicals, petroleum products, solvents, and other potentially hazardous materials would be returned to vendors, transferred to other BMG operations for use, or disposed of according to federal, state, and local regulations.

All non-beneficiation equipment, including transformers and generators, would be salvaged and used at other BMG properties, sold, or disposed of according to federal, state, and local regulations. Structural building materials also would be salvaged and reused at other BMG properties or disposed of according to federal, state, and local regulations. Following closure, beneficiation and ancillary facility areas would be recontoured to blend with existing topography. Recontoured areas would be seeded as described in Section 2.4.21.4.

Aboveground fuel tanks would be closed according to federal, state, and local regulations.

Underground septic tanks also would be dismantled and disposed of in accordance with the applicable regulations.

Beneficiation equipment containing cyanide solutions during operations (including the solution tanks, pumps, piping, carbon adsorption facilities, and refinery facilities) would be neutralized and either salvaged or disposed of in accordance with federal, state, and local regulations. Neutralization may include rinsing with fresh water, ferrous sulfate, calcium hypochlorite, hydrogen peroxide solutions, or other chemical oxidation techniques. All rinsate would be evaporated within the respective circuit.

2.4.21.14 Disposition of Concrete Foundations

Concrete foundations and pads would be broken up and covered with at least 5 feet of fill material. These areas would be contoured to blend with the adjacent topography. Recontouring would be designed to facilitate free drainage from the reclaimed sites. Each of the areas would be revegetated as described in Section 2.4.21.4. This form of reclamation is consistent with NDEP regulations for disposing of cement foundations at mine sites (Nevada Administrative Code 519A.345.8a)

2.4.21.15 Open-pit Reclamation

Figure 2-5 illustrates the final configurations for the proposed open pits associated with the Phoenix Project. In order to maintain public safety and minimize public access, the Midas and Phoenix pits would be bermed and posted with warning signs. Pit perimeter berms would be placed at a minimum distance of 50 feet from any pit perimeter, and would range from 50 to 200 feet from the perimeter depending upon topographic constraints associated with the pit and adjacent topography. Proposed security measures are intended to maintain long-term public safety at the closed pit facilities.

A large portion of waste material generated from the open pits would be used to completely or partially backfill the current or proposed open-pit mine disturbances of the Phoenix, Midas, Reona, Iron Canyon, and Minnie pits, as well as to cover the Philadelphia Canyon copper leach piles and the Natomas dredge and tailings facility.

2.4.21.16 Monitoring of the Reclaimed Site

Monitoring of unsaturated zones within the waste rock facilities would be conducted in accordance with the Waste Rock Management Plan (Brown and Caldwell 2000d) and the Contingent Long-Term Groundwater Management Plan (Brown and Caldwell 2000c). Continued monitoring of the proposed and existing ground water monitoring wells presented within the Water Resources Monitoring Plan ***(Brown and Caldwell 2000e)*** and the Phoenix Water Pollution Control Permit ***application*** would continue until closure and reclamation are completed.

A site-specific revegetation success program would be established and conducted in coordination with NDEP and the BLM with respect to the terms of a joint-agency reclamation permit that would be issued for the project pursuant to agency approvals. Documentation of Reclamation Activities for Surety Release (Attachment A of the permit application) and the Nevada Guidelines for Successful Revegetation (finalized on September 30, 1998, as Attachment B of the permit application) would be compiled as part of this permit application and its resulting monitoring program. These commitments are incorporated into the Plan of Operations for the proposed project.

Revegetation monitoring would be conducted on an annual basis to assess growth media management, seed bed preparation, seed mixtures and distribution rates, nutrient enhancement, noxious weed introduction, and other cultural treatments. Data generated by the periodic evaluations would be used to assess reclamation effectiveness, refine reclamation techniques, and determine the ability of BMG to achieve proposed reclamation objectives.

BMG would establish Reclaimed Desired Plant Communities (RDPCs) based on the designated post-mining land use. Several RDPCs would be selected depending upon the reclamation goals and variable site characteristics of the reclaimed disturbances. Major alterations to the reclaimed mine site and soils, and their effect on the site potential for revegetation, would be considered in selection the RDPCs. Selection of the RDPCs would be coordinated with NDEP and BLM during the first growing season following initiation of the Phoenix Project. Revegetation for purposes of bond release would be considered complete once revegetation has been established to one of the following levels as determined by the BLM and NDEP: perennial vegetative cover is as close as possible to 100 percent of selected comparison areas or perennial vegetative cover is as close as possible to 100 percent of the ecological or range site description cover. Evaluation of the various revegetated areas would be conducted during active growing seasons, and revegetation success may first be evaluated during the third full growing season after revegetation was conducted.

BMG, in coordination with the BLM or NDEP, as appropriate, has established a noxious weed control program. The program is designed to control or eradicate weed populations using either physical, biological, or chemical methods.

Potential impacts to waters of the state from backfilled pits, the heap leach pad, the tailings disposal areas, and waste rock facilities would be monitored pursuant to the Water Pollution Control Permit to be issued by NDEP. Sample points and a monitoring schedule would be coordinated between BMG, the BLM, and NDEP. BMG's proposed ground water monitoring program is described in the Water Resources Monitoring Plan (Brown and Caldwell 2000e), Waste Rock Management Plan (Brown and Caldwell 2000d), and Contingent Long-Term Groundwater Management Plan (Brown and Caldwell 2000c). Analytical parameters and procedures would be consistent with those contained in the final approval of the water pollution control permit for the Phoenix Project.

2.4.21.17 Effect of Reclamation on Future Mineral Activities

Given the long history of mining in the project area, it is reasonable to assume that mineral exploration and development may occur in the future.

Backfilling the open pits, as proposed by BMG, would limit the potential for further open-pit mining of these pits. Otherwise, reclamation, as proposed for the Phoenix Project, would not affect future exploration or mining activities. To ensure that surface mineable economic ore reserves are not located beneath proposed beneficiation facilities, BMG has conducted exploration and condemnation drilling of the proposed site locations. Reclamation of beneficiation and ancillary facilities would not preclude future mineral exploration and development activities.

2.4.21.18 Exploration Reclamation and Drill Hole Plugging

Exploration roadways and drill pads constructed during the life of the project would be reclaimed in a similar fashion to the roadway reclamation discussed in Section 2.4.21.11, and final contoured areas would be seeded with the proposed seed mixture.

As a normal part of operations, all condemnation and geotechnical drill holes would be plugged upon completion of drilling and before construction of any facility. These holes would be plugged according to standards set forth in Nevada Revised Statutes 534.421 through 534.428.

Process and nonpotable water would be provided by the general mine site wells. Upon final site reclamation, these wells, monitoring wells, and boreholes would be plugged according to standards set forth in Nevada Revised Statutes 534.421 through 534.428.

2.4.21.19 Interim Reclamation

Interim reclamation practices would be conducted upon completion of growth media stockpile construction to stabilize the stockpiled material and prevent potential soil loss caused by wind and water erosion. In the event that continuous, full-scale production is interrupted because of economic considerations or unforeseen circumstances, the following interim reclamation activities may be initiated:

- Power lines would be inspected regularly and maintained as necessary.
- Access roads would be maintained as necessary.
- Open-pits may be bermed to restrict access to bench face areas.
- All erosion control measures would be regularly inspected and maintained in accordance with Best Management Practices.
- All buildings, equipment, and support facilities would be protected from public access and maintained as necessary.

2.4.21.20 Financial Assurance

Consistent with BLM's revised 3809 Surface Mining Regulations (effective January 2001), BMG has prepared a detailed cost estimate for reclamation and fluid management as described in the Proposed Action. The cost estimate reflects the potential contractor costs for each of the components, as well as supervisory and administration costs for the BLM and its engineering contractor. The reclamation cost estimate for the first 3-year phase of operations is approximately $32,073,000. Subsequent 3-year phases would allow credit for successful reclamation concurrent with operations. The maximum forecasted reclamation cost estimate for any phase is approximately $55,800,000 during years 21-23 of operation. The initial bond would be posted by BMG at project startup in a form acceptable to the BLM and NDEP and would be held by the BLM. This bond amount would be adjusted, as necessary, every 3 years to reflect disturbance proposed in the upcoming 3-year phase or if there is an amendment to the plan.

2.4.22 Contingent Long-term Ground Water Management

BMG has developed a contingent long-term management plan to address potential ground water impacts associated with the proposed Phoenix Project waste rock facilities. This plan would involve the early detection and capture of affected ground water, if necessary, within the project area. BMG would conduct unsaturated flow monitoring of the cap, toe, and foundation materials in the waste rock facilities to provide early detection of potential ground water contamination. Contaminated ground water would be ***mitigated*** to meet Nevada drinking water standards. ***Any*** treated water would be injected into the alluvial aquifer; the dewatered sludge would be disposed of on-site in a permitted sludge disposal facility. This management plan is described in the Phoenix Project Contingent Long-term Groundwater Management Plan (Brown and Caldwell 2000c).

At project startup, BMG would be required to establish a long-term trust fund and provide an interim surety to cover potential costs to implement the Contingent Long-term Groundwater Management Plan. Initially, the long-term contingency fund would consist of a $1,000,000 interim surety (e.g., performance bond) for up to 20 years following startup of Phoenix Project operations. The purpose of this interim surety is to ensure that there are sufficient monies to fully fund the self-sustaining trust fund. The initial interim surety amount is based upon a conservative preliminary engineering cost estimate including future average annual costs of $64,000 per year for monitoring, and average annual costs of $483,000 for mitigation. At 10 years after project startup, the value of the interim surety, if still in effect, would be adjusted based on an updated engineering cost estimate to ensure the value is sufficient to fully fund the trust fund.

Within 20 years following project startup, the interim surety would be replaced with cash deposited into the trust fund. The dollar amount to be deposited would be based upon refined engineering cost estimates that reflect actual operational experience at the site, including results of concurrent reclamation and additional monitoring data. All investment gains from the trust would be reinvested in the trust and available for trust purposes. BLM, in coordination with the State and BMG, would control the disbursement of funds. This trust fund would remain in place until BLM determines there is no longer a need to require a long-term contingency fund.

2.4.23 Environmental Protection of Wildlife

Protective measures associated with avian wildlife and potentially deleterious supernatant pond solutions would be managed in compliance with the NDOW Industrial Artificial Pond Permits issued for the Phoenix Project. In addition, BMG would periodically sample, analyze, and report analytical results associated with decant tailings solution, tailings solids, and supernatant pond fluids to the NDEP Bureau of Mining Regulation in accordance with the Phoenix Project Water Pollution Control Permit provisions. This periodic sampling and analysis in conjunction with daily operational analysis associated with tailings supernatant pond make-up water addition to the Phoenix Project milling process, and the operational analysis of tailings discharge water quality would provide a frequent examination and identification of possible deleterious supernatant pond water quality. In the event such conditions were experienced, protective avian wildlife measures would include possible water quality treatment of the supernatant pond fluids to adequately adjust pH values using chemical alkalinity additions such as hydrated lime, milk of lime, or sodium hydroxide. The addition of these chemical constituents would adjust the pH value and would result in the precipitation of trace metal hydroxides abating potential wildlife effects associated with both low pH and trace metal concentrations (Battle Mountain Gold Company 2000c).

Protective measures at the proposed heap leach facility would involve proactive solution management to preclude the presence of ponded or open surface solution sources posing a potential wildlife risk. BMG would replace existing solution spray applications with surface and buried drip irrigation application installations to control potential solution ponding. In addition, BMG would continue using the existing NDOW-approved heap leach pad inspection and maintenance program. This program includes daily leach pad inspections and frequent leach pad surface scarification activities to promote rapid solution infiltration and minimize solution ponding (Battle Mountain Gold Company 2000c).

2.5 Other Project Alternatives

The No Action alternative has been described in Section 2.3. It comprises the facilities and activities currently permitted for construction, operation, and closure and reclamation in Copper Canyon. It is evaluated in detail in this EIS.

The issues and concerns identified during the scoping process focused primarily on potential water quantity and water quality impacts and reclamation scenarios associated with the Proposed Action, including the proposed closure and reclamation plan. Therefore, the BLM focused on these issues in considering alternatives to be evaluated in the EIS. However, other issues also have been considered in identifying alternatives and mitigation measures.

2.5.1 Alternatives Considered in Detail

Mine operations are composed of a number of operational components, and there can be alternative means of accommodating these components in most settings. These alternative means are limited, however, by the location of the mineral deposit, land and mineral ownership, and existing physical constraints – both natural and man-made. For the Phoenix Project, varying the location of operational components is constrained by the existence of facilities developed over the more than 100 years of mining activity in the area and the topographical features of the area. Although alternative locations for various operational components could be selected, the alternative locations would still be within the footprint of disturbance for the Proposed Action. The net effect would not be a project with different potential environmental effects, but with similar environmental ***effects*** from the same operational components configured in a different way.

In addition, while several operational alternatives were identified after the initial Plan of Operations was submitted in August 1994, the existing plan has evolved to include many of the reasonable alternatives, all or in part, in order to strengthen the plan and enhance the environmental outcome of the project.

As a result, no alternatives to the Proposed Action other than the No Action alternative are considered in detail. Other alternatives were considered, but they were eliminated from detailed consideration for the reasons described in the following section.

2.5.2 Alternatives Considered but Eliminated from Detailed Analysis

As described in Section 2.4, BMG initially submitted a Plan of Operations for the Phoenix Project in 1994. The Plan of Operations submitted in 1994 did not include backfilling of open pits. Analysis of the 1994 Plan of Operations projected that approval of the plan would have resulted in pit lakes in the Phoenix, Fortitude, and Midas pits. After initial environmental analysis of this proposed plan, including NEPA scoping, BMG decided to review the proposal. Subsequently, BMG updated the Plan of Operations in January 1999, and in that updated Plan of Operations BMG proposed to backfill all pits above the ground water level to eliminate pit lakes and to incorporate proposed new areas of disturbance and revised mining and processing operations, including water and waste rock management plans. The Plan of Operations has been updated periodically since that time in response to BLM and NDEP comments. Alternatives considered but eliminated from detailed analysis include those that have been considered by the BLM in the NEPA process since the Plan of Operations was originally submitted in 1994.

The 1997 Plan of Operations and the related alternatives were previously evaluated for their potential hydrologic and geochemical impacts; the results of these preliminary evaluations, together with the results of the 1997-1998 exploration and development program, contributed to the development of the current Plan of Operations and the elimination of certain alternatives.

As described in the Introduction in Chapter 1.0 of the EIS, BMG's Proposed Action is designed to integrate mining and beneficiation of new ore deposits with closure and reclamation of previously disturbed areas. Ancillary facilities were sited to provide environmental benefits as well as engineering feasibility. Due to the checkerboard land ownership configuration of private and public lands, it is not feasible, nor economically desirable, to locate all of the facilities on private land.

This section of the EIS describes the alternatives previously considered but subsequently eliminated from detailed analysis and the rationale for their elimination.

2.5.2.1 Pit Lake/Backfill Alternatives

As discussed previously, the original project alternatives focused on the water quality of the open pits and waste rock facilities. Most wall rock in the proposed pits is predicted to be potentially acid generating. The oxidation of iron-sulfide minerals in the pit walls is predicted to initially produce approximately 2 kilograms per square meter per year of soluble sulfate and associated acidity. Virtually all water entering project pit lakes is predicted to be poorly buffered precipitation run-off that would leach acidic solutes into the pits. Eventually, project pit lakes are predicted to become acidic (e.g., pH of approximately 3.5), with concentrations of acidity, dissolved metals, and total dissolved solids generally increasing with time from the evaporative concentration of the solutes leached by run-off.

In response to these potential impacts, the BLM and BMG identified several alternative pit lake and backfill configurations to address acid rock drainage issues. Descriptions of these initial alternatives and the rationale for their elimination from detailed consideration are discussed below.

Drainage Conduit Alternative

Under this alternative, as in the Proposed Action (***Figure 2-5***), the Phoenix Pit would encompass the existing Fortitude Pit, and both would require dewatering during mining. The Reona and Midas pits also would require dewatering. During mining, water collected within the pits would be pumped via sump collections and portable pumping equipment; this water would be used as make-up water in the mill and heap leach operations and used as a roadway dust suppressant.

Surface and ground water that might be encountered initially within the Fortitude Pit and ultimately within the Phoenix Pit would be collected and conveyed by a drainage system constructed within the pit. The entrance to the conduit from the pit would be located in the southwest portion of the Fortitude/Phoenix Pit at the existing C adit; from there, the drainage conduit would be constructed to a downgradient portal opening northeast of the Reona Pit in Copper Canyon (***Figure 2-5***). Water collected within the underground drainage system would be conveyed in a surface channel system in Copper Canyon to a 60-acre infiltration basin in the alluvial ground water system near the Canyon Placer Pit (***Figure 2-3***). The drainage system would remain in place and would continue to drain the Phoenix Pit following the end of mining.

The Reona Pit also was considered as a place to accommodate discharge of water from the C drainage conduit, this option would have eliminated the need for the infiltration basin south of Copper Canyon.

The principal reasons these alternatives were eliminated from further consideration are the potential hydrologic and water quality impacts to ground and surface waters. In addition, the current mine plan for developing the Phoenix Pit would extend mining below the elevation of the drainage conduit.

The hydrologic and geochemical analyses of these alternatives identified the potential for poor water quality in the Reona and Midas pit lakes following the completion of mining and pit dewatering. In addition, the potential for periodic degradation of the drainage from the adit caused by precipitation events was identified.

The adit would drain the Phoenix and Fortitude pits and would be expected to flood with ground water rapidly after the cessation of mining. Upon inundation, soluble acid and metals could be released by sulfide mineral oxidation in the adit walls and would be expected to flush rapidly (e.g., within a few weeks) from the wall rock and into the adit outflow. After the adit floods, oxidation would cease, and discharge water quality would be expected to approach that of the upgradient ground water—a moderately buffered, neutral-pH water. However, during storm events, solutes could be released by the oxidation of sulfide minerals in the Phoenix Pit wall rock and enter the adit, periodically producing effluent with a low pH (e.g., approximately 3.5) and elevated concentrations of metals and sulfate relative to background ground water quality. Discharge of this storm flow from the adit to an alluvial infiltration basin is predicted to have the potential to periodically degrade alluvial ground water.

The adit would not drain the Reona and Midas pits, and pit lakes would form in time. As described previously, most wall rock in these pits is predicted to be potentially acid generating (see Section 2.5.2.1).

In addition, the hydrologic analysis of the Drainage Conduit alternative indicates that the drainage conduit and the reduced recharge through two waste rock facilities would lead to significantly lower ground water elevations in some areas. In the Phoenix Pit area, ground water elevations are predicted to be lowered by more than 100 feet. Ground water elevations are predicted to be lowered more than 200 feet beneath the two waste rock facilities. The ground water model predicted that ground water could decline by 10 feet or more several miles east and north of the mine because of changes in recharge on the mine site. If conditions develop as predicted by the model, several fresh water springs in Iron and Butte canyons could potentially dry up or have reduced discharge.

No Pit Backfill Alternative

Under this alternative to the Proposed Action, no pits would be backfilled with waste rock, and pit lakes would form in the Phoenix, Reona, and Midas pits following the end of mining and dewatering operations when the ground water table rebounds to a steady-state condition. The waste rock generated by the proposed project would be stored in waste rock facilities throughout the project area. These facilities would likely include new disturbance as well as placement on existing waste rock and copper leach piles.

This alternative was eliminated from further consideration because of the poor water quality predicted for the Phoenix, Reona, and Midas pit lakes following the end of mining and pit dewatering; the potential for adverse effects on ground water quality; the greater surface disturbance associated with larger surface waste rock disposal areas; and the benefit to project economics associated with sequential development and backfill of the open pits.

Most pit wall rock in each of the four proposed pits (Fortitude, Phoenix, Reona, and Midas) is predicted to be potentially acid generating (see Section 2.5.2.1). Eventually, all the pit lakes except Fortitude are expected to become acidic (e.g., pH approximately 3.5).

In the Fortitude pit, an outcrop of marble at the bottom of the pit is predicted to provide abundant acid-neutralization potential, and long-term water quality is expected to be good (e.g., neutral pH and metals concentrations below Nevada drinking water criteria). This effect was demonstrated during the wet spring of 1998, when acidic run-off to the existing Fortitude pit lake was effectively neutralized in the lake, and water quality remained good.

Under the No Pit Backfill alternative, the water that would accumulate in the Phoenix and Fortitude pit lakes is predicted to flow into and mix with the surrounding ground water. Ground water elevation declines are predicted to be less extensive than under the Drainage Conduit alternative. If conditions consistent with the model predictions occurred, two fresh water springs would be expected to dry up. No other springs would be expected to have significantly reduced discharge.

Partial Pit Backfill Alternative

In this alternative, the Fortitude Pit and the northern portion of the Midas Pit would be partially backfilled with waste rock, and ground water eventually would rise through the backfill to form shallow pit lakes as the ground water table rises following the end of mining and dewatering operations. Pit lakes also would form in the Phoenix and Reona pits and southern portion of the Midas Pit where no backfill would be deposited. The remaining waste rock would be deposited in expanded waste rock facilities within the project area.

This alternative was eliminated from further consideration because of the poor water quality predicted for the Phoenix (including Fortitude), Reona, and Midas pit lakes following the end of mining and pit dewatering, the potential for adverse ground water quality impacts, and the greater surface disturbance associated with more extensive surface waste rock disposal area development.

Under the partial backfill alternative, most of the pit wall rock remaining above the backfill is predicted to be potentially acid generating (see Section 2.5.2.1). In addition, most of the backfilled waste rock is predicted to be net acid generating. The backfilled materials are predicted to produce approximately 10 kilograms per square meter per year of additional sulfate and acidity at the surface of the backfill until they are inundated by the rising lake, leaching solutes into the lake. Unlike the conditions in the No Backfill alternative, the marble outcrop in the bottom of the Fortitude Pit would be buried by waste rock, reducing its effectiveness at neutralizing acid in the lake. All the pit lakes would thus be expected to eventually become acidic (e.g., pH approximately 3.5).

Under the Partial Pit Backfill alternative, a shallow pit lake is predicted to form on top of the backfill in the Fortitude Pit. In addition, ground water elevations beneath two of the waste rock facilities are predicted to be as much as 250 feet lower. However, the area having drawdown of 10 feet or more is predicted to be less extensive. If the conditions predicted by the model occurred, two fresh water springs would be expected to dry up as a result of the declining ground water elevations.

Selective Pit Backfill Alternative

The Fortitude Pit and the northern portion of the Midas Pit would be fully backfilled with waste rock to levels consistent with adjacent topography along the perimeters of the pits. This backfill would eliminate the formation of pit lakes in these pits. The Phoenix and Reona pits and the southern portion of the Midas Pit would not be backfilled, and pit lakes would form as the water table returns to a steady-state condition.

This alternative was eliminated from further consideration because of the potentially acid-generating wall rock in the pits (see Section 2.5.2.1); the resulting poor water quality predicted for the Phoenix, Reona, and Midas pit lakes following the end of mining and pit dewatering; the potential for adverse effects on ground water quality; the greater surface disturbance associated with larger surface waste rock disposal areas; and the benefit to project economics associated with sequential development and backfill of the open pits.

As mentioned previously, pit lakes are predicted to form in the Phoenix, Reona, and South Midas pits. Only limited outflows would be expected from the Phoenix Pit, and almost none would be expected from the other pits. Two fresh water springs are predicted to dry up, and two other springs are predicted to possibly show reduced discharge as a result of ground water drawdowns caused by this alternative. Ground water elevations are predicted to be affected over an area that extends up to 2 miles east of the mine site. The predicted decline in ground water elevations would be caused by reducing ground water recharge under the new waste rock facilities.

2.5.2.2 Alternate Heap Leach Pad Location

BMG examined an area west of the existing Reona heap leach pad as an alternate location for a new heap leach pad. This alternative was eliminated from further consideration because it would be far enough away from the existing Reona beneficiation facility that it would require the construction of an additional (new) recovery plant. This would increase the amount of new surface disturbance, and significantly increase project costs.

2.5.2.3 Waste Rock Facility Cap Design Alternatives

BMG evaluated a variety of cap designs for proposed waste rock facilities in an effort to limit the percolation of meteoric water and the formation of acidic leachate. It should be noted that regardless of cap construction, the potential flux of meteoric water through the facilities and oxidation of sulfide minerals over time could result in acidic leachate within the Phoenix Project waste rock facilities. The type of cap could, however, control percolation and oxygen diffusion rates and dictate the timeframe over which acidic leachate is projected to migrate to the base or toe of individual facilities (Brown and Caldwell 1999k).

Continuous Capillary Break and/or Clay Tailings Layer

This alternative was eliminated from further consideration because of the impracticality associated with placing and maintaining a uniformly-sized gravel layer between waste rock and the 5-foot cap. Physical stability concerns also would result from placing coarser materials over a clay or tailings layer. In addition, roots penetrating below the base of the 5-foot cap could compromise the integrity of the capillary break by breaking down the coarser grained materials (Brown and Caldwell 1999k).

Ten-foot Nominal Cap Thickness

Modeling results predicted that caps thicker than 5 feet would provide only modestly lower percolation rates without completely eliminating meteoric water flux. Therefore, this alternative was eliminated because of the physical limitations of constructing and maintaining a 10-foot cap and the limited value associated with such a thickness (Brown and Caldwell 1999k).

2.5.2.4 Waste Rock Facility Drainage Management Alternatives

These alternatives were evaluated to determine the most practical method for collecting and conveying potential acidic seepage from surface-deposited waste rock facilities to prevent degradation of waters of the State. The first three alternatives described below require an adequate unsaturated hydraulic conductivity contrast between the waste rock material, basal drainage/collection media, and underlying layers to prevent flux from reaching underlying foundation materials. However, it was determined that the permeability contrast would not be adequate for the Phoenix Project waste rock facilities; therefore, these alternatives were eliminated from further consideration. In addition, none of the alternatives described below could be constructed under existing copper leach and waste facilities (Brown and Caldwell 1999k).

Basal Layer Alternative

This alternative would consist of an engineered drainage blanket constructed above native soils or bedrock foundation before waste rock is placed. Seepage would be collected in the basal layer and transported by gravity to the facility toe without reaching the underlying soil or bedrock (Brown and Caldwell 1999k).

Finger Drain Alternative

This alternative would involve placing slotted pipe along the major drainage axis and subsidiary drainages below the surface-deposited waste rock facilities. Seepage would be captured in the drain system and conveyed to the toe of each facility (Brown and Caldwell 1999k).

Ground Water Cut-off System Alternative

Ground water cut-off systems beneath and immediately downgradient of each waste rock facility would be added to the finger drains to manage the seepage below grade rather than as toe seepage. These cut-off systems would capture seepage from overlying waste rock facilities and convey the seepage to a pipeline that could be managed without creating a toe seep (Brown and Caldwell 1999k).

Compacted Soil or Foundation Liner Alternative

This alternative would involve placing compacted soil or other foundation liners on the waste rock facility footprints before construction. This would provide a preferential pathway for seepage migration along the interface between overlying waste rock and underlying bedrock or alluvium. Seepage would be directed to the toe of each facility. This alternative was eliminated from further consideration because of slope stability and liner integrity issues (Brown and Caldwell 1999k).

2.5.2.5 Alternatives Identified in Comments on the Draft EIS

Several additional potential alternatives to protect ground water were identified in public comments on the Draft EIS. These alternatives included:

- ***Constructing a cutoff wall***
- ***Creating a grout curtain***
- ***Grouting fractures in the pit wall***
- ***Grouting the backfill***

BLM evaluated these suggested alternatives and determined that they were not technically feasible or, in some cases, economically feasible (see the response to Letter 13 in Appendix C of the Final EIS). Therefore, these additional alternatives were considered but eliminated from detailed analysis.

2.6 Past, Present, and Reasonably Foreseeable Future Actions

As defined in the Council on Environmental Quality regulations for implementing the National Environmental Policy Act (40 CFR 1508.7), "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." Actions with the potential for cumulative impacts must be included within the scope of an EIS (40 CFR 1508.25). As specified in BLM Instruction Memorandum NV-90-435, impacts must first be identified for the Phoenix Project before cumulative impacts can occur. For resources where project-specific impacts are identified in the EIS, cumulative impacts also are evaluated (see Chapter 3).

The BLM has identified past, present, and reasonably foreseeable future actions with the potential to result in cumulative impacts with the proposed project. These actions were identified based on the type of activity, geographic location, and time period to determine the potential for cumulative impacts to individual resources. A brief description of these actions, as of 1999, is included in this section; their locations are shown in ***Figure 2-7***. The specific cumulative effects area and the potential cumulative impacts for each resource are described in the respective cumulative impact sections of Chapter 3.

2.6.1 Past and Present Mining Actions

Mining constitutes a dominant land use in the project region. Several companies have conducted mining activities in the region since January 1981, when the federal surface mining regulations became effective.

Mining in the region includes surface placer operations, underground mining, and open-pit mining. The surface disturbance associated with these mines includes mine workings (adits, shafts, prospect pits), open pits, dredge deposits, waste rock piles, heap-leach pads, tailings ponds, and ore milling and other processing facilities. The locations of past and present mining operations are shown in ***Figure 2-7***. These operations are described briefly below.

2.6.1.1 McCoy/Cove Mine

Echo Bay Minerals Company began operating the McCoy/Cove Mine in 1985. This is an open-pit gold mine, mill, and heap-leach operation. Total disturbance at the McCoy/Cove Mine is approximately 4,375 acres. The mine is located in Lander County and employs approximately 45 workers (Howell International Enterprises, LLC 1998). McCoy/Cove dewatered at an average rate of approximately 15,500 gpm in 1999.

2.6.1.2 Trenton Canyon Mine

The Trenton Canyon Mine, owned by Newmont Mining Company, is located in Humboldt and Lander counties east of Winnemucca. Currently permitted activities include open pits, heap-leach facility, waste rock disposal areas, roads, and ancillary facilities. A recently permitted expansion of existing facilities brings total disturbance at this mine to approximately 2,682 acres. Approximately 130 workers are employed at the Trenton Canyon Mine, which is expected to operate until 2005 (BLM 1998). Pit dewatering is not required at Trenton Canyon.

2.6.1.3 Marigold Mine

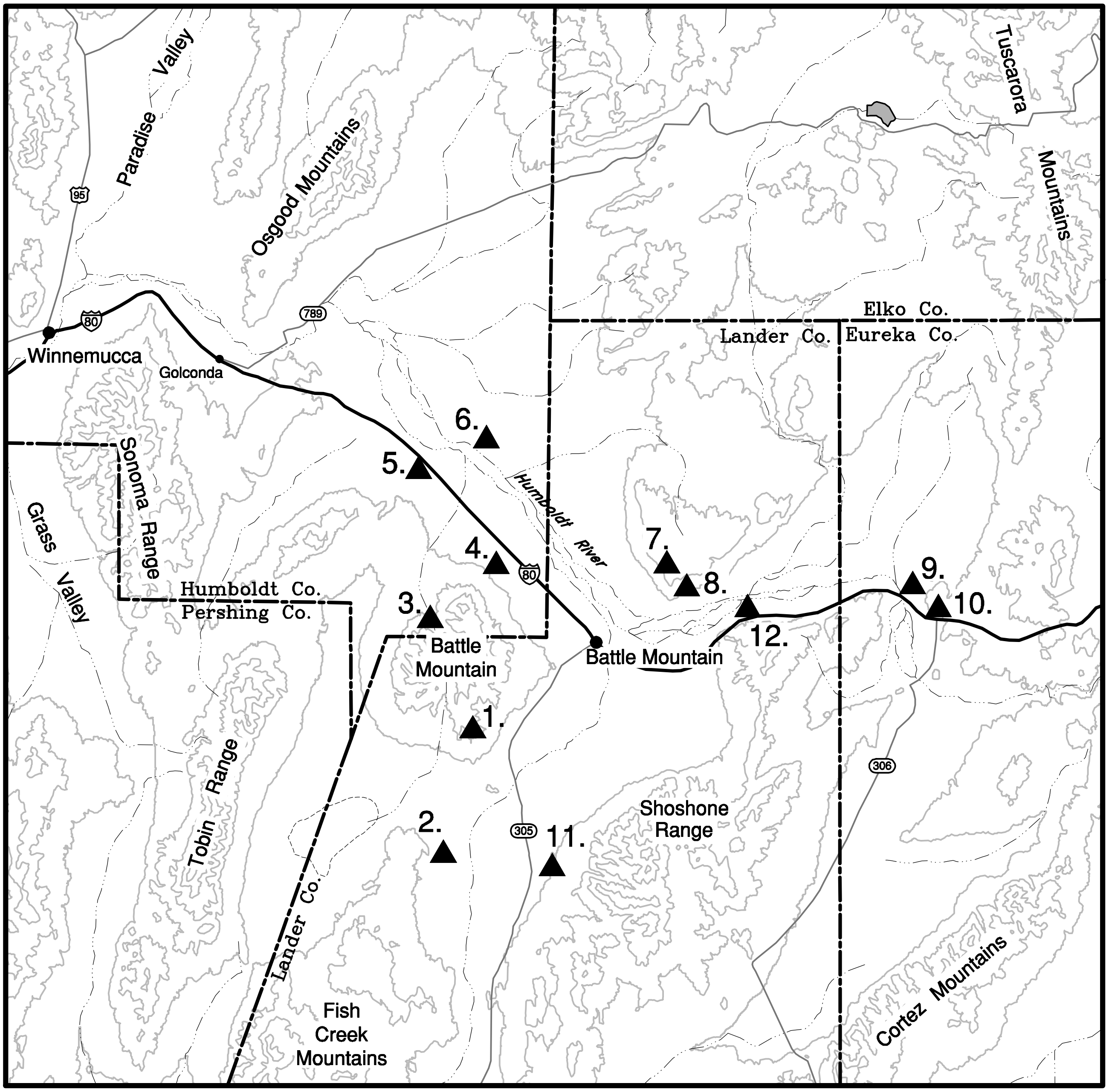
Glamis Gold, Inc. owns this open-pit gold mine in Humboldt County, which began operations in 1988. Eighty-three employees operate the mine at a rate of approximately 11 million tons per year. Approximately 124 million tons of ore and waste rock had been mined through December 1999 (BLM 2000a). Mine facilities, including open pits, heap-leach, and mill facilities, currently affect 1,349 acres. No mine dewatering is currently required. An EIS is being prepared for a proposed expansion of up to 717 acres at the Marigold Mine; this expansion is described in Section 2.6.4.

2.6.1.4 Lone Tree Mine

Newmont Mining Company's Lone Tree Mine in Humboldt County is located approximately 34 miles east of Winnemucca. The mine is an active open-pit operation employing 350 workers. Operations began in 1991 and continue at a mining rate of 48 million tons per year (Howell International Enterprises, LLC 1998). The project is projected to end in 2006. From 1991 to 2006, the projected maximum dewatering rate for the mine is 75,000 gpm (BLM 2000b). Active and currently permitted operations affect approximately 3,617 acres (BLM 1998).

2.6.1.5 Battle Mountain Complex

BMG has approximately 20 employees at the Battle Mountain Complex, which is currently permitted for 1,823 acres of mining-related



Explanation

- County
- Interstate 80
- Road
- Drainage
- Playa
- ▲ Existing or Reasonably Foreseeable Future Action

1. Battle Mountain Complex
2. McCoy-Cove Mine
3. Trenton Canyon Mine
4. Marigold Mine
5. Lone Tree Mine
6. North Valmy Generating Station
7. Sierra Chemical
8. Coastal Chemical
9. Rossi Mine
10. Continental Lime/Dunphy Transfer Station
11. M-I Drilling Fluids Plant
12. Baker-Hughes Inteq Plant

0 10 20 Miles

N

Phoenix Project

Figure 2-7

Potentially Interrelated Projects for Cumulative Impact Assessment disturbance in the Copper Canyon and Copper Basin areas in Lander County. Activities to date include mining and processing of gold, silver, and copper ore. BMG is not currently mining or dewatering at the Battle Mountain Complex.

2.6.2 Past and Present Exploration Activity

Numerous companies have conducted exploration activities in the cumulative impact area since January 1981, when the federal surface mining regulations became effective. Exploration activities include drilling, trenching, sampling, and drill road construction.

2.6.2.1 McCoy/Cove Exploration

Echo Bay Minerals Company is permitted for 300 acres of exploration disturbance at the McCoy/Cove Mine.

2.6.2.2 Trenton Canyon Exploration

Newmont Mining Company's Trenton Canyon Project is permitted for 955 acres of exploration disturbance.

2.6.2.3 Battle Mountain Complex Exploration

BMG is currently permitted for 146 acres of exploration disturbance.

2.6.2.4 Other Exploration Activities

Other exploration activities in the region have created approximately 300 acres of surface disturbance.

2.6.3 Past and Present Non-mining Activities

2.6.3.1 North Valmy Generating Station

The North Valmy Generating Station is a coal-fired power plant operated by approximately 110 Sierra Pacific Power Company employees in Valmy, Nevada, just north of Interstate 80 in Humboldt County.

2.6.3.2 Coastal Chemical Plant

The Coastal Chemical plant is located approximately 5 miles north of the town of Battle Mountain in Lander County. The plant produces 150,000 tons of ammonium nitrate per year and employs 24 people. Project disturbance is 15 acres.

2.6.3.3 Sierra Chemical Facilities

Sierra Chemical operates the Rennox and Battle Mountain facilities as offloading areas for caustic soda, sulfuric acid, ammonium bisulfide, and hydrochloric acid from rail car to truck for delivery to area mines. Combined, the Rennox and the Battle Mountain facilities have 7 employees and approximately 2 acres of disturbance.

2.6.3.4 M-I Drilling Fluids Plant

The M-I Drilling Fluids Plant, located in the town of Battle Mountain in Lander County, employs approximately 28 people to process barite from local mines and ship drilling fluid products by rail.

2.6.3.5 Baker-Hughes Inteq Plant

The Baker-Hughes Inteq plant, located approximately 25 miles east of the town of Battle Mountain in Lander County, employs 18 people to process barite from a local property and ship drilling fluid products by rail.

2.6.3.6 Livestock Grazing

The livestock grazing cumulative effects area comprises the Copper Canyon and North Buffalo allotments. There are 5,023 animal unit months in the Copper Canyon allotment and 3,447 animal unit months in the North Buffalo allotment. There are currently four permittees that graze both cattle and sheep within these allotments.

2.6.4 Reasonably Foreseeable Mining Actions

Glamis Gold, Inc. and the BLM currently are developing an EIS to evaluate the impacts associated with expanding the Marigold Mine. This proposed expansion would result in 717 acres of new disturbance and continued mining activities through 2006. The work force is not expected to exceed 113 employees with the expansion. (BLM 2000a). There is an additional 1,175 acres of reasonably foreseeable disturbance associated with possible future Marigold Mine activities.

2.6.5 Reasonably Foreseeable Exploration Activity

2.6.5.1 Battle Mountain Complex Operations

BMG intends to conduct continued exploration and development drilling throughout the life of the Phoenix Project. Drilling activities would be undertaken to further delineate mineral resources at depth and in geologically favorable areas within the proposed Phoenix Project area. In addition, exploration activities would be conducted at the Sunshine, Western Deeps, and Plumas areas in the Copper Canyon mining area. Surface disturbance associated with these activities, including roadway access and drill pad construction, would affect approximately 300 acres and would continue to be permitted under separate exploration plans of operations. Any ore from these areas that would be amenable to beneficiation using Phoenix Project facilities could extend the life of the proposed beneficiation operations.

2.6.5.2 Other Exploration Activity

Assuming a 28-year project life, the BLM estimates an additional 1,100 acres of exploration disturbance by various mining companies in the cumulative impact area. Approximately 420 acres of this would be reclaimed during the life of the project. This estimate is based on BLM records: approximately 30 acres of small-scale exploration activity disturbance occur per year, approximately 15 acres of small-scale exploration activity disturbance are reclaimed per year, and approximately 260 additional acres of disturbance are predicted to be created from large-scale exploration activity.

2.6.6 Reasonably Foreseeable Non-mining Activity

The BLM is not aware of any major foreseeable change in the type or level of activity at any of the industrial facilities described in Section 2.6.3 above. Livestock grazing is likely to continue as a principal land use in the Phoenix Project cumulative effects area. The BLM plans to conduct a Multiple Use Evaluation for the allotments within the jurisdiction of the Battle Mountain Field Office in 2004 or 2005. The BLM predicts that this evaluation will result in a reduction in AUMs; however, the actual results are unknown at this time.

2.7 Comparative Analysis of Alternatives

Table 2-9 summarizes and compares the environmental impacts of the Proposed Action and the No Action alternative. Detailed descriptions of the impacts are presented in Chapter 3.0, Affected Environment and Environmental Consequences. The summarized impacts assume the absence of potential mitigation measures; implementing the monitoring and mitigation measures recommended in Chapter 3.0 would potentially reduce the impacts.

2.8 BLM Preferred Alternative

Chapter V, Section B.2.b. of the BLM NEPA Handbook directs that "The manager responsible for preparing the EIS should select the BLM's preferred alternative. ... For externally initiated proposals, ... the BLM selects its preferred alternative unless another law prohibits such an expression. ... The selection of the preferred alternative should be based on the environmental analysis as well as consideration of other factors which influence the decision or are required under another statutory authority."

The BLM has selected a preferred alternative based on the analysis in this EIS; this preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors. The BLM has determined that the preferred alternative is the Proposed Action as described in Chapter 2.0 with the inclusion of the mitigation measures to the Proposed Action specified in Chapter 3.0.

The selection of the Proposed Action as the BLM's preferred alternative rather than the No Action alternative is based on the impacts associated with water resources and geochemistry, and social and economic values. The No Action alternative potentially could have significant adverse water resources and geochemistry impacts (Section 3.2.2.2) from the development of acidic pit lakes and ground water degradation from existing waste rock facilities. The Proposed Action ***with the inclusion of the Contingent Long-term Groundwater Management Plan*** provides greater assurance that these impacts would not occur, or would be mitigated. No pit lakes would occur under the Proposed Action, and the proposed design, monitoring, and mitigation measures for the waste rock facilities in the Proposed Action would eliminate or greatly reduce potential ground water degradation from both the existing and proposed facilities. The Proposed Action would have beneficial social and economic impacts (Section 3.12.2.1) resulting from up to 28 years of employment for up to 435 individuals (includes up to 250 direct and 185 indirect jobs). Under the No Action alternative, 20 individuals would continue to be employed through a 5-year closure period, unless an improved gold price allowed mining to resume under existing permits. In this case, up to 80 individuals would be employed for 6 months before the 5-year closure period was completed with 20 individuals. The Proposed Action also is preferred because under the No Action alternative, identified mineral resources would not be developed.

Table 2-9
Impact Summary and Alternatives Comparison

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
Geology and Minerals			
• Mineral extraction	• Extraction of 5.2 million ounces of gold, 27 million ounces of silver, and 360 million pounds of copper.	None	• Extraction of 40,000 ounces of gold and 270,000 ounces of silver.
• Geotechnical and seismic stability impacts	• Minimal impacts anticipated with appropriate design and construction.	G-1: Designs for Tailings Area #3 and for facilities that could be constructed in the South Optional Use Area (including a tailings impoundment and/or heap leach facility would be designed, constructed, and maintained in a stable manner during both the operations and postmining periods.	• Same as Proposed Action.
• Pit slope stability	• Some potential for long-term pit slope failures to locally damaged waste rock facilities.	G-2: BMG would conduct geotechnical investigations and analysis to determine facility setback from pit rim to preclude damage during operation and postclosure.	• Greater potential for long-term pit slope failure to damage waste rock facilities.
• Future availability of mineral resources	• No impacts expected.	None	• No impacts
Water Resources and Geochemistry			
• Dewatering and Drawdown	• Pit dewatering would occur at rates between 150 to 1,500 gpm over the first 24 years. Drawdown area (≥ 10 feet of drawdown) is projected to expand in the postmining period and up to 3 miles from the pit areas 150 years after the start of mining. Ground water levels are not predicted to fully recover due to a reduction in local recharge in areas covered by reclaimed waste rock facilities.	WR-1: BMG would be responsible for continued monitoring and reporting of changes in ground water levels and surface water flows in the postreclamation period. BMG would provide the monitoring results, and describe any deviations from the original predictions, and propose modifications to the monitoring plan in an annual report to both the Nevada Division of Water Resources and BLM. WR-2: Prior to the initiation of mine dewatering, a baseline inventory would be performed to locate and characterize any perennial waters, including spring source areas and perennial stream reaches, located in the south tributary of Little Cottonwood Canyon. Based on the results of the inventory, BLM or BMG ***would add*** additional representative spring(s) to BMG's surface water monitoring program***, if appropriate***.	• There would be no additional pit dewatering. However, leakage through exploration borings is predicted to result in localized drawdown extending up to 1 to 1.5 miles from the Midas Pit at approximately 25 years after mining. After this period, the areal extent of the drawdown is predicted to remain relatively constant for the foreseeable future. Ground water recovery is predicted to occur in the postmining period in the vicinity of the chloride plume mitigation well field and Fortitude Pit.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Drawdown effects on perennial streams and springs	• Potential flow reductions or drying up in lower perennial reach of Willow Creek and 10 springs	WR-3: The comprehensive water resources monitoring plan would be expanded to include all 10 spring sites and at least 3 flow monitoring locations along the lower perennial reach of Willow Creek. Monitoring of these surface water resources would include annual measurement of flows during the low-flow season. A stream gage coupled with a shallow ground water monitoring well, would be established to continuously monitor flows and shallow ground water elevations on Willow Creek. If monitoring indicates that flow reductions have occurred and that these reductions are likely the result of mine-induced drawdown, the following measures would be implemented: 1) The Nevada Division of Water Resources (NDWR) and BLM would evaluate the available information and determine if mitigation is required. 2) If mitigation is required, BMG would be responsible for preparing a detailed, site-specific plan to enhance or replace impacted perennial water resources. 3) An approved site-specific mitigation plan would be implemented, followed by monitoring and reporting to measure the effectiveness of the implemented measures. 4) If initial implementation were unsuccessful, NDWR or BLM ***would*** require implementation of additional measures.	• No adverse impacts to perennial streams anticipated. • Possible reduction in flow or drying up of 1 spring.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Drawdown Effects on Water Rights	• Seven surface water rights and nine ground water rights could be impacted. by drawdown	WR-4: BMG would be responsible for monitoring ground water levels between the mine and water supply wells, ground water rights, and surface water rights as part of the comprehensive monitoring program. Adverse impacts to water wells and water rights would be mitigated, as required by the NDWR.	• No adverse impacts to surface water rights or ground water rights expected.
• Pit lake development	• Backfill would preclude pit lake development.	None	• Fortitude Pit lake would develop with non-acidic waters. • A small pond with acidic water could develop in Minnie Pit.
• Waste rock storage areas: degradation of ground water	• Potential for acidic leachate to discharge from waste rock facilities during the postclosure period. • Proposed long-term capture and treatment system should prevent downgradient ground water degradation.	WR-5. The BLM, in coordination with applicable state agencies, ***would*** require BMG to provide funding for additional monitoring of ground water quality in the postmining period. Long-term monitoring of ground water quality ***would*** be required to 1) assist in evaluating the need to implement the Contingent Long-term Groundwater Management Plan, 2) verify that ground water quality has not been impacted, and/or 3) demonstrate that impacted ground water has been fully captured by the ground water management system. WR-6: The Contingent Long-term Groundwater Management Plan would be revised to include the following measures: 1) If postclosure unsaturated zone monitoring of water quality indicates that leachate from the facility is migrating downward beyond the depth of the unsaturated zone monitoring points, a site-specific ground water monitoring plan would be developed. 2) After approval, the ground water monitoring system would be installed and maintained to monitor ground water quality immediately downgradient of the facility on at least a quarterly basis. The combined information from the vadose zone and ground water monitoring system would be used by NDEP and BLM to trigger implementation of the ground water	• Potential for acidic leachate to discharge from waste rock facilities to impact downgradient ground water resources during the postclosure period.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
		extraction and treatment system plans in specific areas, as necessary, to prevent impacts to ground water quality downgradient of the extraction points identified in the Contingent Long-term Groundwater Management Plan.	
		3) If extraction and treatment become necessary, additional monitoring would be implemented downgradient of the extraction wells to verify that the degraded water has been fully captured by the ground water extraction system.	
		4) Any unsaturated zone monitoring or ground water monitoring required would continue until the potential risk of ground water contamination has been shown to be minimal as determined by the NDEP and BLM. WR-7: The Water Resources Monitoring Plan would be expanded to include monitoring for water ponded in the existing Minnie Pit, if it occurs. If standing water is observed in the Minnie Pit prior to backfill, the backfill material placed in the potential ground water saturation zone would be amended to preclude ground water quality impacts. • Soils and reclamation measures S-1 and S-2 would protect waste rock facility caps during reclamation.	
• Waste rock and ore stockpile facilities: degradation of surface water	• Impacts to runoff water quality may occur due to interaction with acid generation material. Runoff water affected by sulfide oxidation products would be captured and managed.	***WR-10: All waste rock to be used as construction material (e.g., haul roads, pads) and older waste rock exposed in excavations for roads or facility areas would be sampled and analyzed to determine if it contains contaminants that are likely to become mobile and degrade surface or ground water. Only benign waste rock would be used as construction fill, and older waste rock exposed during construction would be covered with a sufficient thickness of benign material to prevent impacts to storm water runoff quality.***	• Same as Proposed Action.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
		WR-11: The Water Resources Monitoring Plan would be revised to include specific procedures to monitor surface water flow and field water quality parameters (including pH and conductivity) at monitoring locations Phx-1 through Phx-14 quarterly (if there is sufficient flow) and during runoff events.	
• Water ponded on tailings facilities	• Fluids ponded on the tailings facilities could at times have a low pH and contain elevated trace metal concentrations that may be toxic to waterfowl and other wildlife.	WR-8: The pH of any ponded fluids contained within the tailings facilities ***would*** be monitored. If deleterious supernatant pond water quality is detected, the pH of the fluids would be adjusted using chemical alkalinity additions (i.e., hydrated lime, milk of lime, or sodium hydroxide) to increase the pH and correspondingly reduce trace metal concentrations to non-toxic levels.	• None
• Sediment basins located downstream of waste rock facilities	• ***Prior to capping and successful revegetation of the waste rock facilities, sediment basins located downstream of the waste rock facilities could collect runoff that is acidic and/or contains elevated metals concentrations***	***WR-9: As part of the final reclamation and closure activities, the chemical composition of sediment contained in the basins would be analyzed. If the sediment contains contaminants likely to degrade surface or ground water quality, the sediment would be excavated and disposed of either on-site or off-site in accordance with applicable state and federal regulations.***	• Similar to Proposed Action
• Flooding, erosion and sedimentation	• Short-term reductions in seasonal runoff in ephemeral drainages would result in reduced surface water yield from the project area	None	• Measurable reductions in surface water yield are not anticipated.
Soils and Reclamation			
• Accelerated erosion in disturbed areas	• No adverse impacts by implementing erosion control methods.	None	• Same as Proposed Action.
• Compromised public safety due to slope instabilities	• No adverse impacts by implementing slope stability measures and access controls.	None	• Same as Proposed Action.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Lack of concurrent reclamation	• No adverse impacts because of concurrent reclamation and other control measures.	None	• Same as Proposed Action.
• Decreased site productivity	• Adverse impacts minimized by implementing reclamation plan.	S-3: The extent of slopes steeper than 2.5 horizontal: 1 vertical would be minimized.	• Same as Proposed Action.
• Potential presence of contaminants in soils	• Arsenic concentrations could potentially inhibit plant grown in sensitive plant species and thereby limit reclamation success. There is a potential risk to soil invertebrates and organisms that consume those invertebrates from bioaccumulation.	V-1: Annual monitoring would include analysis of plant tissue to determine if metals are bioaccumulating. If monitoring indicates that plant uptake could result in adverse impacts to wildlife or livestock, a plan would be developed by BMG and submitted to BLM and NDOW for approval to minimize potential impacts associated with accumulated metals. S-4: To facilitate successful revegetation and to minimize the risk to wildlife and livestock associated with plant uptake and bioaccumulation of metals, BMG would conduct 1) additional geochemical characterization studies of the capping material, 2) an evaluation of potential effects to the reclamation plant species, and 3) site-specific assessment of ***ecological*** risk. If these evaluations indicate ***an ecological risk***, BMG would modify the Waste Rock Management Plan with BLM approval to include specific measures to mitigate these impacts.	• Same as Proposed Action.
Vegetation			
• Impact to vegetation communities	• Short-term loss of approximately 6,497 acres of vegetation; long-term loss of 576 acres (pit highwalls); long-term increase in carrying capacity following successful reclamation.	***S-1: BMG would leave the project perimeter fence intact for pasture management and for waste rock cap integrity, subject to the grazing management plan (S-2).*** ***S-2: BMG would develop a grazing management plan, in coordination with grazing permittees, BLM, and NDOW.***	• Short-term loss of approx. 2,823 acres of vegetation; long-term loss of 492 acres (pit highwalls); long-term increase in carrying capacity following successful reclamation.
• Impacts to wetlands, waters of the U.S., and riparian areas	• Nine areas associated with springs or seeps and a short reach of Willow Creek could be impacted.	• Water resource measures WR-1***, WR-2, and WR-3*** would apply to spring-related vegetation potentially affected by dewatering.	• One area associated with springs or seeps could be impacted.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Increase in noxious weeds	• No impact, assuming implementation of weed control plan and successful revegetation.	None	• No impact, assuming implementation of weed control plan and successful revegetation.
• Impacts to special status plant species	• No impact	None	• No impact.
<u>Wildlife and Fisheries Resources</u>			
• Flow reduction impacts on perennial streams ***and associated riparian habitat***	• Potential habitat reduction for Willow Creek trout populations due to dewatering. • ***Potential reduction in feeding and nesting habitat for waterbirds due to dewatering.***	• Measures WR-1, WR-2 and WR-3 (Water Resources) would also apply to fisheries ***and riparian habitat.***	• No impact on perennial streams with trout populations. ***No impact on associated riparian habitat.***
• Direct habitat loss or alteration	• Short-term disturbance to 6,497 acres of wildlife habitat. • Long-term loss of 576 acres of habitat in pit highwalls.	None	• Short-term disturbance to 2,823 acres of wildlife habitat. • Long-term disturbance to 45 acres of wildlife habitat due to Midas Pit expansion.
• Mule deer summer range and migration corridors.	• No impact.	None	• No impact.
• Loss of critical or important habitat for federally listed or candidate wildlife species	• No impact.	None	• No impact.
• Loss of habitat for bats	• Potential loss of bat maternity and roost sites associated with adits.	W-6: Conduct bat surveys in adits and shafts prior to ground disturbance; ***block*** entries during non-occupation periods to prevent bat entry prior to disturbance. Alternative roost sites would be evaluated for mitigation.	• No impact.
• Big game mortalities	• Potential mortalities to big game due to vehicle collisions.	W-2: Report big game collisions to BMG along access road; if problem areas are detected, BMG would consult	• Potential mortalities to big game due to vehicle collisions during continued mine

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
		with NDOW regarding possible mitigation measures.	operation.
• Wildlife disturbance from human activities	• Potential disturbance to wildlife from illegal hunting and human presence.	W-3: BMG would implement firearms control. W-4: BMG would implement an educational program to minimize disturbance and harassment to wildlife. W-5: BMG would prohibit unauthorized off-road vehicle traffic.	• Same as Proposed Action.
• Disturbance to nesting raptors	• Potential disturbance to burrowing owl nest sites; no impacts to other raptors.	W-1: Resurvey suitable habitat disturbance areas for presence of burrowing owls ***and implement mitigation, if necessary.***	• No impacts
• Disturbance to nesting migratory bird species	• Possible loss of migratory bird nest sites by ground clearing during the nesting season	W-9: Ground clearing would not occur during the nesting season unless under the direction of a qualified biologist to locate nest sites in proposed disturbance areas. Mitigation for occupied nest sites would be determined in consultation with the BLM.	• Same as Proposed Action.
• Utility line impacts on raptors	• Potential collisions or electrocution of raptors using power poles.	W-7: Construction and design of power poles would be completed to minimize effects on raptors.	• No impacts
• Disturbance to sage grouse	• No impacts.	***W-8: Monitor seeps, springs, and lower Willow Creek to determine flow reductions (water resources measures WR-1, WR-2, and WR-3); mitigate water loss by using wildlife guzzlers and other appropriate measures (WR-1 and WR-2).***	• No impacts
• Exposure to toxic water sources	• No expected exposure to potentially toxic water sources due to committed measures.	***WR-8: The pH of any ponded fluids contained within the tailings facilities would be monitored. If deleterious supernatant pond water quality is detected, the pH of the fluids would be adjusted using chemical alkalinity additions (i.e., hydrated lime, milk of lime, or sodium hydroxide) to increase the pH and correspondingly reduce trace metal concentrations to non-toxic levels.*** ***W-10: If process ponds or other water sources contain potentially toxic wildlife water sources, BMG would install wildlife exclusionary methods.***	• No impact with use of committed measures.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Loss of water sources	• Potential reduction of water sources in lower Willow Creek and springs in Philadelphia and Galena canyons.	W-8: Monitor seeps, springs, and lower Willow Creek to determine flow reductions (water resources measures WR-1***, WR-2, and WR-3)***; mitigate water loss by using wildlife guzzlers and other appropriate measures (WR-1 and WR-2).	• None.
<u>Range Resources</u>			
• Reduced carrying capacity	• Short-term loss of approximately 197 animal unit months (or 3.9 percent of Copper Canyon allotment's capacity).	None	• Short-term loss of approximately 121 animal unit months.
• Loss of key grazing areas	• No key grazing areas would be removed.	None	• Same as Proposed Action.
• Reclamation of grazing areas	• Grazing could affect reclamation of disturbed areas.	S-1: Perimeter fencing would be left intact to ensure effective reclamation. S-2: Grazing management plan would be developed.	• Same as Proposed Action.
• Loss of stock water sources	• Potential flow reductions in lower Willow Creek and springs and seeps in Philadelphia and Galena canyons could affect water sources for grazing.	• Water resources measures WR-1, WR-2, and WR-3 would monitor and mitigate loss of water sources. R-1: Three short-term water sources would be developed.	• No impacts
• Prevention of livestock movements	• No adverse effects on livestock movements.	None	• Same as Proposed Action.
<u>Paleontological Resources</u>			
• Disturbance to unique or significant paleontological resources	• No impacts expected to unique or significant invertebrate, vertebrate, or paleobotanical fossils.	None	• No impacts

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
Cultural Resources			
• Direct impacts to prehistoric or historic cultural resources	• 85 sites directly impacted; 21 of these are NRHP-eligible or potentially eligible. All of the 21 eligible or potentially eligible sites have been treated.	CR-1: Employee and equipment access would be limited to minimize the potential for direct impacts to resources. Mine exploration and operations equipment would be prohibited outside of the proposed permit boundary, which would be clearly marked. Employee access to known archaeological and paleontological sites on private land in the vicinity of the mine would be limited.	• 36 sites directly impacted; 12 of these are NRHP-eligible or potentially eligible. All of the 12 eligible or potentially eligible sites have been treated.
		CR-2: Previously unsurveyed portions of the proposed fenceline would be surveyed for cultural resources prior to construction. If significant sites are found in these locations, attempts would be made, as identified in the PA, to avoid the sites. If avoidance is not possible, mitigation would be implemented as stipulated in the PA.	
• Potential impacts to previously undiscovered significant sites	• Previously unidentified sites could be discovered during development of the Proposed Action.	As stipulated in the PA, construction in the area would be halted until the site can be reviewed by the BLM's authorized officer. If the previously unidentified resources are determined to be eligible to the NRHP or protected under other state and federal statutes, impacts would be mitigated as outlined in the PA.	• Same as Proposed Action.
• Potential indirect impacts to cultural resources	• 8 sites indirectly impacted; 4 of these are NRHP-eligible or potentially eligibile. All of the eligible or potentially eligible sites have been treated. Indirect effects could occur from increased erosion and human activity.	CR-1: Employee and equipment access would be limited to minimize the potential for direct impacts to resources. Mine exploration and operations equipment would be prohibited outside of the proposed permit boundary, which would be clearly marked. Employee access to known archaeological and paleontological sites on private land in the vicinity of the mine would be limited. As stipulated in the PA, BMG would ensure that its personnel and contractors are directed not to engage in illegal collecting of cultural resources.	• 15 sites indirectly impacted; 4 of these are NRHP-eligible or potentially eligible. All of the eligible or potentially eligible sites have been treated. Indirect effects could occur from increased erosion and human activity.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Potential impacts to resources of importance to Native Americans	• Two potential TCP properties, CrNV-62-7027 and -7028, could be indirectly impacted. The TCP status of these properties has not been conclusively established during discussions with tribal representatives.	BMG has committed to avoiding disturbance at these sites.	• Same as Proposed Action.
<u>Air Quality</u>			
• 24-hour average ambient PM_{10} concentration	• Maximum concentration of 89 micrograms/cubic meter (PM_{10}).	Although impacts are not anticipated, BLM is implementing a measure for BMG reporting of air quality data. AQ-1: BMG would submit all NDEP air quality data and reports to BLM. BMG would report annually to BLM or source-specific fugitive dust controls and their effectiveness.	• Maximum concentration of 56 micrograms/ cubic meter (PM_{10}).
• Compliance with federal and state ambient air quality standards	• Complies with standards.	Although impacts are not anticipated, BLM is implementing a measure for BMG reporting of air quality data. AQ-1: BMG would submit all NDEP air quality data and reports to BLM. BMG would report annually to BLM or source-specific fugitive dust controls and their effectiveness.	• Same as Proposed Action.
<u>Land Use and Access</u>			
• Compliance with plans and policies	• Complies with plans.	None	• Same as Proposed Action.
• Land use changes threaten viability of private economic activities	• Minor increase in area restricted from grazing (life-of-mine temporary effect). Pits represent permanent restriction.	None	• No new change in land use. Pits restricted permanently.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Access constraints devalue economic or recreational pursuits	• Willow Creek Road re-routed; minor effect on access.	None	• No new constraints.
• Degradation of post-mining land use	• Post-mining use returned to grazing and wildlife habitat (except for pits).	None	• Post-mining use returned to grazing, wildlife habitat (except for pits).
• Existing ROWs impacted	• Four ROWs affected.	None	• One ROW affected.
• Compliance with level of service planning standards	• Moderate increase in traffic; no reduction in level of service	None	• Minor increase in traffic; no reduction in level of service
• Public highway safety	• Minor increased accident risk commensurate with traffic increase; no other highway safety degradation.	None	• Same as Proposed Action.
<u>Recreation and Wilderness</u>			
• Permanent change in recreation resources or WSAs	• Loss of pit areas only; no Wilderness Study Area effects.	None	• Same as Proposed Action.
• Unmitigable displacement of recreation	• Minor displacement; life-of-mine temporary effect.	None	• No new displacement.
• Change in recreation demand exceeding capacity	• Capacity exceeds demand; no impact.	None	• Same as Proposed Action.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
Social and Economic Values			
• Demographic change	• Life-of-mine temporary population increase up to 5.5 percent for construction, 6.4 percent for operations; counteracting recent declines.	None	• 6-month temporary population increase of 0.8 percent reverting to current level at end of mining.
• Employment and income change	• Employment increase up to 10.4 percent for construction; 7.7 percent for operations. Income increase up to $15 million/year for construction; $17.4 million/year for operations.	None	• 6-month temporary employment increase of 2.4 percent reverting to current level at end of mining. Income increase for 6 months at an annual rate of $3.5 million.
• Changes to local public finance	• Lander County revenue increase of $1.7 million/year from construction; $900,000/year from operations.	None	• Lander County revenue increase of $130,000 for 6 months, returning to approximately current levels during reclamation.
• Housing demand exceeding supply	• Local supply adequate for demand due to recent population slump.	None	• Same as Proposed Action.
• Demand for public services in excess of surplus capacity	• Local capacities of essential services are adequate.	None	• Same as Proposed Action.
• Low income or minority population disproportionately affected	• No disproportionality identified.	None	• Same as Proposed Action.
• Uncompensated taking or use of property	• No impact on property use or values.	None	• Same as Proposed Action.
Visual Resources			
• Landform contrast	• Creation of significant long-term landform contrasts.	VR-1: Landform modification to soften unnatural, angular appearance.	• Reduction in existing landform contrasts following reclamation.

Table 2-9 (Continued)

Resource/Impact Issue	Proposed Action		No Action Alternative
	Impact	Monitoring/Mitigation	Impact
• Vegetation color contrast	• Short-term contrasts would be reduced following successful reclamation.	None	• Reduction in existing color contrast following reclamation and revegetation.
• Structural contrast	• Little to no creation of visible structural contrasts.	None	• No visual impact associated with existing structures.
• Conformance with visual resource management Class IV objectives	• Partial conformance; long-term moderate adverse impact due to unnatural landform modifications.	None	• Conformance with objectives; long-term impacts would be beneficial following reclamation and revegetation of existing facilities.
Noise			
• Noise levels at sensitive receptors	• Minor increases for life of project; not exceeding standards.	None	• Slight, short-term increases.
Hazardous Materials			
• Transportation impacts	• Moderate risk of an accidental release during transport during project life.	None	• Very low risk of accidental release during transport during project life.
• Storage and operations impacts	• Emergency Response Plan is expected to minimize the potential for significant impacts associated with spills.	None	• Same as Proposed Action.