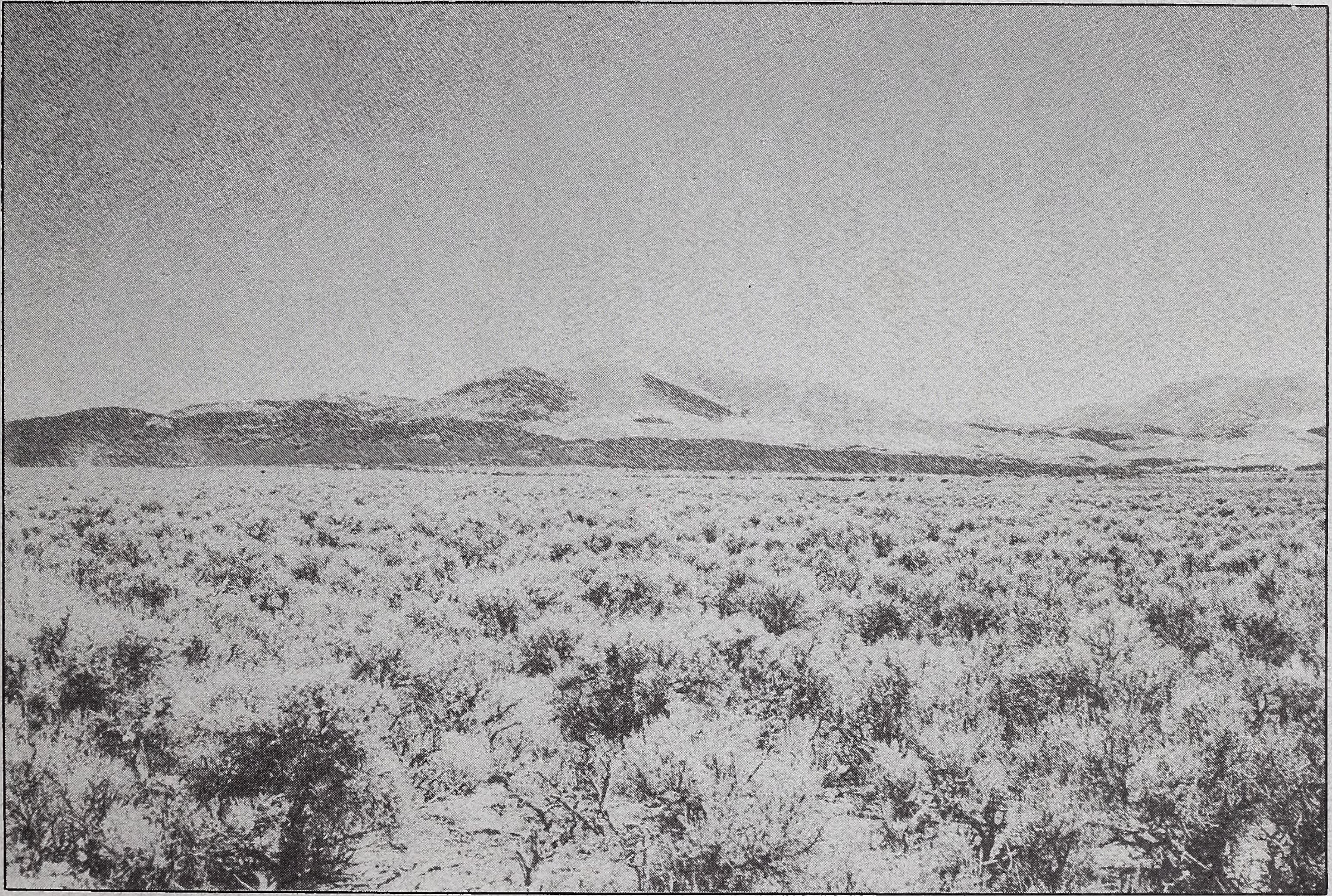
United States Department of the Interior
Bureau of Land Management

Ely District
Egan Resource Area, Ely, NV

September 1995

FINAL

Bald Mountain Mine Expansion Project Environmental Impact Statement



BLM Mission Statement

The Bureau of Land Management is responsible for the stewardship of our public lands. It is committed to manage, protect, and improve these lands in a manner to serve the needs of the American people for all times.

Management is based upon the principles of multiple use and sustained yield of our nation's resources within a framework of environmental responsibility and scientific technology. These resources include recreation, rangelands, timber, minerals, watershed, fish and wildlife, wilderness, air and scenic, scientific and cultural values.

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Nevada State Office
850 Harvard Way, P.O. Box 12000
Reno, Nevada 89520-0006

In Reply Refer To:
N46-83-004P
1793/3809
(NV-932.8)
(NV-040/047)

September 6, 1995

Dear Reader:

Enclosed for your information is the Bald Mountain Mine Expansion Project Final Environmental Impact Statement for the proposed Plan of Operations. This project is located in White Pine County, 60 miles northwest of Ely, Nevada. The Final Environmental Impact Statement responds to comments received during the public review period on the Draft Environmental Impact Statement, which was held from April 18, 1995, through June 16, 1995. A total of twelve comment letters were received during the public comment period. Several comments were also received during the public meetings held in Ely, Elko, and Reno, Nevada.

The Final Environmental Impact Statement contains in its entirety the analysis originally presented in the Draft Environmental Impact Statement with responses to public comments. The public comments have been responded to by supplementing, improving or modifying the analysis, making factual corrections or explaining why the comments do not warrant further agency response. All text changes to the document have been highlighted in bold and italics to aid the reader. The Final Environmental Impact Statement incorporates mitigation measures to minimize impacts to wildlife and other resources, as well as monitoring to review the effectiveness of the proposed mitigation.

Questions or comments should be directed to Dan Netcher, Environmental Impact Statement Team Leader, at the Bureau of Land Management, Ely District Office, HC33 Box 33500, Ely, Nevada 89301, telephone (702) 289-1872.

Sincerely,

Ann J. Morgan
State Director, Nevada

Enclosure
1. Bald Mountain Mine Expansion Project Final EIS

BALD MOUNTAIN MINE EXPANSION PROJECT
ENVIRONMENTAL IMPACT STATEMENT

( ) DRAFT (X) FINAL

Lead Agency:	United States Department of the Interior Bureau of Land Management
Cooperating Agency:	Nevada Division of Wildlife
Counties Directly Affected:	White Pine and Elko Counties, Nevada
Environmental Impact Statement Contact:	Correspondence on this Final environmental impact statement should be directed to:
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Date Draft environmental impact statement filed with United States Environmental Protection Agency: April 18, 1995.

Date Final environmental impact statement filed with United States Environmental Protection Agency: ______________.

ABSTRACT

Bald Mountain Mine Properties proposes to expand gold mining activities in 1996 in the Bald Mountain area 75 road miles northwest of Ely, Nevada. The Bald Mountain Mine Expansion Project (Proposed Action) would involve the excavation of seven pits and the construction of three waste rock dumps at the Horseshoe/Galaxy Mine, as well as the construction of an ore processing facility in Mooney Basin. The Proposed Action would also involve modifications to the existing Process and Top Areas at the Bald Mountain Mine through the excavation of a new pit and the expansion of an existing pit, the construction of a new waste rock dump and the expansion of an existing dump, and the construction of a new ore processing facility. All mining and waste rock disposal would occur on public land managed by the Bureau of Land Management. A total of 1,450 acres would be disturbed by the Proposed Action. Mining operation is expected to occur 7 days per week. Development is expected to last 12 years at the Process Area, 10 years at the Top Area, and 4 years at the Horseshoe/Galaxy Mine.

This Final environmental impact statement analyzes the environmental effects of the Bald Mountain Mine Expansion Project, plus the No Action Alternative and four additional alternatives that would involve different waste rock disposal options and reclamation requirements.

Official Responsible for environmental impact statement:

Ann J. Morgan
State Director, Nevada

9-6-95
Date

SUMMARY

SUMMARY

Bald Mountain Mine Properties proposes to expand gold mining operations within the historic Bald Mountain mining area in White Pine County between Elko and Ely, Nevada (see Map 1-1). Mining of small deposits of precious metals, including gold, has occurred in the area since 1869. In 1976, Bald Mountain Mine Properties began exploration on claims within the district. Gold mining began in 1983, when Bald Mountain Mine Properties installed a pilot scale 600 gallon-per-minute heap leach project at Bald Mountain Mine; in 1985, the project was upgraded to a 1,200 gallons per minute heap leach facility. Bald Mountain Mine Properties intends to expand its operations by developing the Horseshoe/Galaxy Mine to the southeast of Bald Mountain Mine and by expanding operations in the Process and Top Areas of the existing Bald Mountain Mine (see Map 1-2). To date, historic mining activities have disturbed a total of 2,100 acres, of which 300 acres have been reclaimed. Although mining is the most prominent present land use within this area, other uses include livestock grazing, wildlife and wild horse use, and recreation. Under the Proposed Action, an additional 1,450 acres would be impacted, of which 1,316 acres would be reclaimed.

PURPOSE AND NEED

Bald Mountain Mine Properties's economically driven project objectives are to expand gold mining activities in the Bald Mountain Mine area and to extract economically recoverable gold that has been determined to exist in the area. The Bureau of Land Management has the responsibility and authority to manage the natural resources of the Egan Resource Area. In April 1994, the Bureau of Land Management determined that an environmental impact statement would be required for the project, and a Notice of Intent to prepare the environmental impact statement was published in the Federal Register on May 11, 1994. The Draft and Final environmental impact statements were prepared in compliance with the National Environmental Policy Act and in accordance with the Bureau of Land Management Handbook H-1790-1.

A technical appendix (Appendix B in the Draft and Final environmental impact statements) has also been prepared to address the issue of cumulative impacts associated with the Bald Mountain Mine Expansion Project. Mining development activity in the Proposed Action area has occurred on a limited basis since the late 1800s. However, with the increase in gold prices in the early 1980s and the improvement of extraction technology, mining activity and associated surface disturbance in the area has increased in the past 15 years. Since recent mining development to date has been permitted through environmental assessments for individual mining units, the Bureau of Land Management became concerned with the need for a more thorough analysis of the cumulative impacts in the Buck and Bald Mountain area, not only from mining but also from other activities such as grazing and increased human use. Mining and grazing were seen as the primary causes of impacts, while wildlife, wild horses, and livestock and the forage they consume were assumed most likely to be affected by cumulative impacts in the project area.

Cumulative impact analysis is not a new requirement for inclusion in an environmental impact statement, but rather has been an integral part of the regulations published by the Council on Environmental Quality since their inception in 1978 (see 40 Code of Federal Regulations, Part 1500). In September 1990, the Bureau of Land Management Nevada State Director issued an Instruction Memorandum (NV-90-435) covering cumulative impact analysis. This was followed by Bureau-wide Guidelines for Assessing and Documenting Cumulative Impacts in April 1994. The content of the technical appendix follows the guidance contained in these documents and is intended to serve as a basis for evaluating future proposals in the Buck and Bald Mountain area.

The proposed use of public lands and the National Environmental Policy Act are the driving mechanisms behind an environmental analysis and this environmental document. The environmental impact statement considers the potential environmental impacts that may result from expanding gold mining activities in the Proposed Action area.

PROPOSED ACTION

The Bald Mountain Mine Expansion Project includes two components: the Horseshoe/Galaxy Mine and the Process/Top Area Modifications totalling 1,450 acres (see Map 1-2). At the Horseshoe/Galaxy Mine, seven pits in three locations would be mined; the ore would be processed at a new facility in Mooney Basin (see Map 2-2). Existing roads would be upgraded to accommodate the 85-ton haul trucks, and new haul roads to new pits would also be constructed. Three waste rock dumps would also be constructed. The acreage disturbed by this development would total 423 acres.

Modifications to the Process and Top Areas at the existing Bald Mountain Mine would include three related developments. An open pit would be constructed at Sage Flats, just south of the existing Top pit, and a new waste rock dump would be constructed east of the pit (see Map 2-3). This development would disturb approximately 357 acres. The existing Top pit would be expanded and an existing waste rock dump would be expanded into South Water Canyon (see Map 2-3). This expansion would disturb approximately 223 acres. Finally, an ore processing facility would be constructed adjacent to the No. 2 process facility (see Map 2-4), disturbing 447 acres. The existing processing scenario would be modified to include a wet crushing circuit that would produce a split flow of ore; the proposed processing facility would consist of both heap leaching and carbon-in-leach facilities with associated tailings impoundments.

The proposed project is located in White Pine County, Nevada, approximately 75 road miles northwest of the city of Ely. All mining activity would take place on publicly-owned land managed by the Bureau of Land Management, Ely District Office. Construction and development at both the Horseshoe/Galaxy Mine and the Process/Top Areas would commence in 1996. Final reclamation of these component areas would be complete by 2011. Bald Mountain Mine Properties estimates that approximately 12.1 million tons of ore from Sage Flats pit and the Top pit expansion would be processed by the existing and proposed processing facilities over the project's 12-year life. Approximately 4.5 million tons of ore would be mined and processed using the heap leach method to recover gold from the Horseshoe/Galaxy Mine over the 4-year lifetime of the project.

ALTERNATIVES

The Draft environmental impact statement analyzes the direct, indirect, and cumulative environmental impacts of the Proposed Action and six alternative scenarios: the No Action Alternative, the Alternative to Backfill Pits at Horseshoe/Galaxy Mine, the Alternative to Relocate the Haul Road and Modify South Water Canyon Dump, the Alternative to Relocate the Haul Road and Modify East Sage Dump, and two options under the Reclamation Alternative, including use of an exclusively native seed mixture and final grading of Top Area slopes at 3:1 without terraces versus 2.2:1 with horizontal terraces. These alternatives are described in the following sections.

No Action Alternative

Under the No Action Alternative, gold mining at the Horseshoe/Galaxy and Sage Flats areas would not occur, and the existing Top pit and processing areas at the Bald Mountain Mine would not be expanded. Mineral resources in these areas would remain undeveloped, and no construction of new pits, waste rock dumps, leach pads and ponds, or gold recovery facilities would occur. Mining would continue in the permitted areas of Bald Mountain Mine until reserves are exhausted. The mine would then be closed and existing disturbance reclaimed.

Alternative to Backfill Pits at the Horseshoe/Galaxy Mine

Facilities associated with an alternative of backfilling pits at the Horseshoe/Galaxy Mine can be found on Map 2-2. Assuming that mining of the seven pits at the Horseshoe/Galaxy Mine would begin with the Horseshoe and Bida pits, this waste rock would be deposited in the Horseshoe waste rock dump. During the subsequent mining of the Galaxy pit, this waste rock would be used to backfill the Horseshoe pit. This alternative would reduce the disturbance at the Galaxy waste dump by 15 acres but increase mining costs due to the increased haul distance. The Horseshoe pit would not be completely backfilled even after the Galaxy pit is complete. Waste rock from two of the four Saga pits would be placed in the Saga waste rock dump; waste rock from the remaining two pits could be used to backfill the original two pits. This pit backfilling would reduce the planned disturbance of the Saga waste rock dump by approximately 14 acres. In order for backfilling of the Saga Pits to occur, new access roads would disturb an additional 11 acres. The two backfilled pits totaling 9 acres would be reclaimed. Total disturbance would be 1,432 acres.

Alternative to Relocate Haul Road and Modify South Water Canyon Dump

Under this alternative (shown on Map 2-5), the existing haul road from the Top Area to the processing facility would be relocated from South Water Canyon to North Water Canyon, allowing for waste rock to be deposited across the entire width of South Water Canyon (approximately 193 acres). The relocation would require upgrading 1.5 miles of existing road and constructing 0.5 mile of new road between the canyons. Total surface disturbance associated with the Top Area Modifications under this alternative would increase from 580 to 608 acres, for a total surface disturbance for the alternative of 1,478 acres.

Alternative to Relocate Haul Road and Modify East Sage Dump

This alternative (shown on Map 2-6) would include the haul road relocation to North Water Canyon described in the preceding alternative but would also divert 30 million tons of waste rock from the East Sage dump to the expanded South Water Canyon dump. The ultimate size of the East Sage dump would drop to 166 acres, while that of the South Water Canyon dump would increase to 210 acres. Under this alternative, the distance between the East Sage dump and Cherry Spring would be increased. The total surface area disturbed by the Top Area modifications would decrease from 580 to 556 acres, for a total surface disturbance for the alternative of 1,426 acres.

Reclamation Alternative

This alternative is composed of two options, the first of which would require only native species to be used for reclamation purposes. Under the

Proposed Action, a mixture of native and non-native species would be selected based on the results of a site-specific test plot program. The second option would require final side slopes in the Top Area to be 3 feet horizontal to 1 foot vertical (3:1), instead of 2.2:1 with horizontal terraces every 100 feet in elevation, as specified under the Proposed Action. The 3:1 slopes would be constructed without terraces. The proposal for 3:1 side slopes for the Horseshoe/Galaxy Mine is not altered under this alternative. Map 2-7 shows the expanded "footprints" for the East Sage and South Water Canyon waste rock dumps with 3:1 slopes. Total surface disturbance would increase from 1,450 to 1,602 acres.

IMPORTANT ISSUES AND IMPACT CONCLUSIONS

A number of important issues were raised during scoping for this environmental impact statement. These issues along with their impact conclusions are presented below. Impact conclusions include the implementation of mitigation measures that have been identified. These measures are presented in detail in Chapter 4 of this Final environmental impact statement. A summary and comparison of environmental impacts for the Proposed Action and all alternatives can be found at the end of Chapter 2 on Table 2-16. Detailed discussions of impacts can be found in Chapter 4 of this Final environmental impact statement.

Soils

See vegetation and reclamation issues.

Vegetation

Issue: Loss of forage for wildlife, wild horses, and livestock.

Conclusion: Approximately 1,450 acres of native vegetation would be lost during the mining operation. All but 134 acres would be reclaimed. Plant communities on reclaimed areas would be dominated by weedy species, other forbs, and grasses for approximately 5 to 7 years after reclamation. Grasses, native forbs, and shrubs would become more prevalent as time progresses. Forage production would increase in the long term. (Also see Access and Land Use.)

Geology and Minerals

No issues were identified, and no impacts were identified.

Water Resources

Issue: Effects of pumping on groundwater drawdown.

Conclusion: Stock wells within a 1- to 2-mile radius of the Bald Mountain Mine well field may show impacts after 8 to 10 years of pumping. Aquifer drawdown of 6 to 10 feet in this limited area is expected to rebound within about 20 years following the end of processing (12 years). The proposed well at Mooney Basin should not impact the bedrock groundwater aquifer in Mooney Basin.

Issue: Acid generation and metals mobilization from waste rock, pit walls and tailings that could contaminate surface water.

Conclusion: No impacts to groundwater or surface water quality are expected from the waste rock dumps, pits, or tailings impoundment. Waste rock dumps have the potential to generate runoff with elevated arsenic, iron, manganese, and possibly mercury, but modeling has shown that seepage from the dumps is very unlikely. Testing indicates that the pits have no potential to generate acid. Impacts of the proposed tailing facility are expected to be negligible.

Wetlands and Waters of the U.S.

Issue: Impacts to wetlands, riparian areas, and waters of the United States.

Conclusion: Construction within the Proposed Action area would not directly impact wetlands or riparian areas. Other waters of the United States (one intermittent drainage totalling 0.04 acre) would be directly impacted by placement of culverts during construction of proposed haul roads. Project design measures would minimize erosion and sedimentation in all drainages and divert discharges and runoff from the waste rock dumps.

Wildlife and Fisheries Resources

Issue: Direct, indirect, and cumulative impacts to big game, upland game, and nongame species and their associated habitats.

Conclusion: Habitat loss would total 1,450 acres, within a 295,000-acre crucial mule deer winter range. All but 134 acres would be reclaimed. Total habitat disturbed would include 595 acres of potential migratory bird nesting habitat within piñon-juniper woodland, mixed shrub, and mountain mahogany. Wildlife displacement and habitat fragmentation would occur. Nesting and brooding habitat for upland game birds may be affected at Cherry Spring. Effects to roosting bats would be avoided. Effects from displacement would be offset by the Bureau of Land Management's Final Multiple Use Decision on grazing allotment, ongoing horse gathers from the Buck and Bald Herd Management Area, and improving wildlife habitat through vegetation conversion, all of which reduce grazing pressure on rangeland.

Issue: Potential impacts to wildlife from cyanide solutions.

Conclusion: Due to exclosures or cyanide neutralization required for cyanide solutions toxic to wildlife, effects to wildlife would be minimal.

Threatened, Endangered, or Candidate Species

Issue: Impacts to threatened or endangered species, including Federal candidate species.

Conclusion: No threatened, endangered, or candidate plants have been documented in the Proposed Action area. Potential effects would be limited to short-term loss of and long-term changes to foraging habitat for migrant species and potential direct effects to the pygmy rabbit, western burrowing owl, and several candidate bat species.

Wild Horses

Issue: Impacts of the expanded mining operations to wild horses migrating through the area.

Conclusion: Effects to wild horses from expanded mining operations would be minimal, based on reduced herd size and environmental protection measures.

Cultural Resources

Issue: Excavation will lead to the permanent loss of cultural resources.

Conclusion: Based on a programmatic agreement between the mine operator and the Bureau of Land Management, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation, specific safeguards are in place to ensure that if cultural resources are discovered or affected in an unanticipated manner during construction activities, proper steps would be taken to evaluate the quality of the resource, to determine whether the loss is acceptable, and to mitigate losses that are not acceptable. In some cases, construction activities could lead to the permanent loss of cultural resources.

Issue: Development will lead to indirect impacts (e.g., casual collecting).

Conclusion: Indirect impacts would be controlled by continuing to limit employee access to known archaeological sites, educating employees about the significance of cultural resources, and implementing a strict management policy restricting the casual collection of artifacts from the project area.

Air Quality

Issue: Impacts to air quality.

Conclusion: Maximum concentrations of particulate matter smaller than 10 micrometers, oxides of nitrogen, carbon monoxide, and sulfur dioxide would not exceed State or Federal ambient air quality standards. Process and fugitive dust emissions from the facilities would be less than 100 tons per year. Air pollution controls, including dust control along haul roads, would reduce impacts to air quality during construction, operation, and reclamation.

Social and Economic Resources

Issue: Socioeconomic impacts in White Pine, Elko, and Eureka Counties.

Conclusion: Tax revenue contributions to White Pine County, Elko County, and State coffers would continue through 2007; 25 additional employees from the local areas would be required for the expansion project and would increase the annual payroll by $977,000 to $9.1 million. Due to the small number of additional personnel, no noticeable changes in population numbers and infrastructure utilization are anticipated. However, the additional personnel and payroll would have the beneficial effect of inducing a small number of additional indirect jobs and income throughout the regional economy. The proposed expansion would further facilitate efforts by Bald Mountain Mine Properties to phase out operations over several years, thereby ameliorating the adverse impacts resulting from a sudden cessation of the mining operation. The mine operations are located in White Pine County, and mine personnel are expected to reside in White Pine County and Elko County; consequently, there would be no socioeconomic impacts in Eureka County.

Recreation

No issues were identified, and only minimal impacts to dispersed recreation from the short-term loss of use of 1,450 acres of public land were identified.

Visual Resources

Issue: Visual resource impacts to Ruby Lake National Wildlife Refuge.

Conclusion: Although portions of the Horseshoe/Galaxy Mine and East Sage dump would be visible from Ruby Marsh Road, visual contrasts and impacts associated with project components are not expected at Ruby Lake National Wildlife Refuge. Impacts along portions of Ruby Marsh Road would be moderate to high.

Paleontological Resources

No issues were identified, and no impacts were identified.

Reclamation

Issue: Identification of reclamation areas and proposed treatment.

Conclusion: Areas to be reclaimed would be identified based on the nature of disturbance. The Proposed Action would reclaim 1,316 acres of the 1,450 acres disturbed; pits would not be reclaimed. Proposed treatment methods would be developed using a test plot program to evaluate components such as growth medium stockpiling practices; seeding mixtures, techniques, and rates; and growth medium amendments.

Hazardous Materials and Wastes

Issue: Impacts of mining on human health, especially as a cause of cancer.

Conclusion: None of the process chemicals or fuels expected to be utilized in large quantities are carcinogenic.

Fugitive dust emissions would be mitigated through watering and/or the use of chemical treatment methods. Increases in cancer are not anticipated from mining.

Issue: Transportation of hazardous materials and location of sensitive resources along these routes.

Conclusion: The chances of a process chemical or diesel fuel release have been estimated at less than 1 over the 12-year life of the mine (226 releases of hazardous materials occurred in Nevada in the 10 years between 1983 and 1992). All material carriers would comply with Federal and State regulations. In addition, Bald Mountain Mine Properties has prepared an emergency response plan to deal with potential releases. The 150 miles of transportation routes intersect 10 miles of riparian and wetland areas, and would pass through about 2 miles of commercial and residential development in the communities of Elko and Ely. If a truck spill occurred in a sensitive area, impacts to soils, water, biological resources, and people would be expected. However, the probability of such a spill would be very low because only about 8 percent of the 150-mile transportation routes would cross these sensitive areas.

Access and Land Use

Issue: Impacts to livestock grazing.

Conclusion: A short-term loss of an average of 138 tons per year of forage potentially utilized by livestock and short-term displacement of 347 animal unit months (used by both livestock and wild horses) would occur. Approximately 345 animal unit months are expected to be recovered following reclamation. The long-term loss is expected to be 2 animal unit months. About 447 acres of seeded range (Julian and West Bald seeding) would be lost to the expansion of the Process Area at Bald Mountain Mine.

AGENCY PREFERRED ALTERNATIVE

In accordance with the National Environmental Policy Act, Federal agencies are required by the Council on Environmental Quality (40 Code of Federal Regulations 1502.14) to identify their preferred alternative for a project in the Final environmental impact statement prepared for the project. The preferred alternative is not a final agency decision; it is rather an indication of the agency's preliminary preference. The alternative identified below is the Bureau of Land Management's preferred alternative at the Final environmental impact statement stage in the environmental review process. The Bureau of Land Management's preference considers all information that has been received and reviewed relevant to the proposed project. The agency preferred alternative is the Proposed Action as described in the environmental impact statement with all appropriate mitigation.

Rationale

- The Proposed Action would keep the North Water Canyon ecosystem intact and contain all disturbance in South Water Canyon, which would be reclaimed. The current disturbance for the Bald Mountain Mine is located in South Water Canyon.

- Reclamation would be achievable; however, the long slopes associated with the South Water Canyon dump may take more time to reclaim.

- The Proposed Action would meet the reclamation standards but at a lower cost than the 3:1 slope option in the Reclamation Alternative.

- The Proposed Action would have no short- or long-term impacts to riparian vegetation.

- The Proposed Action would not have effects on the human environment that are highly uncertain and would not involve any unique or unknown risks to public health and safety.

TABLE OF CONTENTS

1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 PROPOSED ACTION

Bald Mountain Mine Properties proposes to expand gold mining operations within the historic Bald Mountain Mining District in White Pine County between Elko and Ely, Nevada (see Map 1-1). The Proposed Action would include two projects, the Horseshoe/Galaxy Mine and the Process/Top Area Modifications. A total of 1,450 acres of public land administered by the Bureau of Land Management would be required for these projects, including ancillary facilities.

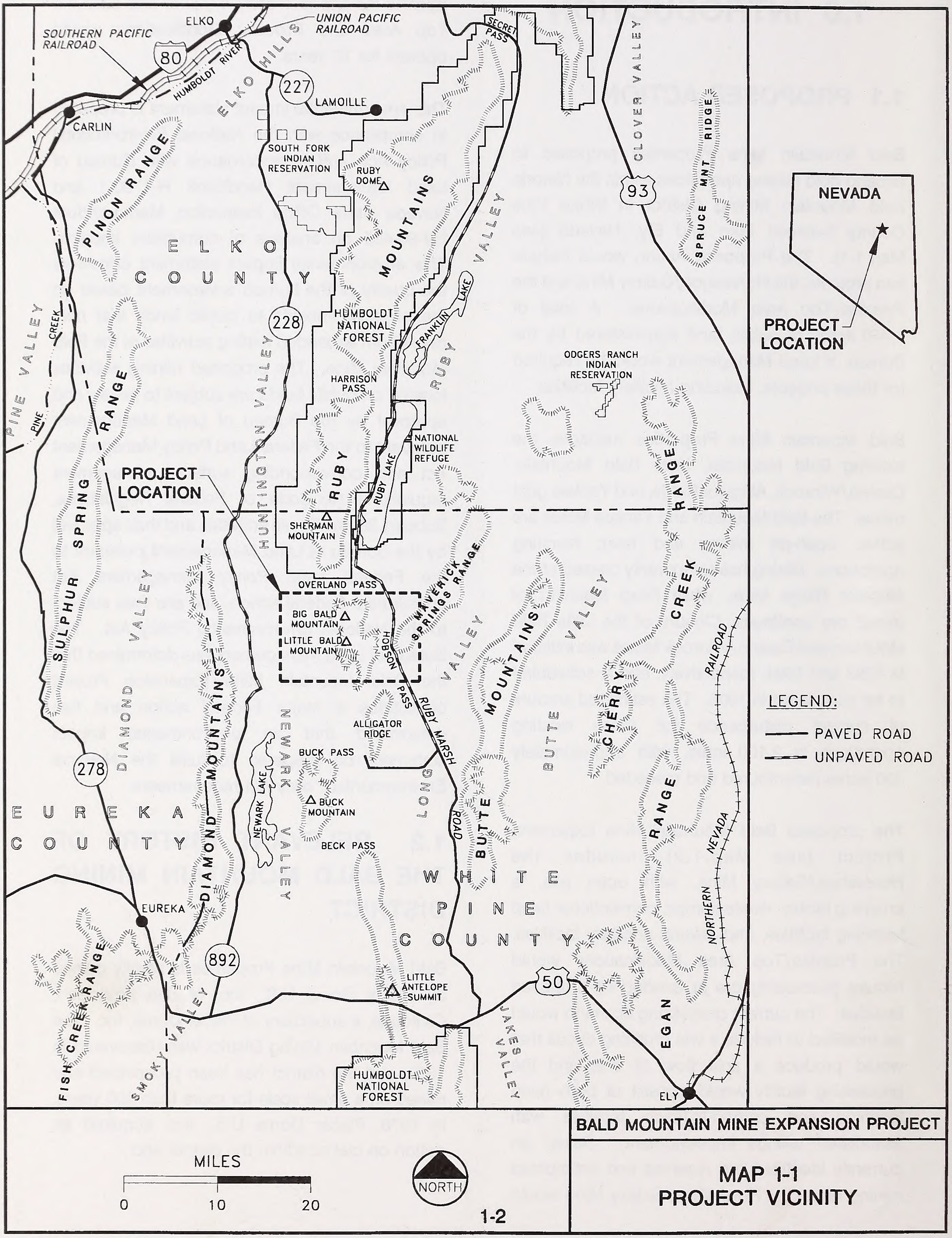
Bald Mountain Mine Properties manages the existing Bald Mountain, Little Bald Mountain, Casino/Winrock, Alligator Ridge, and Yankee gold mines. The Bald Mountain and Yankee Mines are active, open-pit mining and heap leaching operations. Mining has temporarily ceased at the Alligator Ridge Mine, while heap leaching of mined ore continues. Closure of the Little Bald Mountain and Casino/Winrock Mines was initiated in 1993 and 1994, respectively, and is scheduled to be completed in 1995. The estimated amount of current disturbance for these existing operations is 2,100 acres, with approximately 300 acres recontoured and reseeded.

The proposed Bald Mountain Mine Expansion Project (see Map 1-2) includes the Horseshoe/Galaxy Mine, with open pits, a crushing facility, waste dumps, conventional heap leaching facilities, and several ancillary facilities. The Process/Top Area Modifications would require processing ore at existing or proposed facilities. The current processing scenario would be modified to include a wet crushing circuit that would produce a split flow of ore, and the processing facility would consist of both heap leaching and carbon-in-leach facilities with associated tailings impoundment. Based on currently identified ore reserves and anticipated mining rates, the Horseshoe/Galaxy Mine would operate for approximately 4 years, and both the Top Area and Process Modifications would operate for 12 years.

This environmental impact statement is prepared in compliance with the National Environmental Policy Act, and in accordance with Bureau of Land Management Handbook H-1790-1 and Nevada State Office Instruction Memorandum NV-90-435 on analysis of cumulative impacts. This environmental impact statement considers the quality of the human environment based on the physical impacts to public lands that may result from expanded mining activities at the Bald Mountain Mine. The proposed mining activities located on public lands are subject to review and approval by the Bureau of Land Management pursuant to the Federal Land Policy Management Act and corresponding surface management regulations (43 Code of Federal Regulations, Subpart 3809). These activities and their approval by the Bureau of Land Management pursuant to the Federal Land Policy Management Act constitute a Federal action, and are thus subject to the National Environmental Policy Act. The Bureau of Land Management has determined that the Bald Mountain Mine Expansion Project constitutes a major Federal action and has determined that an environmental impact statement be prepared to fulfill the National Environmental Policy Act requirements.

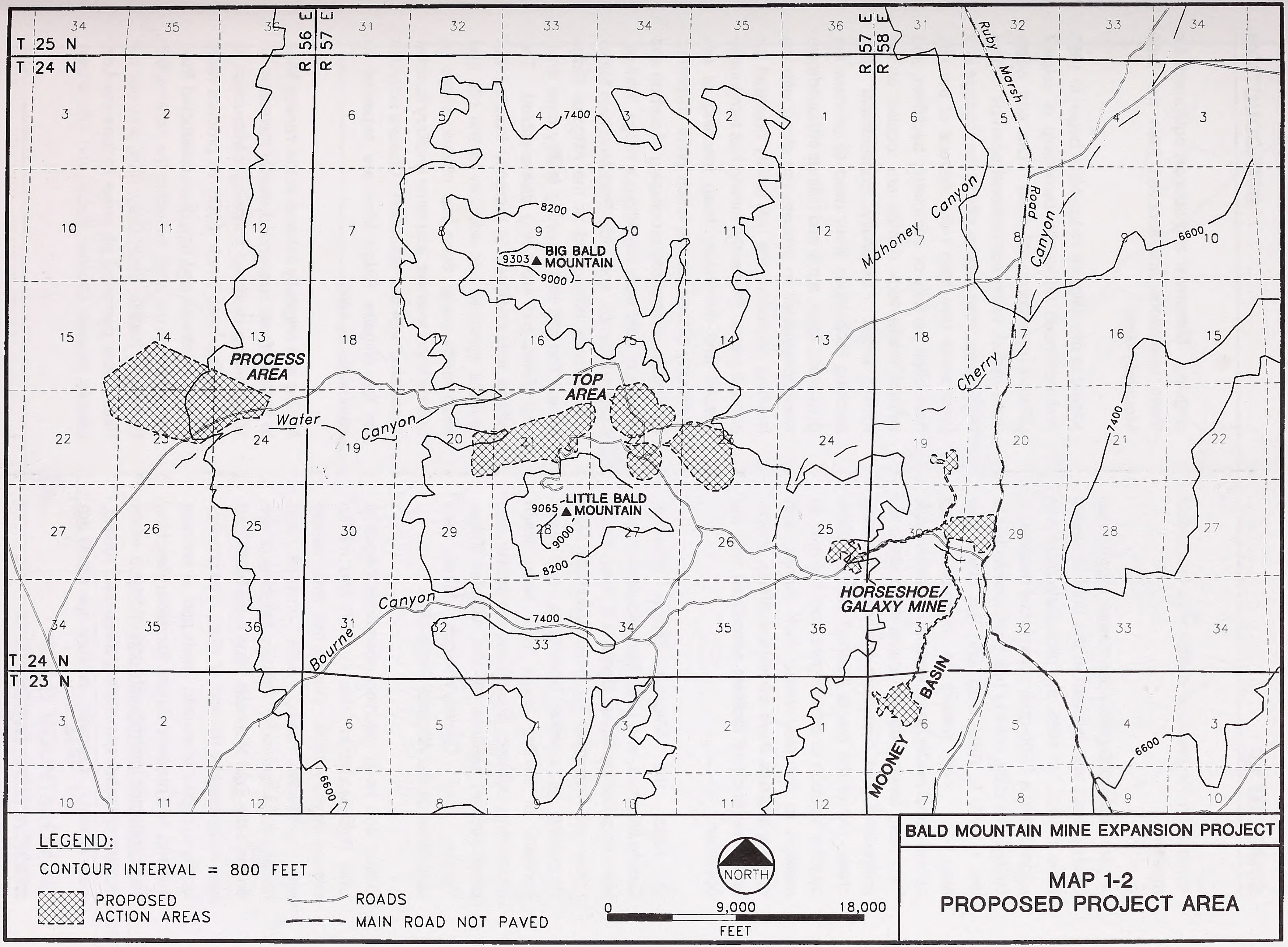
1.2 RELEVANT HISTORY OF THE BALD MOUNTAIN MINING DISTRICT

Bald Mountain Mine Properties is wholly owned by Placer Dome U.S., Inc. of San Francisco, California, a subsidiary of Placer Dome, Inc. The Bald Mountain Mining District was discovered in 1869, and the district has been prospected and mined on a small scale for more than 100 years. In 1976, Placer Dome U.S., Inc. acquired an option on claims within the district and



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 1-1
PROJECT VICINITY


T 25 N
T 24 N
T 23 N
R 56 E
R 57 E
R 58 E
Ruby Marsh Road
Mahoney Canyon
Canyon
Cherry
BIG BALD MOUNTAIN
9303
LITTLE BALD MOUNTAIN
9065
PROCESS AREA
TOP AREA
Water Canyon
Bourne Canyon
HORSESHOE/ GALAXY MINE
MOONEY BASIN
6600
7400
8200
9000
LEGEND:
CONTOUR INTERVAL = 800 FEET
PROPOSED ACTION AREAS
ROADS
MAIN ROAD NOT PAVED
NORTH
0
9,000
18,000
FEET
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 1-2
PROPOSED PROJECT AREA

exploration for precious metals was initiated at that time.

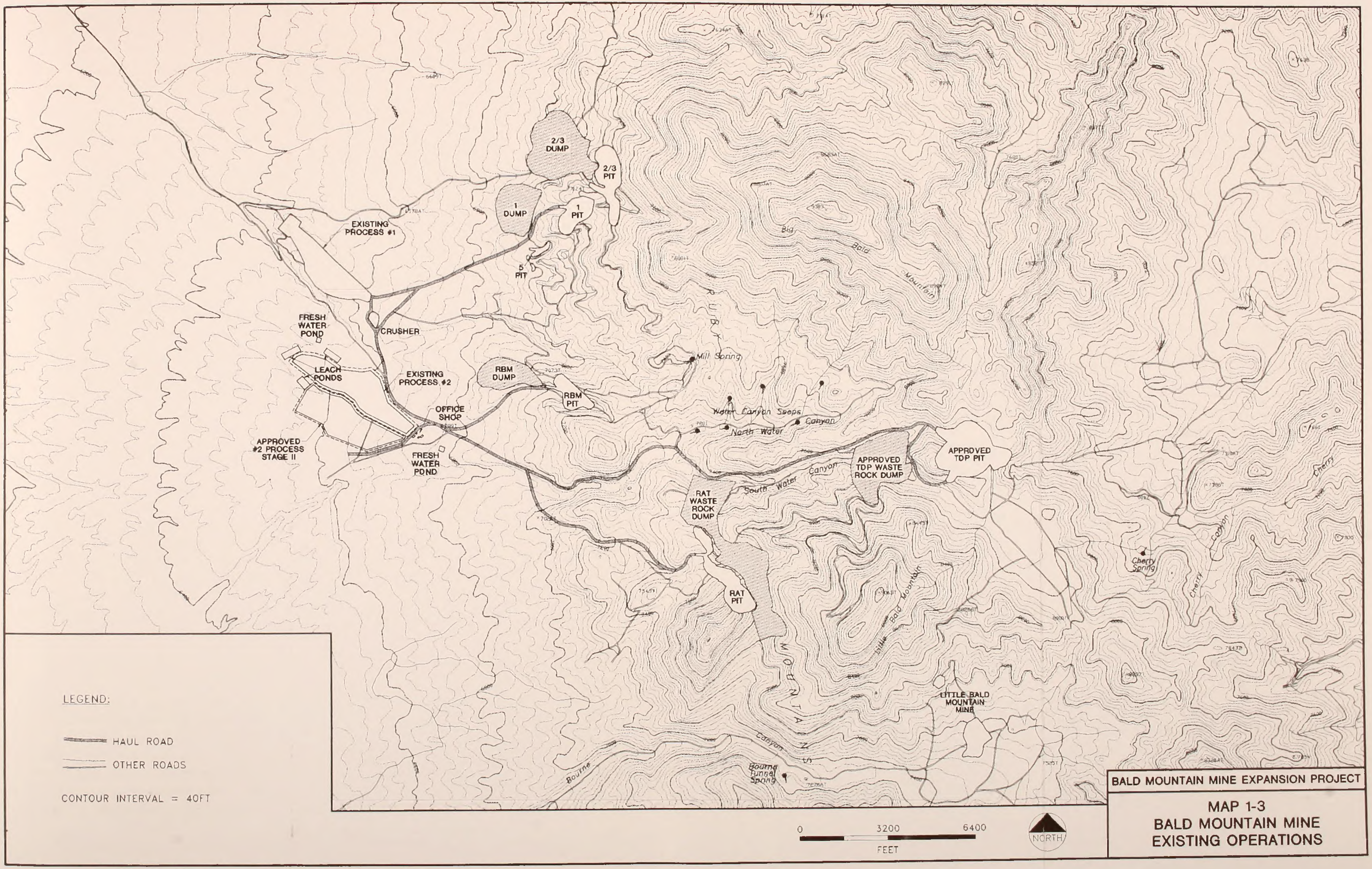
A pilot scale 600-gallon-per-minute (gpm) heap leach project was initiated at the Bald Mountain Mine in 1983. In 1985, the pilot scale plant was upgraded to a 1,200-gpm commercial heap leach facility. To date, mining has been conducted in the 1, 2/3, 5, RBM, Top, and Rat areas (see Map 1-3). All mining is open-pit, using conventional loader/truck excavation techniques. Two heap leach pads are currently in place for processing gold ores from the various mining areas. All of the ore is leached using a dilute cyanide solution to extract gold from the ore. In addition to the pits, waste rock dumps, and process facilities, there are several offices, shops, and other ancillary facilities associated with the operation.

In 1993, the Alligator Ridge, Yankee, Casino/Winrock, and Little Bald Mountain Mines were acquired by Placer Dome U.S., Inc. These mines are managed by Bald Mountain Mine Properties as satellite operations, and each consists of mining areas and heap leach processing facilities. Equipment, manpower, and other support services for the Alligator Ridge, Yankee, and Casino/Winrock Mines are centralized at the Alligator Ridge Mine.

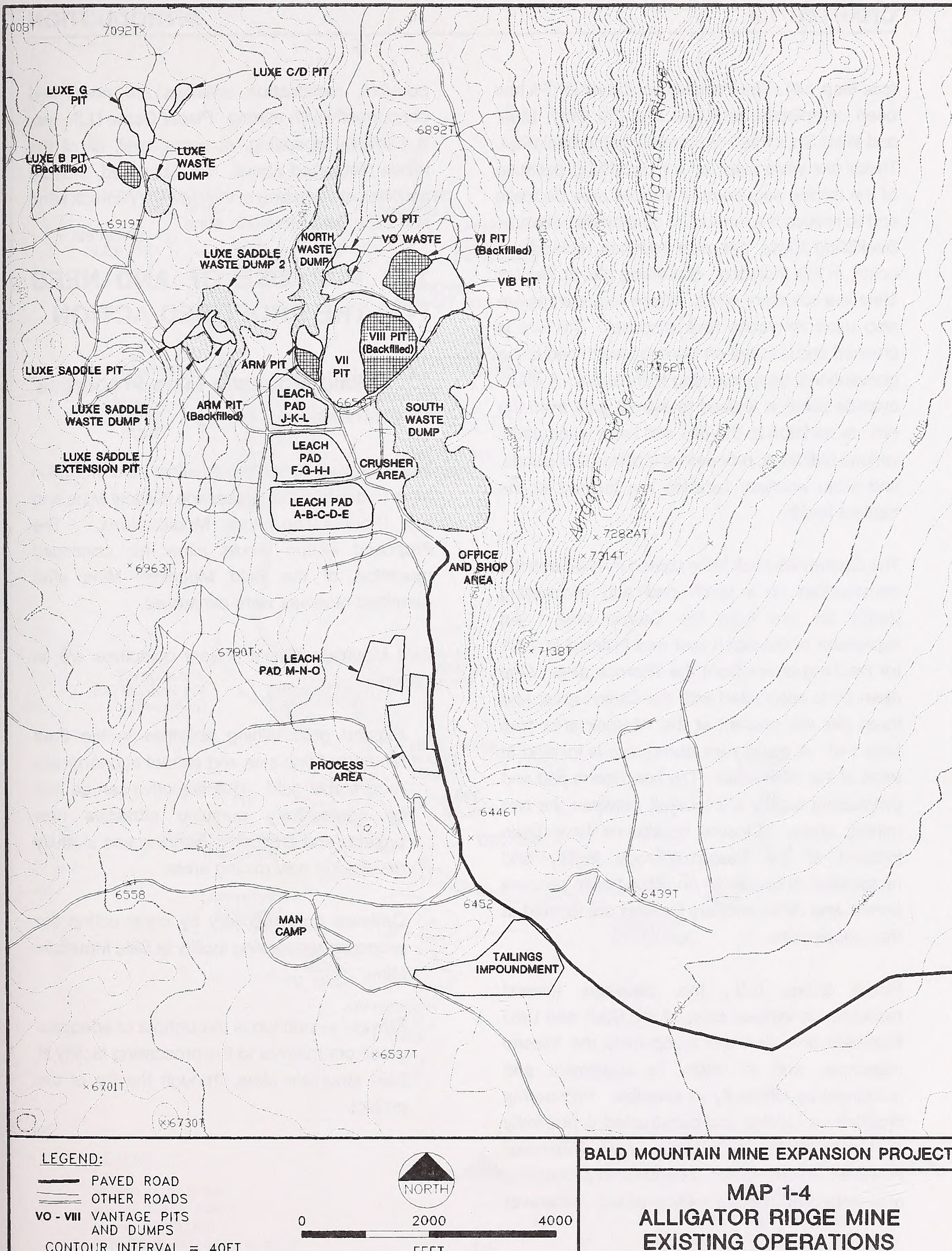
Mining and heap leaching operations began at Little Bald Mountain Mine in 1985 and mining ceased in early 1990. During this time, mining was conducted using both open-pit and underground methods. Primary leaching of ore on the Little Bald Mountain Mine heap leach pad was completed by the end of 1990. The process facility consists of a heap leach pad, a process building, and process ponds. Secondary leaching was conducted intermittently until mid-1993, when closure operations, including leach pad rinsing, were initiated. Currently, closure operations are ongoing. Manpower and support equipment for these operations are supplied from the Bald Mountain Mine.

Mining at the Alligator Ridge Mine began in 1980 and continued under the ownership of several different operators until 1990. Ore and waste were mined, using conventional open-pit mining techniques, from various pits in the Vantage and Luxe areas (see Map 1-4). Several of the pits have been partially or completely backfilled, and several waste rock dumps are located at the mining areas. Originally, conventional heap leaching techniques were used to process the gold ores. Later, a mill and tailings impoundment were constructed to process ore along with the leaching operation; the mill facility operated for about 2 years. Presently, mining has temporarily ceased and secondary heap leaching of ore previously placed on the leach pads continues. In addition, centralized processing of carbon and refining of gold from the Alligator Ridge, Yankee, Casino/Winrock, and Little Bald Mountain Mines are currently conducted at the Alligator Ridge Mine. The mill and crushing facility have been shut down and are being disassembled. The tailings impoundment is currently inactive, but remains operable. In addition to the pits and heap leach pads, there are offices, shops, a tailings impoundment, and other ancillary facilities associated with this operation. Closure activities for the Alligator Ridge Mine are expected to commence in 1995.

Mining was originally initiated at the Yankee Mine in 1989 and was suspended shortly thereafter. In 1991, mining resumed following construction of the existing heap leach facility to process ores. Mining continues and has been conducted from several pits in the area, including the Yankee/SW Extension, Saddle, Spur, Gray, Blue, and Monitor Pits. Other permitted pit areas include the Lee, Lincoln, Musket, Crusher, Rebel, and Rifle areas



2/3 DUMP
2/3 PIT
1 DUMP
1 PIT
EXISTING PROCESS #1
5 PIT
FRESH WATER POND
CRUSHER
LEACH PONDS
EXISTING PROCESS #2
RBM DUMP
RBM PIT
OFFICE SHOP
APPROVED #2 PROCESS STAGE II
FRESH WATER POND
Big Bald Mountain
Mill Spring
Water Canyon Seeps
North Water Canyon
South Water Canyon
APPROVED TDP WASTE ROCK DUMP
APPROVED TDP PIT
RAT WASTE ROCK DUMP
RAT PIT
Little Bald Mountain
Cherry Spring
Cherry Canyon
LITTLE BALD MOUNTAIN MINE
Bourne Canyon
Bourne Tunnel Spring
LEGEND:
HAUL ROAD
OTHER ROADS
CONTOUR INTERVAL = 40FT
0 3200 6400
FEET
NORTH
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 1-3
BALD MOUNTAIN MINE
EXISTING OPERATIONS



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 1-4
ALLIGATOR RIDGE MINE
EXISTING OPERATIONS

(see Map 1-5). The Yankee/SW Extension Pit has been completely backfilled and the Gray, Blue, and West Spur Pits are currently being backfilled. These pits were selected for backfilling because of the mining sequence of Yankee area deposits and to reduce the amount of surface disturbance. Backfilling these pits also reduces reclamation costs, in this instance. Backfilling pits at Yankee Mine is a voluntary effort. Waste rock dumps are also used for waste rock disposal. The ore is crushed and stacked on the heap leach pad using conventional heap leaching techniques. A dilute cyanide solution is used to extract gold from the ore. In addition to the pits and heap leach pads, various buildings, processing facilities and ponds, and other ancillary facilities are located at the Yankee facility.

The Casino/Winrock Mine started in 1990 with the construction of a leach pad and processing facility for ore from the Casino area. An expansion of the leach pad was initiated in 1991 for leaching of ore from the Winrock area. One open pit is associated with the Casino area, and three pits are present at the Winrock area (see Map 1-6). A waste rock dump also is located at each of the mine areas. The heap leach pad and processing facility are located between the two mining areas. Closure operations have been initiated at the Casino/Winrock facility and reclamation is ongoing. An office trailer, process ponds, and other ancillary facilities are located at the process site.

Placer Dome U.S., Inc. develops mineral resources in various areas of the Buck and Bald Mountain area in order to optimize the mineral resources, and to utilize its equipment and personnel as efficiently as possible. Processing facilities are located and constructed in proximity to the deposits to minimize haul distances; however, in some cases, a centralized processing area supports different mining areas. Wherever possible, reclamation activities are performed concurrently with mining. Placer Dome U.S., Inc. is currently operating, at some level, all of the mines discussed above. As discussed, closure activities are ongoing at the Casino/Winrock Mine and Little Bald Mountain Mine.

1.3 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.3.1 Bald Mountain Mine Properties' Objectives

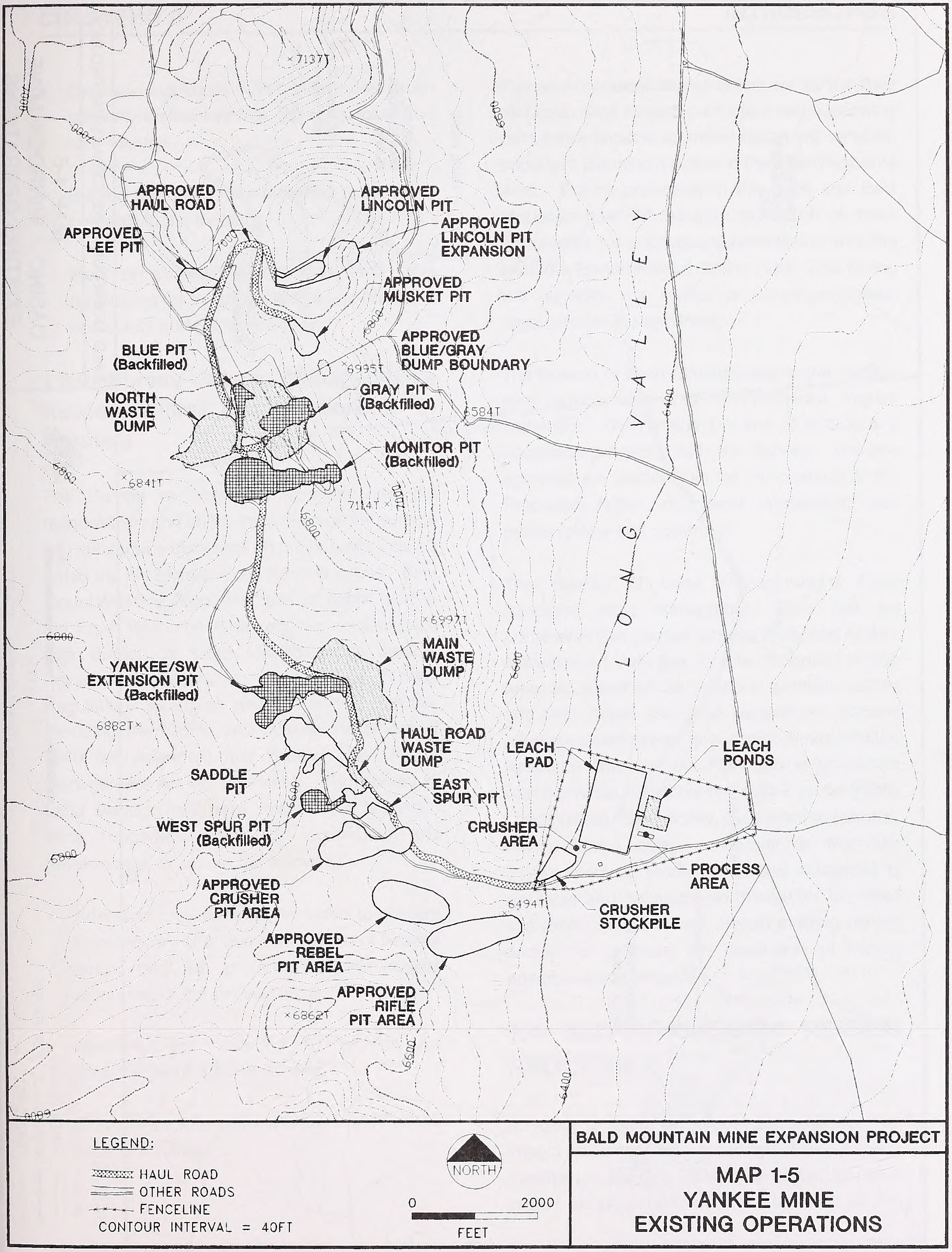
The Proposed Action would allow Bald Mountain Mine to develop the Horseshoe/Galaxy Mine and the Process/Top Area Modifications. The Proposed Action would allow for continued operation of the Bald Mountain Mine after permitted reserves were exhausted.

Bald Mountain Mine's project objectives are as follows:

- Expand gold mining activities in the Bald Mountain Mine area and extract economically recoverable gold. This objective can be met by aggressively pursuing attractive new projects and creatively financing and skillfully developing new mining areas.

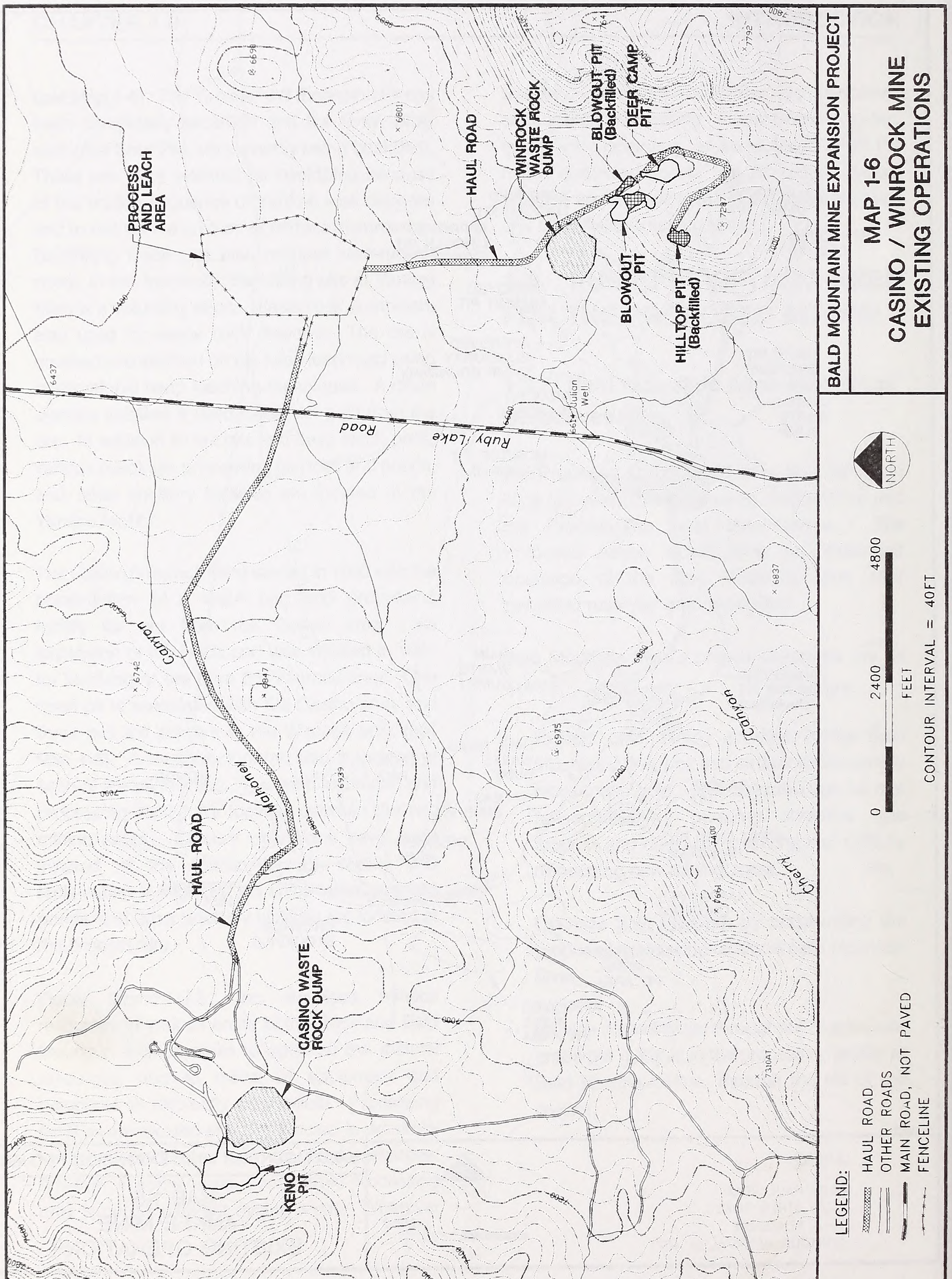
- Optimize gold recovery by constructing the proposed processing facility at Bald Mountain Mine.

- Provide a continuous throughput of adequate grade ore material to the processing facility at Bald Mountain Mine, through the life of the project.



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 1-5
YANKEE MINE
EXISTING OPERATIONS


BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 1-6
CASINO / WINROCK MINE
EXISTING OPERATIONS
LEGEND:
HAUL ROAD
OTHER ROADS
MAIN ROAD, NOT PAVED
FENCELINE
NORTH
0
2400
4800
FEET
CONTOUR INTERVAL = 40FT
PROCESS AND LEACH AREA
HAUL ROAD
WINROCK WASTE ROCK DUMP
BLOWOUT PIT (Backfilled)
DEER CAMP PIT
BLOWOUT PIT
HILLTOP PIT (Backfilled)
Julian Well
Ruby Lake Road
Mahoney Canyon
Cherry Canyon
HAUL ROAD
CASINO WASTE ROCK DUMP
KENO PIT

- Operate and reclaim the mine sites in an efficient, environmentally conscientious, and safe manner.
- Set the standards for ethical and responsible behavior in the industry.
- Meet or exceed Federal, state, and local regulations for the protection of human health and safety and the environment.

1.3.2 Bureau of Land Management's Responsibilities and Relationship to Planning

The Bureau of Land Management has the responsibility and authority to manage the surface and subsurface resources on public lands located within the Ely District, Egan Resource Area. Bald Mountain Mine Properties' use of public land in the Egan Resource Area requires conformance with Bureau of Land Management's surface management regulations (43 Code of Federal Regulations 3809), as well as various statutes, including the Mining and Mineral Policy Act of 1970 (as amended) and Federal Land Policy Management Act (as amended). The Bureau of Land Management must review Bald Mountain Mine Properties' plans for exploration and development to ensure the following:

- Adequate provisions are included to prevent unnecessary or undue degradation of Federal lands and to protect the non-mineral resources of the Federal lands.
- Measures are included to provide for reclamation of disturbed areas.
- Compliance with applicable state and Federal laws is achieved.

The environmental impact statement for the Bald Mountain Mine Expansion Project and supporting cumulative impacts technical report will serve an important planning function in the Egan Resource Area. Future proposals in the Buck and Bald Mountain area will be able to tier off of these documents for subsequent compliance with the National Environmental Policy Act. This tiering will expedite the review of future proposals, regardless of the applicant.

The Bureau of Land Management is the Federal lead agency for this environmental impact statement. The Nevada Division of Wildlife is a cooperating agency with the Bureau. The two agencies are responsible for the analysis of the Proposed Action, document preparation, and public review and comment.

The Bureau of Land Management's Egan Resource Area Management Plan has no constraints that conflict with the Proposed Action. Management activities for the Proposed Action area are identified as livestock grazing, wildlife and wild horse use, and recreation. Mineral resource development is in conformance with the Resource Management Plan and is consistent with the White Pine County Policy Plan for Public Lands (1985). Specifically, the White Pine County Policy Plan states: "Recognize that the development of Nevada's mineral resources is desirable and necessary to the nation, the state and White Pine County. Retain existing mining areas and promote the expansion of mining operations and areas."

1.4 ENVIRONMENTAL REVIEW PROCESS

A Notice of Intent to prepare the environmental impact statement was published in the Federal Register on May 11, 1994. The Notice of Intent invited scoping comments to be sent to the

Bureau of Land Management through June 17, 1994. On May 11, 1994, 300 copies of the news release, "Public Invited to Comment on the Bald Mountain Mine-Alligator Ridge Project," were issued statewide to newspapers, radio and television stations, and major interest groups. The Bureau of Land Management also mailed individual notifications to 325 interested persons, agencies, or groups. Public meetings were held in Ely, Elko, and Reno. Four members of the public attended the Ely meeting on May 31, 11 participants registered at the Elko meeting on June 1, and 15 individuals attended the Reno meeting on June 2. Comments recorded during these meetings are available in the Bureau of Land Management's Ely office. As a result of the public scoping process, 13 comment letters were received by the Bureau of Land Management from the following:

White Pine County Sheriff's Office
Duckwater Shoshone Tribe
Walt Johnson
Theona and Abb Richie
United States Bureau of Mines
Nevada Bureau of Health Protection Services
Nevada Division of Minerals
Nevada Division of State Lands
Nevada Division of Wildlife
United States Fish and Wildlife Service
Parsons, Behle & Latimer
Nevada Division of Water Resources
United States Environmental Protection Agency

On December 19, 1994, an update for the environmental impact statement was mailed to everyone on the project mailing list. This update informed the public of a change in the project name (Alligator Ridge Project to Bald Mountain Mine Expansion Project) and inclusion of an additional 161 acres of disturbance in the Proposed Action. This notice also requested assistance in updating the mailing list for the draft and final environmental impact statement. Responses were requested by January 23, 1995.

Following issuance of the draft environmental impact statement, public meetings ***were*** held in Ely, Elko, and Reno, Nevada, during the formal 45-day public comment period. ***Chapter 5.0, Consultation and Coordination, summarizes the comments from the public meetings and presents the written comments and responses.***

The BLM received 12 letters addressing the draft environmental impact statement during the 45-day public comment period. All letters were reviewed, and comments needing a response were identified. Responses were provided to clarify the contents of the draft environmental impact statement, modify or correct the draft environmental impact statement, or provide additional information in the final environmental impact statement. Where changes (modification, correction, or addition) have been made to the text contained in the draft environmental impact statement, these changes are presented in the final environmental impact statement in bold-italic type.

All letters have been reproduced in their entirety in Section 5.4 of the final environmental impact statement, and all material submitted has been reviewed and considered. Responses have been prepared for the comments identified and are presented in Section 5.4 of the final environmental impact statement. All letters have been reviewed and considered by the BLM in determining the agency preferred alternative for the proposed project.

The Bureau of Land Management Ely District has prepared previous environmental assessments for existing Bald Mountain Mine Properties' projects. Data presented in the environmental assessments and other technical studies were used to the extent practicable in preparation of this environmental impact statement. Also available were the Egan Resource Area Resource Management Plan and amendments, including the Approved Oil and Gas Leasing Amendment (May 1994) and the Southwest Intertie Project Final Environmental Impact Statement. This environmental impact statement analysis examined available 1989, 1991, and 1993 French SPOT satellite imagery for the Proposed Action area and Bureau of Land Management Cumulative Impact Position Papers that identify discipline-specific resource issues within the Egan Resource Area. Previous and ongoing technical studies for neotropical migratory birds and the water chemistry for area seeps and springs also were used to prepare this environmental impact statement.

Wilderness resources would not be affected by the Proposed Action, since none are present in the area and are therefore not addressed in the environmental impact statement. The Bureau of Land Management also is required to assess impacts to prime or unique farmlands, floodplains, and Areas of Critical Environmental Concern; none of these areas occur within the Proposed Action. This elimination of nonrelevant issues follows the Council on Environmental Quality policy as stated in 40 Code of Federal Regulations 1500.4.

1.5 APPLICABLE REGULATORY REQUIREMENTS AND COORDINATION

The permits shown on Table 1-1 would be required for this Proposed Action. Bald Mountain Mine Properties is responsible for applying for and acquiring these permits.

1.6 ORGANIZATION OF THE ENVIRONMENTAL IMPACT STATEMENT

This environmental impact statement follows the Council on Environmental Quality recommended organization (40 Code of Federal Regulations 1508.9): Chapter 1.0 provides descriptions of existing operations, the purpose and need of the Proposed Action, the role of the Bureau of Land Management, and public participation in the environmental impact statement process; Chapter 2.0 describes the Proposed Action and Alternatives; Chapter 3.0 describes the affected environment; and Chapter 4.0 describes direct, indirect, and cumulative impacts associated with the Proposed Action and Alternatives and possible mitigation to reduce or minimize impacts. Chapter 5.0 summarizes the ***consultation and coordination for preparation of the environmental impact statement and presents the comments from public meetings, written letters, and responses to comments.*** Chapter 6.0 presents the list of preparers, and Chapter 7.0 is a list of references. Copies of supporting documents are on file in the Bureau of Land Management's office in Ely.

Table 1-1

Major Permits and Approvals Required for the Bald Mountain Mine Expansion Project

Permit/Approval	Granting Agency
Approval of Plan of Operations	Bureau of Land Management
Nationwide Dredge and Fill Permit (Section 404)	Army Corps of Engineers
Surface Disturbance Permit (Air Quality)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality
Permit to Operate (Air Quality)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Air Quality
Water Pollution Control Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Reclamation Permit	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Mining Regulation and Reclamation
Permit to Appropriate Water	Nevada Department of Conservation and Natural Resources, Division of Water Resources
Permit for Dam Construction	Nevada Department of Conservation and Natural Resources, Division of Water Resources
Industrial Artificial Pond Permits	Nevada Department of Conservation and Natural Resources, Nevada Division of Wildlife
Approval to Operate a Sanitary Landfill	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Solid Waste
General Discharge Permit (Stormwater)	Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control
Hazardous Materials Storage Permit	State of Nevada, Fire Marshal Division

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 PROPOSED ACTION

2.1.1 Introduction

A Plan of Operations for the Bald Mountain Mine Expansion Project has been submitted by Bald Mountain Mine Properties to the Bureau of Land Management, Ely District Office, in compliance with 43 Code of Federal Regulations 3809. The Proposed Action in this Plan of Operations includes various components (see Map 2-1). A new mine and processing facility, the Horseshoe/Galaxy Mine, is proposed approximately 12 miles north of the existing Alligator Ridge Mine, on the eastern side of the southern Ruby Mountains. This facility would be a stand-alone facility, operated by existing personnel from the Alligator Ridge Mine. This mine would result in approximately 423 acres of disturbance. In addition to the Horseshoe/Galaxy Mine, the Proposed Action includes Process/Top Area Modifications to the existing Bald Mountain Mine. These modifications include the following:

1. Sage Flats Development: Development of an open pit, waste rock dumps, and roads located approximately 0.25 mile south of the existing Top pit. This development would result in approximately 357 acres of disturbance.

2. Top Pit Expansion: Expansion of the existing Top pit and waste rock dump. This expansion would result in approximately 223 acres of disturbance.

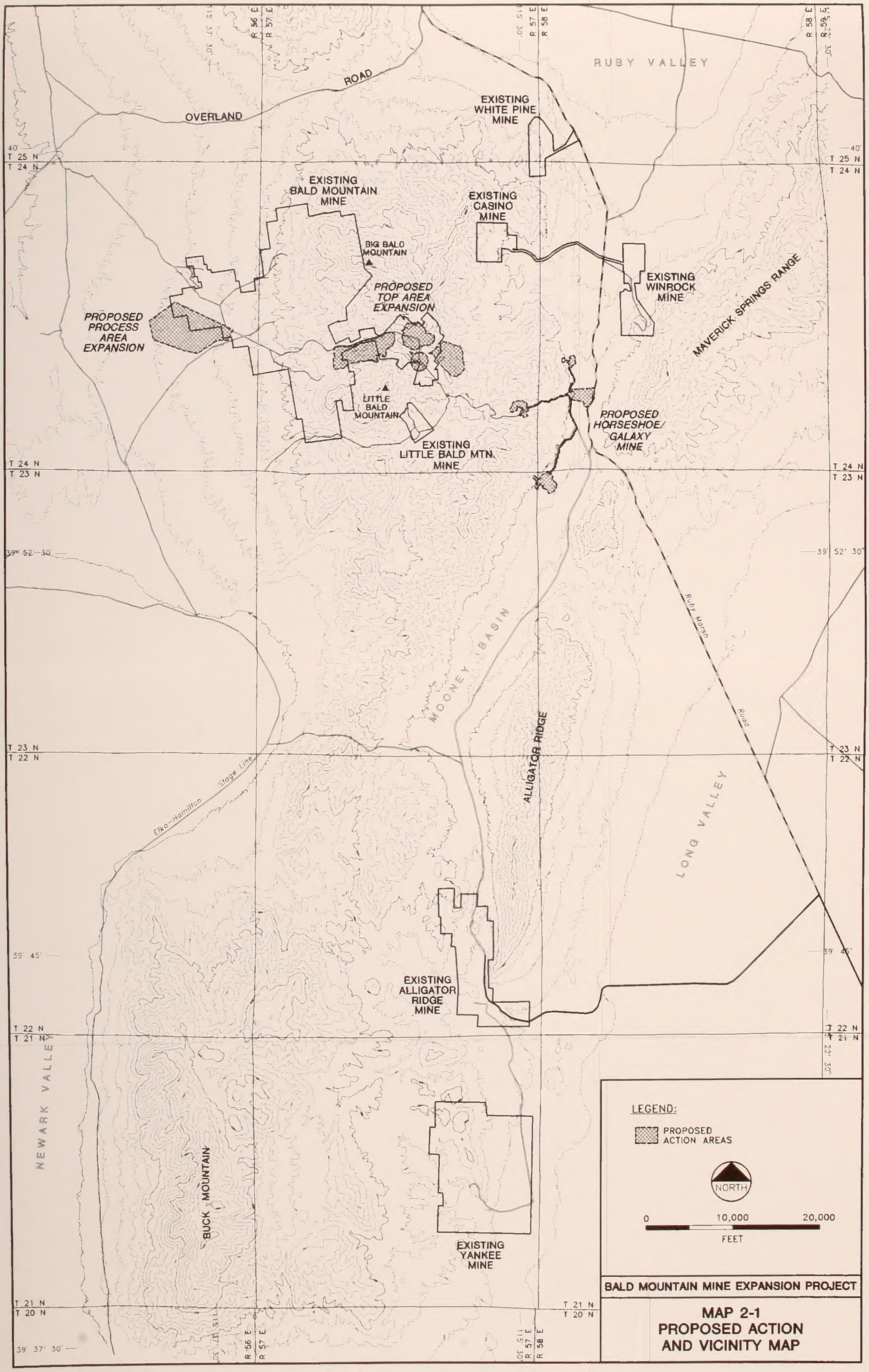
3. Ore Processing Facility: An ore processing facility would be constructed adjacent to the approved No. 2 process facility expansion. The facility would consist of heap leaching and carbon-in-leach facilities with associated tailings impoundment. This facility would result in approximately 447 acres of disturbance.

The total proposed disturbance from activities included in the Plan of Operations is approximately 1,450 acres. All of this disturbance would occur on lands administered by the Ely District Bureau of Land Management. No patented or privately owned lands would be involved with the Proposed Action.

The following sections discuss the details of each of the components listed above. First, the details of the Horseshoe/Galaxy Mine are described, followed by the details of the Process/Top Area Modifications. A single discussion of the entire Proposed Action for hazardous materials management, environmental protection measures, and reclamation is included, due to the similarity of these issues between the components. Previous and ongoing mining activities in the Bald Mountain Mining District were reviewed by the Bureau of Land Management in appropriate National Environmental Policy Act-compliance documents. Therefore, it is not necessary to reanalyze activities at the Little Bald Mountain, Alligator Ridge, Yankee, or Casino/Winrock Mines in this environmental impact statement, and the following discussion will focus only on the Proposed Action.

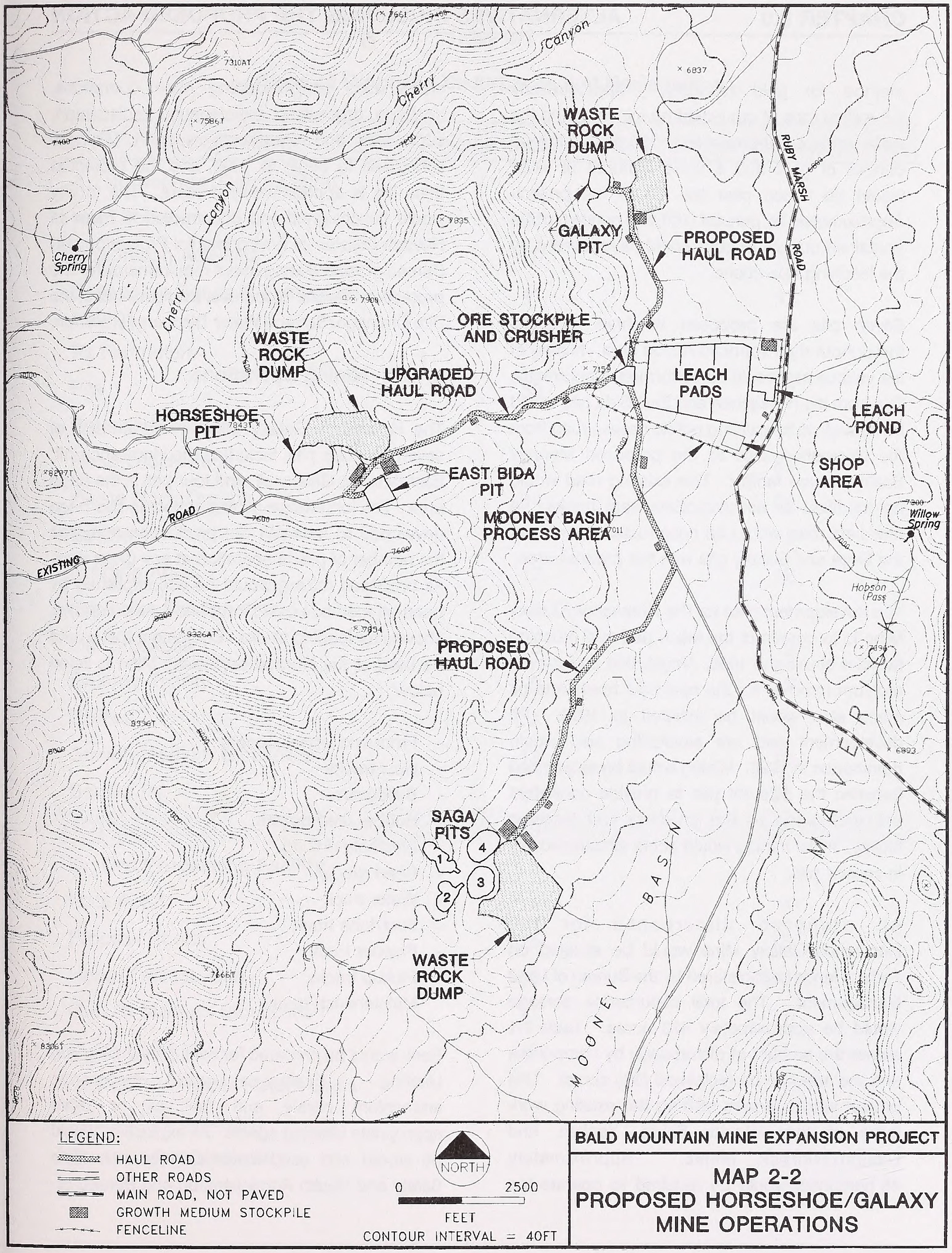
2.1.2 Horseshoe/Galaxy Mine

The Horseshoe/Galaxy Mine would involve the mining of gold ores in the Horseshoe, Galaxy, East Bida, and Saga areas. Ore would be processed at a facility constructed in Mooney Basin. Map 2-2 shows the general layout of the proposed operation. Approximately 1.5 million tons of ore per year would be mined and processed, utilizing the cyanide heap leach



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 2-1
PROPOSED ACTION AND VICINITY MAP



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 2-2
PROPOSED HORSESHOE/GALAXY MINE OPERATIONS

method for gold recovery. Approximately 4.5 million tons of ore would be mined during the entire project. Approximately 139,500 contained ounces of gold and a lesser amount of silver would be mined over the life of the project. Approximately 75 percent (105,000 ounces) of the contained ounces of gold would be recovered by the leaching operations.

Seven pits are proposed in three locations throughout the Proposed Action area. Mining of the various pits would be performed concurrently. Ore from the Horseshoe and East Bida pits would be hauled via an existing public access road from the Horseshoe area to the proposed Mooney Basin process facility. This existing road would be modified to accommodate haul trucks. A new haul road would be constructed to connect the Saga and Galaxy pits with the process area.

The development plan for the Horseshoe/Galaxy Mine is to construct the leach pad and crushing facilities starting in 1996. Vegetation and growth medium removal for the new haul roads and pit areas also would be initiated in 1996. Pit development and ore stockpiling also would commence in 1996. Mining would be sequenced between the different pits to provide consistent ore and grade to the crushing and leaching facility. Initial mining would occur simultaneously in several pits.

All proposed disturbance for the Horseshoe/Galaxy Mine would be situated on Federal lands administered by the Bureau of Land Management. The total disturbance acreage would be approximately 423 acres. Table 2-1 shows the amount of disturbance by component and the areas to be reclaimed (395 acres). This project would require utilizing the existing work force of the Alligator Ridge, Yankee, and Casino/Winrock Mines. Approximately 45 personnel would be required to operate the entire mine site, including mine operations, crushing, processing, maintenance, reclamation, supervision, and administrative support. Mining is scheduled to begin in 1996, and the projected mine life is approximately 4 years. The facility would be designed and constructed to meet all Nevada Division of Environmental Protection and Bureau of Land Management requirements for the protection of water resources, as discussed in the Site Drainage/Surface Water Discharges section.

2.1.2.1 Mining Operations

The Horseshoe/Galaxy Mine would consist of seven separate pits, including the Horseshoe pit, East Bida pit, Galaxy pit, and four pits in the Saga area. The long-range mining schedule has been developed to maintain ore production and limit the number of pits in operation at any given time. All proposed mining would be accomplished by open-pit methods using front-end loaders and/or shovels for loading trucks. Equipment that would be used at the Horseshoe/Galaxy Mine is listed below:

- Front-end wheel loaders
- Haul trucks
- Bulldozers
- Rubber tired dozers
- Blasthole drill rig
- Road grader
- Water truck
- Fuel/lube truck
- Powder truck
- Pickup trucks
- Maintenance trucks

Rock would be prepared for mining by drilling and blasting. Explosives would incorporate ammonium nitrate and fuel oil or other appropriate blasting agents. All explosives would be stored and used in accordance with Mine Safety and Health Administration and Bureau of

Table 2-1

Areas of Proposed Disturbance and Reclamation

Component	Acres to be Disturbed	Acres to be Reclaimed
A. Horseshoe/Galaxy Mine		
Haul Roads	57	51
Exploration Activities[1]	70	70
Secondary Roads & Temporary Ramps	41	41
Pit Perimeters	6	6
Pits	39	17
Process Ponds	4	4
Heap Leach Pads	64	64
Waste Rock Dumps	84	84
Landfill	1	1
Building Areas	12	12
Explosive Storage Area	1	1
Ore Stockpile	3	3
Crusher Facility	5	5
Utilities	3	3
Growth Medium Stockpiles	13	13
Borrow Pit	20	20
TOTAL	423	395
B. Ore Processing Facility		
Haul Road	4	4
Process Roads	15	15
Heap/Tailings Area	388	388
Growth Medium Stockpiles	11	11
Building Areas	11	11
Tailings and Water Return Lines	1	1
Coarse Ore Stockpile	3	3
Crushed Ore Stockpile	2	2

Table 2-1 (Continued)

Component	Acres to be Disturbed	Acres to be Reclaimed
Heap Feed Stockpile	2	2
Crusher Facility	5	5
Utilities	5	5
TOTAL	447	447
C. Sage Flats and Top Pits		
Pits	144	38
South Water Canyon Waste Rock Dump[2]	189	189
East Sage Waste Rock Dump[2]	235	235
Growth Medium Stockpiles	8	8
Storm Water Controls	4	4
TOTAL	580	474
TOTAL FOR PROPOSED ACTION	1450	1316

[1]Includes 50 acres of existing disturbance and 20 acres of proposed disturbance; however, this value excludes the 18 acres of exploration disturbance that would occur in the pit areas, in order to avoid double-adding the disturbed acreage.

[2]Haul road disturbance is included in the waste rock dump disturbance acreage.

Alcohol, Tobacco, and Firearms regulations. Ore would be mined from the various pits throughout the Horseshoe/Galaxy Mine and hauled to the crushing facility located at the proposed Mooney Basin process facility for crushing or stockpiling. Mining operations would be conducted 2 shifts per day, 7 days per week, and 52 weeks per year. The actual mine production would depend on weather conditions and gold production requirements.

Development and exploration drilling also are proposed for the Horseshoe/Galaxy area. Development drilling in the Proposed Action area would be required to further define the size, shape, and character of known deposits. The development drilling activity would be completed in areas that are likely to be part of the proposed pits.

An exploration drilling program would be carried out in the Proposed Action area as the pits are developed. The exploration drilling would address mineralization outside of the known deposit areas and would disturb 70 acres, as part of the Proposed Action. The exploration drilling program would utilize all-terrain and track-mounted drill rigs that are designed to operate with minimal disturbance. In the event that an all-terrain or track drill rig cannot be used, it may be necessary to utilize a truck-mounted drill rig. The truck rig would use existing roads to perform drilling where possible. All drill holes would be immediately plugged after data collection is complete, in accordance with Nevada Revised Statute 534.425-428. All drill holes would be plugged appropriately, depending on whether or not they penetrate the aquifer. If a drill hole does not penetrate the aquifer, it would be backfilled from the total depth with the drill cuttings or inorganic fill material, and the top 10 feet would be sealed. If a drill hole penetrates the aquifer, it would be plugged with an approved mixture and the top 10 feet would be sealed with a cement grout, concrete grout, or neat cement plug.

Although exploration activities associated with the Horseshoe/Galaxy Mine are expected to disturb 88 acres, 18 of these acres also would ultimately be disturbed during pit development activities, leaving a total of 70 acres disturbed by past and proposed exploration. These 18 acres would be affected by exploration and pit development, and are categorized under pit disturbance in Table 2-1. All 70 acres disturbed by exploration would be reclaimed, including 50 acres previously disturbed.

Twenty acres of disturbance from the exploration activities include exploration roads and drill site pads. The 20 acres would be considered a floating disturbance; i.e., no more than 20 acres of development and exploration disturbance would exist at any one time. If this acreage were reached, reclamation would be conducted and the acreage would be released from bond prior to any further exploration and disturbance.

2.1.2.2 Roads

Ore from the Horseshoe and East Bida pits would be hauled via an existing public access road to the proposed Mooney Basin process facility; the existing road would be upgraded to accommodate haul trucks. Ore haulage from the Saga and Galaxy pits would require new haul roads. Map 2-2 shows the general layout of the road system. All haul roads would be approximately 80 feet wide (including ditches) to accommodate 85-ton haul trucks. The road design parameters include 60 feet of running surface, ditches, and 1 foot horizontal to 1 foot vertical (1:1) cut slopes and 1.5:1 fill slopes. Water and/or other approved dust suppression methods would be used on the roads to control fugitive dust.

The temporary pit ramps, secondary roads, and haul roads would be utilized for waste rock hauls and other associated mining activities, in addition to ore hauling. The temporary ramps and secondary roads would be built to the same specifications as the haul roads. The total acreage associated with haul road disturbance (57 acres) includes a corridor previously disturbed by the existing public access road. During reclamation, the original road access would be restored, reclaiming 51 acres of the total 57 acres disturbed. Secondary roads and temporary ramps would disturb an additional 41 acres, all of which would be reclaimed.

2.1.2.3 Waste Rock Dumps

Waste rock would be mined with the same equipment used for mining ore, and waste rock would be hauled to waste rock dumps. Approximately 4.5 million tons of waste rock would be removed from the 7 pits during the operation. The waste rock dumps would cover approximately 84 acres. Map 2-2 shows the approximate locations and sizes of the proposed waste rock dump sites.

All waste rock dumps would be developed by end-dumping and would be constructed with as low a profile as possible to minimize visual impact. The dumps would be built using approximately 40-foot lifts with a 60-foot offset for each lift, or similar proportional dimensions. The overall slope of the waste rock dumps would be designed and constructed to approximately 3:1. Engineered diversion ditches would be constructed to prevent surface runoff from entering the waste rock dump areas.

Nevada Division of Environmental Protection regulations require that a permit application include an evaluation of the potential for overburden waste rock and ore to degrade the waters of the State. Those materials that would likely reside in waste rock dumps after mining have been classified and representatively sampled and analyzed. An evaluation of these analyses indicates that the rock types that would be encountered would not exceed the Nevada Division of Environmental Protection discharge standards for waste rock, and the waste rock dumps have been designed accordingly.

2.1.2.4 Ore Stockpile/Crushing Operation

The Horseshoe/Galaxy Mine would have an ore stockpile for the crushing facility, as shown in Map 2-2. A front-end wheel loader would be used to continuously feed ore to the crushing facility from the stockpile. The stockpile would contain approximately 100,000 tons of material at any one time. The crushing operations would be conducted 2 shifts per day, 7 days per week, and 52 weeks per year.

The proposed operation would utilize a semi-portable crushing system. The production rate of the crusher would be determined by the mining rates of the various deposits. In addition to crushing, the ore may be agglomerated to assist the leaching process. The crushing size and agglomeration requirement would be determined from the rock type and leaching characteristics.

The crushing system would operate using water sprays or pneumatic fogging sprays to control the amount of dust generated. Also, the moisture content of the ore would be monitored to ensure the most effective use of water sprays. Air Quality Permits to Operate would be required from

Nevada Division of Environmental Protection prior to construction of the system.

2.1.2.5 Heap Leach/Gold Recovery Facilities

The location of the proposed Mooney Basin process facility is shown on Map 2-2. The processing facility would consist of the crushing facility, a leach pad, lined solution ponds, a process building with a carbon adsorption system, and support buildings and structures.

After crushing, the ore would be stacked onto the heap leach pad and the leaching process would begin. The leaching system would use a dilute sodium cyanide solution to extract the gold from the ore. The solution would be applied using spray and/or drip irrigation and would percolate through the crushed ore to the synthetic liner, flowing via lined ditches or collection piping to the lined leach solution pond. The leach solution would then be pumped through the carbon columns where the gold is adsorbed to carbon. The barren solution would be returned to the barren sump and pumped back up to the heap leach pad to continue the leaching process. The heap leach facility would operate at approximately 1,000 to 1,500 gallons per minute (gpm). Loaded carbon from the circuit would be transported in containers to the existing stripping facility at Alligator Ridge Mine for stripping and refining of the strip solution.

The heap leach pad would be a composite-lined system with a leak detection and collection system. The secondary liner material would be a soil material with a permeability of 1×10^{-5} centimeter per second (cm/sec) ***combined with a leak detection system or a permeability of 1×10^{-6} cm/sec without a leak detection system,*** as required by the Nevada Division of Environmental Protection, *NAC 445.24362* (see Table 2-2). The primary liner would be an 80-mil synthetic, high density polyethylene liner or equivalent. The top drainage layer would be a finely crushed rock (gravel) material, meeting all applicable standards, to protect the synthetic liner from punctures. This material also serves the purpose of reducing hydraulic head on the various liners, enhancing the ability of the pad to drain. The containment system would be sized to contain the 25-year, 24-hour storm event and designed to withstand the 100-year, 24-hour storm event (see Table 2-2). All design criteria would be submitted to the Nevada Division of Environmental Protection for the Water Pollution Control Permit approval. All open waters at permitted facilities that would contain solutions toxic to wildlife would be fenced and netted or covered to preclude access by terrestrial animals and by birds and bats.

2.1.2.6 Tailings Facilities

No tailings would be generated as part of the gold recovery process proposed for the Horseshoe/Galaxy Mine.

2.1.2.7 Site Drainage/Surface Water Discharges

No permanent surface waters are present in the Horseshoe/Galaxy Mine area. A few dry stream courses with ephemeral flows are found in the Proposed Action area. Runoff from snowmelt or thunderstorms would be diverted away from the operation areas to the extent possible to minimize erosion of the disturbed area. This would be accomplished by using ditches, berms, and other acceptable diversion structures. Surface water runoff would be diverted around pits and waste rock dumps, and returned to natural drainages. Culverts would be placed where roads cross natural drainages. The diversions and berms would be designed to control a 100-year, 24-hour

Table 2-2

Summary of Design Requirements for Process Facilities

Regulatory Requirement	Regulation
A written application, including all necessary information, would be submitted to the Nevada Division of Environmental Protection to obtain a permit to construct, operate, and close permanently the facility.	NAC[1] 445.24288
Construction of the facility would not commence until a permit is obtained.	NAC 445.2428
The facility would be designed such that waters of the state are not degraded.	NAC 445.24342
Appropriate procedures would be instituted to ensure that all mined areas do not release contaminants that have the potential to degrade the waters of the state.	NAC 445.24352
Spent ore that has been left on pads or would be removed from a pad would be rinsed until: 1) WAD cyanide levels in the effluent rinse water are less than 0.2 mg/l; 2) the pH level of the effluent rinse water is between 6.0 and 9.0; and 3) contaminants in any effluent from the processed ore, which would result from meteoric waters would not degrade waters of the state.	NAC 445.24354
The following minimum design requirements would be met: 1) All process components would achieve zero discharge. 2) All process components would be designed to minimize release of contaminants into groundwaters or subsurface migration pathways so that any release from the facility would not degrade waters of the state. 3) All process components would be designed to withstand the runoff from a 24-hour storm event with a 100-year recurrence interval. 4) The primary fluid management system would be designed to remain fully functional and fully contain all process fluids including all accumulations resulting from a 24-hour storm event with a 25-year recurrence interval.	NAC 445.2436
The liner system for the heap leach pad would be engineered to provide containment equal to or greater than that provided by a synthetic liner placed on top of a prepared subbase of 12 inches of soil, which has a recompacted in place coefficient of permeability of 1×10^{-5} cm/sec ***combined with*** a leak detection system, ***or*** 1×10^{-6} ***cm/sec without a leak detection system.***	NAC 445.24362
All ponds would consist of a primary synthetic liner and a secondary liner, and would include a leak detection and recovery system.	NAC 445.24364
The tailings impoundment would utilize a system of containment equivalent to 12 inches of soil, which has a recompacted in-place coefficient of permeability of no more than 1×10^{-6}.	***NAC 445.24368***
Synthetic liners would have a resistance to the passage of process fluids equal to a coefficient of permeability of 1×10^{-11} cm/sec.	NAC 445.2437
Process components would be monitored, as required.	NAC 445.24378

[1]NAC = Nevada Administrative Code

storm event. Wherever possible, road drainage and site diversions would be combined. The calculations and design for the structures would be submitted to Nevada Division of Environmental Protection to comply with the Nevada General Discharge (Stormwater) Permit requirements (see Table 2-2). In addition, a diversion upgradient from the crushing and leaching facilities would divert stormwater runoff around the processing area.

2.1.2.8 Fencing and Security

Fencing would be constructed around the process facility to prevent injury to wildlife, wild horses, livestock, and the general public, and to promote revegetation during reclamation. Appropriate warning signs also would be posted. All access roads through fenced areas would have locking gates to control vehicular access. If operations show the need for additional fencing, it would be installed. Following mining activities, berms would be constructed around the open pit as a long-term access deterrent. Warning signs would be appropriately placed along the pit perimeter berm to warn of the potential hazards.

2.1.2.9 Water Supply

A water supply well would be developed and water lines would be required for connecting the well with the head tank and process facility. An average of 400 gpm would be required on an annual basis. The location of the well would be at or near the process area (see Map 2-2). The well would be constructed in accordance with the requirements of Nevada Revised Statute Chapter 534, including the following:

1. The water well would be drilled by a driller licensed by the State engineer;

2. The water well would be cased to the bottom of the drill hole and constructed to prevent impacts to or waste of the groundwater;

3. The driller would take every reasonable precaution to prevent impacts to or waste of the aquifer water;

4. The water well would be properly sealed; and

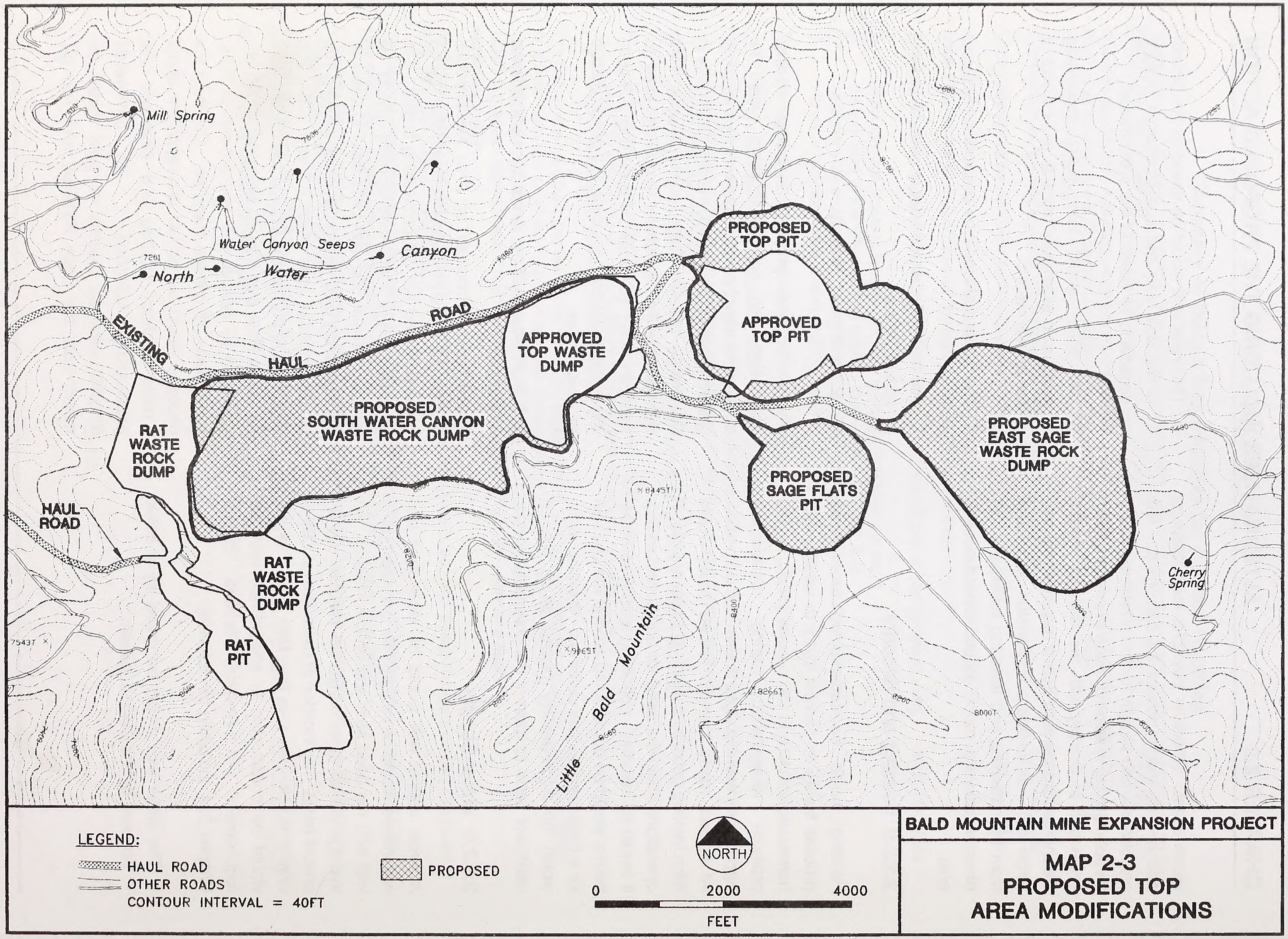
5. The well driller would keep a complete log of all work done.

2.1.2.10 Power Supply

Power for the project (including mining, processing, and support facilities) would be supplied by diesel-powered generators. A backup generator would be used at the process facility in the event that the main power supply were interrupted. This generator would be used to maintain water balances by providing power to the process pumps in the case of a power outage or similar event.

2.1.3 Process/Top Area Modifications

The proposed Process/Top Area Modifications include the Sage Flats development, the Top pit expansion, and the ore processing facility. The proposed Sage Flats development would be located between Big and Little Bald Mountains, approximately 0.25 mile south of the existing Top pit development (see Maps 1-2 and 2-3). The Proposed Action would involve mining ore from the Sage Flats and Top pit deposits, which are estimated to contain 6.5 and 5.6 million tons, respectively, of mineral resource. Ore from the deposits would be hauled downgradient about 6 miles to both existing and proposed ore processing facilities. An estimated 572,000 contained ounces of gold would be mined from the Sage Flats pit and Top pit


Mill Spring
Water Canyon Seeps
North
Water
Canyon
7261
EXISTING
HAUL
ROAD
HAUL ROAD
RAT WASTE ROCK DUMP
RAT WASTE ROCK DUMP
RAT PIT
PROPOSED SOUTH WATER CANYON WASTE ROCK DUMP
APPROVED TOP WASTE DUMP
PROPOSED TOP PIT
APPROVED TOP PIT
PROPOSED SAGE FLATS PIT
PROPOSED EAST SAGE WASTE ROCK DUMP
Cherry Spring
Little Bald Mountain
8266T
8000T
7543T
LEGEND:
HAUL ROAD
OTHER ROADS
CONTOUR INTERVAL = 40FT
PROPOSED
NORTH
0
2000
4000
FEET
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 2-3
PROPOSED TOP
AREA MODIFICATIONS

expansion. Approximately 503,000 ounces (88 percent) would be recovered by the split-flow processing operations. The split-flow process would also allow the recovery of an additional 93,000 ounces from currently permitted ore. The Sage Flats deposit would be mined concurrently with the Top pit. Waste rock from the deposit would be placed in two locations, along the eastern slope of Sage Flats and west of the Top pit in South Water Canyon, as a continuation of the existing Top pit waste rock dump. Haul road construction would be limited to roads connecting the pits and waste rock disposal sites. Ore would be transported to the process facilities via the existing Top pit road and other waste rock haul roads.

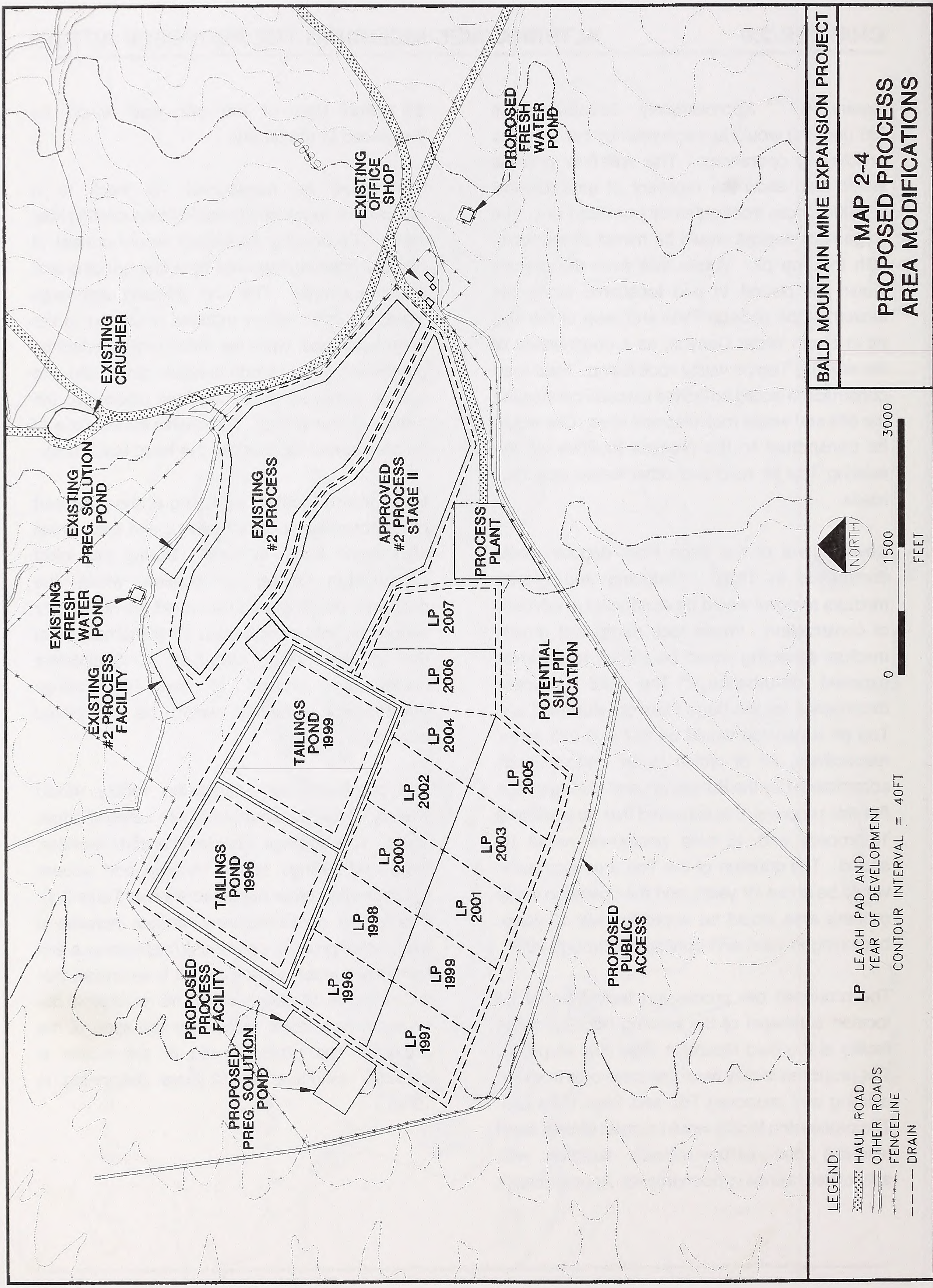
Development of the Sage Flats deposit would commence in 1996. Grubbing and growth medium removal would be conducted in advance of construction. Waste rock dump and growth medium salvaging would be staged to minimize exposed disturbance. The total proposed disturbance for the Sage Flats development and Top pit expansion would be 357 and 223 acres, respectively, all of which is on Federal lands administered by the Bureau of Land Management. For this proposal, it is expected that an additional 10 process and 15 mine personnel would be added. The duration of the Top area expansion would be about 10 years, and the operation of the process area would be approximately 12 years, beginning in 1996 and continuing through 2007.

The proposed ore processing facility would be located southeast of the existing No. 2 process facility at the Bald Mountain Mine (see Map 2-4). The proposed facility would process ores from the existing and proposed Top and Sage Flats pits. The processing facility would consist of both heap leaching and carbon-in-leach facilities with associated tailings impoundments. Approximately 2.5 million tons of ore per year would be processed in the facility.

Ore would be transported via truck to a run-of-mine (uncrushed) stockpile on existing haul roads. Processing operations would consist of primary crushing followed by a fine grinding and washing circuit. The find grinding discharge would be split: larger material would go to the heap leach pad, while the fines portion would be processed in a carbon-in-leach plant and the tailings would be transported via pipeline to the tailings impoundment. The coarse material would be transported via truck to the heap leach area.

Initial growth medium salvaging at the proposed ore processing facility for tailings and heap areas also would begin in 1996. During this initial construction phase, a location within the proposed disturbance area would provide silt for secondary liner construction for the remainder of the project (see Map 2-4). Successive construction phases of the heap/tailings development schedule would be completed annually.

The proposed ore processing facility would directly impact approximately 447 acres of public lands. This acreage includes the plant facilities, heap and tailings areas, haulage and access corridors, and other disturbances (see Table 2-1). The project would require a modest increase in the present process operations/maintenance and technical support work force. It is estimated that an additional 10 people would be required in the process department areas over the span of the project. The projected life of the facility is currently estimated at 12 years (beginning in 1996).


BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 2-4
PROPOSED PROCESS AREA MODIFICATIONS
LEGEND:
HAUL ROAD
OTHER ROADS
FENCELINE
DRAIN
LP LEACH PAD AND YEAR OF DEVELOPMENT
CONTOUR INTERVAL = 40FT
NORTH
0
1500
3000
FEET
EXISTING CRUSHER
EXISTING OFFICE SHOP
PROPOSED FRESH WATER POND
EXISTING PREG. SOLUTION POND
EXISTING #2 PROCESS
APPROVED #2 PROCESS STAGE II
PROCESS PLANT
EXISTING FRESH WATER POND
EXISTING #2 PROCESS FACILITY
LP 2007
LP 2006
POTENTIAL SILT PIT LOCATION
TAILINGS POND 1999
LP 2004
LP 2002
LP 2005
TAILINGS POND 1996
LP 2000
LP 2003
LP 1998
LP 2001
LP 1996
LP 1999
LP 1997
PROPOSED PUBLIC ACCESS
PROPOSED PROCESS FACILITY
PROPOSED PREG. SOLUTION POND

2.1.3.1 Mining Operations

The proposed disturbance for the Sage Flats development and Top pit expansion would be 357 and 223 acres, respectively. Equipment at Sage Flats and Top pits would be similar to that described for Horseshoe/Galaxy Mine. Ammonium nitrate and fuel oil would be the primary blasting agent. Front-end loaders would load end-dump haul trucks with broken ore and waste rock at the Sage Flats and Top pits. Ore would be hauled approximately 6 miles to the ore stockpile, where it would then be processed via existing and/or proposed process facilities. The Sage Flats pit would be mined concurrently with the Top pit to achieve the scheduled ore supply of approximately 2.5 million tons per year. Mining operations would be conducted 2 shifts per day, 7 days per week, and 52 weeks per year. The actual mine production would depend on weather conditions and gold production requirements.

Development drilling activities at Sage Flats would consist of in-fill drilling of the ore deposit and condemnation drilling within the waste rock disposal site locations to confirm that no ore is present. No additional disturbance would result from development drilling and no exploration drilling is proposed. The only exploration activities associated with the proposed ore processing facility would be condemnation drilling in the proposed processing and heap/tailings impoundment areas. The drill hole plugging program would be conducted in accordance with Nevada Revised Statute 534.425-428 (see Horseshoe/Galaxy Mining Operations).

2.1.3.2 Roads

At the Sage Flats development, the existing Top pit haul road would be used to transport ore to the process facilities' ore stockpile. Additional haul roads would be constructed to the East Sage and South Water Canyon waste rock dumps. The West Top waste rock haul road would intercept the Top pit haul road and also serve as an ore haulage route. Haul roads would be constructed approximately 80 feet wide (including ditches). New haul road construction disturbance is included in the proposed waste rock dump disturbance in Table 2-1. Haul roads would be maintained with a road grader. Fugitive dust emissions would be controlled with water trucks and/or other acceptable methods.

Map 2-4 shows the general layout of the haulage and access roads associated with the proposed ore processing facility. An 80-foot wide haul road would connect the fine grinding facility to the leach pad area. Additional access roads would be constructed around the heap/tailings perimeter and pond locations. Access roads also would follow power distribution and tailings transport lines. The total disturbance acreage for new haul road construction would be approximately 4 acres.

2.1.3.3 Waste Rock Dumps

Waste rock would be hauled to the proposed East Sage and expanded South Water Canyon waste dumps. These dumps would be constructed over subsoil after suitable growth medium had been salvaged. Approximately 80.5 million tons of waste rock would be removed from the Sage Flats deposit, of which roughly 60 million tons would be placed in the East Sage area and 20.5 million tons would be placed in the South Water Canyon area. Approximately 80 million tons of waste would be removed from the Top Pit Expansion. This waste would be placed in South Water Canyon. The East Sage and South Water Canyon waste rock dumps would disturb approximately 235 and 189 acres, respectively. Disturbance estimates are based on 2.2:1 reclaimed slopes.

2.1.3.4 Ore Stockpile/Crushing Operation

A run-of-mine (uncrushed) stockpile would be used to continuously feed the primary crushing plant at the proposed ore processing facilities. The stockpile would contain about 100,000 tons of material at any given time. A front-end wheel loader would feed material from the stockpile into a primary crusher; the product would be transferred by conveyors to a 5,000-ton stockpile. This second stockpile would feed the fine grinding circuit. The nominal crushing rate would be 800 tons per hour. The primary crusher would operate 10 hours per day, 7 days per week, and 52 weeks per year to produce a product less than 6 inches in size.

Ore would be conveyed from the crushed stockpile to the fine grinding circuit at a nominal rate of 7,000 tons per day. Lime and dilute cyanide solution would be introduced into the fine grinding mill and the mill product would discharge onto a double deck screen and be split into three streams based on material size. Larger material would recirculate to the fine grinding mill. The finer materials would be conveyed to a lined stockpile for transport to the leach pad or report to a sump for classification. The finest materials would report to a gravity concentrator, with the gravity tailings recirculating to the fine grinding mill. Depending upon the grade of the gravity concentrate, this product would report to the carbon-in-leach circuit or to gravity separation. It is estimated that 30 percent of the feed to the fine grinding circuit would report to the carbon-in-leach circuit, while the remaining mass would report to heap leach pads.

2.1.3.5 Heap Leach/Gold Recovery Facilities

Existing process facilities consist of two cyanidation carbon-in-column heap leach circuits; the first process leaches lower grade, run-of-mine (uncrushed) ore, and the second process leaches crushed ore product less than 0.75 inch in size. The proposed process facility would consist of a wet crushing/split circuit flow process circuit with an integrated heap leach pad and tailings impoundment.

Carbon-in-Leach Circuit

A multi-stage carbon-in-leach cyanidation and adsorption circuit would be located adjacent to the crushing facility. Building construction for the enclosed portion of this circuit and ancillary facilities would consist of sealed-joint concrete containment and a structural steel framework with corrugated metal sheeting and roofing.

Heap Leach Facilities

The proposed heap leach area would be constructed in phases in conjunction with the tailings storage facility. The heap cells would be hydraulically isolated from each other and from the tailings cells to maintain the integrity of the remaining area in the event leakage developed in the primary liner. The heap leach area would accommodate approximately 23 million tons of heap leach material and would ultimately cover approximately 250 acres.

Ore for the heaps would be transported via truck to the leach pad and end dumped on the heap in minimum 15-foot lifts. Due to the nature of the material, ultimate heap heights of 80 to 100 feet could be effectively utilized, if needed. The heaps would be designed and constructed at a minimum 2:1 slope to minimize recontouring work at closure and to allow some concurrent revegetation to take place. Dilute cyanide leach solution would be applied at a rate of approximately 0.004 gpm per square foot (nominal pumping rate 3,500 gpm). The anticipated total leach cycle would be 90 days.

The heap leach pads would consist of a composite-lined area draining by gravity to perimeter discharge collection ditches. The secondary liner material would be compacted soil material meeting Nevada Division of Environmental Protection design specifications ***for permeability of*** 1 x 10^{-5} cm/sec ***combined with a leak detection system or 1 x 10^{-6} cm/sec without a leak detection system*** (see Table 2-2). The primary liner would be an 80-mil high density polyethylene material or equivalent. A network of leak detection ditches and collection piping would underlie the synthetic liner following all natural and engineered drainages and solution collection ditches. The leach solution collected in the perimeter ditches would flow to a system of solution collection ponds. The entire heap leaching facility would be designed to completely contain all process solutions. The solution collection ponds would be designed and constructed in phases to store operating volumes of solution and to contain runoff from a 25-year, 24-hour storm event from each discrete pad drainage area. The heap/tailings area would include berms to prevent stormwater run-on from the 100-year, 24-hour event.

Solution ponds and ditches would be fenced and netted or covered to prevent access by terrestrial wildlife and by birds and bats. No ponding of solutions on the leach pads is anticipated due to the high porosity of the ore placed on the heaps.

Stripping and Refining Circuit

Gold would be recovered from the leach solution in a system of carbon-in-column circuits. Loaded carbon from the carbon-in-leach and carbon-in-column circuits would be transported by pump and by truck, respectively, to a common stripping facility. A new facility would be constructed within the proposed plant site. Loaded strip solution would be stored in a collection tank for feed to the electrowinning circuit. Purged strip solution would be fed into the carbon-in-leach circuit. Gold would be recovered onto stainless steel wool cathodes in the electrowinning cells, which would be periodically removed along with the gold collected. The steel wool and gold would be refined and poured into bullion bars for shipment.

2.1.3.6 Tailings Facilities

The tailings storage facility would be located west of the plant site (see Map 2-4). The tailings impoundment and heap leaching facilities would be integrated into one facility in order to minimize disturbance and allow effective use of heap leach material as dam building and drainage material. The tailings facility would cover approximately 138 acres. As presently planned, this facility would consist of a tailings embankment; a composite-lined impoundment area; composite-lined solution storage ponds; and tailings slurry and water return pipelines.

The tailings impoundment would be constructed in two phases to accommodate a total of approximately 10 million tons of fine tailings. Tailings would be deposited around the impoundment area via valved spigots, which would be operated on a daily or weekly basis to consolidate the tailings.

The final tailings pile would be dewatered through an underlying drainage blanket so that the pile would ultimately be a solid stable mass to facilitate reclamation. The drainage blanket would discharge solution to a perimeter collection ditch that would conduct the solution to a storage pond.

The tailings disposal facility would be designed to contain all tailings solids and solutions. The facility would be designed and constructed to meet all Nevada Division of Environmental Protection and Bureau of Land Management requirements for the protection of water resources (see Table 2-2). All open waters at permitted facilities that would contain solutions toxic to wildlife would be fenced and netted or covered to preclude access by terrestrial animals and by birds and bats.

2.1.3.7 Site Drainage/Surface Water Discharges

The Sage Flats and Top pits, waste rock dumps, and haul roads would be constructed to minimize erosion. Surface water controls would focus on diverting runoff away from disturbed sites. Diversion berms and surface water controls would be designed to control the 100-year, 24-hour storm event. Where diversion is not practical, containment measures may be employed. Appropriate Best Management Practices such as sediment traps and sediment barriers would be implemented and maintained to minimize the potential discharge of contaminants to surface waters. Diversion ditches and berms would be constructed upgradient from the pits and dumps to minimize run-on. Containment berms and/or ditches would be constructed on the upper dump perimeter as a safety measure and to minimize slope run-on. The upper perimeter berms would be an interim control measure, used prior to final reclamation and dump stabilization. Growth medium berms, constructed at the dump toe, would serve to contain slope runoff during mining. The berms would be advanced as the dump expands to design capacity. Revegetation and drainage re-establishment are the ultimate long-term control measures.

No perennial surface water occurs within the Proposed Action area. The few, ephemeral drainage courses that flow during extreme precipitation events would be diverted around the process facilities. Surface runoff would be diverted around processing and heap/tailings areas to prevent run-on to the process facility. This would prevent erosion of structures within the facility and protect the integrity of the process water containment structures. The diversion structures would be designed to control a 100-year, 24-hour storm event from the area upgradient of the processing facilities (see Table 2-2). The calculations and design criteria for these structures would be submitted with the Water Pollution Control Permit application to the Nevada Division of Environmental Protection. In addition, the proposed design would incorporate emergency solution catchment ponds and containment structures that meet or exceed regulations.

2.1.3.8 Fencing and Security

Fencing would be constructed as needed to prevent injury to wildlife, wild horses, livestock, and the general public, and to promote revegetation during reclamation. Appropriate warning signs also would be posted. All access roads through fenced areas would have locking gates to control vehicular access. Following mining activities, berms would be constructed around the open pit as a long-term access deterrent. Warning signs would be appropriately placed along the pit perimeter berm to warn of the potential hazards.

2.1.3.9 Water Supply

Two water supply wells would be developed and water lines would be constructed to connect the wells with the head tank and process facility. The wells would be constructed in accordance with all applicable regulations and would be drilled at or near the process area (see Map 2-4). The wells would be constructed in accordance with the requirements of Nevada Revised Statute Chapter 534, including the following:

1. The water well would be drilled by a driller licensed by the State engineer;

2. The water well would be cased to the bottom of the drill hole and constructed to prevent impacts to or waste of the groundwater;

3. The driller would take every reasonable precaution to prevent impacts to or waste of the aquifer;

4. The water well would be properly sealed; and

5. The well driller would keep a complete log of all work done.

Permits to appropriate water would have to be obtained from the Nevada Division of Water Resources.

2.1.3.10 Power Supply

Power for the project (including mining, processing, and support facilities) would be supplied by a 69-kilovolt (kV) electric transmission line. This line was approved by Bureau of Land Management in Spring 1995 as a separate action and is scheduled to be constructed in 1995. It is discussed further under Cumulative Impacts. The Bald Mountain Mine is currently operated using generators. A backup generator would be used at the process facility in the event that the main power supply was interrupted. This generator would be used to maintain water balances by providing power to the process pumps in the case of a power outage or similar event.

2.1.4 Hazardous Materials and Wastes

This section describes the quantities of additional mine process chemicals and fuel needed for the project, and how they will be transported and stored on-site. Emergency response procedures for transport accidents, and for release from storage and processing are presented. This section also discusses the expected quantities of hazardous materials and wastes that would be generated, and the disposal methods for each type of waste. The following descriptions apply to both the Horseshoe/Galaxy Mine and the Process/Top Area Modifications.

2.1.4.1 Chemical Transportation and Storage

The additional chemicals that would require transportation to the Proposed Action area, would require storage, and would be consumed during mining and processing are listed in Appendix A, Table A-1. The primary processing chemicals required for the Proposed Action include sodium cyanide, lime, hydrochloric acid, antiscalants, flocculants, and sodium hydroxide; additional diesel fuel for mining equipment and blasting agents would be needed for the Horseshoe Galaxy operations.

Trucks currently transport chemicals to the Alligator Ridge and Bald Mountain Mines and represent the only practical form of transportation. To provide the additional chemicals needed for the Top Area under the Proposed Action, large bulk shipments would be transferred from railroad cars in Carlin to trucks, which would then follow

I-80 to Elko and State Highway 228 along the Huntington Valley south to the intersection with the mine access road leading to the Bald Mountain Mine area. Some chemicals required for the Horseshoe Galaxy operation would be transported by truck west from Ely along United States Highway 50, and then turn north along Ruby Marsh Road to the intersection with the private mine access road (see Map 1-1 and 2-1).

Liquid chemicals would be transported in drums, and large liquid quantities such as hydrochloric acid, sodium cyanide, and diesel fuel would be transported in tanker trucks. These materials would require transfer into tank storage at the mine site. All chemical transporters would be regulated by the Department of Transportation.

Current chemical storage and containment would be modified to accommodate the additional storage requirements for the Proposed Action (Appendix Table A-2). A fuel storage area would be constructed at the Horseshoe/Galaxy Mine to provide fuel for mining operations. A synthetic liner or concrete containment area would be constructed for the storage of aboveground bulk fuel tanks. All other petroleum products and chemicals would be stored in lined containment areas, ***with a minimum of 110 percent secondary containment capacity***. An existing fuel island at the Top pit shop would service the mobile equipment fleet for Top area modifications. The island would consist of a 10,000-gallon aboveground fuel tank with 110 percent lined secondary containment, level indicator, and in-tank pump. Lubricants would be contained in a mobile service truck. Bulk lubricants and petroleum products would remain stored at the main mobile maintenance shop at the Bald Mountain Mine. Sodium cyanide would be stored in an area physically separated from acid storage areas. Blasting agents and explosives would be stored and used on site in accordance with Mine Safety and Health Administration regulations (30 Code of Federal Regulations 56, Subpart E) and users would maintain a valid Bureau of Alcohol, Tobacco, and Firearms permit.

2.1.4.2 Emergency Planning and Response

The transportation, storage, and use of hazardous materials and substances requires a variety of planning and coordination efforts that have been mandated by the Federal and State governments. The extent that such plans are required depends upon the chemical hazard characteristics, the quantities of these chemicals stored, and the quantities potentially released to the environment in the event of an accident.

Of the additional chemicals needed to implement the Proposed Action, sodium cyanide, hydrochloric acid, and nitric acid are hazardous substances that are listed in 40 Code of Federal Regulations 302.4 of the Comprehensive Environmental Response, Compensation, and Liability Act, and the hazardous substances appendices of the Superfund Amendments and Reauthorization Act. The Comprehensive Environmental Response, Compensation, and Liability Act creates a framework for Federal response to hazardous substance releases. In order for this program to be effective, the Federal government must be informed immediately when releases occur that may require rapid response to protect public health and the environment. Notification is necessary if an amount of a hazardous substance greater than or equal to its reportable quantity is released to the environment within a 24-hour period. Following notification, Federal personnel evaluate the need for a Federal response and initiate removal or remedial actions, if necessary. For purposes of emergency response planning under the Superfund Amendments and Reauthorization Act, Title III, a threshold planning quantity is established for each hazardous substance. The threshold planning quantity and reportable quantity values for sodium cyanide are 100 lbs and 10 lbs, respectively; the reportable quantity value for hydrochloric acid is 5,000 lbs. Petroleum products are excluded as hazardous substances under the Comprehensive Environmental Response, Compensation, and Liability Act, Section 101(14).

The Federal Department of Transportation has developed a list of materials that are classified as hazardous for transportation purposes (49 Code of Federal Regulations 172.101) and prescribes packaging and labeling requirements for each designated hazardous material. The Department of Transportation hazardous materials list includes the hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act, as well as other types of chemicals. In addition to the hazardous substances described above, transportation of sodium hydroxide, ammonium nitrate, Class A explosives, diesel fuel, and calcium oxide (lime) must comply with Department of Transportation hazardous materials packaging and labeling requirements.

Bald Mountain Mine Properties has developed an outline for a fluid management plan (see Table 2-3), which would describe the capabilities of the fluid containment system to accommodate unusual natural or operational events to prevent fluid losses from containment areas. The plan would also discuss monitoring capabilities to detect leaks from the leach pad and tailings areas. Bald Mountain Mine Properties also maintains an Emergency Response Plan for current operations. An updated Emergency Response Plan would be developed for the Proposed Action; an outline of the updated plan is presented in Table 2-4. This plan would demonstrate that Bald Mountain Mine Properties has developed a system to detect an emergency, notify the proper authorities, and react properly to the various types of emergencies. Detailed plans for both fluid containment and emergency response would be prepared and approved prior to start of operations.

The Emergency Response Plan would outline those actions that would be initiated, and by whom, in the event of a release or spill from any component of their respective fluid management system. The fluid management system includes: the process recovery system, piping, pumping, ditches, and other items used in the management and fluid containment of the leaching and processing facilities. The Emergency Response Plan would also apply to spills of stored chemicals and petroleum products. All chemicals would be stored and handled in accordance with manufacturer's recommendations and State regulations.

The Emergency Response Plan would identify the spill discovery and notification procedure; the general cleanup procedures for chemical spills, pipeline leaks, pipeline breaks, or other releases from the fluid management system; and the reporting procedures. The procedures outlined in this plan apply to leaks and spills that remain within the mine boundary as well as those that flow off-site.

The material safety data sheets for all the chemicals used on the mine site would be kept in a location readily available to the working personnel. The Emergency Response Plan would be kept at locations that are accessible to the working personnel.

Table 2-3

Fluid Management Plan Outline

1.1	Introduction
1.2	Fall-on Areas
1.3	Pipe and Pond Sizes
1.4	Simulated Storm Events
1.5	Total Capacity versus Total Runoff Calculations
1.6	Routing Documentation of the Fluid Management System
1.7	Solution Management Under Condition of Mechanical Failure
1.8	Response to Accumulation Due to Natural Events
1.9	Control Factors to Manage Total Solution to be Contained
1.10	Summer versus Winter Operations
1.11	Emergency Pond Solution Removal
1.12	Monitoring of Leak Detection Sumps

Table 2-4

Emergency Response Plan Outline

I.	Introduction
II.	Spill Discovery and Notification Procedure
III.	Contingency for Major Failures of the Fluid Management System
IV.	Seismic Event Discovery and Notification Procedure
V.	Reporting

2.1.4.3 Spill and Release Reporting

The person discovering a chemical or petroleum product spill or an accidental discharge from any component of the fluid management system, would immediately shut that portion of the failed system down to eliminate the discharge. He would then notify his immediate supervisor. The appropriate procedure would be followed based on the time of the event, including other proper notifications of mine personnel, as identified in the Emergency Response Plan.

A release or spill from the fluid management system would be considered a noncompliance with the Water Pollution Control Permit. The Environmental Coordinator would be responsible for reporting to the Nevada Division of Environmental Protection for all spills and to the Bureau of Land Management for spills on public lands. A release from the fluid management system would be reported orally to the Nevada Division of Environmental Protection at 1-800-992-0900, extension 4670, as soon as possible, but no later than the end of the first working day after knowledge of the release. A written summary would also be provided to the Nevada Division of Environmental Protection within 10 days of the oral notification. The written report would be sent to Nevada Division of Environmental Protection, Mining Regulation and Reclamation, 333 West Nye Lane, Carson City, Nevada 89710. The written summary would contain a description of the release and its cause; the periods of release (including exact times and dates); whether the release has been corrected, and if not, the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the release.

The size of the release or spill also could result in notification of additional offices, as part of the requirements. They would include:

Division of Emergency Management

(702) 687-4240 during normal working hours, or
(702) 687-5300 after normal working hours.
2525 South Carson Street
Carson City, Nevada 89710

National Response Center

1-800-424-8802

Since this facility would have an approved Emergency Response Plan, the following reporting requirements would apply:

- A release directly into surface or groundwater of any quantity of pollutant, hazardous waste, or contaminant must be reported to the Nevada Division of Environmental Protection as soon as possible, but no later than the end of the first working day after knowledge of the release.

- A release of a substance in a quantity equal to or greater than that covered by 40 Code of Federal Regulations 302.4 must be reported to the Division of Emergency Management and Nevada Division of Environmental Protection, provided:

  - The quantity of constituents released is equal to or greater than that which is reportable to the National Response Center pursuant to 40 Code of Federal Regulations Part 302.

- The release consists of any quantity of pollutants, as defined in Nevada Revised Statute 445.178; hazardous waste, as defined in Nevada Revised Statute 459.430; or contaminants, as defined in Nevada Revised Statute 445.143, allowing that the constituent is not listed in 40 Code of Federal Regulations 302.4.

- The release consists of petroleum product in a quantity greater than 25 gallons.

- A release of solutions containing a pollutant, hazardous waste, or contaminant and the quantity is equal to or exceeds 500 gallons must be reported to Nevada Division of Environmental Protection. Smaller quantities are to be reported in the quarterly report.

- A release of petroleum products in a quantity equal to or greater than 100 gallons must be reported to Nevada Division of Environmental Protection in the required timeframe. Smaller spills are reported quarterly.

- A release of ethylene glycol in a quantity equal to or greater than 10 gallons of product must be reported to Nevada Division of Environmental Protection in the required timeframe. Smaller spills are reported quarterly.

Notification to these agencies would be made as soon as possible after knowledge of such releases. As stated, the Emergency Response Plan with these reporting requirements would be kept at locations accessible to the working personnel.

2.1.4.4 Waste Management

Mining operations also would result in the generation of nonhazardous waste. The majority of this waste would be "mine waste," including mill tailings, waste rock, and spent leach ore. Mine wastes are currently excluded from regulation under the Resource Conservation and Recovery Act of 1976; 40 Code of Federal Regulations Part 261, Mining Waste Exclusion; Final Rule, Federal Register Vol. 54, No. 169, September 1, 1989; 40 Code of Federal Regulations Parts 260, 261, 262, Mining Waste Exclusion and Definition of Designated Facility; Proposed Rule, Federal Register Vol. 54, No. 184, September 25, 1989; 40 Code of Federal Regulations Parts 260, 261, 262, Mining Waste Exclusion; Section 3010 Notification for Mineral Processing Facilities; Designated Facility Definition; Standards Applicable to Generators of Hazardous Waste; Final Rule, Federal Register Vol. 55, No. 15, January 23, 1990).

Bald Mountain Mine Properties would require additional Class III (industrial, nonhazardous) solid waste disposal capacity. A summary of the existing on-site landfills, their compliance status, and size are presented in Appendix A, Table A-3. Approval would be requested from Nevada Division of Environmental Protection for the construction of a Class III landfill at the Horseshoe/Galaxy Mine, and a waiver application would be filed. All approved nonhazardous wastes would be hauled to this facility. Typical wastes include glass, plastics, waste paper, wood, scrap metal, used tires, and laboratory nonhazardous wastes. The landfill would be managed in accordance with a management plan approved by Nevada Division of Environmental Protection during permitting. In no case would the landfill receive materials that meet the definition of hazardous waste, or waste that could produce pollutants or contaminants that may degrade the waters of the State. A sign indicating acceptable wastes would be posted. A maintenance program would be implemented that includes routine covering, restriction of public access, litter control, and stormwater runoff control. The landfill would be properly closed at mine closure.

Bald Mountain Mine Properties is currently classified as a Conditionally Exempt Small Quantity Generator of hazardous waste, as defined by the Resource Conservation and Recovery Act. A small-quantity generator is a facility that generates less than 100 kilograms per month of Resource Conservation and Recovery Act regulated hazardous waste (40 Code of Federal Regulations Part 261.5). This generator status is not expected to change if the Proposed Action were implemented.

Bald Mountain Mine Properties currently recycles some waste products, which requires storage and pickup by the recycler. Specifically, used oil, antifreeze, and solvents would be recycled by an approved facility under the Proposed Action.

Analytical procedures conducted in the on-site laboratory would generate hazardous and nonhazardous laboratory wastes. All laboratory work in support of the Horseshoe/Galaxy Mine would be conducted at the existing Alligator Ridge Mine laboratory. The laboratory drains are connected to the barren solution pond, allowing recycling of liquid residue from the various analyses. Other wastes from the laboratory that exhibit a hazardous waste characteristic, including off-specification commercial chemicals and assay wastes, would be managed as hazardous waste. These wastes would be temporarily stored and manifested to an off-site Treatment, Storage, or Disposal facility, in accordance with the Federal Resource Conservation and Recovery Act and Nevada Division of Environmental Protection regulations.

Lead wastes (lead cupels, crucibles, and slag) would be packaged, labeled, and shipped as a hazardous waste to an approved metal recycler.

2.1.5 ENVIRONMENTAL PROTECTION MEASURES

The following measures would be implemented during the project to reduce potential adverse environmental impacts associated with both the Horseshoe/Galaxy Mine and the Process/Top Area Modifications.

- **Control of Air Emissions**

  Roads and disturbed areas within the mining and process areas would be watered and/or treated with a chemical dust suppressant. All growth medium stockpiles would be seeded if they are left in place for more than one growing season, to minimize dust emissions and erosion.

  Engineered designs for dust controls applicable to the processing facility, would be approved in the Nevada Division of Environmental Protection Air Quality Operating permits. Any potential sources would not be operated unless the required equipment for controlling emissions was installed and operated (Nevada Administrative Code 445.664). All restrictions listed in the permit would be implemented. Monitoring of sources would be conducted as required in the permit.

- **Control of Sediment**

A stormwater pollution prevention plan for the Proposed Action would be submitted to the Nevada Division of Environmental Protection and BLM outlining all Best Management Practices that would be taken to control sediment. The outline of this plan is provided in Table 2-5. This plan would identify practices taken to prevent impacts to stormwater. Diversion and routing of stormwater around the open pits, stockpiles, waste rock dumps, and process areas would be accomplished using accepted engineering practices. Flow dissipation and sediment control structures would be located. Straw bales would be placed along drainages, and culvert outfalls would be riprapped. Growth medium stockpiles would be seeded to minimize erosion. Temporary sediment control measures, such as straw bales, silt fences, and sediment traps, would be implemented during construction.

During and after reclamation, routine checks would determine if excessive erosion is occurring on the site as a consequence of disturbance. Excess erosion, if occurring, would be controlled on the site by appropriate techniques. Any excess rilling or gullying would be mitigated by placement of graded rubble fill or by interceptor ditching or berming. Areas of deposition would be revegetated.

- **Protection of Waters of the State**

All mining operations would be conducted in accordance with all applicable State and Federal regulations and guidelines, as summarized in Table 2-2.

Waste rock materials would ***continue to*** be fully evaluated for their potential to mobilize pollutants and produce acid drainage, and would be routinely monitored. The heap leach pads and solution ponds would be constructed with a composite liner and leak detection system. These systems would be operated and monitored in accordance with the requirements of an approved Nevada Division of Environmental Protection Water Pollution Control Permit and the Bureau of Land Management's cyanide management policy. Final closure of these components would require any water discharge to meet State and Federal water quality standards.

A leak detection system monitoring plan for all process components also would be submitted to the Nevada Division of Environmental Protection for approval with the Water Pollution Control Permit application (see Table 2-6). The monitoring plan would identify the proposed site monitoring locations and leak detection monitoring points. The plan also would address the proposed monitoring protocols for each monitoring point.

The depth to groundwater is a minimum of 400 feet. Waste rock characterization and monitoring would be used to assess any long-term concerns. Table 2-7 outlines the ***plan*** to be used in the characterization of waste rock. Exploration drill holes would be plugged in accordance with Nevada Revised Statute 534.425-428 to minimize potential groundwater exposure (see Horseshoe/Galaxy Mining Operations).

- **Protection of Cultural Resources**

Impacts to cultural resources in the area would be minimized by following procedures outlined in the Programmatic Agreement between Bald

Table 2-5

Stormwater Pollution Prevention Plan Outline

1.0 INTRODUCTION

2.0 ASSESSMENT
- 2.1 Site Location and Project Description
- 2.2 Materials Inventory
- 2.3 Past Spills and Leaks
- 2.4 Non-Stormwater Discharges
- 2.5 Existing Monitoring Data
- 2.6 Site Evaluation Summary

3.0 BEST MANAGEMENT PRACTICES
- 3.1 Housekeeping
- 3.2 Maintenance and Inspections
- 3.3 Spill Prevention and Response
- 3.4 Sediment and Erosion Control
- 3.5 Management of Runoff

4.0 IMPLEMENTATION
- 4.1 Implementing Controls
- 4.2 Employee Training

5.0 SITE EVALUATION
- 5.1 Annual Evaluation
- 5.2 Recordkeeping
- 5.3 Revisions

Table 2-6

Leak Detection System Monitoring Plan Outline

1.1 INTRODUCTION

1.2 MONITORING LOCATIONS, PARAMETERS, AND FREQUENCY
- 1.2.1 Process Solution Ponds
- 1.2.2 Heap Leach Pads
- 1.2.3 Water Supply Well
- 1.2.4 Corrective Actions

1.3 MONITORING SYSTEM DESIGN
- 1.3.1 Process Solution Ponds
- 1.3.2 Heap Leach Pads

1.4 SAMPLE COLLECTION
- 1.4.1 Sampling Equipment
- 1.4.2 Sample Preservation and Storage
- 1.4.3 Chain-of-Custody

1.5 LABORATORY ANALYSES

1.6 REPORTING REQUIREMENTS

Table 2-7

Waste Rock Characterization Plan Outline

1.0 INTRODUCTION

1.1 Project Location
1.2 Project Description

2.0 PROJECT GEOLOGY

2.1 General Geology
2.2 Site-Specific Waste Rock Geology

3.0 WASTE ROCK SAMPLING AND ANALYSIS

3.1 Description of Individual Rock Types
3.2 Geologic Cross Sections of Pit Areas
3.3 Description of Sampling Procedure and Locations
3.4 Results of Meteoric Water Mobility Procedure Analyses
3.5 Results of Acid-Base Accounting

4.0 SUMMARY AND CONCLUSIONS

Mountain Mine Properties, Bureau of Land Management, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation. Class III cultural resource inventories have been conducted in the area of the Proposed Action. If necessary, data recovery plans would be developed using Programmatic Agreement guidelines so that no cultural resource information would be lost as a result of mining operations in the area. All mining operations would be conducted in accordance with the guidelines of the Bureau of Land Management and all other applicable laws and regulations.

If previously undocumented archaeological sites or subsurface components of documented sites are discovered during mining operations, activities will be halted until the resources are examined by professional archaeologists in accordance with the procedures outlined in the draft Programmatic Agreement. If resources are determined to be eligible for the National Register of Historic Places, impacts would be mitigated through an appropriate treatment plan as stipulated in the Programmatic Agreement.

- **Protection of Wildlife, Wild Horses, and Livestock**

All ponds and ditches containing solutions toxic to wildlife would be covered or netted and fenced to preclude access to wildlife. The existing monitoring program for the cyanide solution ponds and heap leach facilities would be expanded to determine the full extent of bird and mammal mortalities or injuries. The cyanide solution ponds and heap leach pads would be surveyed daily for wildlife species. The tailings facility also would be examined daily to record any wildlife mortalities and injuries that may occur. All recorded data would be reported to the Bureau of Land Management and the Nevada Division of Wildlife. If the solution ponds, heap leach pads, or tailings facility cause wildlife mortalities, both the Bureau of Land Management and the Nevada Division of Wildlife would be consulted and the appropriate mitigation measures (e.g., netting, supplemental fencing) would be developed to reduce or eliminate the problem.

Efforts would be taken to protect wild horses in the area, including flagging, fencing, and informing employees of the penalties for harassing wild horses. To minimize collisions with wildlife, wild horses, and cattle, traffic control signs would be posted in the Proposed Action area and along the access road.

Existing historic mine shafts, adits, or other underground workings would be avoided where possible. If these areas were to be disturbed, Bureau of Land Management would be notified and a survey for bats would be conducted prior to the disturbance. The survey would be conducted by a recognized expert, equipped to perform both summer and winter surveys. If bat species occupy any underground openings to be affected, the closure or disturbance would only be conducted when bats are absent or the underground opening would be avoided.

- **Regulatory Permitting Requirements**

The permits listed in Table 1-1 would be required for this project. These permits would be applied for and acquired prior to activities being conducted.

2.1.6 Reclamation Plan

The following reclamation plan would be implemented for both the Horseshoe/Galaxy Mine and the Process/Top Area Modifications. The plan would follow the Nevada Division of Environmental Protection format and the Bureau of Land Management interim reclamation standard guidelines for reclamation.

2.1.6.1 Schedule

The proposed reclamation schedule is an estimate of the amount of time required to complete reclamation of the Proposed Action. The reclamation plan does not describe activities to be taken for existing disturbance. All existing disturbances will be reclaimed in accordance with previously approved plans. Final reclamation would commence after mining and leaching operations have ceased. The reclamation schedule for each project component would be dependent on variables that exist in the mining schedule. Reclamation procedures would be initiated on disturbed areas where no further activities are planned concurrently with operations. However, for the purpose of bonding and permitting, those areas would not be considered reclaimed. The reclamation schedule for the Horseshoe/Galaxy Mine is presented in Table 2-8, with final reclamation activities completed in 2002. Reclamation of the Top Area would be finalized in 2008; reclamation of the proposed ore processing facility would be complete in 2011 (see Table 2-9).

Concurrent reclamation at the Horseshoe/Galaxy Mine would be primarily conducted on existing exploration roads, drill sites, and drill holes where operations would allow. Concurrent reclamation of waste rock dumps also may be conducted as the design limits of the dumps are reached. Again, the timing of this reclamation would depend on the sequence of mining.

Concurrent reclamation in the Top Area may become feasible once discrete portions of the waste rock dumps reach design capacities. The mining plan, however, requires the haul roads and most waste rock dumps to remain active throughout the project life.

Concurrent reclamation activities at the ore processing facility would be limited to recontouring completed areas of the heap leach pads and tailings impoundment dams. By utilizing the sequenced pond construction, it would be possible to initiate heap rinsing activities on discrete drainage areas of the heap leach pad by dedicating a portion of the carbon-in-column plant to this activity. Depending upon the success of this activity, these areas also would be revegetated to aid in the neutralization process. Final rinsing and neutralization of the heap leach areas is expected to take 2 years to complete, following completion of ore processing activities.

2.1.6.2 Post-mining Land Use

Proposed Post-mining Land Use

The post-mining land use would be consistent with the pre-mining land use. The majority of the uses include mineral exploration, livestock grazing, wildlife and wild horse use, and recreation. The reclamation plan is intended to be consistent with the Egan Resource Management Plan for this area. The reclamation plan is further intended as an attempt to reduce soil loss through the control of erosion. Erosion control would be accomplished by regrading slopes, revegetation and other methods discussed in the plan. The area would be available after mining for mineral exploration, livestock grazing,

Table 2-8

Horseshoe/Galaxy Mine Estimated Reclamation Schedule

Area/Activity	Start	End
Horseshoe and East Bida		
Exploration disturbance reclamation	1996	1998
Waste rock dump recontouring	1998	1998
Waste rock dump topsoil and seeding	1999	1999
Haul and secondary road reclamation and revegetation	1998	1999
Open pit and pit perimeter reclamation	1999	1999
Galaxy		
Exploration disturbance reclamation	1997	1998
Waste rock dump recontouring	1999	1999
Waste rock dump topsoil and seeding	1999	1999
Haul and secondary road reclamation and revegetation	1999	1999
Open pit and pit perimeter reclamation	1999	1999
Saga		
Exploration disturbance reclamation	1998	1999
Waste rock dump recontouring	1999	2000
Waste rock dump topsoil and seeding	2000	2000
Haul and secondary road reclamation and revegetation	1999	2000
Open pit and pit perimeter reclamation	2000	2000
Mooney Basin Process Area		
Leach pad neutralization	2000	2002
Leach pad recontouring	2002	2002
Leach pad topsoil placement and revegetation	2002	2002
Removal of structures and equipment	2002	2002
Final reclamation and revegetation	2002	2002

Note: Concurrent reclamation of mining and process components would be performed when and where feasible. Test plot programs would be conducted on leach pads and waste rock dumps during operations.

Table 2-9

Process/Top Area Estimated Reclamation Schedule

Area/Activity	Start	End
Top Area		
Waste rock dump recontouring	2005	2006
Waste rock dump topsoil and seeding	2007	2007
Haul road reclamation and revegetation	2007	2008
Seeding of open pits	2008	2008
Reclamation of Top Pit shop area	2008	2008
Process Area		
Tailings drain down/stabilization	2005	2008
Leach pad neutralization	2007	2009
Tailings capping	2008	2009
Removal of structures and equipment	2009	2010
Leach pad recontouring	2009	2010
Topsoil placement and revegetation	2009	2010
Leach pad topsoil placement and revegetation	2010	2011
Final reclamation of utilities and revegetation	2010	2011
Post closure reclamation and process monitoring	2010	2015

Note: Concurrent reclamation of mining and process components would be performed when and where feasible. Test plot programs would be conducted on leach pads and waste rock dumps during operations.

wildlife and wild horse use, and other multiple uses.

2.1.6.3 Post-mining Topography

The topography following reclamation would blend with the surrounding topography wherever possible. No pit recontouring would be conducted. The waste rock dumps would be reshaped to reduce potential erosion and to blend into the existing topography. Erosion control features (terraces and/or dozer basins) would be constructed at maximum 100-foot intervals on the slopes. Roads would be reclaimed by utilizing all the material originally associated with the road cut or fill, including rolling sidecast or berm material back into place. In most instances, the final configuration of the road or other feature would blend into the surrounding topography. The establishment of vegetative cover at closure would stabilize the slopes and minimize erosion.

2.1.6.4 Soil Management

Most newly disturbed areas would have growth medium removed from 6 to 12 inches and stockpiled prior to surface disturbance. The stockpiles would be located in such a manner as to reduce degradation of the material by wind and water erosion. These locations also would be segregated from the waste material. Stockpiles would be seeded to help stabilize the material. The proposed stockpiles would be seeded with 8 pounds pure live seed per acre for erosion control (see Table 2-10). If the stockpiled growth medium were not in place during the growing season, interim seeding would not occur.

Growth medium would be placed to a depth of 6 to 12 inches over the entire haul road and waste rock dump pile surfaces. Preliminary growth medium assessments indicate sufficient growth medium exists within the proposed disturbance areas. Sufficient growth medium would be salvaged to allow for potential losses. Following placement of the growth medium, the seed bed would be prepared with the appropriate equipment and seeding would commence on these areas.

Since growth medium from one part of the Proposed Action area (i.e., Top Area, Horseshoe/Galaxy Mine, or Process Area) would not be salvaged for use in other parts of the Proposed Action area, it is possible that some areas may not contain sufficient amounts of growth medium for reclamation. The volume of salvageable growth medium could be limited by shallow soils or soils with high percentages of coarse fragments, and consequently not provide 6 to 12 inches of growth medium for revegetation. In such cases, salvaged material would be placed above waste rock and the area to achieve 6 to 12 inches of loosened material for plant growth. Results from the test plot program would provide input on reclamation success and practices that would be employed during reclamation, including amendments that could be added to the growth medium on waste rock areas.

2.1.6.5 Revegetation

Reclamation for the Proposed Action would be planned and designed to return the area to a stable and productive condition that would be compatible and supportive of the post-mining land uses. The reclamation goals for mining disturbances would be to stabilize the site and establish a productive vegetative community.

Table 2-10

Interim Seed Mixture for Growth Medium Stockpiles

Species	Seeding Rate (PLS lb/acre)[1]
Grasses	
Slender wheatgrass - *Agropyron trachycaulum*	3
Western wheatgrass - *Agropyron smithii*	1
Forbs	
Yellow sweetclover - *Melilotus officinalis*	3
Sainfoin - *Onobrychis viciaefolia*	1
TOTAL	8

[1]Pure live seed (pounds per acre).

The plant species proposed for revegetation at the Horseshoe/Galaxy Mine are shown in Table 2-11. Seven of these species are native. This species mix is similar to the Bureau of Land Management-approved seed mixture currently being used at Yankee and Casino/Winrock Mines. A more site-specific seed mix would be developed based on a test plot program to be run during mine operation, which is discussed below. The program would determine the most appropriate seed mix and seeding techniques to be used for each area. Certain species currently used at Bald Mountain Mine also would be evaluated. The seed mixture identified for revegetation of the Process/Top Area Modifications is the same as that used for the Bald Mountain Mine (see Table 2-12); 11 of these species are native.

Annual precipitation in the Proposed Action area ranges from 9 to 13 inches per year and is received mainly in the form of snow. Seeding would occur between October 1 and March 15 to take full advantage of the increased moisture for enhanced seed germination and establishment. Broadcast and drill seeding are the proposed primary seeding methods. Fertilizer needs would be determined on a site-specific basis using the results of the test plot program. Limited salvaging of the piñon and juniper trees would be done as part of the reclamation effort. The piñon and juniper removed would be either spread back over the reclaimed areas to enhance the reclamation efforts or would be left in piles for wildlife cover.

Test Plot Program

A revegetation test plot program is currently being developed and would be implemented to evaluate and select successful, site-specific reclamation measures that would achieve the reclamation standards or demonstrate the need for species mixes adaptable to the different settings expected within the reclaimed Proposed Action area. These settings would include different aspects and soil or growth medium types. Various surface preparation techniques also would be evaluated for their success in promoting plant establishment and resistance to soil erosion, including growth medium amendments. The reclamation test plot program would be implemented in cooperation with the Bureau of Land Management and the Nevada Division of Environmental Protection, and would be site-specific to different types and areas of disturbance. Because of the various areas proposed for mining activity under the Proposed Action, the reclamation techniques used for the Horseshoe/Galaxy Mine may differ from those used for the Process/Top Area Modifications.

Growth Medium Management

All newly affected areas would have available growth medium removed and stockpiled, except where limited by topography. The uppermost layer of soil material, approximately 6 to 12 inches or more in areas where available, would be removed from these areas prior to disturbance. The stockpiles would be located in such a manner as to reduce degradation of the material by wind and water erosion. These locations also would be segregated from the waste material.

Bald Mountain Mine Properties would attempt to recover at each area of disturbance, the volume of growth medium required to cover that disturbance. However, because of the areas to be disturbed, this would not always be possible. In these instances, growth medium would be placed in higher priority areas, as determined in cooperation with Bureau of Land Management and the Nevada Division of Environmental Protection. It is currently planned to cover the disturbed areas with a minimum of 6 inches of growth medium during reclamation.

Table 2-11

Proposed Seed Mixture for Horseshoe/Galaxy Mine

Species	Seeding Rate (PLS lb/acre)[1]
Grasses	
Slender wheatgrass[2] - *Agropyron trachycaulum*	4.0
Thickspike wheatgrass[2] - *Agropyron dasystachyum*	1.0
Western wheatgrass[2] - *Agropyron smithii*	3.0
Great Basin wildrye[2] - *Elymus cinerus*	2.0
Sandberg bluegrass[2] - *Poa sandbergii*	0.5
Forbs	
Small burnet - *Sanguisorba minor*	3.0
Yellow sweetclover - *Melilotus officinalis*	1.0
Sainfoin - *Onobrychis viciaefolia*	3.0
Shrubs	
Prostrate kochia - *Kochia prostrata*	0.5
Shadscale[2] - *Atriplex confertifolia*	3.0
Fourwing saltbush[2] - *Atriplex canescens*	2.0
TOTAL	23.0

[1]Pure live seed (pounds per acre).

[2]Native Species.

Table 2-12

Proposed Seed Mixture for the Process/Top Area Modifications

Species (variety)	Seeding Rate (PLS lb/acre)[1]
Grasses	
Great Basin wildrye (Magnar)[2] - *Elymus cinerus*	2.0
Thickspike wheatgrass (Critana)[2] - *Agropyron dasystachyum*	2.0
Indian ricegrass (Nezpa)[2] - *Oryzopsis hymenoides*	1.5
Bluebunch wheatgrass (Secar)[2] - *Agropyron spicatum*	1.0
Western wheatgrass (Arriba)[2] - *Agropyron smithii*	0.5
Slender wheatgrass (Revenue)[2] - *Agropyron trachycaulum*	2.0
Forbs	
Sainfoin (Remont) - *Onobrychis viciaefolia*	2.5
Ladak alfalfa (65) - *Medicago sativa*	0.5
Yellow sweetclover (Madrid) - *Melilotus officinalis*	0.35
Small burnet (Deiar) - *Sanguisorba minor*	1.5
Blue flax (Appar)[2] - *Linum lewisii*	0.35
Palmer penstemon (Cedar)[2] - *Penstemon palmeri*	0.25
Shrubs	
Prostrate kochia (Immigrant) - *Kochia prostrata*	0.25
Fourwing saltbush[2] (Rincon) - *Atriplex canescens*	2.5
Bitterbrush (Lassen or native)[2] - *Purshia tridentata*	2.0
Cliffrose[2] - *Cowania mexicana*	0.25
TOTAL	19.45

[1]Pure live seed (pounds per acre).

[2]Native Species.

All salvaged growth medium would be stored in clearly identified stockpiles, away from active operations, but located as close as possible to the areas to be reclaimed.

Stockpiles would be seeded to help stabilize the material if they were to remain in place for more than one growing season. The stockpile surface would be loosened as necessary to provide a proper seedbed. The top, ramps, and side slopes would be broadcast seeded with the interim seed mix listed in Table 2-10. Diversion channels would be constructed around the stockpiles to protect them from surface runoff, where needed. A program to monitor the success of erosion control on stockpiles, particularly following high precipitation events, would be implemented.

Growth Medium Amendments

The test plot program also would be used to determine the need for soil amendments to establish vegetation on disturbed areas. If determined necessary, amendments would be placed on roughened surfaces to ensure good contact. On steeper slopes, efforts would be taken to create small trenches (i.e., dozer tracking) to enhance seed and water catchment and reduce erosion. Fertilization would be completed in the spring, following seeding. On gentle slopes, the surface would be loosened to prepare an appropriate seedbed and incorporate the fertilizer into the soil. If the test plot program determined that mulching were necessary, mulch would be evenly spread over the seeded area at rates dependent on seeding method and slope.

Seedbed Preparation

Seedbeds would be prepared immediately after grading. Soil amendments would be added only as required, based on soil analyses and test plot results. The area to be planted would be reasonably smooth and free of rills and gullies to provide the best possible soil conditions for seeding. Furrows and terraces may be created to aid in the collection and retention of rainwater. Seedbed preparation would generally include the following practices, as determined to be necessary during test plot work:

- Compacted surfaces would be loosened and left in a roughened condition through ripping, disking, or other mechanical means. Compacted areas, such as access and haul roads, would be ripped to a depth of 1 to 2 feet prior to soil amendment or further seedbed conditioning.

- Where practical, areas to be reclaimed would be scarified or tilled to a depth of several inches prior to seeding. Tillage operations on slopes would be conducted on the contour to minimize erosion.

- The addition of soil amendments, such as mulch or fertilizer, would be evaluated and applied based on an assessment of site characteristics and the test plot results.

- Loose, erodible surfaces may need to be "dozer-tracked," terraced, or deep-furrowed to prevent sloughing before amendments, seed, and mulch are applied.

Vegetation Establishment

Proposed interim and final seeding mixtures were developed for the reclamation plan based on known climatic and soil conditions, consultation with Bureau of Land Management, as well as anticipated post-mining land use requirements and use for existing disturbances in nearby areas. The seed mixes were developed with the final reclamation goals in mind.

The species selected for inclusion in the mix and their application rates are expected to vary depending on seed availability and site conditions, such as aspect, slope, and nutrient conditions, as determined by the test plot program. The species and rates presented in Tables 2-10 through 2-12 are currently used at Bald Mountain and Alligator Ridge Mines. These mixtures would be the starting points for the test plot program for the Proposed Action.

For linear features, such as access roads and pipelines, slight variations in the seed mixture may be required, depending on the terrain that would be crossed. Seed mixtures and application rates would be refined for the various types of reclamation sites based on an evaluation of post-mining site characteristics (slope, soil type, aspect), seed availability, interim seeding success, and results from the test plot program.

Methods of seeding to be used include drill and broadcast seeding. Drilling may be used where topography and surface conditions permit operation of the equipment. Broadcast seeding would be done on rocky areas, on steep slopes, and on small disturbances. Some aerial seeding also may occur in pit areas. The seeding rates in Tables 2-10 through 2-12 assume that seeds would be broadcast; these rates are generally higher than those used for drill seeding.

Seed planted with a drill or broadcast would be covered with soil to a depth of 0.25 to 0.5 inch. This would be accomplished by dragging a harrow-type piece of equipment behind a machine. In very steep or rocky areas, seeding would be done by hand broadcasting and not covered.

Vegetation establishment activities would be timed to take advantage of optimal climatic conditions and would be coordinated with other reclamation activities to occur as soon as practical after seedbed preparation. Seeding would be conducted between October 1 and March 15.

2.1.6.6 Goals for Successful Revegetation

The following goals would be applied to the Proposed Action to determine the success of revegetation efforts:

- Establishment of vegetation with a 35 percent perennial canopy coverage of the surface.
- Diversity of cover would be as follows, based on total vegetation occurrence:
  - At least 50 percent represented by perennial grasses, consisting of at least 4 species;
  - At least 10 percent represented by forbs, consisting of at least 2 species;
  - At least 10 percent represented by shrubs, consisting of at least 2 species; and
  - The remaining 30 percent may be any combination of perennial vegetation; and
  - No noxious weeds would be allowed on any of the reclaimed areas. A list of noxious weeds is shown in Table 2-13.

The above percentages include both planted and volunteer growth. Success would be determined by either the Line Intercept Method or the Step Point Transect Method of cover monitoring (Bureau of Land Management 1985). The goal for cover is based on the range site descriptions (see Soils, Chapter 3) for areas proposed for disturbance. The diversity goals are based on actual transect measurements in the areas

Table 2-13

Noxious Weeds[1]

Common Name	Scientific Name
Austrian fieldcress	*Rorippa austriaca*
Austrian peaweed	*Sphaerophysa salsua - Swainsona salsula*
Camelthorn	*Alhagi camelorum*
Klamath weed	*Hypericum perforatum*
Hemlock	
Poison	*Conium maculatum*
Water	*Cicuta douglisii*
Horsenettle	
Carolina	*Solanum carolinense*
White	*S. Elaeagnifolium*
Knapweed	
Diffuse	*Centaurea diffusa*
Russian	*C. repens*
Leafy spurge	*Euphorbia esula*
Licorice	*Glycyrrhiza lepidota*
Mediterranean sage	*Salvia aethiopis*
Medusahead	*Elymus caput-medusae - Taeniatherum asperum*
Puncturevine	*Tribulus terrestris*
Sorghum species, perennial, such as, but not limited to: Johnsongrass, sorghum alsum, and perennial sweet sudan	
Thistle	
Canada	*Cirsium arvense*
Musk	*Carduus nutans*
Scotch	*Onopordum acanthium*
Sow	*Sonchus arvensis*
Iberian star	*Centaurea iberica*
Purpoe	*C. calcitrapa*
Yellow star	*C. solstitialis*
Dalmatian toadflax	*Linaria dalmatica*
Whitetop/hoary cress	*Cardaria draba, C. pubescens*
Peppergrass	*Lepidium latifolium, L. repens*

[1]As identified by the Nevada State Department of Agriculture, approved revision dated September 29, 1989.

proposed for disturbance and the range site descriptions for these areas.

These goals would be applied throughout the project site on all reclaimed surfaces. Due to the potential limitations inherent in reclamation in arid climates, especially in the direct revegetation of varied growth medium, including waste rock, it is possible that these goals for cover or diversity may not be met. The following criteria would be used to determine if a lesser degree of cover and/or diversity would be appropriate:

1. Bald Mountain Mine Properties must take reasonable surface and seedbed preparation measures necessary to create a viable growth medium, as stated and approved in the reclamation plan.
2. Bald Mountain Mine Properties must use an appropriate seed mixture for each disturbed area, as stated and approved in the reclamation plan.

Revegetation efforts would be determined to be complete and successful upon demonstrating that the standards for success described above, or alternative standards deemed appropriate by Bureau of Land Management based on results of the test plot program, have been met. At a minimum, the release criteria would be to achieve as close to 100 percent of the perennial plant cover of selected vegetation communities or reference areas as possible. The vegetation communities or reference areas would be selected from representative, undisturbed plant communities adjacent to the mine site, or, as appropriate, representative ecological or range site descriptions.

2.1.6.7 Surface Water and Sediment Control

Sediment loading from storm events would be controlled and minimized by diverting runoff around potential sediment sources, constructing sediment traps, minimizing runoff velocity where feasible, armoring ditches and drainages where erosion potential is high, and most importantly, by revegetating and stabilizing disturbed areas. The goal of these actions is to minimize the amount of sediment leaving the disturbed lands. All drainages within the Proposed Action area are ephemeral and do not discharge into any surface water bodies. Further, no surface water is present in the vicinity of the Proposed Action. Sedimentation control structures would be left in place for sediment control following reclamation or recontoured to match the original topography. In addition, growth medium would be salvaged and stockpiled during the construction and mining phases of the operation, and any growth medium remaining in a stockpile for one or more growing seasons would be seeded for erosion control. Once vegetation has been established, no other controls would be needed. Diversion structures constructed upstream of the dumps would divert runoff around the dumps.

2.1.6.8 Open Pits

All mine roads into the pits would be bermed to prevent public access, and protective berms would be placed around the perimeter of the pits. Warning signs would be posted around the perimeter of the pits at potential points of public access. Fencing also may be necessary to maintain reclamation integrity and increase public safety. Following mine closure, signs and fences would no longer be maintained. Backfilling pits is not proposed.

Diversions would be constructed upgradient from the pits to divert runoff around pits and back into the natural drainage. Any diversion would be designed to withstand a 100-year, 24-hour storm event. This would promote long-term stability of the pits by the control of runoff into these areas. Because all mining activity would occur above the water table and the pit bottoms would be ripped to facilitate infiltration, the formation of permanent lakes within the pits would not occur.

2.1.6.9 Waste Rock Dumps

Due to the topography at the proposed Horseshoe/Galaxy Mine, the waste dumps could be constructed in lifts at a 3:1 overall slope. The East Sage and South Water Canyon waste rock dumps, however, could not be constructed in lifts. Dumps in this area must be end-dumped from one elevation. These dumps, therefore, have a designed slope at angle of repose (i.e., 1.5:1). For reclamation, these dumps would be recontoured to a 2.2:1 slope, which approximates the surrounding hillsides. Figure 2-1 ***shows designed and reclaimed topography for the two Top Area waste rock dumps.*** Dump top surfaces would be reclaimed by end dumping.

Erosion would be minimized at all waste rock dumps by diverting upgradient run-on. All waste rock dump lifts would be constructed to drain water away from the dump face, thus reducing potential erosion of the dump. A diversion structure would be constructed above waste rock dumps to promote stability in the future. The reclaimed East Sage and South Water Canyon waste rock dumps would have horizontal terraces along the slopes, located every 100 feet in elevation. Stormwater control structures would generally be designed to control the 100-year, 24-hour storm event. The mine's General Stormwater Discharge Permit Stormwater Pollution Prevention Plan would further address stormwater controls and Best Management Practices (see Table 2-5).

Vegetation establishment would serve as permanent erosion control. Stockpiled growth medium would be placed at 6 to 12 inches over the waste dumps. The other important function of growth medium application and vegetation establishment would be the reduction of infiltration of precipitation through the waste rock dumps. The final reclamation design of these dumps or areas, including slopes, growth medium depth, and revegetation procedures, would incorporate provisions to reduce or eliminate infiltration.

2.1.6.10 Heap Leach Pads

Rinsing and reclamation of the heaps and process solutions would be performed after cyanide leaching of the gold ore is completed. The objectives would be: 1) to reduce the concentrations of cyanide and metal constituents in the heap effluent to levels that would be specified by the Nevada Division of Environmental Protection and 2) to reclaim the heaps to facilitate vegetation growth and blend with surrounding topography.

Methods of rinsing the heaps and neutralizing solutions would include dilution, natural degradation (volatilization and oxidation), chemical oxidation (i.e., Caro's Acid), carbon adsorption, and stabilization/precipitation. These methods involve different processes:

- Dilution of cyanide and metal levels involves rinsing heaps with fresh water so that approximately 1 ton of solution per ton of ore is applied during an estimated 2-year period.

- Natural degradation of cyanide would occur via volatilization and oxidation during the rinsing period. Biological oxidation also

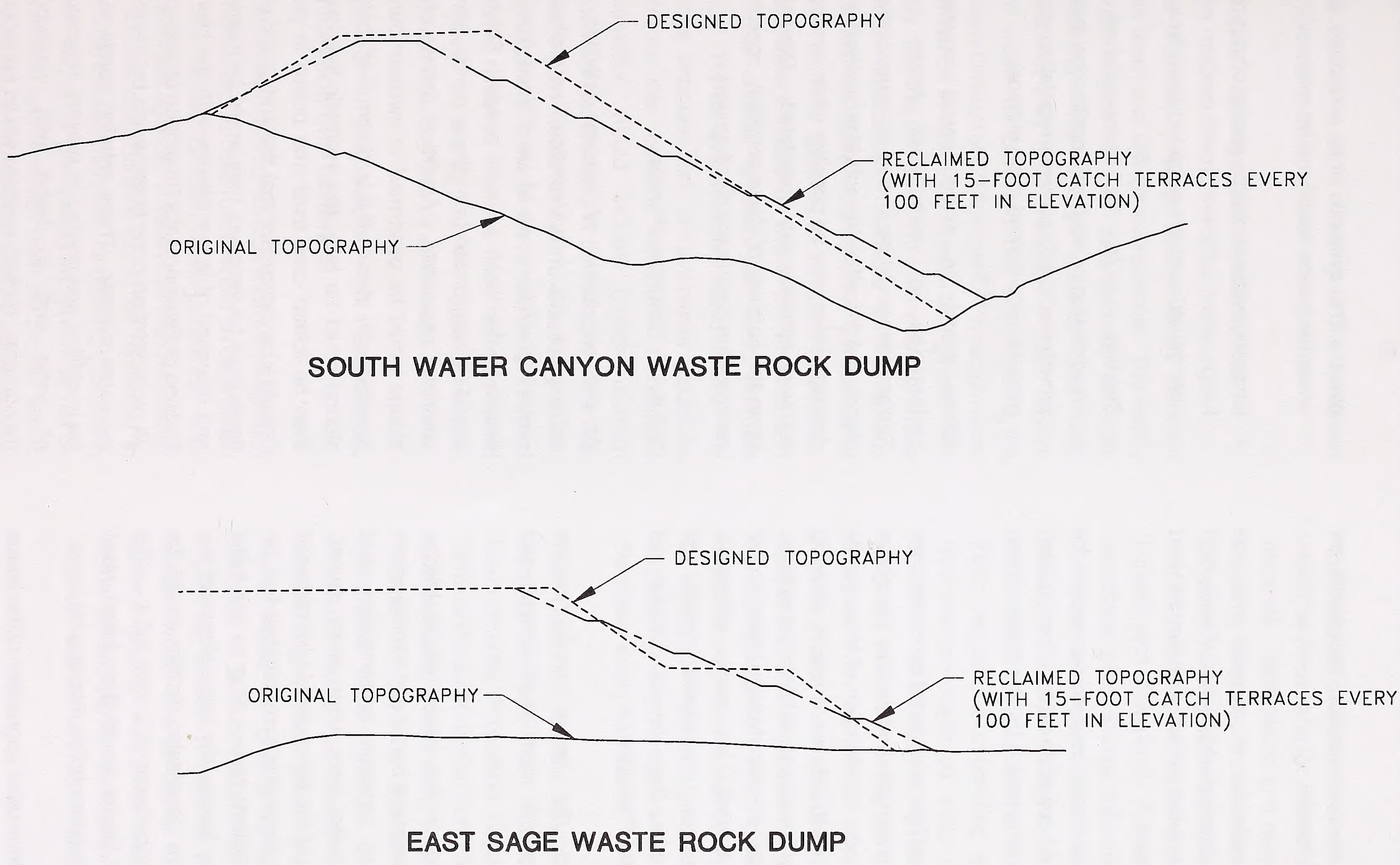


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FIGURE 2-1
CROSS SECTIONS OF
WASTE ROCK DUMPS

contributes to concentration reductions for cyanide and metals.

- Chemical oxidation of cyanide may be required to achieve desired levels. Caro's Acid is an example of an oxidant that may be used for this purpose.

- Cyanide and metal complexes would be adsorbed onto activated carbon from solution during the rinsing period to help remove these constituents.

- It is anticipated that most metal concentrations would be substantially reduced by the above rinsing methods. Destruction of free cyanide also would result in lower levels by allowing precipitation of metals as stabilized complexes. If the results of the rinsing indicate that standards cannot be met, alternative decommissioning procedures would be discussed with the Nevada Division of Environmental Protection.

Reclamation of the heaps would include recontouring, growth medium placement, and seeding:

- Recontouring of the heaps would involve removal of perimeter berms and ditches where necessary to prevent accumulation and ponding of water from future storm events. Also, slopes of the heaps would be regraded to an overall slope of approximately 3:1 at the Horseshoe/Galaxy Mine. Due to the initial design of the heaps, the heap slopes at the proposed ore processing facility would be regraded to between 2:1 and 2.5:1. The recontoured heaps would then blend more naturally with surrounding topography.

- Diversion berms used upgradient of the heaps to control stormwater run-on would remain in place. The synthetic liner and drain pipes under the heaps would not be removed.

- Growth medium would be placed on top of the heaps, and if sufficient growth medium exists, over the sides of the regraded heap face.

- Seeding would be accomplished by broadcasting or seed drill application into the growth medium to promote vegetation growth over the recontoured heap surfaces.

Efforts would be made toward concurrent reclamation of completed heap cells. Reclamation could be limited to recontouring of slopes, but detoxification activities on discrete cell drainage areas may be possible when secondary recovery activities are completed. Depending upon the success of these activities, concurrent revegetation could take place as well.

2.1.6.11 Solution Ponds

At the conclusion of mining activities and subsequent to heap/solution neutralization, remaining solutions would be drained from the heaps to the leach solution ponds. Solutions would be evaporated from these ponds, leaving stabilized precipitate. Analytical testing of the sludge would be performed to evaluate burying the sludge in place. If it is determined that the sludge could be left, the synthetic liner would then be folded onto itself and buried in place. Should it be determined that the sludge and pond liners must be removed, they would be managed and disposed of in compliance with the Nevada Division of Environmental Protection closure plan. All other solution pond liners would be treated in the same manner. These solution ponds would be backfilled and graded to prevent impounding of water and to blend with surrounding topography. Growth medium would be replaced over the fill to allow seeding of the reclaimed ponds and facilitate growth of vegetation.

2.1.6.12 Tailings Cell Reclamation

The proposed process facility would combine heap leach and tailings components. The facility would consist of an arrangement of cells containing only tailings material and cells containing only heap material. A final closure plan would be prepared and submitted to the Nevada Division of Environmental Protection upon termination of operation of each tailings cell. The freely draining design of the cells would promote tailings desiccation. Closure of the tailings impoundment cells would involve placement of cover material graded to minimize infiltration. Embankment freeboard would be removed and the final contour of each cell would promote runoff. Typical overall slopes would be 2:1. The tailings impoundment embankments would be built to this contour initially. Concurrent reclamation would include growth medium placement and seeding of these areas. The final closure plan would include the seeding of the impoundment surface areas as well. Alluvial material removed from the heap cell area would be used in addition to the growth medium removed from the tailings cell areas.

2.1.6.13 Disposition of Structures, Equipment, and Materials

Closure disposition of surface improvements such as fences and access roads would be determined by the Bureau of Land Management or other appropriate agency. Unless otherwise requested, all surface disturbances would be reclaimed in accordance with this plan. All buildings, crushers, tanks, and other processing equipment would be dismantled and removed from the project site to another project location or sold for salvage value. Structures not salvageable would be demolished and disposed of in an approved landfill. Materials would be rinsed and/or detoxified prior to sale or disposal. Salvageable and recyclable materials, including reagents, would be removed from the property. Aboveground piping would be removed and sold. Underground piping would be emptied, capped, and left in place. Following demolition of structures, process area soils would be evaluated for potential impacts. Where appropriate, materials would be placed on the leach pads for neutralization or disposal of in accordance with State regulations depending on the material. Hydrocarbon impacted soils may be treated on-site. All chemicals, petroleum products, reagents, and their empty containers would be removed from the project site in an approved manner. Hazardous materials would be salvaged and/or disposed of pursuant to current State and Federal regulations. Facility foundations would be broken in place and buried on site. Slopes would be regraded if needed, compacted areas would be ripped, growth medium would be applied, and the areas would be seeded.

The Class III landfills would be closed in accordance with the Nevada Division of Environmental Protection regulations and the terms of the authorization from Nevada Division of Environmental Protection's Waste Management Section. A layer of suitable cover material compacted to a minimum uniform depth of 24 inches would be placed on the surface representing the final grade of the landfill. This cover would be graded to allow for proper drainage of surface runoff. The septic system would be closed in such a manner that the system would not be usable in the future. All surface piping would be removed and the below-surface piping and components would be emptied, capped, and left in place.

The water wells would be plugged in accordance with the procedures outlined in Nevada Revised Statute 534.420 including the following:

1. The water well would be plugged by a driller licensed by the State engineer.

2. The casing would be removed or perforated to allow the plugging fluid to penetrate the area between the casing and the wall of the drill hole.

3. The well would be plugged with neat cement or a bentonite product specifically designed to plug abandoned wells.

4. If the well is plugged with bentonite, the top 50 feet would be plugged with cement.

5. The well driller would submit the proper report to the Nevada Division of Water Resources.

Well plugging would be completed after mining and reclamation is performed. The water tanks would be removed after mining is completed and reclamation performed. All below-surface water lines from the water well to the water tanks and other areas would be capped and left in place.

2.1.6.14 Road Reclamation

Road reclamation would be the same for all proposed roads that are part of the mining operation and exploration activities. Generally, the road cuts and fills would be replaced to their approximate original contour, including side berms and side cast material or any other feature associated with road construction and maintenance. Material would be pushed back into place where natural terrain would permit equipment to operate safely, and all berms, ditches, turnouts, and other features would be removed. Waterbars and other diversion methods may be either built or retained if they enhance reclamation. All culverts would be removed, drainage crossings would be reshaped to approximate the original drainage, and riprap or other methods would be used if drainage stabilization is required.

Prior to the deposition of fill material or growth medium, the road would be ripped to allow water infiltration. Once the road material has been reshaped, the compacted areas would be ripped to a depth of 18 to 24 inches to allow infiltration and stabilization for the growth medium placement. Stockpiled growth medium would be replaced to a depth of 6 to 12 inches. Areas along the road where little or no growth medium existed would be ***ripped and*** recontoured only. The method of seeding would be determined by the working slopes and the ability to operate equipment safely. The proposed seed mixture would be applied at the appropriate rate.

Although the existing public access roads in the Top Area and near Horseshoe and East Bida pits would be closed to the public during the life-of-mine operation, other public access roads exist. At final closure, access through the Top Area would be re-established.

2.1.6.15 Drill Hole Plugging

The drill hole plugging program would be conducted in accordance with Nevada Revised Statute 534.425-428 (see Horseshoe/Galaxy Mining Operations).

2.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, gold mining at the Horseshoe/Galaxy and Sage Flats areas would not occur, and the existing Top pit and processing areas at the Bald Mountain Mine would not be expanded. Mineral resources in these areas would remain undeveloped, and no construction of new pits, waste rock dumps, roads, leach pads and ponds, crushers, and gold recovery facilities would occur. Mining would continue in the permitted areas of the Bald Mountain Mine until reserves are exhausted. The mine would then be closed and existing facilities would be reclaimed, including 68 acres of exploration disturbance in the Horseshoe/Galaxy area. Mining and reclamation at Bald Mountain Mine would be expected to be complete in 1997 and 2000, respectively.

2.3 ALTERNATIVE TO BACKFILL PITS AT THE HORSESHOE/ GALAXY MINE

The exact mining sequence for the Horseshoe/Galaxy Mine would not be determined until mining commences. This decision would be based on any increases in resources from development drilling and the economic conditions and corporate goals at that time. To analyze an alternative of backfilling pits at the Horseshoe/Galaxy Mine, a potential mining sequence was selected. This sequence entails mining beginning in the Horseshoe and East Bida pits for the first 2.5 years. Waste from the Horseshoe and East Bida pits would be placed in the Horseshoe waste rock dump. In the third of the scheduled four years, mining would be initiated and completed in the Galaxy pit. The four Saga pits would be initiated in the third year and completed in the fourth year. The Horseshoe pit and two of the Saga pits would be backfilled. The Backfill Alternative would disturb a total of 1,432 acres, as opposed to 1,450 acres from the Proposed Action.

Waste rock from the Galaxy pit would be hauled via truck to the Horseshoe pit for voluntary backfilling, and the 15-acre Galaxy waste dump would not be constructed. Mining costs would increase to haul the waste rock 1.9 miles to the Horseshoe pit. This increase in costs includes the additional time necessary for the trucks to haul the waste rock the 1.9 miles, the increased cost to maintain the 1.9 miles of haul road, and the increased cost to backfill to Horseshoe pit from the bottom upward. After the Galaxy pit is completed, the Horseshoe pit would not be completely backfilled and would not be reclaimed.

The mining sequence of the four Saga pits would be to mine pits 1 and 2 consecutively and pits 3 and 4 concurrently, due to their relative location, topography, ore tonnage, and limited access. The waste rock from pits 1 and 2 would be placed in the Saga waste rock dump. After pits 1 and 2 have been completely mined, they would be backfilled with waste rock from pits 3 and 4. However, a greater amount of waste rock would be generated from pits 3 and 4 than pits 1 and 2 have the capacity to hold. The additional waste rock from pits 3 and 4 would be placed in the Saga waste rock dump, for a total of 1,764,000 tons of waste rock located in the dump. The Saga waste rock dump would be reduced in size by 14 acres by backfilling waste rock from pits 3 and 4 in pits 1 and 2. Mining costs would also increase from this scenario. This increase in costs includes the additional time necessary for the trucks to haul the waste rock from pits 3 and 4 uphill to pits 1 and 2. The additional cost also includes construction of the haul road to access the upper rim of pits 1 and 2 and the maintenance of this additional haul road. New haul roads enabling the voluntary backfilling of pits 1 and 2 would require an additional 11 acres of disturbance. Following backfilling, pits 1 and 2 (totaling 9 acres) would be reclaimed.

2.4 ALTERNATIVE TO RELOCATE HAUL ROAD AND MODIFY SOUTH WATER CANYON DUMP

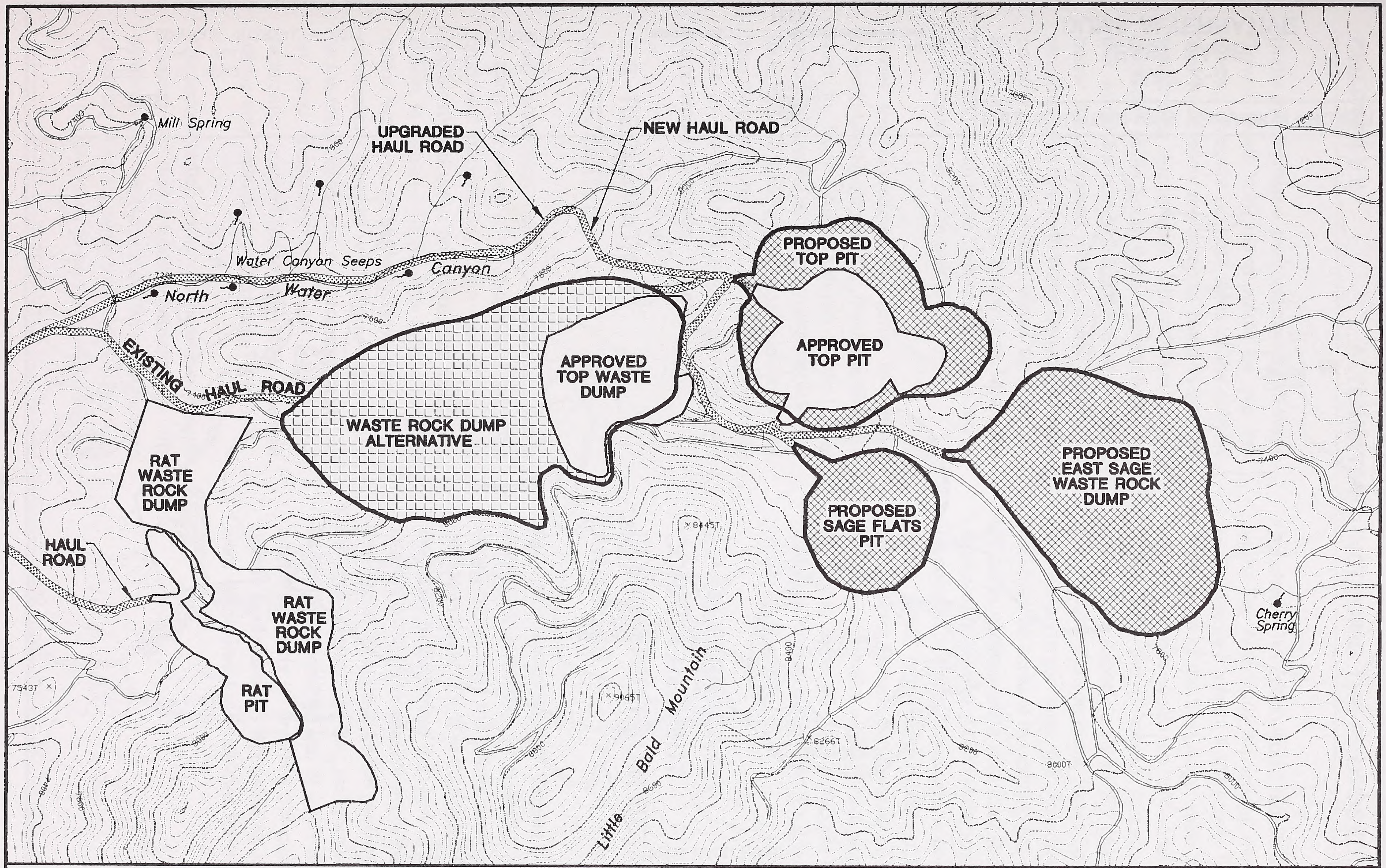
Under this alternative, the haul road from the Bald Mountain Mine Top area to the processing facilities would be relocated from South Water Canyon to North Water Canyon (see Map 2-5). This would allow the total width of South Water Canyon to be used for waste rock deposition. Final size of the South Water Canyon waste rock dump following mining of the Top and Sage Flats pits would be 193 acres (4 acres larger than the Proposed Action), and the total disturbance for the South Water Canyon Dump Alternative would be 1,478 acres. This alternative would not change the disturbance for the East Sage waste rock dump (235 acres).

The proposed haul road through North Water Canyon would require 0.5 mile of new road construction and 1.5 miles of upgrading the existing North Water Canyon road. It would be constructed from Top pit, through a saddle between South and North Water Canyons, and down the existing road in North Water Canyon. The new haul road would be constructed approximately 80 feet wide (including ditches) and would be maintained with a road grader. Approximately 24 acres would be disturbed by the new haul roads. Fugitive dust emissions would be controlled with water trucks and/or other acceptable methods. Under this alternative, the reclaimed South Water Canyon waste rock dump would be tied into existing contours on both sides of the canyon. This would allow the dump to blend in with the surrounding topography. In addition to the 5,500 feet of the South Water Canyon haul road that would be covered, 4,000 feet of this road below the proposed waste dump would be reclaimed after the North Water Canyon road was constructed. This section would be from the lower end of the dump to the area where the North and South Water Canyon haul roads merge at the lower end of the canyon. All waste dumps would be reclaimed to the standards outlined in the reclamation plan (see Reclamation - Waste Rock Dumps). Haul roads to be reclaimed would be ripped, stockpiled growth medium replaced, and seeded. The North Water Canyon road would be returned to its public access width and opened for public use.

Under this alternative, two major operational advantages exist. First, the new haul road in North Water Canyon would better accommodate the larger size trucks that would be used to mine in the Top area and would be safer than the existing haul road. In addition, the waste hauls to the South Water Canyon waste rock dump would be shorter.

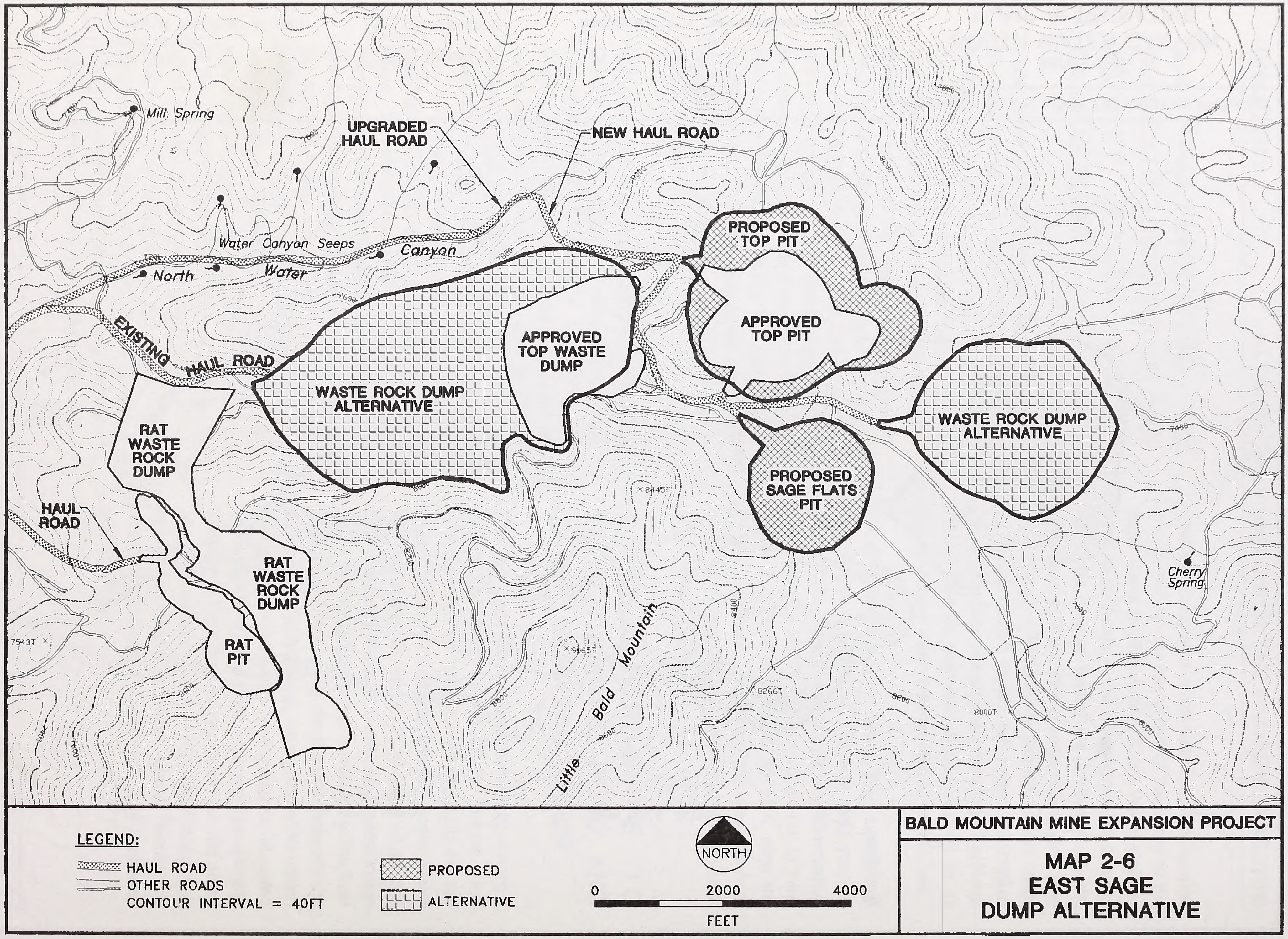
2.5 ALTERNATIVE TO RELOCATE HAUL ROAD AND MODIFY EAST SAGE DUMP

The East Sage Dump Alternative would disturb a total of 1,426 acres (see Map 2-6). The new haul road features of this alternative would be the same as those described for the South Water Canyon Dump Alternative. In addition, waste rock from the Sage Flats pit would be hauled to the South Water Canyon dump instead of to the East Sage dump, increasing the distance between the dump and Cherry Spring. An additional 30 million tons of Sage Flats waste rock would be relocated to the South Water Canyon dump. The ultimate size of the East Sage dump would be 166 acres (69 acres smaller than the Proposed Action), and the South Water Canyon dump would be 210 acres (21 acres larger than the Proposed Action).



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 2-5
SOUTH WATER CANYON
DUMP ALTERNATIVE


Mill Spring
UPGRADED HAUL ROAD
NEW HAUL ROAD
Water Canyon Seeps
North Water Canyon
EXISTING HAUL ROAD
PROPOSED TOP PIT
APPROVED TOP PIT
APPROVED TOP WASTE DUMP
WASTE ROCK DUMP ALTERNATIVE
WASTE ROCK DUMP ALTERNATIVE
PROPOSED SAGE FLATS PIT
RAT WASTE ROCK DUMP
RAT WASTE ROCK DUMP
RAT PIT
HAUL ROAD
Cherry Spring
Little Bald Mountain
LEGEND:
HAUL ROAD
OTHER ROADS
CONTOUR INTERVAL = 40FT
PROPOSED
ALTERNATIVE
NORTH
0
2000
4000
FEET
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 2-6
EAST SAGE
DUMP ALTERNATIVE

Under this alternative, the reclaimed South Water Canyon waste rock dump would be tied into existing contours on both sides of the canyon. This would allow the dump to blend in with the surrounding topography. In addition to the 6,000 feet of the South Water Canyon haul road that would be covered, 3,500 feet of this road below the proposed waste dump would be reclaimed after the North Water Canyon road was constructed. This section would be from the lower end of the dump to the area where the North and South Water Canyon haul roads merge at the lower end of the canyon.

Under this alternative, the same two major operational advantages exist. First, the new haul road in North Water Canyon would better accommodate the larger size trucks that would be used to mine in the Top area and would be safer than the existing haul road. In addition, the waste hauls to the South Water Canyon waste rock dump would be shorter.

2.6 RECLAMATION ALTERNATIVE

Two reclamation options were raised during scoping and review of the Proposed Action. The proposed reclamation plan would use a combination of native and introduced species as shown in Tables 2-10 through 2-12. The first option would be to use only native species for reclamation. Species would be selected based on the results of the test plot program, as well as on seed availability and cost at the time reclamation is scheduled to take place. A sample "native only" seed list is provided in Table 2-14.

The second option deals with the final side slope of waste rock dumps following reclamation. The side slopes for the Horseshoe/Galaxy dumps are proposed to be 3:1, while those for the Top Area dumps are proposed to be 2.2:1, with designed benches. This option would require side slopes in the Top Area to be 3:1 without benches, and would disturb a total of 1,602 acres. The surface disturbance of the East Sage waste rock dump with 3:1 slopes would be 274 acres (39 acres larger than the Proposed Action). Surface disturbance associated with 3:1 slopes on the South Water Canyon dump would be 302 acres (113 acres larger than the Proposed Action). However, 56 acres of the existing Rat Dump and 57 acres of the existing haul road (both already approved by Bureau of Land Management) would be covered by the flattened side slopes. The Rat Dump would have been reclaimed before the South Water Canyon dump would be reclaimed. Thus, this alternative would involve disturbing and reclaiming those 56 acres a second time. The footprints for both dumps with 3:1 side slopes are shown on Map 2-7.

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

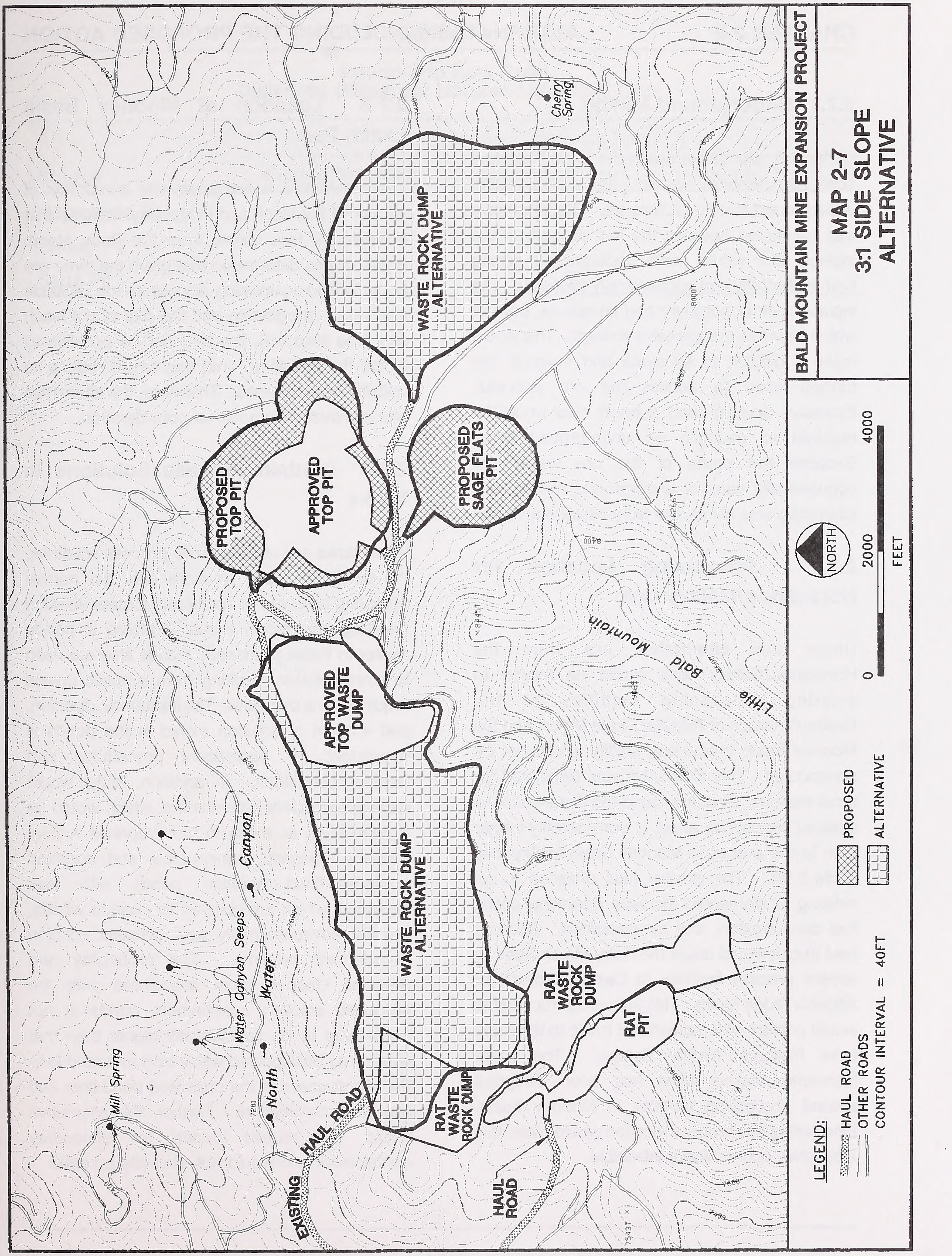
As the environmental impact statement developed, a number of potential alternatives were raised by the environmental impact statement team. Each of these alternatives was examined to determine if it were a reasonable alternative. To be reasonable an alternative would need to: 1) meet the identified purpose and need for the project, 2) be technologically and economically feasible, and 3) avoid or minimize adverse impacts or enhance the quality of the human environment. The following alternatives were considered but eliminated for the reasons stated.

Table 2-14

Alternative Native Seed Mixture

Species	Seeding Rate (PLS lbs/acre)[1]
Thickspike wheatgrass - *Agropyron dasystachyum*	2.0
Bluebunch wheatgrass - *Agropyron spicatum*	1.0
Western wheatgrass - *Agropyron smithii*	1.0
Great Basin wildrye - *Elymus cinerus*	2.0
Indian ricegrass - *Oryzopsis hymenoides*	1.5
Squirreltail - *Sitanion hystrix*	2.0
Palmer penstemon - *Penstemon palmeri*	1.0
Bitterbrush - *Purshia tridentata*	2.0
Cliffrose - *Cowania mexicana*	0.25
Shadscale - *Atriplex confertifolia*	4.0
Fourwing saltbush - *Atriplex canescens*	2.5
Blue flax - *Linum lewisii*	.35
TOTAL	19.6

[1]Pure live seed (pounds per acre).



BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 2-7
3:1 SIDE SLOPE ALTERNATIVE
LEGEND:
HAUL ROAD
OTHER ROADS
CONTOUR INTERVAL = 40FT
PROPOSED
ALTERNATIVE
NORTH
0
2000
4000
FEET
WASTE ROCK DUMP ALTERNATIVE
PROPOSED TOP PIT
APPROVED TOP PIT
PROPOSED SAGE FLATS PIT
APPROVED TOP WASTE DUMP
WASTE ROCK DUMP ALTERNATIVE
RAT WASTE ROCK DUMP
RAT PIT
RAT WASTE ROCK DUMP
EXISTING HAUL ROAD
HAUL ROAD
Cherry Spring
Mill Spring
North Water Canyon Seeps
Water Canyon
Little Bald Mountain

2.7.1 Underground Mining

Under this alternative, ore in the Sage Flats and Top pit deposits would be mined using underground mining techniques. The alternative was eliminated because the low strength of the inplace rock would make underground mining both technically and economically infeasible. The inplace rock is porphyry and limestone, both of which have low compressive strength. This would make it difficult to excavate and maintain the tunnels used to access the ore deposits. Extensive aboveground support also would be required to maintain an underground mine. Because the grade of the ore would not economically support underground mining, this alternative was eliminated from detailed analysis.

2.7.2 Processing Location for Horseshoe/Galaxy Ore

Under this alternative, ore from the Horseshoe/Galaxy Mine would be hauled to existing processing facilities at the Casino/Winrock or Alligator Ridge Mines, and the Mooney Basin processing facility would not be constructed. This alternative was eliminated for three reasons. First, the round-trip distance to the existing processing areas is considerably longer than to the proposed Mooney Basin facility (see Table 2-15). The greater haul distance to an existing facility would increase operating costs, fuel consumption, and air emissions. Second, haul trucks would utilize the Ruby Marsh Road to access process facilities at Casino/Winrock or Alligator Ridge Mines. This increased truck traffic would conflict with recreational traffic to the Ruby Lake National Wildlife Refuge. The entire Horseshoe/Galaxy Mine has been designed around processing facilities in Mooney Basin. Eliminating this process location would make this alternative economically infeasible.

2.7.3 Location of Mooney Basin Leach Pad

This alternative investigated the possibility of relocating the leach pad in Mooney Basin so that it would be less visible from the Ruby Marsh Road. It was determined that given the three ore body locations, existing access roads, suitable leach pad topography, and the size of the leach pad (see Map 2-2), it would not be possible to locate the pad in an area that would reduce its visibility from the road. Therefore, the alternative was eliminated from further consideration.

2.7.4 Contain Process Solutions in Tanks

When tanks are used to store process solutions, the tanks are sized to store only the normal operating amounts of solutions. Excess solution resulting from storm events is stored in ponds similar to those proposed. Ponds also are used to store solution resulting from process upsets requiring tank bypasses. The frequency, duration, and amount of solution stored in the ponds is dependent on operational procedures and weather conditions. In addition, tanks would require secondary containment, which would be a pond such as those in the Proposed Action. Properly designed, constructed, and operated composite-lined solution ponds with leak detection, which are covered to exclude wildlife, provide environmentally safe process solution containment systems. The probability and potential clean-up cost associated with the proposed solution containment ponds is not considered to be substantially higher than that which may be expected with a tank system due to the effectiveness of the proposed pond liner and leak detection system. Further, this alternative would still require ponds for secondary containment and would not eliminate potential

Table 2-15

Round-Trip Haul Road Distances (Miles) for Horseshoe/Galaxy Ore

Source	Destination (Process Facility)		
	Casino/Winrock	Alligator Ridge	Mooney Basin
Horseshoe Pit	14.6	26.7	2.6
Galaxy Pit	13.5	25.6	1.5
Saga Pit	16.4	25.5	4.4

exposure of wildlife to process solutions and would not reduce potential adverse impacts.

2.7.5 Divide Top Pit Waste Rock between South Water Canyon and Mahoney Canyon

This alternative would decrease disturbance in South Water Canyon by placing half the Top pit expansion waste in Mahoney Canyon and half in South Water Canyon. This alternative would increase the overall disturbance by approximately 120 acres due to the topography of the area. In addition, because Mahoney Canyon is prospective exploration ground, future exploration and recovery of resources might prove economically infeasible, due to the increased costs of rehandling waste material.

2.7.6 Backfill the Sage Flats or Top Pits

This alternative evaluated backfilling either the Sage Flats or Top pits with waste rock after mining had been completed. Backfilling would reduce the amount of new surface disturbance associated with waste rock dumps. The feasibility of backfilling is closely tied to the sequence of mining as well as the haul distance from one pit to another. The Sage Flats and Top pits are relatively close to each other (about 0.25 mile) and would be mined concurrently. This would eliminate backfilling as an option during most of the mining schedule. The economics of backfilling at the end of the mine life would result in a decrease in the total tons of ore that could be mined from the optimized pits by 66 percent for the Top pit and 98 percent for the Sage Flats pit. These reductions would be due to the increased costs required by this alternative as a result of rehandling waste material. For these reasons, the alternative of backfilling in the Top Area was eliminated from further consideration.

2.7.7 Reduce the Pit Wall Angle During Reclamation

The possibility of reducing (flattening) the final pit wall angle at the end of mining was considered as a means of encouraging natural revegetation. No reclamation is proposed for pit walls. This alternative was considered for all pits that are part of the Proposed Action. To reduce a pit wall angle, it would be necessary to push the outer edge of the pit into the pit bottom by blasting and using dozers or graders. This excavation would increase the overall surface disturbance of the pit and would not ensure future revegetation of the pit wall. This alternative would not reduce project-related impacts and, for these reasons, was given no further consideration.

2.8 SUMMARY COMPARISON OF IMPACTS AMONG THE PROPOSED ACTION AND ALTERNATIVES

Table 2-16 summarizes and compares the environmental impacts among the Proposed Action and six alternative scenarios: the No Action Alternative, the Alternative to Backfill pits at Horseshoe/Galaxy Mine, the Alternative to Relocate the Haul Road and Modify South Water Canyon Dump, the Alternative to Relocate the Haul Road and Modify East Sage Dump, and two options under the reclamation alternative, including use of an exclusively native seed mixture and the regrading of Top Area slopes from 2.2:1 with benches to 3:1. Detailed descriptions of impacts are contained in Chapter 4. The summarized impacts include the implementation of potential mitigation measures presented in Chapter 4.

2.9 AGENCY PREFERRED ALTERNATIVE

In accordance with National Environmental Policy Act, Federal agencies are required by the Council on Environmental Quality (40 Code of Federal Regulations 1502.14) to identify their preferred alternative for a project in the draft environmental impact statement, if a preference has been identified, and in the final environmental impact statement prepared for the project. The preferred alternative is not a final agency decision; it is rather an indication of the agency's preliminary preference. The alternative identified below is the Bureau of Land Management's preferred alternative at the ***final*** environmental impact statement stage in the environmental review process. The Bureau of Land Management's preference at ***this*** time considers all information that has been received and reviewed relevant to the proposed project. The agency preferred alternative is the Proposed Action as described in the environmental impact statement with all appropriate mitigation.

Rationale

- The Proposed Action would keep the North Water Canyon ecosystem intact and contain all disturbance in South Water Canyon, which would be reclaimed. The current disturbance for the Bald Mountain Mine is located in South Water Canyon.

- Reclamation would be achievable; however, the long slopes associated with the South Water Canyon dump may take more time to reclaim.

- The Proposed Action would meet the reclamation standards but at a lower cost than the 3:1 slope option in the Reclamation Alternative. ***Further, it would avoid 152 acres of additional surface disturbance that would be associated with the 3:1 slope option.***

- The Proposed Action would have no short- or long-term impacts to riparian vegetation.

- The Proposed Action would not have effects on the human environment that are highly uncertain and would not involve any unique or unknown risks to public health and safety.

Table 2-16

Comparison of the Proposed Action and Alternatives

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	**Varies by Alternative**	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	**Varies by Alternative**	1,468
Acres Not Reclaimed	134	0	125	134	134	**Varies by Alternative**	134
Soils	Eleven soil associations would be impacted (see acreage above). Soils would be removed during ground-disturbing activities. Areas that are not reclaimed would have long-term loss of productivity, while reclaimed areas would have long-term reductions in productivity.	No soils would be impacted.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	56 acres of previously disturbed and reclaimed soil would be redisturbed.
Vegetation	Eight range sites would be impacted (see acreage above). Seed mixtures for revegetation purposes would be developed under a test plot program.	No vegetation would be impacted.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	56 acres of previously disturbed and reclaimed land would be redisturbed.

Table 2-16 (Continued)

						Reclamation	
Resource Areas	**Proposed Action**	**No Action**	**Backfill Pits**	**South Water Canyon Dump**	**East Sage Dump**	**Native Seed Mixture**	**3:1 Slopes at Top Area**
Acres Impacted	**1,450**	**0**	**1,432**	**1,478**	**1,426**	**Varies by Alternative**	**1,602**
Acres Reclaimed	**1,316**	**0**	**1,307**	**1,344**	**1,292**	**Varies by Alternative**	**1,468**
Acres Not Reclaimed	**134**	**0**	**125**	**134**	**134**	**Varies by Alternative**	**134**
Geology and Minerals	608,000 ounces of gold would be produced.	Production of 608,000 ounces of gold would not occur. About 93,000 ounces of gold would not be recovered from currently permitted ore due to less efficient recovery processes.	Backfilling 3 pits would potentially remove a resource from future mining.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Water Resources							
• Groundwater	Withdrawal of 400 to 700 gpm of groundwater for 6 years at the Mooney Basin facility and 500 to 700 gpm for 12 years at the Process/Top Areas would have minimal effects on existing wells.	Groundwater would not be tapped.	Water use would be the same as the Proposed Action. Backfilling would reduce potential recharge to groundwater.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
• Surface water	Water quality could be degraded by a spill of process chemicals or fuels.	Potential for release would remain for existing mining.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Springs	Potential reduction in flows from Cherry Spring. 235 acres of the recharge area would be covered by the East Sage Dump.	Cherry Spring would not be affected.	Same as the Proposed Action.	Same as the Proposed Action.	166 acres of the Cherry Spring recharge area would be covered.	Same as the Proposed Action.	274 acres of the Cherry Spring recharge area would be covered.
Wetlands and Waters of the U.S.	No wetland or riparian areas would be directly impacted. One intermittent drainage totalling 0.04 acre would be impacted.	No wetland, riparian, or drainage impacts.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
Wildlife and Fisheries Resources							
• Habitat loss/crucial mule deer winter range.	1,450 acres disturbed.	0 acres disturbed.	1,432 acres disturbed.	1,455 acres disturbed.	1,402 acres disturbed.	Same as Proposed Action.	1,489 acres disturbed.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	**1,450**	**0**	**1,432**	**1,478**	**1,426**	**Varies by Alternative**	**1,602**
Acres Reclaimed	**1,316**	**0**	**1,307**	**1,344**	**1,292**	**Varies by Alternative**	**1,468**
Acres Not Reclaimed	**134**	**0**	**125**	**134**	**134**	**Varies by Alternative**	**134**
• Habitat not reclaimed.	134 acres not reclaimed.	No habitat disturbed.	125 acres not reclaimed.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Loss of nesting habitat for birds.	595 acres lost.	0 acres lost.	586 acres lost.	570 acres lost.	541 acres lost.	Same as the Proposed Action.	609 acres lost.
• Mule deer displacement/habitat fragmentation.	Increased displacement and fragmentation.	No additional displacement or fragmentation.	Same as the Proposed Action.	Greater displacement and habitat fragmentation than the Proposed Action.	Greater displacement and habitat fragmentation than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Impacts to mule deer migration/ movements	Reduced impacts to movements following partial reclamation of the South Water Canyon haul road.	Continued impacts to movements from the South Water Canyon haul road.	Same as the Proposed Action.	Greater than the Proposed Action during operation from the North Water Canyon haul road.	Greater than the Proposed Action during operation from the North Water Canyon haul road.	Same as the Proposed Action.	Somewhat less than the Proposed Action, but impacts would still be minor.
• Effects to upland game birds.	Potential impacts to nesting and brooding habitat at Cherry Spring.	No decline in habitat.	Same as the Proposed Action.	Greater than the Proposed Action.	Greater than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Noise effects	Continuing noise impacts.	No increased noise.	Same as the Proposed Action.	Greater than the Proposed Action.	Greater than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	**Varies by Alternative**	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	**Varies by Alternative**	1,468
Acres Not Reclaimed	134	0	125	134	134	**Varies by Alternative**	134
• Effects to bats	Potential loss of habitat.	Less than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Effects to Cherry Spring.	Potential decrease in water availability.	Potential water quantity effects would not occur.	Same as the Proposed Action.	Same as the Proposed Action.	Less than the Proposed Action.	Same as the Proposed Action.	Greater than the Proposed Action.
• Potential for hazardous material release.	Huntington Valley riparian areas.	Would remain as existing.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Cyanide effects.	Barriers to prevent mortalities.	No potential mortalities from cyanide.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Effects to raptors.	Habitat loss.	No reduction in habitat.	Same as the Proposed Action.	Greater than the Proposed Action potentially affecting red-tailed hawk nest.	Greater than the Proposed Action potentially affecting red-tailed hawk nest.	Same as the Proposed Action.	Same as the Proposed Action.
Threatened, Endangered, or Candidate Species							
• Potential for hazardous material release.	Huntington Valley riparian areas are the most sensitive.	Potential would remain for existing mining.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
• Effects to bats.	Identification of roosting habitat.	Habitat loss would not occur.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Effects to foraging raptors.	Habitat loss.	No habitat loss.	Same as the Proposed Action.	Greater than the Proposed Action.	Greater than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.
• Effects to pygmy rabbit.	Habitat loss.	No habitat loss.	Same as the Proposed Action.	Greater than the Proposed Action in North Water Canyon.	Greater than the Proposed Action in North Water Canyon.	Same as the Proposed Action.	Same as the Proposed Action.
Wild Horses							
• Decrease in habitat.	1,450 acres disturbed.	0 acres disturbed.	1,432 acres disturbed.	1,455 acres disturbed.	1,402 acres disturbed.	Same as the Proposed Action.	1,489 acres disturbed.
• Habitat not reclaimed.	134 acres.	0 acres.	125 acres.	134 acres.	134 acres.	Varies by Alternative.	134 acres.
• Impacts to horses.	Increased disturbance.	No additional impacts.	Same as the Proposed Action.	Greater than the Proposed Action.	Greater than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	**Varies by Alternative**	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	**Varies by Alternative**	1,468
Acres Not Reclaimed	134	0	125	134	134	**Varies by Alternative**	134
Cultural Resources	20 sites directly affected. Impacts would be associated with ground-disturbing activities. The use of site-specific treatment plans, as stipulated in the Programmatic Agreement, would reduce impacts.	No impacts to cultural resources beyond currently occurring impacts from casual collecting and erosion would occur on public lands surrounding the project.	Impacts to site 46-7559 may be reduced.	Same as the Proposed Action	Same as the Proposed Action.	Same as the Proposed Action.	A total of 21 sites directly affected.
Air Quality	Air quality effects from construction, operation, and reclamation activities may result in a temporary elevation of local total suspended particulate levels, as well as oxides of nitrogen, carbon monoxide, and sulfur dioxide emitted by electrical generators, vehicles, and other equipment.	Fugitive dust and vehicle emissions would decrease over time, and revegetation of exposed surfaces would occur.	Additional fugitive dust and vehicle emissions from backfilling pits.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Additional fugitive dust and vehicle emissions from regrading.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Social and Economic Values	The local economy would benefit for 12 years from the continuation of 208 mining jobs, the addition of 25 new mining jobs, and 19 additional indirect jobs, and the continuation of tax revenue generation and income. The existing mine payroll would increase by $977,000 from $8,130,000 to $9,107,000.	Tax revenues would decrease or no longer be accrued. If the population of the area decreased, there could be under-used infrastructure (schools, housing, etc.) in the communities.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Recreation	1,450 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 134 acres would not be reclaimed.	No additional public land would be dedicated for mining activities.	1,432 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 125 acres would not be reclaimed.	1,478 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 134 acres would not be reclaimed.	1,426 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 134 acres would not be reclaimed.	Same as the Proposed Action.	1,602 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 134 acres would not be reclaimed.

Table 2-16 (Continued)

						Reclamation	
Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Native Seed Mixture	3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	**Varies by Alternative**	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	**Varies by Alternative**	1,468
Acres Not Reclaimed	134	0	125	134	134	**Varies by Alternative**	134
Visual Resources	Visual contrasts allowed for VRM Class III lands would be exceeded in the Mooney Basin process area, resulting in high visual impacts following reclamation. Visual impacts at the Bald Mountain Mine, as seen from Overland Road, would be low following reclamation.	Management guidelines for VRM Class III lands would not be exceeded.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Somewhat less than Proposed Action, but impacts at the Bald Mountain Mine would still be low.
Paleontological Resources	No impacts to paleontological resources are expected.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Reclamation	A test plot program would be developed to improve growth medium stockpile management and seeding techniques. All but 134 acres would be reclaimed.	Only previously disturbed acreage would be reclaimed; no test plot program would be developed.	Same as the Proposed Action except total disturbance would be reduced by 18 acres; 9 additional acres would be reclaimed.	Same as the Proposed Action except an increased area would be reclaimed. Steep road cuts along the South Water Canyon haul road would be reclaimed.	Same as the Proposed Action except a reduced area would be reclaimed. Steep road cuts along the South Water Canyon haul road would be reclaimed.	The use of native seed mixture might slow reclamation efforts.	An increased area relative to the Proposed Action would be reclaimed.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Hazardous Materials and Waste							
• Potential releases of hazardous process chemicals or fuels	Spills could be associated with truck deliveries of process chemicals and diesel fuel. Approximately 6.2 miles of stream and wetlands occur along Hwy. 288 and 3.7 miles along U.S. 50. Trucks would pass through approximately 2 miles of commercial/residential area. Probability of a chemical or fuel release during the project is 0.02. Emergency response actions would contain and cleanup any spill.	No impacts due to increased use/transportation of hazardous materials. Potential for release would remain for existing mining.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation	
						Native Seed Mixture	3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Hazardous Materials and Waste (Continued)	Chemicals and fuels kept in storage would be contained, minimizing impacts from a spill. No unusual hazards to human health are anticipated from transportation or mining activities.						
• Hazardous waste	Rates of hazardous waste generation would not increase. No procedural changes in recycling or off-site disposal would be required.	Generation of hazardous waste would cease when currently permitted resources are mined.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.

Table 2-16 (Continued)

Resource Areas	Proposed Action	No Action	Backfill Pits	South Water Canyon Dump	East Sage Dump	Reclamation: Native Seed Mixture	Reclamation: 3:1 Slopes at Top Area
Acres Impacted	1,450	0	1,432	1,478	1,426	Varies by Alternative	1,602
Acres Reclaimed	1,316	0	1,307	1,344	1,292	Varies by Alternative	1,468
Acres Not Reclaimed	134	0	125	134	134	Varies by Alternative	134
Access and Land Use	1,450 acres of public lands would be converted to mining activities. 238 acres of potential firewood, Christmas tree, and piñon nut harvesting areas would be removed. Short-term displacement of 347 AUMs would occur, of which approximately 345 AUMs are expected to be recovered following reclamation. The long-term loss is expected to be 2 AUMs. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald seedings would be disturbed.	There would be no change from current uses of livestock grazing, wildlife habitat, dispersed recreation, and some firewood, Christmas tree, and piñon nut harvesting.	1,432 acres disturbed. Short-term displacement of 344 AUMs would occur, of which 343 AUMs are expected to be recovered following reclamation. The long-term loss is expected to be 1 AUM. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald seedings would be disturbed.	1,478 acres disturbed. Short-term displacement of 350 AUMs would occur, of which 353 AUMs are expected to be recovered following reclamation. The long-term gain is expected to be 3 AUMs. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald seedings would be disturbed.	1,426 acres disturbed. Short-term displacement of 336 AUMs would occur, of which 339 AUMs are expected to be recovered following reclamation. The long-term gain is expected to be 3 AUMs. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald seedings would be disturbed.	Species less suitable for livestock grazing forage would be used for reclamation. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald seedings would be disturbed.	1,602 acres disturbed and existing haul road in South Water Canyon would be covered. Short-term displacement of 356 AUMs would occur, of which 385 AUMs are expected to be recovered following reclamation. The long-term gain is expected to be 29 AUMs. Cherry Spring could experience reduced flow, and 447 acres of the Julian and West Bald

3.0 AFFECTED ENVIRONMENT

3.0 AFFECTED ENVIRONMENT

This chapter describes the environment that would be affected by the proposed Bald Mountain Mine Expansion Project (see Map 2-1, Chapter 2). The Bald Mountain Mine Expansion Project is located in the southern Ruby Mountains in east-central Nevada, approximately 75 road miles northwest of Ely, Nevada, in White Pine County (Township 21-24North, Range 56-57East, Mt. Diablo Meridian).

The baseline information summarized in this chapter was obtained from published and unpublished materials; interviews with local, state, and Federal agencies; and from field and laboratory studies of the Proposed Action area. For resources such as soils and vegetation, the affected area was determined to be the physical location and immediate vicinity of the areas to be disturbed by the Horseshoe/Galaxy Mine and Process/Top Area Modifications. For other resources such as water quality, air quality, wildlife, social and economic values, and the transport of hazardous materials, the affected environment was more extensive. For each of the 17 categories of resources, the affected environment was defined by the potential environmental impacts of the Proposed Action.

3.1 SOILS

Based on Soil Conservation Service soil survey mapping, 11 soil associations are present within the Proposed Action area. Descriptive and interpretive data on the soil associations were derived from an unpublished 1991 Soil Conservation Service survey report that is available for review at the Bureau of Land Management's Ely office. This information was used in conjunction with Soil Conservation Service range site descriptions in order to identify and correlate range sites with the vegetation types within the expansion Proposed Action area. The soils data summarized in Table 3-1 include:

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

Soils vary in depth, quality, and quantity across the Proposed Action area. In general, these soils are shallow loams with high percentages of coarse fragments (e.g., gravelly, cobbly, stony) throughout the soil profile and occur on moderately steep to steep slopes (8 to 50 percent). The Abgese-Yody-Shabliss and Hunnton-Chiara soil associations support the big sagebrush vegetation type dominated by Wyoming big sagebrush. Mountain big sagebrush is more commonly found on Segura, Bobs, Fax, Parisa, and McIvey soils within the Proposed Action area. The Bobs-Fax-Parisa soil association also supports the big sagebrush vegetation type dominated by Basin big sagebrush. The Hutchley soils support low sagebrush, and Segura and Tusel soils occur in the mixed shrub vegetation type. The Grink soils support the mountain mahogany vegetation type associated with rock outcrops on summits and mountain sideslopes. Piñon-juniper generally occurs on Cavehill, Cropper, or Pioche soils.

Soil suitability evaluations for the project components are summarized in Table 3-1 and indicate the average depth of salvageable growth

Table 3-1

Summary of Soils in the Proposed Action Area

Map Unit Number	Soil Association	Average Soil Depth (inches)	Salvageable Growth Medium Depth (inches)	Growth Medium Texture (Surface Soil)	Potential Limiting Factors
100	Pookaloo-Cavehill-Rock outcrop	19-27	19-27	Very gravelly loam; very gravelly silt loam	Steep slopes (15-50%), depth to bedrock (19 to 27")
226	Hutchley-Tusel-Suak	12-42	10-13	Very gravelly loam; cobbly loam; very stony loam	Steep slopes (8-50%), depth to bedrock (12 to 42"), coarse fragments in Tusel and Suak soils
480/481	Pioche-Segura/ Pioche-Segura-Cropper	14-16	0-4	Extremely stony loam; very cobbly loam; very cobbly loam	Steep slopes (8-50%), depth to bedrock (14 to 16"), coarse fragments in Pioche and Cropper soils, clay in Pioche soils
500	Segura-McIvey-Hutchley	12-62	12-18	Very cobbly loam; very gravelly loam	Steep slopes (8-50%), depth to bedrock (12 to 14") in Segura and Hutchley soils, coarse fragments in McIvey soils
566	McIvey-Segura-Cropper	14-62	4-18	Gravelly loam; very cobbly loam	Steep slopes (15-50%), depth to bedrock (14 to 16") in Segura and Cropper soils, coarse fragments in McIvey and Cropper soils.
670	Cavehill-Grink-Rock outcrop	19-27	19-27	Very gravelly silt loam; very stony loam	Steep slopes (15-50%), depth to bedrock (19 to 27")
753	Upatad-Cropper-Atlow	15-16	4-15	Very gravelly silt loam; very cobbly loam; very gravelly loam	Steep slopes (15-50%), coarse fragments in Cropper soils, depth to bedrock (15 to 16")
920	Abgese-Yody-Shabliss	55-60	13-60	Sandy loam; gravelly sandy loam; gravelly loam	Depth to duripan (13 to 38") in Shabliss and Yody soils, high alkalinity in lower profile of Abgese soils
1010	Hunnton-Chiara	19-40	19-35	Silt loam	Soil texture (clay) in Hunnton soils, depth to duripan (19 to 35")
1081	Bobs-Fax-Parisa	14-60	14-26	Very gravelly loam; very cobbly coarse sandy loam; gravelly loam	Depth to duripan (14 to 26"), high alkalinity in Parisa soils
1372	Wardbay-Hardol-Adobe	17-60	12-18	Very gravelly loam; very gravelly silt loam	Steep slopes (15-50%), depth to bedrock or duripan (17 to 45"), coarse fragments in Wardbay and Hardol soils

medium for each soil association. Salvageable growth medium depths are average maximum obtainable depths based upon limiting factors in each soil unit. The depth ranges correspond to the variability of soil characteristics among the soil series designated for a specific soil association. Depth of salvageable growth medium for reclamation purposes was determined for each soil series within a particular soil association. The physical and chemical properties of soils were evaluated to identify factors that may limit successful reclamation. These depths were assumed to be restricted to material directly above bedrock or duripan layers, and material not characterized by extremely gravelly, stony, or cobbly soil profiles.

Approximately 70 percent of the Proposed Action area contains soil associations characterized by extremely stony or very gravelly, cobbly, or stony material. Salvageable soil depths within the Proposed Action area range from 0 to 60 inches or more with the majority of the soil associations providing between 10 and 30 inches of salvageable growth medium. With the exception of the more gently sloping alluvial fans at the lower elevations (i.e., ore processing facility and Horseshoe/Galaxy process and leach areas), the majority of the soils within the Proposed Action area have the potential for accelerated erosion due to slopes of 15 percent or greater (see Table 3-1).

3.2 VEGETATION

Vegetation types present within the Proposed Action area include big sagebrush, low sagebrush, mixed shrub, piñon-juniper, mountain mahogany, and riparian. Portions of the Proposed Action area also include areas disturbed during previous or ongoing mining activities.

The big sagebrush type is present on alluvial fans, valley bottoms, and hillsides and occurs on a wide range of soil types and depth, slopes, and aspects. Depending on the location, Basin big sagebrush, Wyoming big sagebrush, or mountain big sagebrush dominate the overstory. Understory species commonly associated with Basin big sagebrush include Sandberg bluegrass, bottlebrush squirreltail, Indian ricegrass, lupine, phlox, and bastard toadflax. Rabbitbrush, Sandberg bluegrass, and phlox occur with Wyoming big sagebrush in addition to crested wheatgrass in reseeded areas. Species occurring with mountain big sagebrush include bluebunch wheatgrass, Sandberg bluegrass, Great Basin wildrye, cheatgrass, bottlebrush squirreltail, lupine, and scattered rabbitbrush and bitterbrush.

The Soil Conservation Service has defined range sites, or natural plant communities, based on climate, soil, and relief, to streamline management efforts of species for forage production. Three Soil Conservation Service range sites have been correlated with the big sagebrush vegetation type within the Proposed Action area (see Table 3-2): gravelly clay 10 to 12 inches (Wyoming big sagebrush), gravelly clay 12 to 14 inches (mountain big sagebrush), and calcareous loam 10 to 14 inches (Basin big sagebrush). The big sagebrush type occurs in portions of all the project components, with the exception of the Sage Flats pit.

The low sagebrush vegetation type is concentrated on the shallow, rocky soils along mountain ridges from gentle to very steep slopes. Low sagebrush dominates this low-growing type characterized by low species diversity. Other associated plant species are rabbitbrush, Sandberg bluegrass, bottlebrush squirreltail, winterfat, and buckwheat. The mountain ridge 12 to 14 inches range site has been correlated with

Table 3-2

Productivity and Condition in the Project Area

Range Site[1]	Vegetation Type	Soil Association(s)	Dominant Plant Species Observed	Potential Forage Production (lbs/acre)	Seral Condition[2]
Gravelly clay, 10-12" (28BY086)	Big sagebrush	Abgese-Yody-Shabliss; Hunnton-Chiara	Wyoming big sagebrush, rabbitbrush, crested wheatgrass, Sandberg bluegrass, phlox	350-800	mid seral
Gravelly clay, 12-14" (28BY087)	Big sagebrush	Pioche-Segura-Cropper; Segura-Mclvey-Hutchley; Upatad-Cropper-Atlow	Mountain big sagebrush, bluebunch wheatgrass, Sandberg bluegrass	450-900	mid to late seral
Calcareous loam, 10-14" (28BY094)	Big sagebrush	Bobs-Fax-Parisa	Basin big sagebrush, Sandberg bluegrass, bottlebrush squirreltail, phlox	400-800	upper mid to low late seral
Mountain ridge, 12-14" (28BY034)	Low sagebrush	Hutchley-Tusel-Suak; Segura-Mclvey-Hutchley; Pioche-Segura	Low sagebrush, rabbitbrush, Sandberg bluegrass, bottlebrush squirreltail	100-350	late seral
Calcareous loam, 16+" (28BY085)	Mixed shrub	Segura-Mclvey-Hutchley; Pioche-Segura; Mclvey-Segura-Cropper; Cavehill-Grink-Rock outcrop	Mountain big sagebrush, snowberry, bitterbrush, rabbitbrush, bluebunch wheatgrass	700-1500	late seral
Loamy slope, 12-16" (28BY015)	Mixed shrub	Hutchley-Tusel-Suak; Pioche-Segura-Cropper	Mountain big sagebrush, snowberry, rabbitbrush, needlegrass, lupine	700-1500	upper mid to low late seral
Piñon-juniper WSG[1]: OR1, 12-14" (28BY62) Piñon-curlleaf mountain mahogany WSG: IRI, 14-22" (28BY58)	Piñon-juniper	Cavehill-Grink-Rock outcrop; Upatad-Cropper-Atlow; Pioche-Segura-Cropper; Pookaloo-Cavehill-Rock outcrop; Wardbay-Hardol-Adobe; Bobs-Fax-Parisa	Singleleaf piñon, Utah juniper, curlleaf mountain mahogany, bitterbrush, mountain big sagebrush	N/A[3]	N/A[3]
Stony mahogany savanna (28BY032)	Mountain mahogany	Cavehill-Grink-Rock outcrop	Curlleaf mountain mahogany, snowberry, mountain big sagebrush, needlegrass, cheatgrass	75-300	late seral
Wet meadow, 10-14" (28BY001)	Riparian	Inclusion within Segura-Mclvey-Hutchley	Sedges, bentgrass, bluegrass, yarrow, rush, mountain big sagebrush, dock	1200-4000	upper mid to low late seral

[1] Piñon-juniper vegetation type includes two Woodland Suitability Groups (WSG).

[2] Seral: One of a series of plant communities that follows another in time or a specific site.

[3] No forage production estimates exist for the Piñon Woodland Suitability Groups; therefore, no seral conditions were recorded during the Ecological Site Inventories.

this vegetation type and occurs at Top and Sage Flats pits and corresponding waste rock dumps.

Mixed shrub vegetation generally occurs on the moderately steep to steep sideslopes and backslopes of hills and mountains at all aspects. This type is commonly found on slopes with north and east aspects. These relatively diverse sites are typically supported by shallow to moderately deep, loamy soils. Mountain big sagebrush, snowberry, bitterbrush, and rabbitbrush dominate the shrub canopy layer. Common understory species include needlegrass, bluebunch wheatgrass, mountain brome, Sandberg bluegrass, Great Basin wildrye, sedges, balsamroot, lupine, bastard toadflax, groundsel, and buckwheat. The calcareous loam 16+ inches and loamy slope 12 to 16 inches range sites have been correlated with the mixed shrub vegetation type. This type occurs in portions of the Horseshoe pit and dump and the Sage Flats dump.

Piñon-juniper woodlands within the Proposed Action area generally occur on steep hillsides at all aspects. This vegetation type occurs on shallow, loamy soils with high percentages of coarse fragments. Singleleaf piñon and Utah juniper dominate the overstory with scattered curlleaf mountain mahogany in some areas. Shrubs present include mountain big sagebrush, bitterbrush, snowberry, and low rabbitbrush. Grasses such as Sandberg bluegrass, bottlebrush squirreltail, Indian ricegrass, Great Basin wildrye, and bluebunch wheatgrass are present in the generally sparse understory. These woodlands are present at the Sage Flats pit and dump, Horseshoe dump, and the Galaxy and Saga pits and dumps.

The mountain mahogany vegetation type occurs in association with rock outcrops on summits and sideslopes of hills and mountains. Soils are shallow and contain high volumes of coarse fragments. Curlleaf mountain mahogany clearly dominates this community with snowberry, mountain big sagebrush, and rabbitbrush as the principal understory shrubs. Other common grass species include bluebunch wheatgrass, needlegrass, Indian ricegrass, and cheatgrass. The stony mahogany savanna range site corresponding to this vegetation type occurs at the Sage Flats dump. The riparian vegetation type is discussed in Section 3.5, Wetlands and Waters of the United States.

3.3 GEOLOGY AND MINERALS

Copper, antimony, silver, and gold were mined adjacent to a small granitic intrusion in the Bald Mountain area as early as 1869. Historical mining activities in the Alligator Ridge area have been limited to an ornamental stone quarry and one small pit along a calcite vein located approximately 5 miles west of the present Alligator Ridge Mine.

Recent mining began in 1976 with the discovery of the Vantage gold deposits (Alligator Ridge Mine) in the Vantage basin located at the southern end of Mooney Basin (see Maps 1-4 and 2-1). Exploration and pilot studies were conducted between 1976 and 1980. Precious metals appear to be confined primarily to carbonate and siliclastic formations of Devonian age (360 to 408 million years before present). Mineralization is strongly controlled by faulting and bedding in the host rock, and geologic and radiometric dating indicate mineralization is of mid-Tertiary age (approximately 20 to 40 million years before present). Since mining operations began in 1980, mining has expanded to 5 areas and has resulted in 26 open pits, 30 mine waste rock dumps, 10 heap leach pads, and 7 leach ponds.

3.3.1 Regional Geologic Setting

The Proposed Action area lies within the Great Basin section of the Basin and Range physiographic province and is characterized by north-northeast trending mountain ranges separated by broad valleys (see Map 3-1). The valleys have been formed by downward movement of large blocks of the earth's crust along range-front faults.

During the Paleozoic, the Proposed Action area was covered by a shallow sea in which carbonate and siliclastic sediments were deposited. After deposition, the sediments were folded and faulted during the Antler and Sonoma mountain building events, and then intruded by igneous rocks with associated volcanic deposits. Low-angle normal faulting (extensional faulting) accompanied volcanism and was followed by high-angle normal faulting. Mineralization is thought to have occurred subsequent to high-angle normal faulting but prior to Basin and Range faulting. Basin and Range faulting and erosion are the most recent activities at the site and continue to the present. A detailed summary of the geologic history of the southern Ruby Mountains is contained in Appendix B.

3.3.2 Local Geological Setting

The following sections summarize the local geology of the Proposed Action area. The stratigraphy of this area is presented in Figure 3-1. The surface geology is shown on Map 3-2, and schematic cross-sections showing the subsurface geology are illustrated in Figure 3-2. The local geology was simplified for Map 3-2 by combining the Paleozoic units into seven groups of sedimentary rocks.

3.3.2.1 Stratigraphy

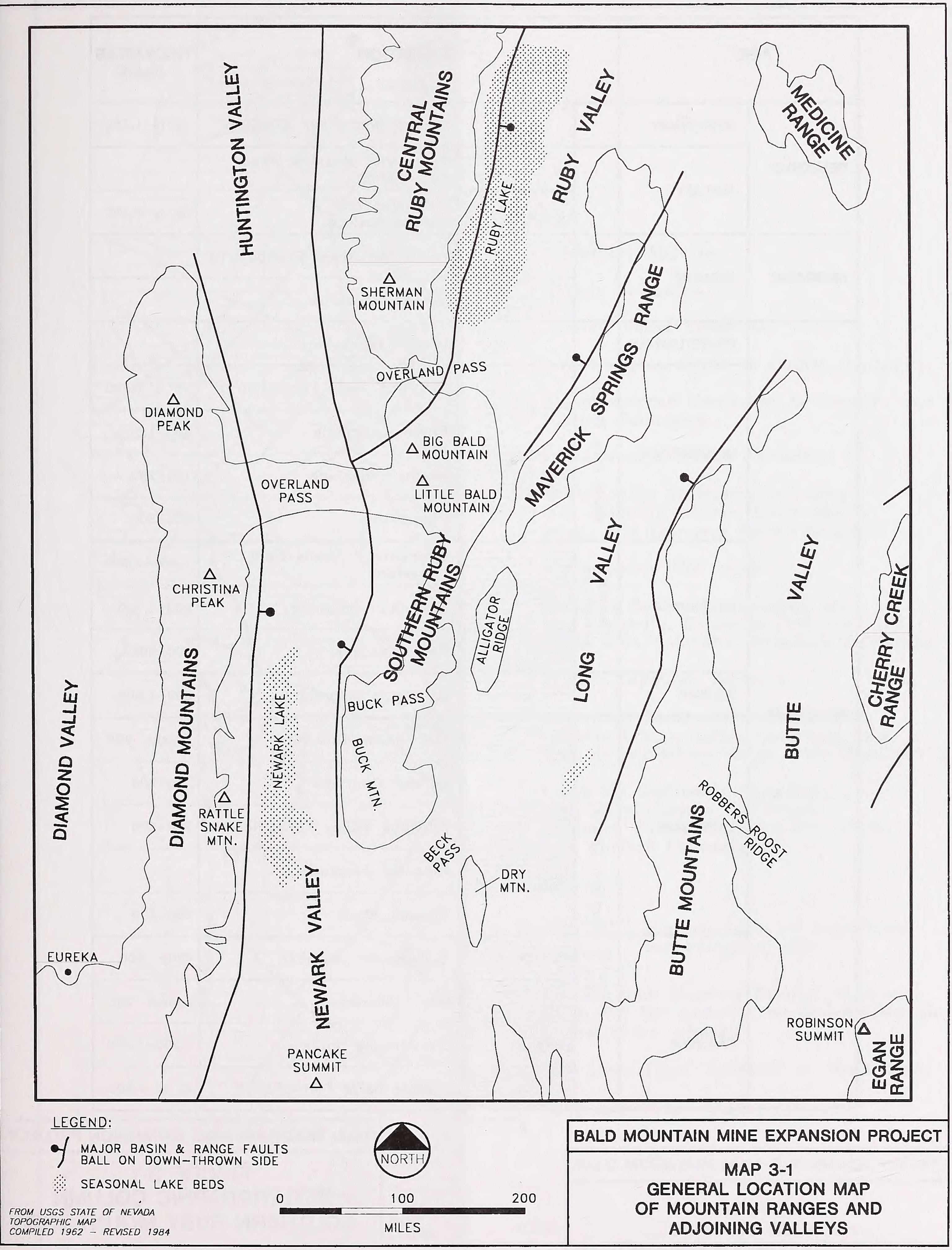
Paleozoic rock types within the Proposed Action area consist of limestone, dolomite, claystone, shale, siltstone, sandstone, and quartzite (deposited 320 to 570 million years before present). These sedimentary rocks formed in a shallow marine platform and shelf environment similar to that of the present day Florida Keys or the Bahamas. Mesozoic intrusives, Tertiary volcanics, and Quaternary alluvium also are present within the Proposed Action area. Most rock units are sufficiently fractured to transmit water.

Gold deposits are commonly hosted by two lithologies within the Proposed Action area: the Devils Gate Limestone and the Pilot Shale. Mineralization is commonly located along the contact between the Devils Gate Limestone and the overlying Pilot Shale, with most ore deposits located in the lower 300 feet of the Pilot Shale. In the Top Area, mineralization is hosted in a Jurassic felsic intrusive.

Erosion of the mountains during uplift beginning approximately 18 to 36 million years before present produced alluvium (sand and gravel) that now fills stream valleys and the alluvial fans shedding into Ruby, Long, Newark and Huntington Valleys and into Mooney Basin. Further discussion of the stratigraphy is contained in Appendix B.

3.3.2.2 Structure

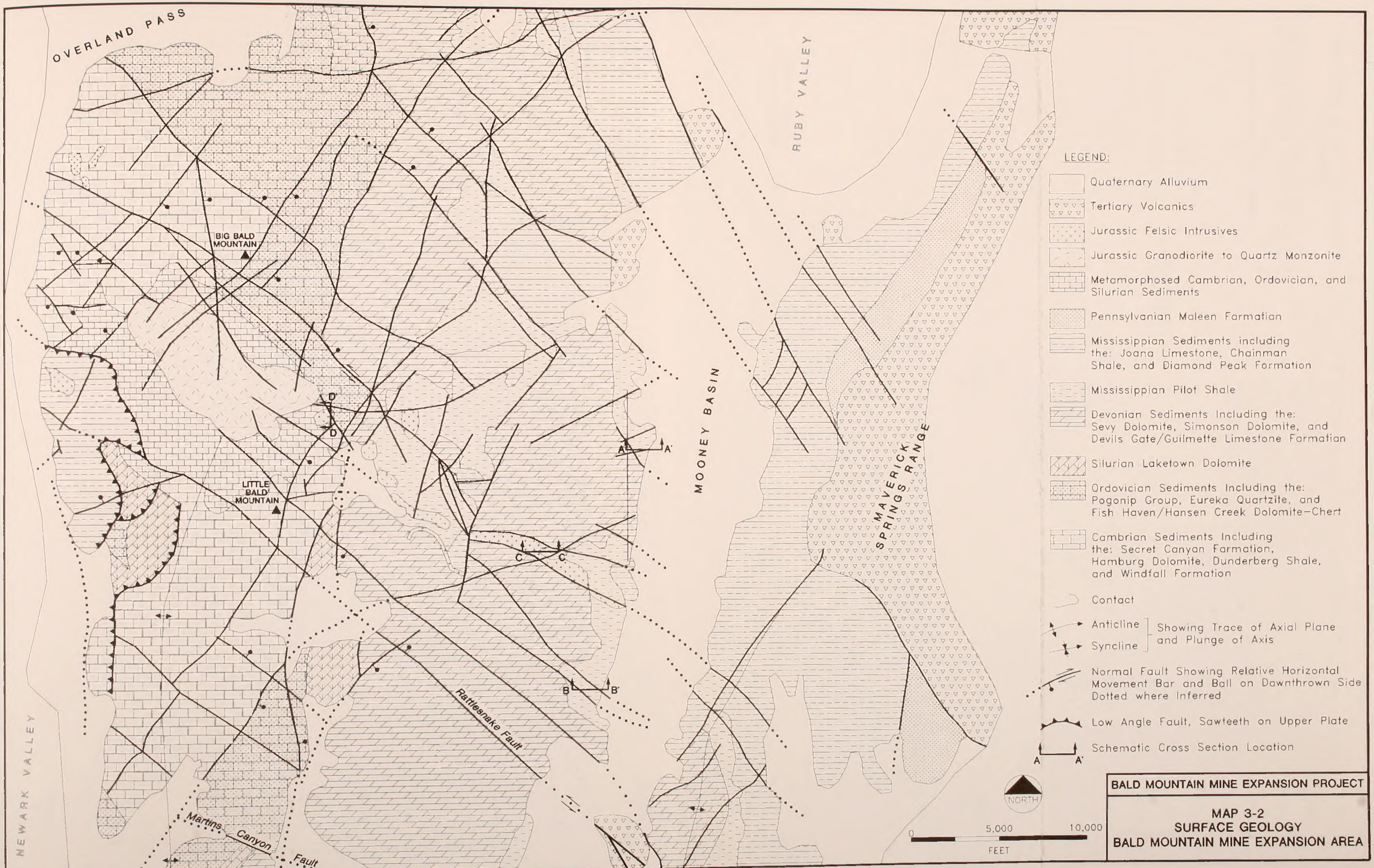
The local structure is dominated by north-south trending Basin and Range faults that separate the mountainous areas from the adjacent broad alluvial valleys. The Ruby Mountains are an example of an elevated block between Huntington Valley on the west and Ruby Valley on the east (see Map 3-1). In addition to the range-front

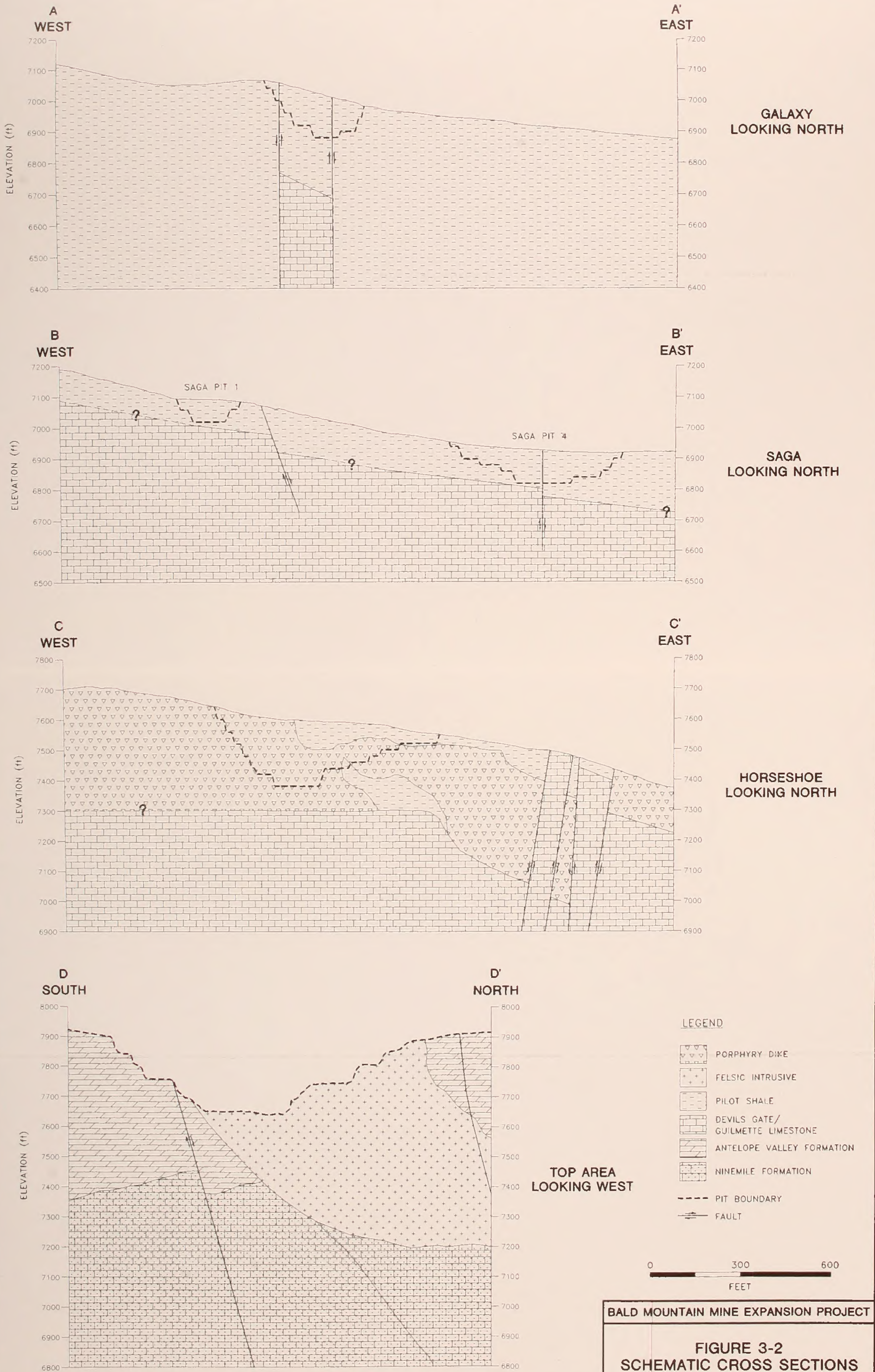

HUNTINGTON VALLEY
CENTRAL RUBY MOUNTAINS
RUBY LAKE
RUBY VALLEY
MEDICINE RANGE
SHERMAN MOUNTAIN
MAVERICK SPRINGS RANGE
OVERLAND PASS
DIAMOND PEAK
BIG BALD MOUNTAIN
LITTLE BALD MOUNTAIN
OVERLAND PASS
CHRISTINA PEAK
SOUTHERN RUBY MOUNTAINS
ALLIGATOR RIDGE
LONG VALLEY
BUTTE VALLEY
CHERRY CREEK RANGE
DIAMOND VALLEY
DIAMOND MOUNTAINS
NEWARK LAKE
BUCK PASS
BUCK MTN.
RATTLE SNAKE MTN.
BECK PASS
DRY MTN.
ROBBERS ROOST RIDGE
BUTTE MOUNTAINS
NEWARK VALLEY
EUREKA
PANCAKE SUMMIT
ROBINSON SUMMIT
EGAN RANGE
LEGEND:
MAJOR BASIN & RANGE FAULTS BALL ON DOWN-THROWN SIDE
SEASONAL LAKE BEDS
NORTH
0
100
200
MILES
FROM USGS STATE OF NEVADA TOPOGRAPHIC MAP COMPILED 1962 – REVISED 1984
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 3-1
GENERAL LOCATION MAP OF MOUNTAIN RANGES AND ADJOINING VALLEYS

AGE			FORMATION	THICKNESS (feet)
CENOZOIC	QUATERNARY		Recent and Older Alluvium	Up to 1,750
	TERTIARY		Jasperoid, Massive Silica Replacement	
			Volcanics and Volcaniclastics	Up to 2,400
MESOZOIC	JURASSIC		Felsic Intrusives–Granodiorite	
			Quartz Monzonite	
PALEOZOIC	PENNSYLVANIAN		Moleen Formation	
	MISSISSIPPIAN	White Pine Group	Diamond Peak Formation	Up to 2,500
			Chainman Shale	900–1,300
			Joana Limestone	100–200
			Pilot Shale	400–500
	DEVONIAN	Nevada Formation	Guilmette / Devils Gate Limestone	1,400–2,000
			Simonson Dolomite	600–1,300
			Sevy Dolomite	400–500
	SILURIAN		Laketown Dolomite	600–1,800
	ORDOVICIAN		Fish Haven Dolomite	approx. 200
			Eureka Quartzite	100–200
		Pogonip Group	Antelope Valley Formation	200–400
			Ninemile Formation	
			Kanosh Shale	300–400
	CAMBRIAN	Windfall Fm	Bullwhacker Member	400–1,800
			Catlin Member	approx. 250
			Dunderberg Shale	1,200–1,400
			Lincoln Peak Formation	up to 4,000

BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE 3-1
STRATIGRAPHIC COLUMN
SOUTHERN RUBY MOUNTAINS


OVERLAND PASS
RUBY VALLEY
BIG BALD MOUNTAIN
LITTLE BALD MOUNTAIN
MOONEY BASIN
MAVERICK SPRINGS RANGE
NEWARK VALLEY
Rattlesnake Fault
Martins Canyon Fault
A A'
B B'
C C'
D D'
LEGEND:
Quaternary Alluvium
Tertiary Volcanics
Jurassic Felsic Intrusives
Jurassic Granodiorite to Quartz Monzonite
Metamorphosed Cambrian, Ordovician, and Silurian Sediments
Pennsylvanian Maleen Farmation
Mississippian Sediments including the: Joana Limestone, Chainman Shale, and Diamond Peak Formation
Mississippian Pilot Shale
Devonian Sediments Including the: Sevy Dolomite, Simonson Dolomite, and Devils Gate/Guilmette Limestone Farmation
Silurian Laketown Dolomite
Ordovician Sediments Including the: Pogonip Group, Eureka Quartzite, and Fish Haven/Hansen Creek Dolomite-Chert
Cambrian Sediments Including the: Secret Canyon Formation, Hamburg Dolomite, Dunderberg Shale, and Windfall Formation
Contact
Anticline
Syncline
Showing Trace of Axial Plane and Plunge of Axis
Normal Fault Showing Relative Horizontal Movement Bar and Ball on Downthrown Side Dotted where Inferred
Low Angle Fault, Sawteeth on Upper Plate
Schematic Cross Section Location
NORTH
0 5,000 10,000
FEET
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP 3-2
SURFACE GEOLOGY
BALD MOUNTAIN MINE EXPANSION AREA



BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE 3-2
SCHEMATIC CROSS SECTIONS

faults, several northwest and northeast trending high-angle normal faults formed within the mountain ranges as a result of Basin and Range activity.

Prior to Basin and Range activity, deformation associated with the Antler and Sonoma mountain building events of Paleozoic and early Mesozoic age (245 to 360 million years before present) resulted in folding and faulting of the Paleozoic sediments. Folding was followed by high-angle northwest, east-west, and northeast-trending normal faulting. The exact timing of movement along the high-angle faults is not known for certain, but geologic relationships indicate faulting occurred from the late Mesozoic to early Cenozoic Eras, (23 to 97 million years before present), prior to Basin and Range activity. North-trending Cenozoic (present to 1.6 million years before present) Basin and Range faults post date the high- and low-angle faults. A detailed discussion of the structural geology of the southern Ruby Mountains is contained in Appendix B.

3.3.2.3 Mineral Resources

Gold deposits in the Proposed Action area occur in the Bald Mountain Mine area (Top pit/Sage Flat) and in Mooney Basin (see Map 2-1). The deposits have been classified as sediment-hosted disseminated gold mineralization with minor amounts of silver (Ilchick 1991; Tapper 1986). Two geologic features have controlled mineralization and aided in the formation of the gold deposits. First are the numerous high-angle faults trending northwest and northeast. In many cases, ore deposits are localized along the northeast-trending faults, along northwest-trending faults (Horseshoe and Saga deposits), or at the intersection of these two major fault sets (Galaxy and Sage deposits). Second is the contact between the Devils Gate Limestone and the Pilot Shale. In the Top Area, mineralization is related to the contact between felsic intrusives and the Antelope Valley Limestone (see Figure 3-2). Mineralization is located in both the contact metamorphosed sedimentary rocks and within the altered felsic intrusives.

Formation of the gold deposits occurred as geothermal fluids were circulated along existing fault planes in the Devils Gate Limestone. Circulation of the fluids resulted in the removal of carbonate from the Devils Gate Limestone and the Pilot Shale and the introduction of silica and precious metals. This same process is believed to be responsible for mineralization within the Top Area, where intense faulting along the contact between the intrusives and the metamorphosed sedimentary rocks allowed passage of mineralizing fluids. Further discussion of the processes of mineralization is contained in Appendix B.

In most cases, the ore is contained in the lower 300 feet of the Pilot Shale and the uppermost portion of the Devils Gate Limestone. In the Top Area, ore is found both in the altered felsic intrusives and in the fractured and faulted metamorphosed sedimentary rocks adjacent to the intrusives. Timing of mineralization has been placed between the Oligocene and the Miocene (24 to 58 million years before present), subsequent to high-angle normal faulting, but prior to Basin and Range activity.

Prior to recent mining activities, a total of 82 million tons of resources were available in the Bald Mountain - Alligator Ridge area. From 1987 to 1993, 25 million tons of resources were mined. An estimated 30 million tons of resources remain. A total of 1.1 million ounces of gold has been produced: 501,361 ounces of gold from the Bald Mountain Mine through 1993, and 620,727 ounces of gold from the Alligator Ridge, Yankee and the Casino/Winrock Mines through October of 1994.

3.3.2.4 Oil and Gas Resources

Oil and gas exploration is common throughout the Egan Resource Area (Bureau of Land Management 1993) and potential resources have been identified in Newark and Long Valleys. The geological potential for oil and gas in eastern Nevada and the Proposed Action area is discussed in detail by the United States Geological Survey (1988). Two types of targets, or "plays," are found in the area: unconformity plays where a structural trap is sealed by volcanics and upper Paleozoic plays where there is a stratigraphic trap between the Diamond Peak Formation and the Chainman Shale. Source rocks for oil and gas are the Chainman Shale and the Pilot Shale. Drilling in Long Valley (Simon Hydro-Search 1994a) has reported oil in the Pilot Shale. Estimated potential resources (United States Geological Survey 1988) are 97 million barrels of oil and 59 billion cubic feet of gas.

3.3.2.5 Seismic Potential

The Great Basin section of the Basin and Range physiographic province is a tectonically active area resulting in occasional earthquakes. A summary of recent major seismic events (earthquakes) in Nevada is presented in Table 3-3.

To identify historic earthquakes in the vicinity of the Proposed Action, a radial search extending 100 miles from the site (latitude 39°57'30" north and longitude 115°38'30" west) was conducted by the United States Geological Survey National Earthquake Information Center in Golden, Colorado. A list of all of the earthquakes within the 100-mile radius is presented in Appendix B. A total of 461 earthquakes was recorded from 1872 to 1993 within this 100-mile radius. The strongest earthquake recorded had a magnitude of 6.0 on the Richter scale and occurred in 1872 approximately 82 miles west of the Proposed Action area. In addition, at least two earthquakes, one with a magnitude of 3.8, have occurred within the area of the Proposed Action. This area is classified as a Zone II seismic risk area (National Ocean and Atmospheric Administration 1973); this classification means that moderate damage is possible from the maximum credible earthquake. Moderate earthquake damage is defined as damage to masonry; weak chimneys falling; plaster, loose bricks, stones, tiles and cornices falling; and small slides and cave-ins along gravel banks.

3.3.3 Existing Surface Disturbance

Existing disturbance areas were calculated for the Proposed Action area and are depicted on Map 2-1. Each area of disturbance has been broken into three categories: permitted, existing, and reclaimed. All data are as of September 1994. Existing areas of disturbance at the Bald Mountain Mine total 987 acres (see Table 3-4). At the Top Area, there is currently 1 open pit (41 acres), 1 waste rock dump (67 acres), and several haul roads (61 acres). Exploration roads and drill pads have disturbed 1 acre. Existing process and leach facilities consist of 2 leach pads (221 acres), 9 solution ponds (8 acres), and miscellaneous facilities (31 acres). To date, approximately 229 acres of disturbance have been reclaimed at the Bald Mountain Mine, including 28 acres of pits, 179 acres of waste rock dumps, 6 acres of haul roads, and 16 acres of exploration roads and drill pads. Existing disturbance in the proposed Horseshoe/Galaxy area totals 68 acres in the form of exploration roads and drill pads.

Table 3-3

Major Seismic Events in Nevada

Date	Epicenter	Magnitude[1]	Area (miles[2])
1845 or 1852	Stillwater area (?) possibly Pyramid Lake	Greater than 7	Unknown
October 2, 1915	Pleasant Valley	Approximately 7.8	500,000
December 20, 1932	Cedar Mountains	7.3	500,000
December 16, 1954	Fairview Peak and Dixie Valley (2 events, 4 minutes apart). Fairview Peak approximately 34 miles south of Dixie	7.1; 6.9	200,000

[1]Magnitude based on the Richter scale.

[2]Earthquake effects were recorded.

Source: National Oceanic and Atmospheric Administration 1973.

Table 3-4

Existing Areas of Disturbance for the Bald Mountain Mine

Area		Pits	Dumps	Haul Roads	Exploration Roads	Leach Pads	Solution Ponds	Process Areas	Devel-opment(1)	Total
Mining Areas										
2/3	Permitted	43	103	23	15	0	0	0		184
	Existing	35	70	23	0	0	0	0	0	128
	Reclaimed	7	33	0	0	0	0	0		40
One	Permitted	25	70	0	36	0	0	0		131
	Existing	21	43	0	6	0	0	0	4	74
	Reclaimed	0	0	0	2	0	0	0		2
Five	Permitted	4	0	0	38	0	0	0		42
	Existing	4	0	0	6	0	0	0	0	10
	Reclaimed	0	0	0	0	0	0	0		0
RBM	Permitted	21	56	6	3	0	0	0		86
	Existing	0	0	0	3	0	0	0	0	3
	Reclaimed	21	56	6	0	0	0	0		83
Rat	Permitted	50	193	38	0	0	0	0		281
	Existing	50	103	38	0	0	0	0	0	191
	Reclaimed	0	90	0	0	0	0	0		90
Top	Permitted	99	136	61	15	0	0	0		311
	Existing	41	67	61	1	0	0	0	58	228
	Reclaimed	0	0	0	0	0	0	0		0
Mahoney	Permitted	18	0	0	20	0	0	0		38
	Existing	0	0	0	3	0	0	0	18	21
	Reclaimed	0	0	0	0	0	0	0		0
Exploration Areas										
Sage	Permitted	0	0	0	40	0	0	0		40
Flat	Existing	0	0	0	11	0	0	0	0	11
	Reclaimed	0	0	0	2	0	0	0		2
Six	Permitted	0	0	0	23	0	0	0		23
	Existing	0	0	0	17	0	0	0	0	17
	Reclaimed	0	0	0	6	0	0	0		6
North 3	Permitted	0	0	0	34	0	0	0		34
	Existing	0	0	0	5	0	0	0	0	5
	Reclaimed	0	0	0	0	0	0	0		0

Note:

1 Development consisits of existing exploration disturbance located within the proposed pit limits

Table 3-4 (Continued)

Area		Pits	Dumps	Haul Roads	Exploration Roads	Leach Pads	Solution Ponds	Process Areas	Devel-opment(1)	Total
<u>Exploration Areas</u>										
LJ	Permitted	0	0	0	40	0	0	0		40
Ridge	Existing	0	0	0	25	0	0	0	0	25
	Reclaimed	0	0	0	0	0	0	0		0
West	Permitted	0	0	0	6	0	0	0		6
Rat	Existing	0	0	0	0	0	0	0	0	0
	Reclaimed	0	0	0	6	0	0	0		6
Bourne	Permitted	0	0	0	14	0	0	0		14
Cyn	Existing	0	0	0	14	0	0	0	0	14
	Reclaimed	0	0	0	0	0	0	0		0
<u>Process Areas</u>										
No. 1	Permitted	0	0	0	0	118	3	7		128
	Existing	0	0	0	0	118	3	7	0	128
	Reclaimed	0	0	0	0	0	0	0		0
No. 2	Permitted(2)	0	0	0	0	234	10	16		260
	Existing	0	0	0	0	103	5	7	0	115
	Reclaimed	0	0	0	0	0	0	0		0
Crusher	Permitted	0	0	0	0	0	0	7		7
	Existing	0	0	0	0	0	0	7	0	7
	Reclaimed	0	0	0	0	0	0	0		0
Utilities/	Permitted	0	0	0	0	0	0	10		10
Support	Existing	0	0	0	0	0	0	10	0	10
	Reclaimed	0	0	0	0	0	0	0		0
Total	**Permitted**	**260**	**558**	**128**	**284**	**352**	**13**	**40**		**1,635**
	Existing	**151**	**283**	**122**	**91**	**221**	**8**	**31**	**80**	**987**
	Reclaimed	**28**	**179**	**6**	**16**	**0**	**0**	**0**		**229**

Note:

1 Development consisits of existing exploration disturbance located within the proposed pit limits

3.4 WATER RESOURCES

The water resources sections discusses surface and groundwater, current water consumption, and water quantity and quality in the area of the Proposed Action. A detailed discussion of water quantity and quality for the southern Ruby Mountains and the valleys that border this mountain range and the area of the Proposed Action is presented in Appendix B. The description of the affected environment for water resources was produced from: 1) a review of literature available on the Proposed Action area and both the southern Ruby Mountains and adjacent valleys, 2) technical data provided by Placer Dome U.S., and 3) reports on water resources prepared for Placer Dome U.S. by Simon Hydro-Search (1994a and 1994b).

3.4.1 Surface Water Resources

3.4.1.1 Introduction

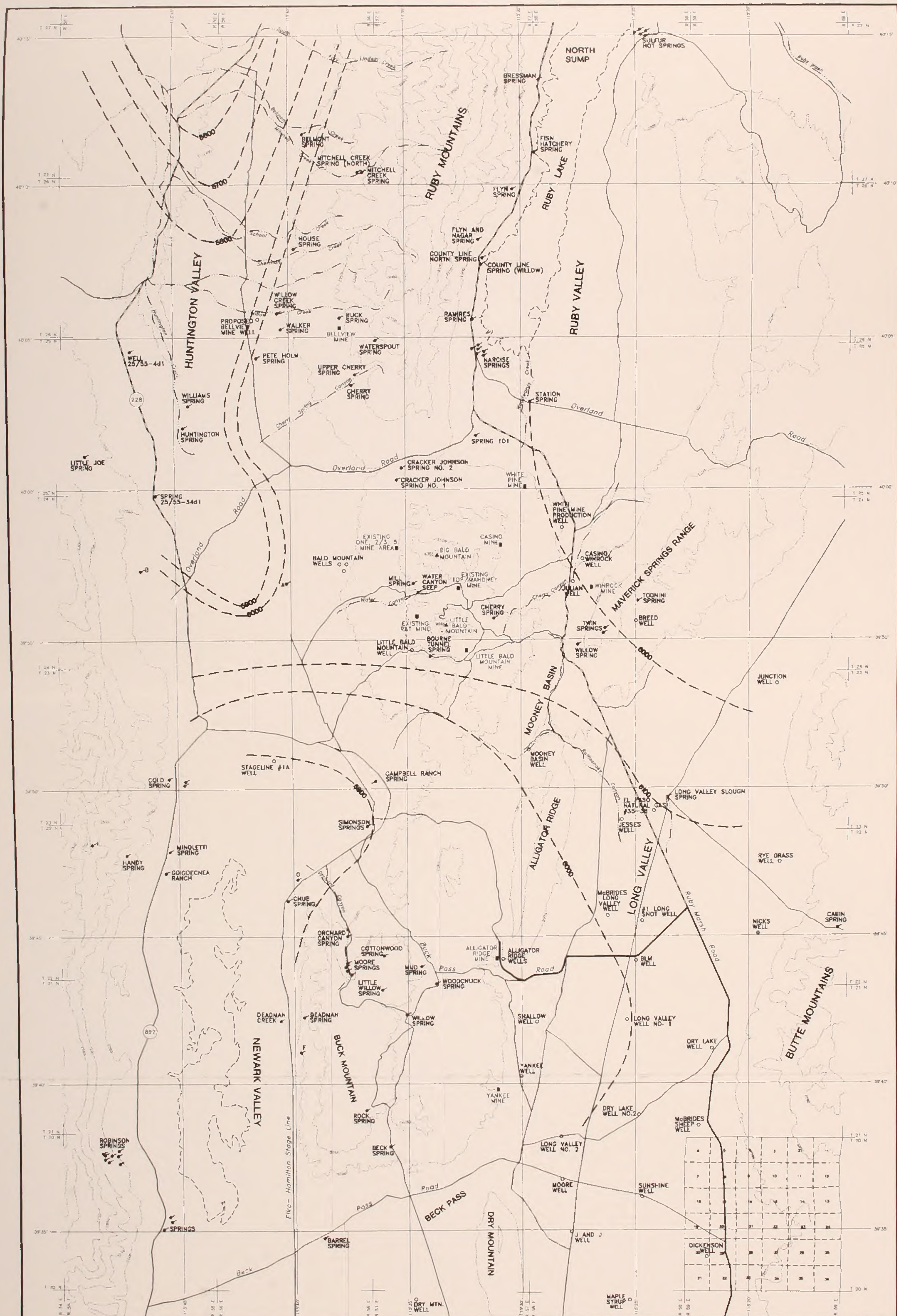
The Proposed Action area includes the western portion of Bald Mountain, northern Mooney Basin, and the saddle area between Big Bald Mountain and Little Bald Mountain, referred to as the Top Area (see Map 2-1). The Horseshoe/Galaxy and Saga areas are situated along the western margin of Mooney Basin, while the proposed Horseshoe/Galaxy Mine process plant and leach facility would be in the center of northern Mooney Basin. Precipitation ranges from 9 to 13 inches per year in this part of the southern Ruby Mountains, while evaporation is in the range of 48 to 52 inches per year (Behnke and Maxey 1969). Most precipitation falls during the winter months.

Generally, evaporation and evapotranspiration exceed precipitation for most of the year in the Proposed Action area. Thus, mountain streams have limited or no flow during the summer, fall, and winter months. During the spring, snowmelt provides flow for streams and also provides water that infiltrates through faults and fractures to recharge the perched aquifers in the Bald Mountain area that feed springs such as Cherry Spring, Mill Spring, and the Bourne Tunnel Spring (see Map 3-3). Appendix B provides a more detailed discussion of the relation between climate and surface water flow in the Proposed Action area.

3.4.1.2 Surface Water Quantity

Surface water flow in the Proposed Action area is minimal, occurring in drainages primarily during the late spring due to snowmelt, and by flow from springs that occur along faults and fractures and are fed by perched aquifers. Flow rates in springs were measured by Simon Hydro-Search (1994a). Flow rates in drainages near the Proposed Action area have not been measured, because flow is intermittent.

Surface water flow in the Proposed Action area is dominated by surface runoff down streams during the spring months and by flow from springs fed by perched aquifers. Springs in the vicinity of the Proposed Action include Cherry Spring, Bourne Tunnel Spring, North Water Canyon Spring, Mill Spring, and the Cracker Johnson #1 and #2 Springs (see Map 3-3). These springs are usually found near the headwaters of major canyons or along canyon floors at or above an elevation of 6,200 feet. Springs such as Cracker Johnson can flow nearly year-round, but most springs are dry by mid-summer. These springs are fed by perched, local aquifers that receive water from snowmelt infiltration. Flow rates are generally in the range of 1 to 2 gallons per minute (gpm), which is described further in Appendix B.



LEGEND:

- ROADS
- PAVED MAIN ROAD
- MAIN ROAD NOT PAVED
- SPRING
- WELL
- 6000 APPROXIMATE GROUNDWATER ELEVATION CONTOUR (MEASURED ON .....)
- SURFACE ELEVATION CONTOUR
- INTERMITTENT STREAM
- INTERMITTENT LAKE
- MINE AREA

NORTH

0 18,500

FEET

BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 3-3
SPRING AND WELL LOCATIONS WITH WATER TABLE ELEVATIONS

Surface water flow in the Horseshoe/Galaxy area is limited to surface runoff during spring snowmelt and during major storms. No springs were observed or sampled during a field baseline reconnaissance (Simon Hydro-Search 1994a) and the upper portions of the valley alluvium are generally dry.

3.4.1.3 Surface Water Quality

Surface water quality in the Proposed Action area is dependent on the quality of water flowing from springs. Water quality in the springs depends on the nature of the flow regime that feeds the springs and the lithology of the rock(s) through which the groundwater flows before it surfaces as a spring. Springs can be classified as perched, local, and regional (Simon Hydro-Search 1994a), depending on how far infiltrating precipitation flows before it breaches as a spring. The four main lithologic groupings that affect spring water quality are: 1) carbonate rocks such as limestones and dolomites, 2) shales and volcanic rocks, 3) intrusive granitic rocks, and 4) valley-fill alluvium. Appendix B summarizes the water quality data available for surface and groundwater in the regional area, including Newark Valley, Huntington Valley, Ruby Valley, Long Valley, and the Bald Mountain-Mooney Basin area.

The springs that occur within the vicinity of the Proposed Action, including Bourne Tunnel Spring, North Water Canyon Spring, Mill Spring, Cracker Johnson Springs #1 and #2, and Cherry Spring (see Map 3-3), generally flow until late summer at rates of 1 to 2 gpm and are often used for stockwater and by wildlife. Water quality is generally within Nevada drinking water standards and is calcium to calcium/sodium bicarbonate dominated. The pH values range between 7.3 and 7.9, with chloride values ranging between 2 to 50 milligrams per liter (mg/l) and sulfate usually below 60 mg/l. These are perched springs fed by perched aquifers that are recharged primarily by snowmelt. There are no springs known for northern Mooney Basin. Surface water flow is ephemeral and no surface water quality data are available for this part of the Proposed Action area.

Ruby Lake is situated north of the Proposed Action area at the southern end of Ruby Valley within the Ruby Lake National Wildlife Refuge (see Map 3-3). The lake is fed by springs along the eastern, fault-bounded margin of the southern Ruby Mountains and by alluvial groundwater in southern Ruby Valley. Ruby Lake is well outside of the boundaries of the Proposed Action and is not connected hydrologically to springs, streams, or groundwater in the area of the Proposed Action. Appendix B discusses in detail the water quality of Ruby Lake and hydrologic factors that influence water quality in these lakes.

3.4.2 Groundwater Resources

The discussion of groundwater within and adjacent to the area of the Proposed Action is based primarily on reports by the State of Nevada and the United States Geological Survey for the valleys that border the southern Ruby Mountains. Only a few wells exist within the southern Ruby Mountains proper and these are production wells for support of mining activities at the Yankee, Alligator Ridge, Casino/Winrock, and White Pine mines (Simon Hydro-Search 1994a). Thus, groundwater patterns in the area of the Proposed Action have been inferred from regional and basin specific studies in the vicinity of the southern Ruby Mountains. Appendix B presents a detailed discussion and summary of regional and basin-specific groundwater studies that pertain to areas adjacent to the Proposed Action.

3.4.2.1 Regional Groundwater System

Regional groundwater flow consists of interbasin flow and flow from high mountains to valleys through bedrock sedimentary units, primarily the Paleozoic carbonate rocks, that are common in this part of Nevada. The flow occurs at moderate depth and is generally beneath the alluvial sediments and volcanic flows and tuffs that form the valley fill for Ruby, Huntington, Newark, and Long Valleys. This regional groundwater flow surfaces in springs that form along basin-margin faults, such as the Simonson Warm Springs of Newark Valley (Mifflin 1968). Regional groundwater flow has temperatures generally above 70° F and high flow rates in springs due to vertical flow. The water is of very good quality and is calcium bicarbonate-dominated.

3.4.2.2 Local Groundwater System

Local groundwater systems consist of perched water in the mountainous areas, water in valley-fill alluvium within the mountains, and water contained within the alluvium and volcanics of the four major valleys in the surrounding Proposed Action area. Local groundwater accounts for most spring flow, most flow down streams, and for agricultural/stockwater obtained in the valleys. This water can be unconfined or confined in sand/gravel beds that are bounded by beds of alluvial bank deposit and lacustrine clays. Local groundwater systems in the valleys adjacent to the southern Ruby Mountains and within the southern Ruby Mountains but outside the area of the Proposed Action are discussed in Appendix B.

Local groundwater in the Proposed Action area consists of perched groundwater found generally at elevations above 6,000 to 6,200 feet. The Bald Mountain area is noted for intrusive rocks, contact metamorphic skarns, veins, and both volcanic rocks and Paleozoic carbonate rocks. The area is transected by numerous, closely spaced northwest-trending faults. Less common and more widely spaced northeast-trending faults cross-cut the dominant northwest structural grain. Perched groundwater, and thus the springs fed by these perched aquifers, is controlled by faults, fault intersections, and lithologic contacts. Springs are more common along the western slopes of Bald and Little Bald Mountains. Cherry Spring is the main spring known in the Top Area and occurs in an area of fault intersections. The Cracker Johnson springs are located along the north slope of Bald Mountain (see Map 3-3).

The groundwater quality in springs found in the project area was discussed under surface water quality. Spring water is usually well within Nevada drinking water standards, and is thus suitable for wildlife, wild horses, livestock, and human use (if properly treated for bacteria).

3.4.2.3 Groundwater Quality

Groundwater quality data for the project area consist of water quality data from springs and from production water wells at the Bald Mountain Mine, the Alligator Ridge Mine, the Casino/Winrock facility, and the Yankee Mine. Spring water is within Nevada drinking water standards as is calcium to calcium/magnesium bicarbonate-dominated or sodium bicarbonate-dominated (see Appendix B). Groundwater quality (including production wells) in the south-central and southern Ruby Mountains, and the Proposed Action is within Nevada drinking water standards. The Yankee, Bald Mountain Mine well #1, and the Casino/Winrock well show minor exceedences in iron and manganese that are probably due to well screen contamination of the water and not reflective of actual groundwater quality.

3.4.2.4 Summary

There are three main types of groundwater in the southern Ruby Mountains: 1) regional groundwater that is part of interbasin flow in northeastern Nevada, 2) local groundwater that consists of subsurface flow from mountainous areas to nearby valleys and basins, and 3) perched groundwater controlled by lithologic units and faults that provides water for springs. Perched groundwater provides water for the springs in the Bald Mountain area.

Water quality for perched water in springs, local groundwater tapped by wells, and for regional groundwater tapped by wells and springs meets Nevada drinking water standards. Groundwater is generally calcium- or calcium/magnesium bicarbonate-dominated. Sulfate and chloride are low. Locally, groundwater can be sodium bicarbonate-dominated. The total dissolved solids are generally below 500 mg/l. The pH values range from 7.0 to 9.0, with most values between 7.3 and 8.5. Iron, manganese, and metal values are low. The water is suitable for wildlife, wild horses, livestock, and human consumption (with proper treatment for bacteria).

The various groundwater aquifers appear to have comparable water levels regardless of whether the aquifer is confined or unconfined. The bedrock aquifers in the limestone and volcanic units have water levels (potentiometric surfaces) similar to water levels in unconfined alluvial aquifers. Confined alluvial aquifers have water levels comparable to the overlying unconfined alluvial aquifer. This apparent hydrodynamic equilibrium among the various aquifers suggests that water is not flowing between the various bedrock and alluvial aquifers and that a steady-state or equilibrium has been reached. Regional groundwater tapped by wells and springs has a potentiometric surface comparable to the local groundwater potentiometric surface found in valleys, basins, and fractured volcanics in the Bald Mountain area. Perched water may not be in hydrodynamic equilibrium with local and regional groundwater. Appendix B presents in detail the relationship between different aquifers known for the area surrounding and including the southern Ruby Mountains.

3.5 WETLANDS AND WATERS OF THE UNITED STATES

Surveys to identify waters of the United States (i.e., wetlands and other waters of the United States) were completed for the Sage Flats area, Horseshoe/Galaxy area, and North Water Canyon in 1993 and 1994 (JBR 1994a; JBR 1995). Wetlands within the vicinity of the Proposed Action are limited to several seeps and springs in North Water Canyon (see Map 2-3, Chapter 2). North Water Canyon, located north of the existing haul road and proposed South Water Canyon waste rock dump, includes six springs of which three have been identified as wetlands (JBR 1995). These wetlands are seasonally inundated by water and support a prevalence of wetland species including Nebraska sedge, Baltic rush, fowl bluegrass, bentgrass, monkeyflower, and water speedwell. These wetlands cover approximately 0.3 acre.

Based on information obtained during the field reconnaissance and from the waters of the United States survey report, it was determined that wetlands were not present in the vicinity of Cherry Spring. Cherry Spring is located immediately below the proposed East Sage dump. This spring provides intermittent (1 out of every 4 years) flow to a heavily disturbed area utilized by livestock, wildlife, and wild horses. A stock pond and troughs are located below the spring site. The site is dominated by weedy species including cheatgrass, blue mustard, poverty sumpweed, tansy mustard, thistle, and bur buttercup. The small seep has not been as affected by livestock and supports a variety of plant species. Rose, snowberry, rabbitbrush, mountain big sagebrush, sedges, mountain brome, lupine, and bastard toadflax are associated with this seep.

Other waters of the United States (i.e., incised drainage channels with drift lines, sediment or detritus deposits, scouring, and vegetational and soil changes) occur in the Proposed Action area and vicinity. The Proposed Action area includes one intermittent drainage identified as a water of the United States. This drainage intersects two proposed road crossings northwest of the Horseshoe/Galaxy process and leach area. This drainage extends in a northeasterly direction from the Horseshoe/Galaxy process and leach area for approximately 2,200 feet. The average width and depth of this drainage is 21 and 4 inches, respectively.

Other waters of the United States that occur in the Proposed Action vicinity include four intermittent drainages and a stock pond located in North Water Canyon (JBR 1995). The four intermittent drainages occur in the upper portion of the North Water Canyon watershed and collectively extend approximately 13,300 feet (2.5 miles) and cover 34,233 square feet (0.8 acre). The stockwater pond covers approximately 7,200 square feet or 0.2 acre. Therefore, approximately 1 acre of other waters of the United States occur in North Water Canyon. Portions of North Water Canyon have been exclosed (fenced) from livestock use. The herbaceous vegetation in the drainage bottom is dominated by sedges, rushes, watercress, bentgrass, and bluegrass, less abundant species include buttercup, clover, dandelion, monkeyflower, dock, and yarrow. Rose, big sagebrush, chokecherry, rabbitbrush, and snowberry are scattered along the banks. Impoundments for livestock use are present outside the fenced areas; this surrounding area appears to be subjected to heavy grazing use on a regular basis. No other areas of significant riparian vegetation exist within the Proposed Action area.

3.6 WILDLIFE AND FISHERIES RESOURCES

The range of habitat types within the Proposed Action area, as described for vegetation resources, supports a wide variety of wildlife resources typically correlated to the differences in elevation and climatic zones in northeastern Nevada.

Important wildlife habitats associated with the project include big sagebrush, piñon-juniper woodland, mountain mahogany, mixed shrub (e.g., bitterbrush, serviceberry, snowberry), and riparian drainages. The piñon-juniper and shrub communities provide structural diversity for a number of wildlife species as both thermal cover and food sources, during both the winter and breeding seasons. Larger deciduous tree species and snags are limited in occurrence within the Proposed Action area, but are important for cavity nesting birds and for foraging activities.

The arid upland areas are typically characterized by a diversity of wildlife species rather than high population densities. Available water for wildlife consumption and riparian vegetation are the limiting factors. Therefore, riparian habitats, particularly with a multi-story canopy and free water, support a greater diversity and population density of wildlife species than any other habitat type occurring within the vicinity of the Proposed Action.

The existing range condition in the Proposed Action area, which encompasses the Warm

Springs Allotment, has deteriorated over the last century, resulting in poor forage availability for wildlife use. This resource deterioration has primarily been caused by heavy grazing pressure from livestock and wild horses, reducing the associated carrying capacities for wildlife resources. Forage competition among livestock, wild horses, and mule deer primarily occurs when herbaceous grasses and forbs are limited, resulting in increased grazing pressure on woody browse species. These grazing pressures combined with continuing drought within the western United States have compounded the problem of plant regeneration. The Bureau of Land Management issued a Notice of Full Force and Effect Final Multiple Use Decision in March of 1994 in an attempt to improve range condition and forage availability by decreasing the number of livestock and wild horses within the allotment (Bureau of Land Management 1994a). This decision is currently under appeal. In addition, 347 wild horses were removed from the Buck and Bald Herd Management Area in 1986, 338 in 1989, and 562 in 1994.

Surface water resources located within the project vicinity include naturally occurring springs, as discussed in Section 3.4.1 for Surface Water Resources. Springs in the vicinity of the Proposed Action that contain free water for wildlife consumption include North Water Canyon, Mill, Cherry, Cracker Johnson #1 and #2, and Bourne Tunnel Springs. Other seeps and springs surrounding the Proposed Action area are primarily defined by moist soils and minimal riparian vegetation, particularly if the areas have been degraded by livestock and wild horse use. Many of these seeps and springs fluctuate annually between wet and dry, depending upon seasonal precipitation and temperatures.

The conditions of the limited riparian habitats located within the Proposed Action area range between poor to good, depending on grazing pressure. Existing conditions generally reflect the overuse of the mesic vegetation by livestock and wild horses, in addition to direct trampling of the riparian vegetation (Bureau of Land Management 1989). The degradation of these riparian zones results in minimal resource value for area wildlife. Water sources protected from these effects by exclosures, such as that occurring at North Water Canyon Spring, provide diverse forage and cover species, in addition to higher water quality and flow rates. A number of perennial and intermittent creeks and springs occur outside of the Proposed Action area and are discussed further in Appendix B.

The following species information focuses on both resident and migratory wildlife that may occupy the Proposed Action area. Because of wildlife mobility, some of these characterizations include regional information. Wildlife species known to occur outside of the Proposed Action area, but within the associated cumulative effects area (e.g., pronghorn, snowy plover, relict dace) are discussed in Appendix B.

Mule deer are the principal big game species in the region. Seasonal movements occur between summer and winter ranges typically defined by available forage and water. The Proposed Action is located within a portion of crucial mule deer winter range designated by the Nevada Division of Wildlife. This winter range supports the largest mule deer herd in Nevada, the Ruby Deer Herd, which currently numbers approximately 30,000 deer throughout the Ruby Mountains. About 400 deer reside in the Buck and Bald area on a year-long basis. However, during winters when snow accumulations in the Ruby Mountains to the north of the Proposed Action area force migrating deer to the south, 20,000 to 24,000 deer may move through the Proposed Action area, continuing as far south as Little Antelope Summit along Highway 50 (Bureau of Land Management 1989; Foree 1994). Map 3-4 depicts the designated winter range and migration routes through the Proposed Action area. The number of deer that move along these routes during the migrational periods typically depends on the severity of the weather and associated snow depth.

As discussed above, the range condition within the Proposed Action area has degraded as a result of high levels of grazing, in addition to current drought conditions. These conditions have limited the available forage for mule deer, particularly affecting browse species on both the summer and winter ranges. Lack of available browse is believed to correlate with higher fawn mortalities recorded for the population (Bureau of Land Management 1989).

Mountain lions occur throughout the Ruby Mountains. Their range coincides with that of mule deer, their primary prey species (Bureau of Land Management 1989). Lions may occur sporadically in the Proposed Action area.

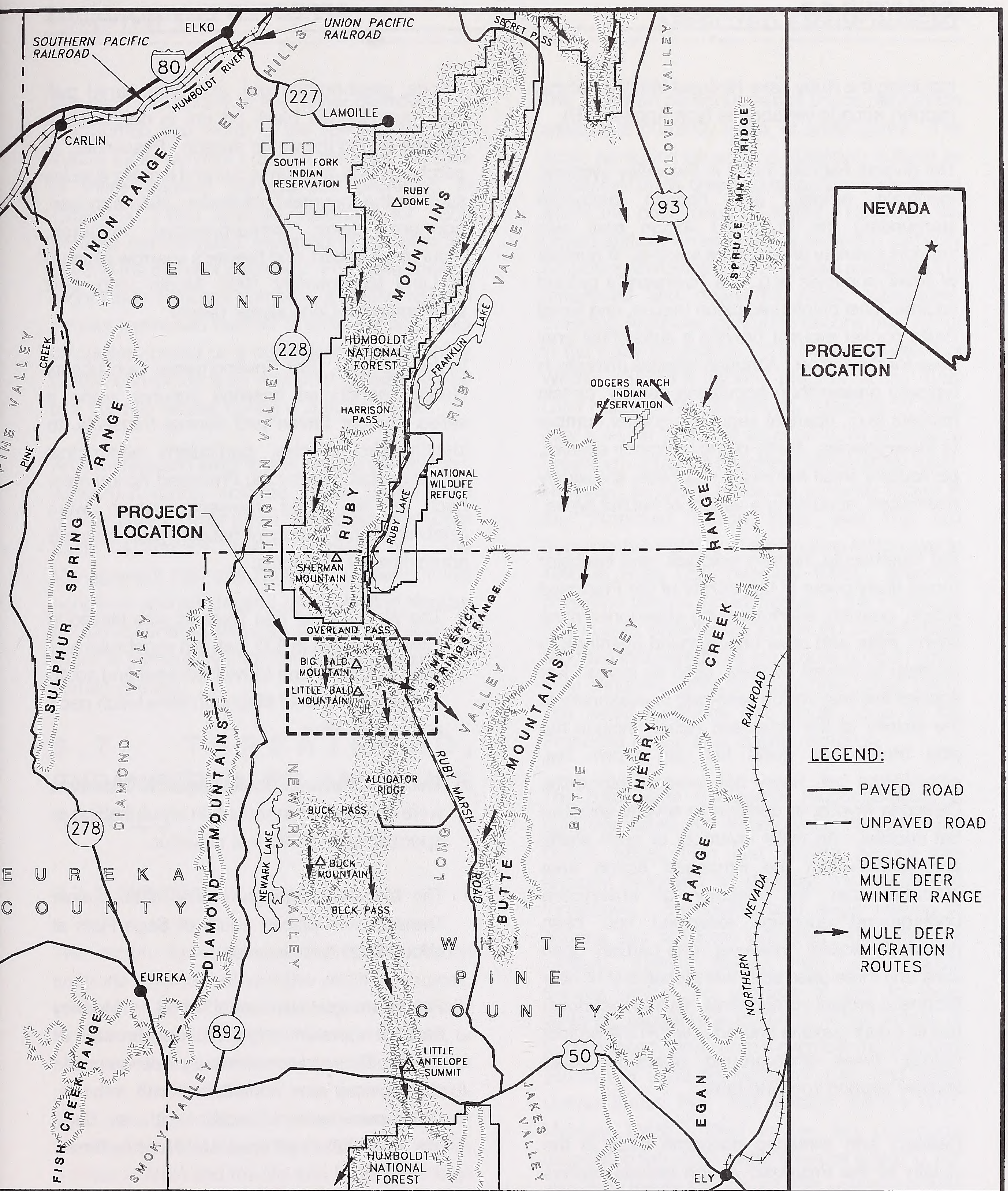
Upland game birds found in the vicinity of the Proposed Action include sage grouse, chukar, gray (Hungarian) partridge, and mourning dove (Bureau of Land Management 1989). Sage grouse inhabit upland shrub communities, breeding on established open leks (or strutting grounds) and occupying appropriate nesting and brooding habitat in proximity to water. No sage grouse leks have been documented within the Proposed Action area, although valuable brooding habitat occurs in the project vicinity near water sources, such as Water Canyon, Mill, and Cherry Springs. Active sage grouse leks are located primarily within the adjacent valley systems, which are discussed further in Appendix B. The closest sage grouse leks to the Proposed Action area are approximately 5 miles north of the proposed Horseshoe/Galaxy Mine in southern Ruby Valley and 6 miles southeast of Horseshoe/Galaxy near Long Valley Slough. The 1994 lek inventory conducted by the Bureau of Land Management indicated that sage grouse numbers have declined within the Egan Resource Area, although the populations are considered stable at moderately low numbers (Bureau of Land Management 1994b).

Chukar are typically associated with perennial water sources, mesic areas, and rugged slopes or outcrops. Gray partridge are often found along riparian drainages and adjacent terraces, particularly near agricultural areas in the surrounding valleys (Bureau of Land Management 1989). Important habitat features for mourning doves include riparian zones, particularly those areas containing trees or shrubs large enough for nesting.

The pygmy rabbit is another game species inhabiting the Proposed Action area. Although the pygmy rabbit is considered a game species in Nevada, it also is a Federal candidate - category 2 for threatened or endangered status and is discussed further in the next section.

No prominent nesting or foraging areas for waterfowl or shorebirds occurs within the Proposed Action area, although the small wetlands, stock ponds, and natural springs provide valuable resting and foraging habitat for both resident and migratory birds (Bureau of Land Management 1987). The use of the Ruby Lake National Wildlife Refuge and other regional water sources is discussed further in Appendix B.

No fisheries occur within the immediate Proposed Action area, due to the limited perennial water. However, a number of perennial sources,



MAP 3-4
MULE DEER WINTER RANGE AND MIGRATION ROUTES

including the Ruby Lake National Wildlife Refuge, support aquatic vertebrates (see Appendix B).

The diverse habitats found in the valley systems, mountain ranges, and riparian drainages surrounding the Proposed Action area also support a variety of nongame species. A number of small mammals (e.g., the Townsend's ground squirrel, least chipmunk, piñon mouse, and Great Basin pocket mouse) provide a substantial prey base for the region. Although species diversity is typically greater than population density, certain habitats (e.g., riparian) support a greater number of these species. Many of the nongame species, particularly small mammals and birds, are widely distributed, occupying a variety of habitat types.

Bat hibernacula, nursery colonies, and bachelor roosts likely occur in the vicinity of the Proposed Action, possibly encompassing abandoned mine shafts, adits, and other underground openings, in addition to natural habitats, such as caves. Bat species that may reside year-long or seasonally in the vicinity of the Proposed Action include the little brown bat, pallid bat, big brown bat, silver-haired bat, hoary bat, western pipistrelle, California myotis, in addition to several sensitive bat species. An initial inventory of open shafts and adits within the Proposed Action area indicated that the majority of abandoned underground openings examined had been previously closed. However, one partially open shaft and three open adits were located in or near proposed project components. Due to the known use of existing shafts and adits within the project vicinity, these underground openings could feasibly support roosting bats.

Resident and wintering nongame birds in the vicinity of the Proposed Action include raptors such as the red-tailed hawk, ferruginous hawk, Swainson's hawk, prairie falcon, merlin, American kestrel, northern harrier, golden eagle, turkey vulture, great-horned owl, and short-eared owl. The rough-legged hawk occurs in northeastern Nevada during the winter season. Passerines, or perching birds, are numerous and include species such as the mountain chickadee, plain titmouse, northern flicker, white-breasted nuthatch, mountain bluebird, and brewer's sparrow (Bureau of Land Management 1987; Medin 1990; JBR Environmental Consultants 1994b).

In July of 1994, JBR Environmental Consultants (1994b) conducted baseline surveys, using a series of eight Emlen bird census transects, to identify bird species, particularly neotropical migrants, that occupy the Proposed Action area. Each of the eight transects, which were established in a variety of habitat types, covered approximately 100 acres:

- The West Alluvial Fan Transect was placed in lower-elevation (6,500 feet) big sagebrush and Utah juniper on the alluvial fan west and south of the existing Bald Mountain Mine leach pads and mill facilities.

- The Sage Flat and South Sage Flat Transects were established in mountain shrub habitat at approximately 8,000 feet elevation.

- The Mountain Mahogany and Piñon-Juniper Transect was placed south of Sage Flats at about 8,000 feet elevation.

- Four transects were established in Mooney Basin at approximately 6,900 feet elevation or higher. These transects were placed in mixed piñon-juniper and mountain shrub habitats, encompassing the Horseshoe pit area, Saga pits area, Galaxy pit area, and Mooney Basin.

Although the surveys were conducted in July, after the peak breeding period, many species exhibited breeding behavior (e.g., territorial defense), particularly at the higher elevations. It is assumed that many of the species recorded during these surveys breed in the area. Results of these transect surveys are presented in Table 3-5. Bird species recorded for each transect are indicated, including those recorded beyond the transect boundary. For those species recorded in sufficient numbers, a relative species density (estimated number of birds per acre) was calculated, based on a coefficient of detectability or how conspicuous an individual species may be in a specific habitat during a specific period.

Area reptiles and amphibians include the northern sagebrush lizard, collared lizard, Great Basin gopher snake, Great Basin rattlesnake, and Great Basin spadefoot toad (Bureau of Land Management 1987 and 1992). A number of these nongame species depend on the limited riparian habitat associated with area streams and springs, which is particularly important to the existence of certain species.

3.7 THREATENED, ENDANGERED, OR CANDIDATE SPECIES

3.7.1 Wildlife

The region surrounding the Proposed Action supports a number of sensitive wildlife resources. However, relatively few sightings of Federally threatened or endangered, Federal candidate, or state sensitive species have been recorded in or near the Proposed Action area (see Table 3-6). The majority of these species were originally identified by the United States Fish and Wildlife Service (1994a) and the Nevada Natural Heritage Program (1994). However, additional sensitive species have been addressed, based on resource issues and agency concerns.

The American peregrine falcon (*Falco peregrinus anatum*) is currently listed as endangered. The Arctic peregrine falcon (*F. p. tundrius*) is listed as threatened on its breeding range and endangered within the contiguous 48 states. However, the United States Fish and Wildlife Service is currently proposing to downlist the American subspecies to threatened and delist the Arctic subspecies. Breeding American peregrine falcons may occur in the Ruby Mountains. The Nevada Division of Wildlife initiated a hacking program at the Ruby Lake National Wildlife Refuge, releasing 27 birds over a 4-year period in an effort to re-establish a breeding population (Mackay 1995; Bradley 1995). However, no active eyries are currently known in the Proposed Action area, and the last documented sighting of a peregrine falcon was in 1990 at Ruby Lake (Mackay 1995). Breeding peregrine falcons could forage in the Proposed Action area, since recent studies in Colorado have reported that peregrines may travel up to 31 miles from occupied eyries to obtain prey (Craig 1994). The Arctic peregrine also could occur in the Proposed Action area during migration.

The bald eagle (*Haliaeetus leucocephalus*) is currently listed as endangered; however, the United States Fish and Wildlife Service has recently proposed to downlist the species to threatened. Successful bald eagle nesting in Nevada has not been recorded within the last century (United States Fish and Wildlife Service 1993). An average of one to three wintering eagles typically occur in the vicinity of the Proposed Action from November through May (Bureau of Land Management 1987 and 1989; United States Fish and Wildlife Service 1993; Mackay 1995). Bald eagles are commonly associated with open water areas for foraging, but also are closely associated with upland habitats that support large jackrabbit populations (United States Fish and Wildlife Service 1993).

Table 3-5

Results of the Emlen Transects Conducted within the Proposed Action Area
July 1994

Species	Transect							
	West Alluvial Fan	Sage Flat	South Sage Flat	Mountain Mahogany and Piñon-Juniper	Horseshoe Pit Area	Saga Pits Area	Galaxy Pit Area	Mooney Basin Area
Turkey vulture		(X)[1]		X[2]		(X)	(X)	
Cooper's hawk					(X)	(X)		
Sharp-shinned hawk				X				
Red-tailed hawk				X				
Northern harrier			X	X				
American kestrel	(X)	X	X					(X)
Sage grouse			X					
Mourning dove	X	X	X	X	X	X	(X)	X
Common nighthawk							(X)	
Broad-tailed hummingbird				X				
Calliope hummingbird				X?[3]				
Northern flicker	X	X	X	X	X	X	X	
Hairy woodpecker				(X)				
Western wood-peewee				X				
Empidonax flycatcher sp.							X	
Western flycatcher							X?	
Gray flycatcher			X	X	X	X	X	
Ash-throated flycatcher				X	X	X		

Table 3-5 (Continued)

Species	Transect							
	West Alluvial Fan	Sage Flat	South Sage Flat	Mountain Mahogany and Piñon-Juniper	Horseshoe Pit Area	Saga Pits Area	Galaxy Pit Area	Mooney Basin Area
Horned lark							X?	
Scrub jay				X	X	X	X	
Common raven	(X)							(X)
Pinyon jay							X	
Clark's nutcracker				X	(X)			
Black-billed magpie	X	(X)	X					X
Mountain chickadee		X	X	0.52[4]	0.29	0.27	0.70	X
Plain titmouse					X	X	X	
Bushtit					X		X	
White-breasted nuthatch				0.14	X	X	X?	
House wren				0.14	X			
Blue-gray gnatcatcher			X	X	X	X	X	
Townsend's solitaire				X				
Mountain bluebird	X	X	X	X	X			
American robin		X	X	X				
Sage thrasher	X	0.38	X				X	X
Solitary vireo					X			
Yellow-rumped warbler				X		X		
Black-throated gray warbler					X	X	X	

Table 3-5 (Continued)

Species	Transect							
	West Alluvial Fan	Sage Flat	South Sage Flat	Mountain Mahogany and Piñon-Juniper	Horseshoe Pit Area	Saga Pits Area	Galaxy Pit Area	Mooney Basin Area
Western tanager				X	X	X		
Grasshopper sparrow		X						
Black-throated sparrow	X						X	X
Sage sparrow	X							
Dark-eyed junco				X				
Green-tailed towhee		X	0.24	0.42	0.20			
Rufous-sided towhee					X	X	X	
Vesper sparrow		X	X					
Chipping sparrow		X		X	0.37	X	X	
White-crowned sparrow							X	
Brewer's sparrow	0.66	1.23	1.90	0.26	0.92	X	0.29	0.54
Brown-headed cowbird	X							
Pine siskin				X				
Lesser goldfinch						X		
Purple finch							X	
Cassin's finch			X	0.15	X			

[1](X) = one or more birds recorded beyond the transect boundary.
[2]X = one or more birds recorded within the transect.
[3]? Bird was likely this species, but identification was not positive.
[4]Number of birds per acre for 100-acre survey area (Emlen transect), based on the coefficient of detectability.

Table 3-6

Threatened, Endangered, and Candidate Wildlife Species Identified for the Bald Mountain Mine Expansion Project

Common Name	Scientific Name	Federal Status[1]	Occurrence in the Vicinity[2]
BIRDS			
American peregrine falcon	*Falco peregrinus anatum*	E[3]	R, M
Arctic peregrine falcon	*F. p. tundrius*	E[4]	M
Bald eagle	*Haliaeetus leucocephalus*	E[3]	W, M
Ferruginous hawk	*Buteo regalis*	C2	R, M
Western burrowing owl	*Athene cunicularia hypugea*	C2	R, M
MAMMALS			
Spotted bat	*Euderma maculatum*	C2	R
Small-footed myotis	*Myotis ciliolabrum*	C2	R
Long-eared myotis	*M. evotis*	C2	R
Fringed myotis	*M. thysanodes*	C2	R
Long-legged myotis	*M. volans*	C2	R
Townsend's big-eared bat	*Plecotus townsendii*	C2	R
Pygmy rabbit	*Brachylagus idahoensis*	C2	R
Sierra Nevada red fox	*Vulpes vulpes necator*	C2	R
AMPHIBIANS			
Spotted frog	*Rana pretiosa*	C1	R

[1]E = Endangered: A species in danger of extinction throughout all or a significant portion of its range.

T = Threatened: A species likely to become endangered within the foreseeable future through all or a significant portion of its range.

C1 = Candidate - Category 1: A species that will likely be listed as threatened or endangered, but has been precluded by other listing activity. Federal listing is anticipated.

C2 = Candidate - Category 2: A species that may be listed as threatened or endangered, but conclusive biological data to support this listing are not currently available.

[2]R = resident; M = migrant; W = wintering.

[3]Proposed to be downlisted to threatened; decision is pending.

[4]Proposed to be delisted; decision is pending.

The ferruginous hawk (*Buteo regalis*) is a Category 2 candidate and is a common breeder in this area of Nevada. The Egan Resource Area is the most important resource within the state for ferruginous hawks, with Newark Valley supporting the greatest number of breeding pairs (see Appendix B). The ferruginous hawk nests on trees, promontory points, cut banks, or on the ground; preferred breeding habitat is scattered juniper trees at the interface between piñon-juniper and desert shrub communities that overlook broad valleys. Its primary prey species is the Townsend's ground squirrel, which is closely associated with white sagebrush vegetation. Nestlings typically fledge by mid-July, as the ground squirrels enter aestivation, and breeding birds migrate from the Ely District by August 1.

Although prominent ferruginous hawk nesting areas occur east of Alligator Ridge in Long Valley and west of Buck Mountain in Newark Valley and suitable habitat may occur near the proposed project components, no nesting activity has been reported in or near the Proposed Action area, based on annual Bureau of Land Management nest surveys. The occupied nest sites recorded within the surrounding valleys (Bureau of Land Management 1994b) are discussed further in Appendix B.

The western burrowing owl (*Athene cunicularia hypugea*) also is a Category 2 candidate species. This species is an uncommon summer resident that breeds in the Ely District. It is dependent on mammal burrows for nesting, typically foraging within open grasslands and sagebrush habitats.

The loggerhead shrike and long-billed curlew occur in the vicinity of the Proposed Action and were previously listed as a Category 2 and Category 3 candidates, respectively. However, the United States Fish and Wildlife Service recently removed both of these species from the candidate list, retaining the migrant loggerhead shrike as a category 2 species for the eastern United States (United States Fish and Wildlife Service 1994b).

Eight mammals (all Category 2 candidates) were identified as potentially occurring in or near the Proposed Action area. Of these eight mammals, six are bats.

The spotted bat (*Euderma maculatum*) is rare in Nevada. Although limited data are currently available on this species, this bat is believed to occupy cold deserts and submontane zones, using hibernacula (hibernation dens) that maintain a constant temperature from September to May rather than migrate (Dalton et al. 1990). It also is believed that this bat forages nocturnally for insects over open water, marshes, and open woodlands (e.g., piñon-juniper). This species has been reported roosting in horizontal rock crevices in cliffs, along washes, or in rock outcrops (Wai-Ping and Fenton 1989).

The small-footed myotis (*Myotis ciliolabrum*) is a summer resident in Great Basin desert, shrub-steppe, and woodlands, with occasional reports in montane forests. This species forages for insects in forests and clearings. It is known to hibernate in caves, mines, buildings, and trees. Females apparently do not form nursery colonies when nursing young.

The long-eared myotis (*M. evotis*) is a summer resident in montane forests throughout the state. This species is believed to glean insects while foraging. The long-eared myotis roosts solitary or in small groups in trees, rock crevices, and occasionally in caves or mines. This species was recorded near Buck Spring in 1994 (Bradley 1995).

The fringed myotis (*M. thysanodes*) is an uncommon summer resident in the Great Basin, but has been reported in woodlands throughout the state. This species gleans small insects from foliage during foraging. Small nursery colonies can be located in mines and other buildings; males typically roost singly in caves, mines, crevices, and buildings.

The long-legged myotis (*M. volans*) is a summer resident in Great Basin woodlands to montane forests. This species forages within forests and openings for insects. Individuals typically day roost singly or in small groups in buildings, rock crevices, and loose tree bark. Night roosts are often in caves and mines. This species also was recorded near Buck Spring and Bellview Mine in 1994 (Bradley 1995).

The Townsend's big-eared bat (*Plecotus townsendii*) is a year-round resident in Nevada, occupying nursery colonies, bachelor roosts, and hibernacula within caves, mines, and buildings. This species gleans insects from foliage while foraging and roosts both singly and in colonies.

The pygmy rabbit (*Brachylagus idahoensis*) is distributed throughout sagebrush habitat in the northern Great Basin. Habitat requirements for these small, burrowing rabbits include dense stands of big sagebrush or bitterbrush for both food and cover (Green and Flinders 1980) and soft, deep soils for their burrows (Wilde 1978). The species has an irregular distribution, limited to suitable stands of sagebrush and rabbitbrush (Dobler and Dixon 1990), often along riparian areas. In Nevada, the pygmy rabbit is a game species. Historically, this species occurred in the Proposed Action area (Borell and Ellis 1934); it is likely that individuals currently occupy the appropriate habitat types in and near the Proposed Action area.

It has been suggested that the red fox found in Elko and White Pine Counties may be the subspecies *Vulpes vulpes necator*, the Sierra Nevada red fox. Incidental sightings have been reported; however, this species would not be considered widespread in the vicinity of the Proposed Action.

The spotted frog (*Rana pretiosa*) is a Category 1 candidate, indicating that Federal listing as a threatened or endangered species is anticipated. This species is known to occur in Green Mountain Creek, north of Harrison Pass (Ports 1995), and may occur in Willow Creek and Huntington Creek (United States Forest Service 1992). It typically inhabits open perennial water, breeding in the surrounding ephemeral pools, and is also dependent on perennial springs for hibernation (Ports 1995). No habitat of this type occurs in the Proposed Action area.

3.7.2 Threatened, Endangered, or Candidate Plants

There are no documented populations of Federally listed threatened or endangered plants within the Proposed Action area or the Egan Resource Area. Information provided by the United States Fish and Wildlife Service (1994a) and Nevada Natural Heritage Program (1994) identified two special status plant species that potentially occur within or near the Proposed Action area. These special status species include the Holmgren smeloskia (*Smeloskia holmgrenii*), a Federal candidate-category 3C species, and the Nachlinger catchfly (*Silene nachlingerae*), a Federal candidate-category 2 species.

Species identified as Category 2 represent taxa for which the United States Fish and Wildlife Service has information to indicate that the listing as threatened or endangered is possibly appropriate; additional information is required prior to a definitive classification. Category 3C species were once considered for listing as threatened or endangered but are no longer receiving such consideration.

A review of the Nevada Natural Heritage Program data indicates that the nearest documented location of these species is approximately 10 miles north of Proposed Action area. This area near Sherman Mountain and Walker and Willow Creeks supports populations of the Holmgren smelowskia. Records indicate that these populations were last observed in 1989. This species is found on cliffs and talus of schist and crevices in calcareous rocks at elevations between 6,500 and 11,000 feet (Mozingo and Williams 1980). The Proposed Action area does not contain this habitat.

The Nachlinger catchfly may occur within the Proposed Action area. Potential habitat includes rocky, limestone slopes or outcrops in association with piñon. The nearest documented population occurs more than 15 miles north of the Proposed Action area, west of Ruby Lake. Other known populations are present in eastern White Pine County along the Duck, Schell Creeks, and Snake Ranges.

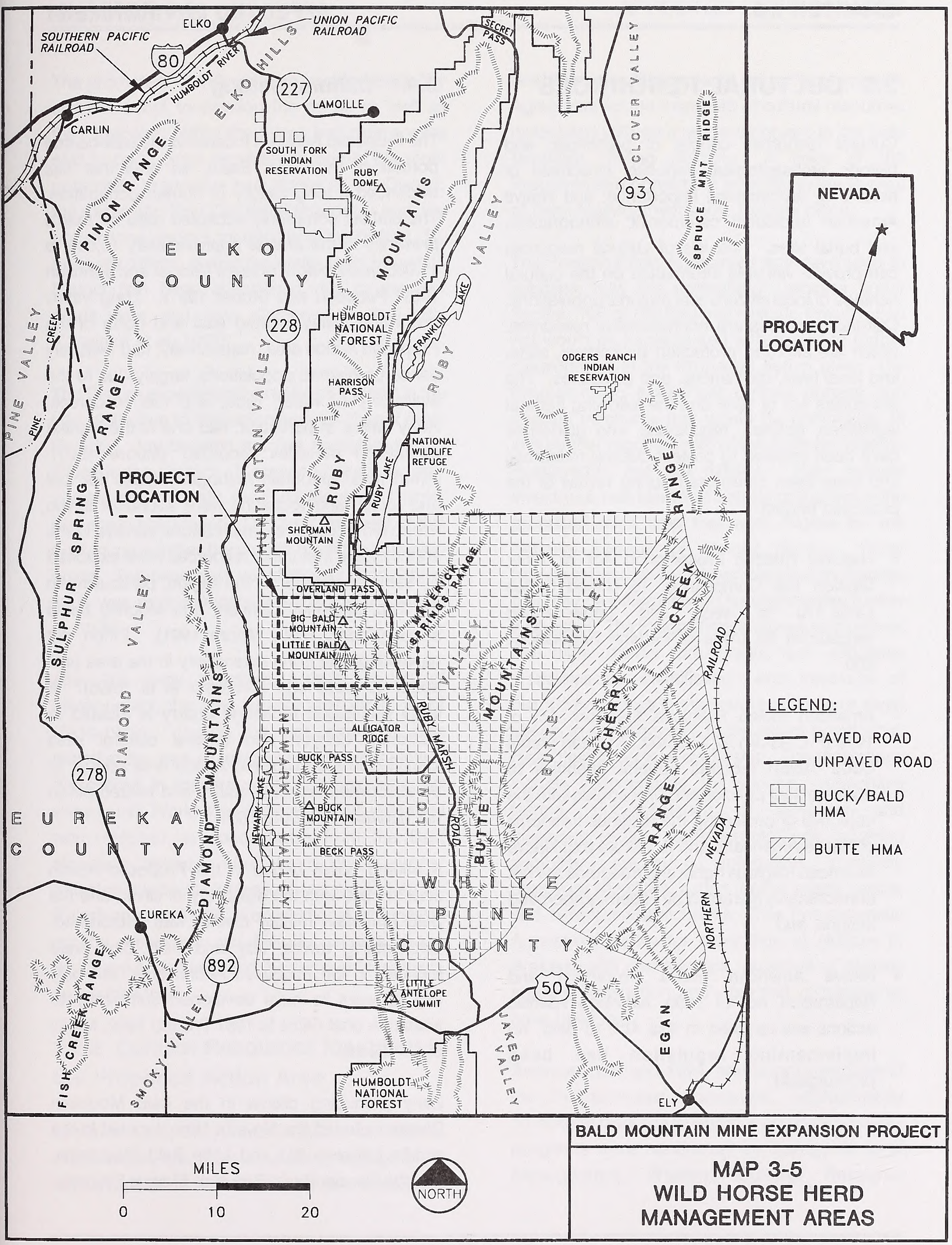
3.8 WILD HORSES

Wild horses, protected under the Wild Free-Roaming Horse and Burro Act, occur within specific herd management areas within the Egan Resource Area. These herds often fluctuate, as bands move across use areas and district boundaries. Regional movements are described further in Appendix B.

Wild horses generally summer in the Buck and Bald Mountains, moving down into Newark, Long, and Huntington Valleys during the winter period. Sufficient year-long range is available within the region and wild horses are generally in good condition. However, competition exists among wild horses, livestock, and wildlife for available forage and water resources.

The Proposed Action area occurs within the Buck and Bald Herd Management Area, as shown on Map 3-5 (Bureau of Land Management 1989). As discussed previously in the Wildlife and Fisheries section, the range condition in the Proposed Action area has deteriorated due to high levels of livestock grazing and wild horse use. In addition, the number of wild horses occurring within the Buck and Bald Herd Management Area has resulted in degradation of riparian habitats, directly affecting the vegetation, water quality, and associated flow rates.

As discussed for wildlife resources, the Bureau of Land Management has issued an allotment decision, based on resource damage. The Appropriate Management Levels for wild horse populations were subsequently established relative to these allotment evaluations. Currently, Appropriate Management Levels have been determined within the Buck and Bald Herd Management Area, totalling 346 wild horses. To achieve these appropriate management level goals, 347 wild horses were removed from the Buck and Bald Herd Management Area in 1986, 338 in 1989, and 562 in 1994 and placed into the Bureau of Land Management's adoption program. The 1994 fall census determined that approximately 593 wild horses remain in the Buck and Bald Herd Management Area.



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 3-5
WILD HORSE HERD MANAGEMENT AREAS

3.9 CULTURAL RESOURCES

Cultural resources consist of prehistoric and historic archaeological deposits; structures of historic or architectural importance; and Native American traditional ceremonial, ethnographic, and burial sites. Analysis of cultural resources can provide valuable information on the cultural heritage of local citizens and regional populations. Cultural resources are nonrenewable resources, which are afforded protection by Federal, state, and local laws, ordinances, and guidelines. The Antiquities Act of 1906 and the following Federal legislation, policies, regulations, and guidelines have been enacted to protect cultural resources and have been considered during review of the proposed project:

- National Historic Preservation Act of 1966; Section 106 Compliance; 16 United States Code 470 et seq., and implementing regulations 36 Code of Federal Regulations 800;

- American Indian Religious Freedom Act of 1979 (P.L. 95-341;92 Stat.469;42 United States Code 1996); requires Federal agencies to evaluate their policies and procedures with the objective of protecting the religious freedoms of Native Americans and to ensure that Native American religious rights and freedoms are not unnecessarily disrupted by Federally approved actions; and

- Native American Grave Protection and Repatriation Act of 1990; although specific actions are required in this Act, to date, no implementing regulation has been promulgated.

3.9.1 Cultural Setting

The Proposed Action is located in the east-central portion of the Great Basin, an area that has evidenced a long history of human occupation. The earliest commonly accepted date for man's presence in the area is approximately 10,000 to 11,000 years before present (Stoner and Johnson 1992; Peterson and Stoner 1991). Long Valley and Ruby Valley located east and north of the Proposed Action area, respectively, had relatively dense prehistoric populations, largely due to the availability of water, food, and fuel resources. Ruby Valley, in particular, had one of the highest population densities recorded (Moore 1991). Piñon nuts, mountain mahogany (used for fuel and tools), and toolstone were abundant in the Proposed Action area, and cultural surveys in the area indicate that these resources were exploited by early inhabitants of the region, particularly in the Top, Mahoney Canyon, and Mooney Basin areas (Young 1988; Moore 1991). Piñon nut harvesting was done extensively in the area until about 50 years ago (Crosland et al. 1995). A large prehistoric toolstone quarry is located in Mahoney Canyon and several cultural sites identified in the Proposed Action area appear to be associated with this quarry and related piñon nut harvesting (Moore 1991).

A mining boom began in the Proposed Action area in 1869 with the discovery of silver, and the Bald Mountain mining district was established. Two mining towns, Joy and Bald City, were founded in the Proposed Action area, but only Joy appears to have developed sufficiently to acquire a post office in 1897 (Young 1992; Mehls et al. 1994a).

Early producing claims in the Bald Mountain District included the Nevada Mine, located in the saddle between Big and Little Bald Mountains, and the Copper Basin Group or Skaggs Property.

The promoters of these claims founded Bald City and set about to develop the mines as well as their townsite. While the mines and claims were said to be in close proximity to one of the most potentially productive fault zones in the District, the mines and Bald City failed to prosper and Joy became the leading community of the District. By the early 1890s, nearly the entire Bald Mountain District had been abandoned due to the low grade ores and long distances to the mills (Crosland et al. 1995).

The District experienced a renewed interest in the late 1890s due to the rediscovery of copper ores. By 1897, Joy became the first recognized Post Office in the District. It remained open for only 2 years and by 1900 the Bald Mountain District was again abandoned. Close on the heels of this bust came another boom with the mines opening again. The estimated population of Bald City in 1905 was approximately 50 miners (Crosland et al. 1995).

After the early twentieth century period of development, the area lay idle until World War I (1914-1919). During the war, antimony was mined in the area. A few years later tungsten was discovered in the area. It, however, was not mined until World War II, when small quantities were shipped as concentrates from the Bald Mountain District. After World War II, further tungsten mining took place during the mid-1950s (Crosland et al. 1995). For additional information on the prehistoric and historic aspects of the Proposed Action area and the surrounding region, see Appendix B.

3.9.2 Cultural Resources Identified in the Proposed Action Area

In March 1995, the Advisory Council on Historic Preservation, the Bureau of Land Management, the Nevada State Historic Preservation Office, and Bald Mountain Mine entered into a Programmatic Agreement for the treatment of cultural resources associated with mineral development in the Bald Mountain Mining District. A copy of the Programmatic Agreement is on file in the Bureau of Land Management's Ely, Nevada office.

The Programmatic Agreement was developed to establish how the consultation process under Section 106 of the National Historic Preservation Act would be implemented with regard to further development in the Proposed Action area. The Programmatic Agreement defines general and specific measures that would be undertaken to ensure that requirements of the National Historic Preservation Act are fulfilled. Prior cultural inventories had identified historic properties in the proposed mine area that were eligible for the National Register of Historic Places. Other historic properties have been identified in the area that may be determined to be eligible after further evaluation. The Programmatic Agreement defines the mine district boundaries and stipulates guidelines for identification and treatment of historic properties in the area to mitigate or avoid effects to the properties to the extent practicable, regardless of surface ownership. The stipulations include requirements for surveys, subsurface testing, documentation of inventory and evaluation results, evaluation methods, resolving eligibility, mediation, mitigation, curation, discovery situations, action timing, surety bonds, and surveyor qualifications. The Programmatic Agreement allows for expedition of Notices to Proceed with development, provided all historic property evaluation and approval requirements have been met.

Between 1983 and 1994, and prior to creation of the Programmatic Agreement, approximately 18 cultural resource inventories and data recovery programs were conducted by Bureau of Land Management, Western Cultural Resource

Management, Inc., JBR Environmental Consultants, Retrospect Research, and Archeological Research Services in the area of the Proposed Action. The inventories included surface evaluations of the areas, archival records review, and literature searches. The initial on-site inventories were nonintrusive, and no attempt was made to remove visual obstructions, such as vegetation or other materials. During subsequent inventories, as warranted, selected sites were probed to determine the nature of deposits, depth, and presence or absence of cultural materials. Appendix C lists the specific inventories and findings, including site numbers, descriptions, project associations, eligibility, and potential mitigation, where appropriate. Reports detailing the results of the intensive archaeological evaluations conducted in the area are on file at the Bureau of Land Management's office in Ely, Nevada. Brief summaries of the inventories are provided in Appendix C. Only general location descriptions for the Proposed Action area are provided in the environmental impact statement to protect the confidentiality of the sites.

Of the 190 sites identified in the Proposed Action area by the end of 1994, 6 have been judged eligible for the National Register of Historic Places; 7 have been judged eligible, pending State Historic Preservation Officer concurrence; 7 have been judged eligible, pending further evaluation; 109 have been judged ineligible, pending State Historic Preservation Officer concurrence; and 60 have been found not eligible for the National Register of Historic Places.

3.9.3 Native American Concerns

The Proposed Action area was traditionally occupied by the Western Shoshone, including the Goshute. Their territory extended from southeastern California, near Death Valley through central and northeastern Nevada into northwestern Utah. The northern boundary generally corresponds to the Idaho state line; the western boundary was roughly the Humboldt River drainage. With the exception of the Goshute, the eastern boundary of the Western Shoshone territory was the Utah-Nevada state line (Dames & Moore 1992).

Goshute territory extended into Utah to the Wasatch Mountains and was bounded on the north by the Great Salt Lake and the south by the northern edge of Sevier Lake. The Goshute population was concentrated around the southern portion of the Great Salt Lake Desert in the Deep Creek Range area on the Nevada-Utah border and the area south of the Great Salt Lake in Tooele and Skull Valleys (Dames & Moore 1992). The Western Shoshone population was generally centered in broad valleys located between north-south trending mountain ranges (Steward 1938). The harsh environment and lack of water and resources limited population numbers.

The Shoshone followed a systematic, seasonal foraging round. Small, relatively isolated groups foraged in the spring, summer, and fall, collecting edible greens in the lowlands in the spring; seeds, berries and roots from the foothills and valleys in the summer; and piñon nuts in the foothills between 5,000 and 8,000 feet in the fall. In winter, larger and more stable villages were formed; these winter camps were generally located in the low foothills near seed and nut caches (Dames & Moore 1992; Steward 1938).

Plant resources, particularly piñon nuts, were staples of the Western Shoshone diet. Seeds and berries were gathered in moister areas, usually mountains, marshes, and stream borders. Meat from deer, bighorn sheep, and antelope supplemented the diet of the Western Shoshone (Dames & Moore 1992). In Goshute territory, smaller game, such as rabbits, lizards, snakes, fish, birds, and insects, played a larger role in subsistence practices (Steward 1938). Mountain mahogany, which is located throughout much of the Proposed Action area, was used for bows and for fuelwood.

Corrals, snares, traps, nests, skewers, and deadfalls were used for hunting. Baskets were used for collecting plant material, carrying water, and preparing food. Manos and metates were used for grinding. Stone tools were made from obsidian, flint, and other metamorphic and igneous rocks. Pottery was made in the pre-contact period, but production appears to have been discontinued following Anglo contact (Dames & Moore 1992). Shelters were simple and included caves and rockshelters or conical brush shelters made of juniper poles thatched with bark and branches; in summer semicircular structures made of sagebrush acted as windbreaks and sunshades (Dames & Moore 1992).

Western Shoshone religious activities were generally centered around the cure and prevention of illness and the hunting of game, particularly antelope. Curative powers were limited to shamans. Shamans also used their powers to charm the souls of antelope and ensure the success of the hunt. The Round Dance was the primary group ceremonial activity. The Goshute held their Round Dance during the spring in conjunction with the antelope drive. The Shoshone of eastern Nevada performed the Round Dance generally during the fall at the time of the piñon harvest (Steward 1938; Dames & Moore 1992). The Western Shoshone cremated their dead, burned the bodies in the structure where the person died, or buried the body in caves, rock slides, or talus slopes (Dames & Moore 1992).

During the 1930s, three Shoshone villages were identified in the Huntington Valley northwest of the Proposed Action area; these included Kinome, 5 miles north of Huntington where 11 families lived; Sahoogep, at Lee where 20 families lived; and Basimugwini, on upper Huntington Creek where 10 families lived. According to historical data, these people traveled to Cold Creek to gather piñon nuts and into Long Valley to hunt (Young 1988). In October 1863, a treaty was signed north of the Proposed Action area in the Ruby Valley by the Western Bands of the Shoshone Indians and the United States government, establishing peaceful relations in the area (Treaty with Western Bands of Shoshone Indians 1863).

As part of requirements established under the American Indian Religious Freedom Act, notification and requests for comment letters were sent to the appropriate Native American Tribes by the Bureau of Land Management. The letter notified the respective Native American groups of the proposed project and potential impacts to proto-historic cultural resources, and provided the Native American groups with an opportunity to express their comments and concerns regarding the Proposed Action. The Duckwater Shoshone Tribe responded in a letter to the Bureau of Land Management that they opposed all expansions of mines in Western Shoshone territory, including the Bald Mountain Mine. They were concerned about potential health impacts to their people from mines in the area (Graham 1994).

3.10 AIR QUALITY

3.10.1 Terrain, Climatology, and Meteorology

The Proposed Action area is located near the east-central portion of the Great Basin. The local surrounding terrain consists of alternating mountain ranges and sagebrush-covered valleys, with the mine site situated in the Basin and Range physiographic province, at the southern end of the Ruby Mountains. The Ruby Mountains lie west of Ruby Valley and north of the mine site. The highest peaks in the Ruby Mountains extend to over 10,000 feet in elevation. Elevations at the project location range from approximately 6,800 feet to 7,700 feet.

The climate in the project region is classified as semi-arid to arid, with elevations below 6,500 feet receiving the least amount of precipitation while the mountainous areas are significantly wetter. A semi-arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges.

Because of the typically dry atmosphere, bright sunny days and clear nights frequently occur. This in turn allows rapid heating of the ground surface during daylight hours and rapid cooling at night. Since heated air rises and cooled air sinks, winds tend to blow uphill during the daytime and downslope at night. This upslope and downslope cycle occurs generally in all the geographical features, including mountain range slopes and river courses. The larger the horizontal extent of the feature, the greater the volume of air that moves in the cycle. Complexity of the terrain features cause complex movements in the cyclic air patterns, with thin layers of moving air embedded within the larger scale motions. The lower level, thermally driven winds also are embedded within larger scale upper wind systems (synoptic winds). Synoptic winds in the region are predominantly west to east, are characterized by daily weather variations which enhance or diminish the boundary layer winds, and are significantly channeled by regional and local topography.

Three important meteorological factors influence the dispersion of pollutants in the atmosphere: mixing height, wind (speed and direction), and stability. Mixing height is the height aboveground within which rising warm air from the surface will mix by convection and turbulence. The degree to which pollutants are diluted in this mixed layer is determined by local atmospheric conditions, terrain configuration, and source location. Mixing heights vary diurnally, with local weather systems, and with season. For the Proposed Action area, the mean annual morning mixing height is estimated to be about 300 feet, but during the winter months the mean morning mixing height is about 200 feet (Holzworth 1972). The mean annual afternoon mixing height exceeds 2,600 feet.

Wind speed has an important effect on area ventilation and the dilution of pollutant concentrations from individual sources. Light winds, in conjunction with large source emissions, may lead to an accumulation of pollutants that can stagnate or move slowly to downwind areas. During stable conditions, downwind usually means down valley or toward lower elevations. Although Elko, Nevada, is located about 60 miles north of the Proposed Action area, the wind rose for Elko, Nevada (see Figure 3-3) is representative of the regional wind climatology. The wind rose indicates that winds are predominantly from the southwest, but with secondary maximum of wind occurrences from the northeast.

Morning atmospheric stability conditions tend to be stable because of the rapid cooling of the layers of air nearest the ground. Afternoon conditions, especially during the warmer months, tend to be neutral to unstable because of the rapid heating of the surface under clear skies. During the winter, periods of stable afternoon conditions may persist for several days in the absence of synoptic scale storm systems to

MONITORING PROGRAM - ELKO
WIND ROSE ANALYSIS (PERCENT)
1/ 1/86 through 12/31/86
10 METER DATA

WIND DIRECTION	WIND SPEED (M/SEC) <= 1.5	<= 3.3	<= 5.4	<= 8.5	<=10.8	>10.8	TOTAL	AVG SPEED
N	3.71	2.77	0.81	0.21	0.01	0.00	7.51	3.16
NNE	3.14	2.36	0.81	0.19	0.00	0.00	6.50	3.17
NE	4.63	3.49	1.20	0.15	0.01	0.00	9.49	3.05
ENE	3.81	2.83	1.04	0.11	0.00	0.01	7.80	3.13
E	2.04	1.54	0.57	0.03	0.00	0.00	4.19	3.02
ESE	1.03	0.78	0.23	0.02	0.00	0.01	2.07	3.17
SE	1.36	1.03	0.54	0.16	0.01	0.01	3.11	3.61
SSE	1.44	1.06	1.28	0.31	0.03	0.02	4.14	4.14
S	2.45	1.80	2.43	0.80	0.06	0.01	7.55	4.20
SSW	2.18	1.64	2.42	0.99	0.14	0.01	7.39	4.47
SW	3.01	2.25	3.39	1.91	0.26	0.06	10.88	4.74
WSW	2.85	2.15	3.31	2.01	0.17	0.02	10.51	4.74
W	1.95	1.47	2.16	0.87	0.03	0.01	6.50	4.41
WNW	1.36	1.00	1.35	0.50	0.06	0.00	4.27	4.16
NW	1.89	1.43	0.70	0.25	0.01	0.00	4.28	3.56
NNW	1.94	1.46	0.39	0.03	0.00	0.00	3.82	2.90
CALM	38.70						38.70	
TOTAL	38.79	29.08	22.61	8.55	0.80	0.17	100.00	

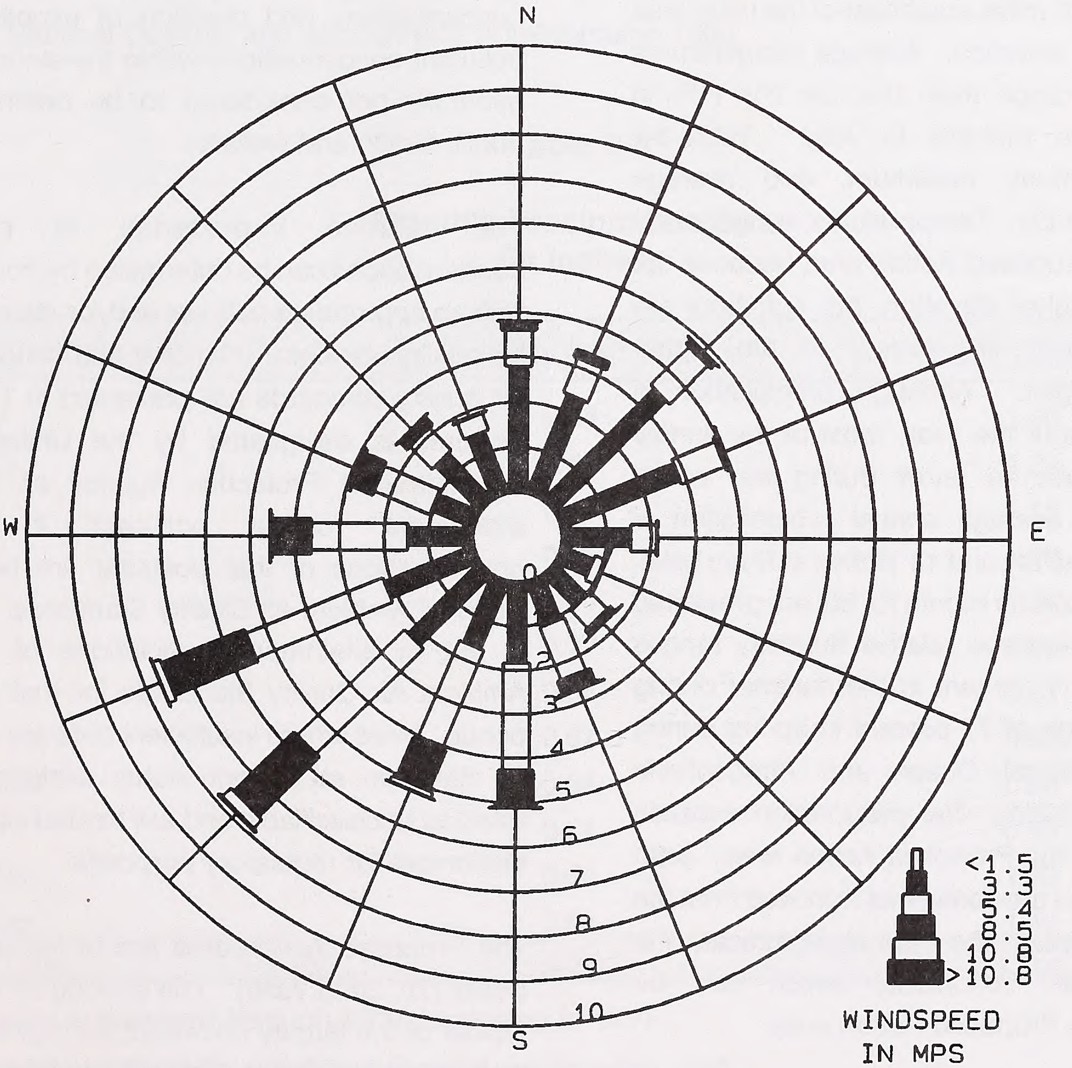


Figure 3-3. Elko, Nevada, Wind Rose

generate higher winds with more turbulence and mixing. A high frequency of inversions at lower elevations during the winter can be attributed to the nighttime cooling and sinking air flowing from higher elevations to the low lying areas in the basins. Although winter inversions are generally quite shallow, they tend to be more stable because of reduced surface heating. The mine site is located at higher elevations and would experience fewer episodes with stagnant conditions.

Precipitation is monitored at Ruby Lake, the weather monitoring station nearest the Proposed Action area. Precipitation and temperature are both monitored in Ely, Nevada. The Ely station is situated within the Steptoe Valley, and is located about 50 miles southeast of the mine area and at a lower elevation. Average temperatures at the station range from the low 20s (°F) in January to the mid-60s in July. Table 3-7 presents minimum, maximum, and average temperatures at Ely. Temperatures are generally cooler at the Proposed Action area because the mine is at a higher elevation, but summers are typically hot and dry except in the higher mountains ranges. Although precipitation is spread throughout the year, most of the annual precipitation falls as snow during the winter months. The average annual precipitation is about 9 inches at Ely and 13 inches at Ruby Lake. Precipitation totals by month for Ely are presented in Table 3-8. Average relative humidity ranges from a low of 17 percent in the summer during the day to a high of 77 percent in spring during the night (National Ocean and Atmospheric Administration 1990). Net evaporation exceeds precipitation in the Proposed Action area. Both observation sites are somewhat removed from the mine area, although the data does indicate the general climatic conditions, which can be expected in the Proposed Action area.

3.10.2 Ambient Air Quality

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution effects on receptors have been used to establish a definition of air quality. Measurement of pollutants in the atmosphere is expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$). Both long-term climatic factors and short term weather fluctuations are considered part of the air quality resource because they control dispersion and affect concentrations. Physical effects of air quality depend on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify acceptable upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards are generally not considered to be detrimental to public health and welfare.

The relative importance of pollutant concentrations can be determined by comparison with an appropriate national and/or state ambient air quality standard. National and state ambient air quality standards are presented in Table 3-9. An area is designated by the United States Environmental Protection Agency as being in attainment for a pollutant if ambient concentrations of that pollutant are below the National Ambient Air Quality Standards. An area is not in attainment if violations of National Ambient Air Quality Standards for that pollutant occur. Areas where insufficient data are available to make an attainment status designation are listed as unclassifiable and are treated as being in attainment for regulatory purposes.

The Proposed Action area lies in Hydrographic Basin 175, Long Valley. The existing air quality is typical of the largely undeveloped regions of the western United States. For the purposes of

Table 3-7

Minimum, Maximum, and Average Temperatures[1] (°F)
Ely, Nevada

Month	Minimum	Maximum	Average
January	9.2	38.6	23.9
February	14.5	42.1	28.3
March	20.2	47.7	34.0
April	26.5	57.1	41.8
May	33.7	66.8	50.3
June	40.2	77.5	58.9
July	47.9	86.7	67.3
August	46.5	84.4	65.5
September	37.4	75.7	56.5
October	28.4	63.3	45.8
November	18.7	49.1	33.9
December	11.6	40.9	26.3
Annual Average	27.9	60.8	44.3

[1]Temperatures are averaged through 1990, beginning in 1939.

Source: National Oceanic and Atmospheric Administration 1990

Table 3-8

Monthly Precipitation Data
(in inches)

Month	Ely, NV[1]	Ruby Lake, NV
January	0.68	1.40
February	0.62	1.22
March	0.93	1.16
April	0.99	1.16
May	1.04	1.36
June	0.77	0.88
July	0.64	0.61
August	0.67	0.63
September	0.84	0.66
October	0.81	0.83
November	0.64	1.69
December	0.64	1.40
Annual Total	9.27	13.00

[1]Precipitation is averaged through 1990, beginning in 1939.

Source: National Oceanic and Atmospheric Administration 1990.

Table 3-9

Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards[1]	National Standards[2,3]	
		Concentration[3]	Primary[4]	Secondary[5]
Sulfur dioxide	Annual Arithmetic Mean	80 $\mu g/m^3$ (0.03 ppm)	80 $\mu g/m^3$ (0.03 ppm)	—
	24 hours	365 $\mu g/m^3$ (0.14 ppm)	365 $\mu g/m^3$ (0.14 ppm)	—
	3 hours	1,300 $\mu g/m^3$ (0.5 ppm)	—	1,300 $\mu g/m^3$ (0.5 ppm)
PM_{10}[6]	Annual Arithmetic Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
	24 hour	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
Ozone[7]	1 hour	235 $\mu g/m^3$ (0.12 ppm)	235 $\mu g/m^3$ (0.12 ppm)	Same as Primary Standards
Carbon Monoxide (<5,000 feet MSL)	8 hours	10,000 $\mu g/m^3$ (9.0 ppm)	10,000 $\mu g/m^3$ (9 ppm)	Same as Primary Standards
Carbon Monoxide (≥5,000 feet MSL)	8 hours	6,670 $\mu g/m^3$ (6.0 ppm)	—	—
Carbon Monoxide (at any elevation)	1 hour	40,000 $\mu g/m^3$ (35 ppm)	40,000 $\mu g/m^3$ (35 ppm)	Same as Primary Standards
Nitrogen dioxide	Annual Arithmetic Mean	100 $\mu g/m^3$ (0.05 ppm)	100 $\mu g/m^3$ (0.05 ppm)	Same as Primary Standards

[1]Nevada standards are values that are not to be exceeded where the general public has access.

[2]National standards, other than those based on annual averages or annual geometric means, are not to be exceeded more than once per year.

[3]Concentrations are expressed first in micrograms per cubic meter ($\mu g/m^3$), and are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury; ppm in this table refers to parts per million (ppm) by volume, or micromoles of pollutant per mole of gas.

[4]National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health. Each state must attain the primary standards no later than 3 years after that state's implementation plan is approved by the United States Environmental Protection Agency.

[5]National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a "reasonable time" after implementation plan is approved by the United States Environmental Protection Agency.

[6]The Nevada State Implementation Plan adopted the Federal PM10 Standard in December 1991.

[7]The state ozone standard for Hydrographic Basin 90 (Lake Tahoe) is 195 $\mu g/m^3$ (0.10 ppm).

Source: Nevada Bureau of Air Quality.

statewide regulatory planning, this area has been designated as unclassifiable for all pollutants that have an ambient air quality standard.

3.11 SOCIAL AND ECONOMIC RESOURCES

3.11.1 Social and Economic Overview

Historically, the economies of both White Pine County and Elko County have been directly influenced by the economic health of the mining industry. Since the 1800s, the counties' population and economies were subject to the "boom-bust" cycles that follow gold and silver strikes in the area. However, in the early 1900s that pattern changed in White Pine County. Copper mining and smelting dominated the economic activity in that county, providing for stable employment opportunities. By the 1970s, with world prices for metals decreasing significantly due to foreign competition, the mining industries in both counties decreased dramatically. Such decline led to adverse economic conditions in the region, including declining economic activity and population decreases. Both Elko and White Pine Counties have emerged from the economic decline of the 1970s and 1980s, and have weathered the recession of the early 1990s. Both counties now benefit from increasing tourism and gaming as well as renewed growth in the mining sectors. Population in the region has been steadily growing and unemployment decreasing.

Recent efforts to diversify economic activity and the increased activity in the mining sector have resulted in population growth in Elko County and a stable population in White Pine County. White Pine County population decreased approximately 1.5 percent from a population of 9,410 in 1990 to an estimated population of 9,280 in 1994. Approximately 50 percent of the county's population resides in the county seat at Ely which had a 1994 estimated population of 4,630. Elko County population grew approximately 22 percent from a population of 33,530 in 1990 to an estimated population of 41,050 in 1994. Approximately 42 percent of the county's population resides in the county seat of Elko, which had a 1994 estimated population of 17,110 (University of Nevada-Reno 1995).

The available statistics indicate that the 1994 labor force numbered 3,510 in White Pine County and 20,700 in Elko County. The 1994 average annual unemployment rate was 7.8 and 5.6 for White Pine and Elko Counties, respectively. Summary Table 3-10 indicates the relative strengths of economic sectors in the Proposed Action area. The employment statistics indicate that government, service, and mining are the largest employing sectors in the region. The trade sector in Elko County is substantial due to the fact that the City of Elko is the major regional trade and retail center. Current employment at the Bald Mountain Mine Properties is 208 process and mine personnel. This accounts for 56 percent of the mining employment in White Pine County.

Per capita income (1992) averages $16,980 in White Pine County and $19,385 in Elko County. Total personal income in 1992 was $163 million in White Pine County and $724 million in Elko County. Currently, the Bald Mountain Mine Properties payroll is approximately $8,130,000 (1994 adjusted dollars). Of this, 77 percent, or $6,250,000, is paid to White Pine County residents and 23 percent, or $1,880,000, is paid to Elko County residents (Jenkins 1994a). The current mine payroll accounts for 3.9 percent and 0.3 percent of White Pine County and Elko County total personal income (1992). The current average wage paid at the Bald Mountain Mine is

Table 3-10

Economic Profile of White Pine and Elko Counties

	White Pine County	Elko County
Population[1]		
1990	9,410 (Ely - 5,300)	33,530 (Elko - 14,736)
July 1, 1994 (est.)	9,280 (Ely - 4,630)	41,050 (Elko - 17,110)
Employment[2]		
Labor Force (1994)	3,510	20,700
Unemployment Rate (1994)	7.8	5.6
Employment By Sector (1994):		
Mining	370	1,270
Construction	130	990
T.C.P.U.[3]	110	580
Trade	750	3,270
F.I.R.E[4]	90	370
Service	500	7,250
Government	1,220	3,140
Manufacturing	30	190
Income		
Per Capita Income[5] (1992)	$16,980	$19,385
Total Personal Income[6] (1992)	$163 Million	$724 Million

[1]University of Nevada - Reno 1995.

[2]Nevada Employment Security Department 1995.

[3]T.C.P.U. = Transportation communications and public utilities.

[4]F.I.R.E. = Finance, Insurance, and Real Estate.

[5]Nevada Department of Employment, Training and Rehabilitation 1995.

[6]U.S. Bureau of Economic Analysis 1995.

$39,080 (1994), well above the average per capita income in both affected counties.

3.11.2 Tax Structure and Revenues

A large percentage of the State of Nevada's revenues is derived from the collection on gaming winnings. Nongaming tax revenues consist of sales tax, the statewide gas tax, cigarette and liquor tax, the drug manufacturers' tax, and the estate and lodging tax. Specific to mining, the state benefits, in part, from the sales and net proceeds taxes. The state also charges a Nevada Business Tax.

County revenue also is determined largely by tax collection. The Nevada counties generate operating revenue through imposition of property taxes and through a portion of sales and use tax and net proceeds tax (sales and use tax and net proceeds tax revenue is shared with the state).

The Proposed Action area for the socioeconomic analysis is White Pine County. The Proposed Action area and all ore bodies are contained within White Pine County limits, and most taxes associated with mining activity would accrue to this County. Limited analysis will be conducted of Elko County. The City of Elko is a major regional commercial center and, therefore, benefits from sales associated with the mine site.

Tax revenue in White Pine County, like other rural counties, has suffered in recent years. The County Economic Diversification Council (1994) cites several reasons for this decline:

1. The closure of Kennecott's mining operation in 1976 reduced the net proceeds of mines.

2. The state legislature repealed the sales tax on food.

3. The state legislature shifted the major tax burden from property taxes to sales tax.

4. At the same time, the legislation limited the combined property tax rate for local governments to 3.64 percent of assessed value. It also restricted the growth of operating expenses to a level not to exceed the combined growth rate of the consumer price index and the county's population. The school district's expenses are not limited by the growth rate for the consumer price index and the certified enrollment.

5. The change in property tax assessments from market value to 35 percent of the appraised value reduced White Pine County's tax level by 24 percent.

The Council further states:

> *The net effect of the tax shift was to substantially reduce the level of tax revenues in all rural Nevada areas. Declining economic conditions meant that sales tax revenues did not rise to fill the void left when property taxes were lowered. By limiting the growth of revenues, the rural counties have not been able to keep up with increasing inflation rates. The city and the county have been faced with two on-going problems: one, they have not had the revenue to cope with changes in the area's economy including the Kennecott closures and the opening of the state prison. Second, they can only cover their immediate needs for operating funds and all maintenance and capital improvement programs have been on hold for almost ten years....The state's property tax assessment methods also rely upon depreciation of property by age rather than on fair market value. As the county's*

housing stock ages it is almost fully depreciated. Since residents have deferred building new homes because of the economy, the county's assessed valuation and therefore its revenues continue to decline.

A large portion of current county revenue is generated from property taxes. In White Pine County, total assessed valuation of property is estimated at $110 million for fiscal year 1995, which covers the period between July 1, 1994, and June 30, 1995. This represents an estimated 3 percent decline over fiscal year 1994. In fiscal year 1993, the total assessed valuation was at a high of $117.5 million. The fluctuations in assessed value closely follow the fluctuations at local mines as net proceeds are factored into the total assessed valuation (Bishop 1994). In 1993, net proceeds served to boost the county assessed valuation. The ad valorem or property tax rate for White Pine County in fiscal year 1995 is $3.3829 per $100 of taxable value (Bishop 1994). The estimated fiscal year 1995 property tax revenue generated from county property is estimated to be $1,316,650. This represents a projected decrease of 4 percent over the property tax collected for fiscal year 1994 (Moore 1994).

Table 3-11 illustrates property tax revenue from fiscal year 1992 to present. The sales and use tax is collected by the state and redistributed to the appropriate jurisdictions districts. Table 3-11 also lists county sales and use tax revenue since fiscal year 1992. Both White Pine and Elko Counties experienced sales tax revenue declines in fiscal year 1993, and both are currently anticipating increases.

The sales and use tax rate in White Pine County for all transactions is 6.75 percent and in Elko County is 6.50. The White Pine County tax rate is broken down in Table 3-12.

County revenue also is generated from the net proceeds tax. This tax, currently 5 percent (if net is over $4 million), is assessed on net proceeds or net profit from mining operations. The tax is collected by the state. The county within which the ore body lies, receives a portion of the collected tax revenue equal to its ad valorem tax rate applied to the total net proceeds. The ad valorem tax rate for White Pine County was 2.5657 percent in fiscal year 1992, 3.4234 percent in fiscal year 1993, 3.4235 percent in fiscal year 1994, and is estimated at 3.3829 percent in fiscal year 1995. The State of Nevada receives the balance of the generated revenues. For example, White Pine County will receive $3.3829 for every $100 of net mining proceeds generated in the second half of 1994. The State of Nevada will receive the balance $1.6171 for every $100 of net mining proceeds generated in White Pine County.

The total net proceeds from mines in White Pine County have risen from $4.9 million in 1984, to a high of $30.3 million in 1988. In 1989, the total fell to $14.8 million. In 1991, net proceeds in White Pine County dropped to $11.8 million before increasing in 1992 by 37 percent to $16.2 million (Gransbery 1994). There was a general decline in mining activity in 1993, which resulted in the decline of net proceeds to $7.4 million, although this is increasing again to an estimated $14.4 million for 1994 (Raible 1994). The county revenue generated by the tax is illustrated in Table 3-11. The County portion of the net proceeds tax peaked in fiscal year 1993 at $554,607, fell in fiscal year 1994, and is expected to rise again with increasing mining activity in fiscal year 1995. White Pine County distributes these tax revenues in the same manner as the ad valorem tax (property) revenues.

Table 3-11

County Tax Revenue[1]

	Fiscal Year			
	1992	1993	1994	1995(E)[2]
White Pine County				
Property and Personal Tax[3]	N/A	1,088,168	1,372,469	1,316,650
Sales and Use Tax[4]	2,873,323	2,487,553	2,688,738	N/A
Net Proceeds Tax[5]	302,906	554,607	239,154	464,569
Elko County				
Sales and Use Tax[4]	22,309,290	13,693,815	23,846,130	N/A

[1]Dollar figures are not adjusted for inflation.

[2](E) = Estimated; N/A = Not available.

[3]Moore 1994.

[4]Riggs 1994. Based on taxable sales as reported and county sales tax rates of 6.75 percent for White Pine County and 6.5 percent for Elko County (2.0 percent of sales tax accrues to the state; therefore, effective county sales tax is 4.75 and 4.5 percent, respectively).

[5]Bureau of Land Management 1994c; Raible 1994.

Table 3-12

Sales Tax Rate Breakdown

Tax	Percent
White Pine County	
Local School Support	2.25
Basic City - County Relief	0.50
Supplemental City-County Relief	1.75
State of Nevada Sales/Use	2.00
Optional Transportation	0.25
Total	6.75
Elko County	
Local School Support	2.25
Basic City - County Relief	0.50
Supplemental City-County Relief	1.75
State of Nevada Sales/Use	2.00
Total	6.50

3.12 RECREATION

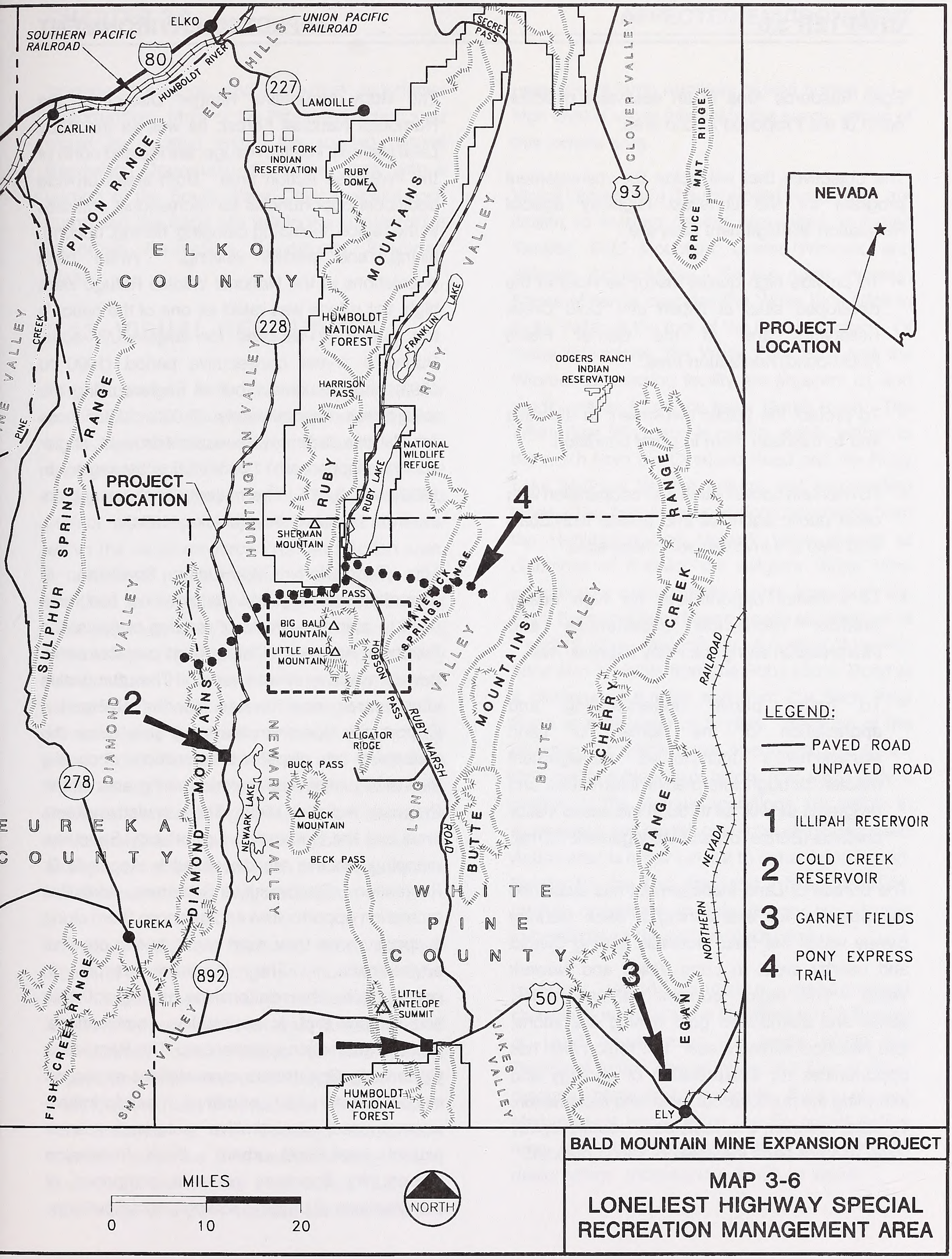
Dispersed backcountry recreation is the predominant type of outdoor recreation in the Egan Resource Area. Primitive backcountry opportunities are available, especially in the mountainous areas. The Bureau of Land Management does not have recreational use data for the public lands in the Proposed Action area. The Nevada Statewide Comprehensive Outdoor Recreation Plan reports that increasing numbers of Clark County (i.e., Las Vegas) residents are coming in the summer to White Pine, Lincoln, and Eureka Counties to enjoy uncrowded conditions and cool climates for their outdoor recreation activities (Statewide Comprehensive Outdoor Recreation Plan 1987). The Proposed Action area is designated as open to use by off-highway vehicles.

The Egan Resource Area provides hunting opportunities for a variety of game animals. These include mule deer, elk, antelope, sage grouse, blue grouse, cottontail rabbit, mourning dove, and mountain lion. Hunting for big game is regulated through a quota system established by the Nevada Division of Wildlife. The quota system is oversubscribed each year for deer, elk, and antelope tags because demand far exceeds supply (Bureau of Land Management 1993).

Mule deer hunting is the predominant type of hunting in the Proposed Action area, which is located within the Nevada Division of Wildlife's mule deer Management Area 10. Tag return data indicate that 856 bucks and 186 antlerless animals were harvested in Management Area 10 during the 1993 season. This compares to a harvest of 1,822 bucks and 738 antlerless animals in 1992. Buck kill during 1993 was 65 percent below the previous 5-year average (1988 to 1992). Quotas during 1993 for the general rifle hunts were 53 percent below the previous 5-year average. Tag reductions were in response to a downward trend in the Management Area 10 population induced by the high over-winter fawn losses associated with the 1992-1993 winter (Nevada Division of Wildlife 1994).

The Bureau of Land Management's Loneliest Highway Special Recreation Management Area was designated as a Special Recreation Management Area on April 1, 1988, and a management plan was completed in September 1991. Four distinct sites compose the Special Recreation Management Area: Illipah and Cold Creek Reservoirs, the Garnet Fields Rockhound Area/Recreation Area, and that portion of the Pony Express Trail traversing the Egan Resource Area. Individually, none of the sites qualify as a Special Recreation Management Area, but collectively they do. These sites constitute the bulk of site-specific recreation management in the Egan Resource Area (Bureau of Land Management 1991). Three of the four sites are in the vicinity of the Proposed Action area (see Map 3-6).

The Illipah Reservoir Recreation Area consists of 300 acres of public land surrounding the reservoir and is located approximately 35 miles south/southeast of the Proposed Action area. The 220-acre Cold Creek Reservoir Recreation Area is located approximately 15 miles southwest of the Proposed Action area. Currently, the reservoir dam leaks, preventing maintenance of an optimum pool level; consequently, fishing opportunities are minimal at present. The 1,280-acre Garnet Fields Rockhound/Recreation Area, known for the abundance and gemstone quality of the ruby red garnets found in the volcanic rock, is located approximately 50 miles southeast of the Proposed Action area. A 57-mile section of the Pony Express Trail traverses the



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 3-6
LONELIEST HIGHWAY SPECIAL RECREATION MANAGEMENT AREA

Egan Resource Area in an east-west direction north of the Proposed Action area.

The objectives that will guide the management program for the Loneliest Highway Special Recreation Management Area are:

- To provide high quality visitor services at the developed sites at Illipah and Cold Creek Reservoirs and at the Garnet Fields Rockhound/Recreation Area.
- To protect the public investment in the sites and to maintain them in good condition.
- To maintain coordination and cooperation with other public agencies and private individuals who also are involved with these sites.
- To enhance opportunities for high quality outdoor recreation experiences and interpretation along the Pony Express Trail.
- To foster public understanding and appreciation of the Bureau of Land Management's multiple-use management mission through interpretive information and programs as well as through increased visitor contacts (Bureau of Land Management 1991a).

The Bureau of Land Management has examined the potential for establishing a Back Country Byway within the Bald Mountain Mining District and nearby areas in Long Valley and Newark Valley. This region contains paleoshorelines, active and abandoned gold mining operations, and historical mining areas. The region also has opportunities for interpretation of geology and informing the public about mine land reclamation. To date, however, a specific back country byway route has not been identified or recommended.

The Ruby Mountains Ranger District of the Humboldt National Forest, as well as the Ruby Lake National Wildlife Refuge, are located north of the Proposed Action area. Both areas provide additional opportunities for recreational activities in the region, including camping, fishing, hunting, hiking, and wildlife viewing. When bass populations at the National Wildlife Refuge were high, the refuge was rated as one of the nation's top ten sport fisheries for largemouth bass. During a 3-year consecutive period (1990 to 1993), the annual number of anglers using the refuge was approximately 70,000. After bass populations declined as a result of drought, angler activity dropped off. The visitation by anglers in 1993 was 10,427. The majority of these anglers are from the local area (Mackay 1994).

The Recreation Opportunity Spectrum, a recreation planning and management tool, was used to map the effects of existing projects, the Proposed Action, and interrelated projects within the cumulative effects area. The cumulative effects area was chosen as the Recreation Opportunity Spectrum mapping area since the probability of dispersed recreation occurring exclusively within the historic mining area of the Proposed Action is slight. The cumulative effects area and the Recreation Opportunity Spectrum mapping process are discussed in Appendix B. Recreation Opportunity Spectrum identifies recreation opportunities and arranges them along a spectrum as they may occur in the physical environment. The spectrum helps to conceptualize the relationships among activities and settings that, in appropriate combinations, produce recreation experiences. The Recreation Opportunity Spectrum system defines recreation opportunities as primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban. Each Recreation Opportunity Spectrum class is composed of combinations of physical settings, social settings, managerial settings, and recreation experience opportunities. Most of the Proposed Action area would be located within the roaded natural Recreation Opportunity Spectrum class, with a portion of the South Water Canyon waste rock dump and the Saga pits within the semiprimitive motorized Recreation Opportunity Spectrum Class.

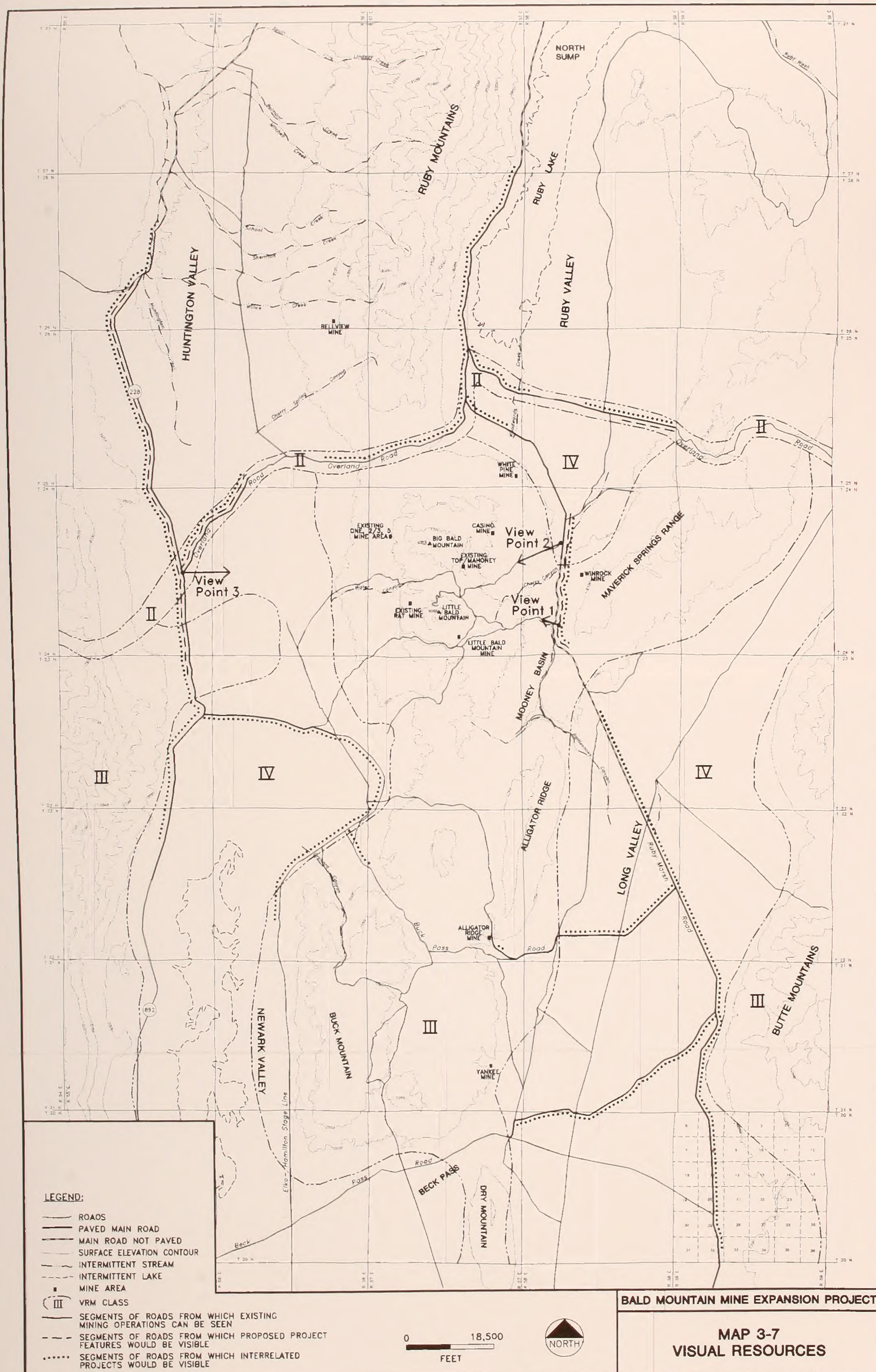
3.13 VISUAL RESOURCES

The Proposed Action area developed for consideration of visual resources includes those lands that contain sensitive viewpoints within approximately 15 miles (outer limit of the background distance zone) from proposed project elements. Map 3-7 includes all lands within the visual resource Proposed Action area. A number of roads within this area have been identified as key observation points because of their sensitivity and/or volume of use. These include State Highway 228 (the Huntington Valley Road), State Highway 892 (the west Newark Valley Road), the Elko-Hamilton stage route (east Newark Valley Road), the Overland Road, Ruby Marsh Road, Buck Pass Road, and Beck Pass Road. In addition the Ruby Lake National Wildlife Refuge and surrounding residential and recreation lands qualify as key observation points and serve as important points from which to assess potential visual impacts of the Proposed Action.

The lands within the Proposed Action area are typical of Basin and Range province landscapes with broad, open, sage-dominated basins bounded by prominent mountain ranges covered by relatively dense stands of piñon-juniper vegetation. To the north, the Ruby Mountains rise sharply above Ruby Lake National Wildlife Refuge. The presence of the Overland Stage/Pony Express route, the Elko-Hamilton Stage route, Buck Stage Station, the sites of Fort Ruby and other stage and pony express stations, and the presence of large numbers of wild horses add a high level of visual interest to the scenic setting of this remote area.

Visual intrusions in the Proposed Action area are limited to existing mining operations, including Yankee, Bald Mountain, Casino/Winrock, and Alligator Ridge Mines. To the north, Western States Minerals operates the White Pine Mine in Ruby Valley at the foot of Big Bald Mountain. Of these operations, the White Pine Mine and the Winrock processing facility are adjacent to, and readily visible from, the Ruby Marsh Road. The White Pine Mine also is readily visible farther to the north from the Overland Road and the Ruby Lake National Wildlife Refuge and surrounding lands. The Top Area operations are visible from the Huntington and Newark Valley Roads at distances of 8 miles; the Alligator Ridge Mine operation is only partially visible from both the Buck Pass and Ruby Marsh Roads at distances of 1 and 12 miles, respectively. A portion of Yankee Mine also is visible from the Ruby Marsh Road at a distance of 8 miles and from the Beck Pass Road at a distance of 3 miles. Because of the distances at which these operations are visible, their geographical separation, and since only a portion of the various operations are visible in most cases, the overall character of the Proposed Action area is either natural to natural-dominated. Except for the Top Area and White Pine Mine, mining operations in this region are visually subordinate to the natural landscape.

Interim visual resource management classifications have been identified by the Bureau of Land Management for lands within the Proposed Action area in place of a formal visual resource management inventory. Bureau of Land Management lands within the Proposed Action area have been assigned two basic interim designations; mountainous lands as visual



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP 3-7
VISUAL RESOURCES

resource management Class III and valley/basin lands as visual resource management Class IV (see Map 3-7). In addition, lands within 0.25 mile of the Overland Road/Pony Express route have been assigned an interim designation of visual resource management Class II. Management guidelines are associated with each of these interim designations, as follows:

Class II: The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer.

Class III: The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer.

Class IV: The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic (landscape) elements.

3.14 PALEONTOLOGICAL RESOURCES

Although invertebrate fossils are abundant in the southern Ruby Mountain and Buck Mountain areas, none is considered rare or important (Taylor 1994). No fossils appear to be unique or site-specific to the Proposed Action area. Fossil remains are rare in the immediate vicinity of the Proposed Action area, probably due to metamorphic activity (Taylor 1994). Those fossils that have been found are generally algae and invertebrates from the Cambrian period (500 to 570 million years before present).

Ordovician, Silurian, and Devonian sediments were formed 340 to 500 million years before present and are found on the eastern slopes of the Proposed Action area. These sediments include outcrops of dolomite that contain silicified algae. Portions of Laketown Dolomite found in the area contain waterflea fossils (Hose and Blake 1976).

Mississippian sediments (deposited 310 to 340 million years before present) also are found on the eastern slope of the Proposed Action area. These sediments include Joana Limestone and Pilot Shale. Joana Limestone contains fragments of echinoderms (marine animals), bryozoans ("sea mosses"), foraminiferans (one-celled aquatic animals), and algae (Hose and Blake 1976).

In the area adjacent to Mooney Basin, older volcanic rocks contain sedimentary rock with ostracods (crustaceans) and freshwater gastropods (terrestrial molluscs) from the Eocene age (37 to 53 million years before present) (Hose and Blake 1976). Although Cambrian-era trilobites (marine arthropods) have been found in the southern Ruby Mountains, it is unlikely that these fossils would be present in the immediate vicinity of the Proposed Action because the area has been heavily metamorphosed (Taylor 1994; Hose and Blake 1976).

No macrofaunal fossils have been found in the Proposed Action area (Henry 1994; Silverling 1994). There are abundant fossils in the area that are believed to be conodonts (small, tooth-like remains of microscopic animals) from the Paleozoic era (225 to 570 million years before present) (Henry 1994). Although conodont fossils are useful to geologists for determining the age of rocks in the area, they are abundant and are not considered a significant resource (Henry 1994).

3.15 RECLAMATION

Approximately 229 acres have been reclaimed to date as part of ongoing operations at Bald Mountain Mine. This reclaimed area consists largely of waste rock dumps (179 acres) with smaller areas of pits, haul roads, and exploration roads included in the total. All remaining disturbance will be reclaimed in accordance with previously approved plans. Final reclamation would typically commence after mining and leaching operations have ceased; reclamation efforts will be initiated on disturbed areas where no further activities are planned. The current mining plan requires haul roads and most waste rock dumps to remain active throughout the project life, eliminating these areas as potential candidates for concurrent reclamation.

Reclamation efforts to date have included reshaping waste rock dumps and pit backfilling to reduce potential erosion and to make the post-mining topography blend with the existing topography. Growth medium management, disturbed soil material testing, growth medium amendments, seedbed preparation, and goal-driven revegetation have all been important components of the existing reclamation efforts. These efforts will continue under a test plot program that will be developed to address reclamation issues associated with the Proposed Action. Reclamation efforts to date have utilized a broadcast mixture of native and non-native seed, consisting of shrubs, grasses, and forbs to support post-mining land uses.

3.16 HAZARDOUS MATERIALS AND WASTES

Bald Mountain Mine Properties currently transports process and mining-related chemicals to the Bald Mountain Mine by truck from Elko along Nevada Highway 228 to the existing haul road, a distance of approximately 75 miles (see Map 1-1). An inventory of currently transported chemicals is presented in Appendix A, Table A-1. This haul route traverses the Huntington Valley, which has been developed for hayland. The haul route would cross several perennial and intermittent streams that drain the west side of the Ruby Mountains. These adjacent wetlands and stream crossings represent about 6.2 miles of the total haul distance. This route also passes through the southern portion of Elko, where some developed commercial and residential areas are located adjacent to Highway 228.

Bald Mountain Mine Properties currently transports process chemicals to the Alligator Ridge Mine by truck from Ely along United States Highway 50, and then along the Ruby Marsh Road for a distance of approximately 75 miles. This route traverses predominantly arid desert shrub dominated areas, with only one perennial stream crossed. Highway 50 parallels Gleason Creek for about 3.7 miles, northwest of Ely. This route also passes through commercial areas along Highway 50 in Ely.

Bald Mountain Mine Properties is currently classified as a Conditionally Exempt Small Quantity Generator under Resource Conservation and Recovery Act guidelines. Bald Mountain Mine Properties currently has these hazardous wastes transported off-site to an approved recycler or disposal facility. Bald Mountain Mine Properties current waste handling and disposal practices are discussed under Hazardous Materials and Waste in Chapter 2. Bald Mountain Mine Properties currently has an Emergency Response Plan in place for its existing operations. Emergency planning and response elements of this plan are also discussed under Hazardous Materials and Waste in Chapter 2.

3.17 ACCESS AND LAND USE

The purpose of the land use investigation was to identify and describe current land ownership patterns, land use plans, public access, and all major land uses that may be affected by the Proposed Action. Access and land use information was compiled from maps and existing literature from public and private agencies. Data sources for the baseline inventory included interpretations from United States Geological Survey 7.5-minute topographic quadrangle sheets, Bureau of Land Management surface management quadrangle maps, Bureau of Land Management Master Title Plats, Bureau of Land Management Oil and Gas Plats, Bureau of Land Management Transportation Plan, White Pine County road map, White Pine County Master Plan of Land Use, White Pine County zoning map and zoning ordinances, aerial photographs, and a review of the Egan Resource Management Plan. The baseline data were supplemented by contacts with the Bureau of Land Management and White Pine County. The data were verified by ground reconnaissance during the summer of 1994.

Land uses in the Proposed Action area reflect typical land use patterns throughout the Egan Resource Area and primarily consist of mining, livestock grazing, wildlife habitat, dispersed recreation, and fuelwood cutting.

3.17.1 Land Jurisdiction/Ownership

More than 90 percent of the land in White Pine County is publicly owned and is administered by four Federal agencies: the Bureau of Land Management (4,302,537 acres), National Park Service (Great Basin National Park; 77,640 acres), Forest Service (Humboldt National Forest; 840,214 acres), and the Fish and Wildlife Service (a portion of the Ruby Lake National Wildlife Refuge; 10,760 acres). Privately owned land in White Pine County totals approximately 3.4 percent. This is divided among urban areas, privately owned industrial and mining developments, and agricultural lands (concentrated in Steptoe, Spring, Newark and Snake Valleys, and the Lund-Preston area of White River Valley).

Tribal lands constitute 1.2 percent (70,699 acres) of the county's land area, including the Ely Shoshone and Goshute Reservations. State government administers 0.05 percent of the county's land, including the Nevada State Parks Division (Cave Lake State Park and Ward Charcoal Ovens Historical Sites), the Nevada State Prisons Department (Ely State Maximum Security Prison and Ely Conservation Camp), and the University of Nevada System (Northern Nevada Community College Ely Center). Local governmental units, including White Pine County, the city of Ely, and the White Pine County School District, own approximately 0.03 percent of the land area in the county.

The Egan Resource Area contains approximately 4,488,665 acres, of which approximately 3,842,143 acres (85 percent) are under administration by the Bureau of Land Management (Bureau of Land Management 1993). The Egan Resource Area encompasses portions of three counties: White Pine, Lincoln, and Nye. The remaining breakdown of the land status by entity within the Egan Resource Area includes: lands administered by other Federal agencies (460,107 acres, 10 percent); private lands (181,135 acres, 4 percent); and state-, county-, or city-administered lands (5,280 acres, less than 1 percent) (Bureau of Land Management 1993). The land ownership pattern of the Egan Resource Area is characterized by large tracts of public land with small parcels of private and non-Federal land dispersed throughout the Resource Area.

3.17.2 Land Use Plans

Public lands under Bureau of Land Management jurisdiction are under multiple-use management for range, hunting, forestry, watershed, mineral extraction, recreation, and wildlife habitat. The following is a summary of the planning issues and management decisions contained in the Egan Resource Management Plan Record of Decision and the Buck, Bald, Maverick, and Diamond Mountains Habitat Management Plan, as they relate to the Proposed Action area.

Management Zone. Because of its large size, the Egan Resource Area was divided into five management zones for analysis purposes during preparation of the Egan Resource Management Plan. The Proposed Action area is located within Management Zone 1 (Buck and Bald/Diamonds). This management zone includes most of the Resource Area's largest wild horse herd, winter range for deer, and is used for livestock grazing and mineral development. In addition, this zone contains the bulk of the Resource Area's wet meadow riparian areas. No Wilderness Study Areas are in this zone. There have been requests for land disposals, particularly adjacent to the existing ranches.

Mineral Resources Management. The Bureau of Land Management's mineral resources policy provides that the public lands will remain open and available for mineral exploration and development unless withdrawal or other administrative action is clearly justified in the national interest. The Proposed Action area is open to oil and gas leasing with Bureau of Land Management's standard terms and conditions (Bureau of Land Management 1994e).

Rangeland Management. The Proposed Action area is located within the Warm Springs grazing allotment. A discussion of livestock grazing management is presented under Livestock Grazing.

Wild Horses. The Proposed Action area is located within the Buck and Bald Herd Management Area. A discussion of wild horses is presented under Wild Horses.

Wildlife. Portions of the Proposed Action area are located within designated mule deer crucial winter range. A discussion of wildlife resources is presented under Wildlife and Fisheries Resources.

Realty Management. There are no designated land transfer areas within the Proposed Action area. Potential land transfer areas for Management Zone 1 were identified as suitable for disposal for agricultural development in the Egan Resource Management Plan. The disposal areas are located 30 miles south of the Proposed Action area.

Utility Corridors. There are no designated or planning utility corridors in the Proposed Action area. A designated corridor is a preferred location for expansion that has an existing transmission or transportation facility and room for expansion. A planning corridor is a utility corridor that has no existing transmission or transportation facilities and is a preferred location for future facilities.

Wilderness. The nearest Wilderness Study Area is the Goshute Canyon Wilderness Study Area, located approximately 30 miles east/northeast of the Proposed Action area. The recommendation for the Goshute Canyon Wilderness Study Area is to designate 22,225 acres as wilderness and release 13,369 acres for uses other than wilderness (Bureau of Land Management 1991b). The nearest designated wilderness area is the Ruby Mountains Wilderness Area within the Humboldt National Forest, approximately 30 miles north of the Proposed Action area.

Riparian Areas. A discussion of riparian areas is presented in Section 3.5.

Off-Highway Vehicle Management. The public lands within the Proposed Action area are designated as "open" to off-highway vehicle use. See discussion under recreation.

Special Management Areas. The Proposed Action area is located within the Loneliest Highway Special Recreation Management Area (see Recreation).

According to the current White Pine County Master Plan of Land Use (1970), the Proposed Action area is located within two general land use categories: high mountain and forest lands; and open range and grazing lands. Mineral extraction industries are recognized as an accepted use within these land use classifications.

The county's zoning ordinance was updated in 1987. The ordinance limits light and heavy manufacturing primarily to the county's industrial park, the Kennecott smelter site in McGill, and the areas that were part of the Nevada Northern Rail yards in the east Ely area. Residential and commercial zones are concentrated in the communities of Ely, Ruth, McGill, Baker, Lund, and Preston; the land along Highway 93 between Ely and McGill; and a residential area known as Cross Timbers northwest of Ely. Since the zoning was completed, the area south of Ely, along Highway 50, has been the site of residential and commercial growth, resulting in zone changes. The remainder of the county is zoned for agricultural land, open space, and 5-acre residential parcels.

According to the White Pine County Regional Planning Commission, the Proposed Action area is zoned for open range (Moorehead 1994). Mining activities are identified as *a* special use within this zone and would require a conditional use permit from the county ***for activities on private lands***.

In 1992, the Western Utility Group, an ad hoc organization of major gas, electric, and telecommunication companies from 11 western states, released the "Western Regional Corridor Study." The primary goal of the Corridor Study is to focus the attention of Federal agencies on the utility industry's future corridor needs. The Corridor Study illustrates these needs, as well as existing corridors, and the land uses that constrain or prohibit the construction, operation, and maintenance of linear utility facilities. The ultimate objective of the Corridor Study is the incorporation of this regional corridor network into Federal land management plans. The Bureau of Land Management has endorsed the Corridor Study and is committed to using it as a reference document when considering land use decisions. The Western Regional Corridor Study was reviewed during the preparation of this environmental impact statement. There are no existing, proposed, or agency designated corridors within the Proposed Action area or cumulative effects area (Michael Clayton & Associates 1992).

3.17.3 Access

Primary access within the Egan Resource Area is furnished by highways, state routes, county roads, and public access roads. The majority of the public lands are accessible to the general public via one of these roads. Some areas do have large amounts of Bureau of Land Management-managed land that are not accessible due to steep terrain and lack of maintained roads. Legal access across private lands is generally not a problem because most private land in the area is accessible only by crossing Bureau of Land Management-administered lands on Bureau of Land Management or county roads.

Access routes for the proposed project would use existing roads (see Chapter 2). Access routes include United States Highway 50, which is located south of the Proposed Action area and runs into the City of Ely corporate limits. Ruby Marsh Road runs north-south through Long Valley and is located on the east side of the Proposed Action area. State Highway 892/228 runs north-south through Newark and Huntington Valleys and is located to the west of the Proposed Action area.

3.17.4 Grazing Management

The mine areas are not open to livestock grazing. The Proposed Action area is located within the Warm Springs Allotment and has one permittee. The Warm Springs Allotment involves 318,740 Federal acres and 325,740 total acres. The allotment includes portions of Long Valley, Newark Valley, Bald and Buck Mountains, and small sections of the Diamond Mountains and Ruby Valley. The Warm Springs Allotment is classified as an "I" category allotment or "improve." An "I" classification indicates: 1) the allotment has a high potential to increase forage production, 2) current forage production is below maximum, 3) current forage value is fair to poor, and 4) the allotment has moderate to extreme resource conflicts. Allotments are evaluated periodically to ensure that the management objectives are being reached and that range improvements are done on those allotments with the greatest potential for improvement in resource conditions and return on investment.

Refer to Vegetation and Table 3-2 for a discussion of range sites, potential forage production, and range conditions in the Proposed Action area. The Warm Springs Allotment is in overall poor condition primarily from overuse of key forage species by cattle and wild horses. As of a Final Multiple Use Decision dated March 14, 1994, the active preference for the Warm Spring Allotment has been identified as 7,744 animal unit months, with *16,251* animal unit months placed in suspended non-use (Bureau of Land Management 1994a). Because of the severity of the resource damage throughout portions of the allotment, the full final reduction is being implemented (Bureau of Land Management 1994a). Livestock mortality data are not available for this area. No new range improvements are scheduled for construction in the Proposed Action area. Existing range improvements in the Proposed Action area include Cherry Spring, the Cherry Spring pipeline, and the 3,536-acre Julian and West Bald seedings, with associated pipelines and troughs.

3.17.5 Woodland Products

The majority of the forest resources occurring in the Bureau of Land Management Egan Resource Area, including the Proposed Action area, are comprised of the piñon-juniper woodland type with occasional mountain mahogany. The timber resource in the Proposed Action area is currently used for Christmas tree and fuelwood cutting, and piñon nut harvesting. However, due to the distance from population centers, demand for woodland product harvesting in the Proposed Action area is low. An estimated 409,600 acres of manageable woodlands currently exist within the Bureau of Land Management's Egan Resource Area (Bureau of Land Management 1993). Manageable woodlands are defined as administratively available (i.e., woodlands not otherwise removed from availability to harvest by law, policy, or regulation), practicably workable (under 30 percent slope), and accessible.

4.0 ENVIRONMENTAL CONSEQUENCES

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discusses anticipated direct and indirect impacts of the Proposed Action, the No Action Alternative, and four alternatives for the proposed Bald Mountain Mine Expansion Project. The four alternatives include backfilling Horseshoe/Galaxy pits, relocating the haul road and modifying the South Water Canyon dump, relocating the haul road and modifying the East Sage dump, and a reclamation alternative.

Environmental Protection Measures developed as part of the Proposed Action are presented in Chapter 2. Potential mitigation and monitoring measures developed in response to anticipated impacts are discussed later in Chapter 4. All actions listed as potential mitigation measures have been developed by Bureau of Land Management and are not part of the Proposed Action. These measures could be required by Bureau of Land Management as a condition or stipulation of approval and authorization of the Plan of Operations.

Unavoidable adverse impacts are described and are followed by a description of short-term uses compared to long-term productivity, irreversible or irretrievable commitments of resources, a summary of energy consumption for the Bald Mountain Mine Expansion Project, and cumulative impacts.

4.1 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

Wilderness resources would not be affected by the Proposed Action, since no wilderness study areas are present in the vicinity of the Proposed Action, and are therefore not addressed in the environmental impact statement. Bureau of Land Management also is required to assess impacts to prime or unique farmlands, floodplains, and Areas of Critical Environmental Concern; none occur within the Proposed Action area. This elimination of nonrelevant issues follows the Council on Environmental Quality policy as stated in 40 Code of Federal Regulations 1500.4.

In addition, with the 25 additional workers projected in the work force, there would essentially be no change from the current conditions in White Pine and Elko Counties to population and demography, total employment, housing, water supply, wastewater treatment, schools, solid waste disposal, law enforcement, fire protection, health care, or social services; therefore, these resources were not examined in this environmental impact statement.

4.1.1 Soils

4.1.1.1 Mine Development/Operation

Acreage totals for each of the 11 soil associations to be impacted by the Proposed Action within the Horseshoe/Galaxy Mine, Process Area, and Top Area are presented in Table 4-1. Three of the 11 soils associations (Hutchley-Tusel-Suak, Segura-Mclvey-Hutchley, and Hunnton-Chiara) account for half of the 1,450 acres of disturbance. These acreages were calculated, using the soil map units provided in the unpublished 1991 Soil Conservation Service soil survey for White Pine County.

Construction activities for the Bald Mountain Mine Expansion Project would impact approximately 1,450 acres of soils. Activities proposed for this project include vegetation clearing, excavation, salvage, and storage of growth medium (topsoil and suitable subsoil), cut and fill for access roads, and grading and contouring. Approximately 423 acres of soils would be impacted at the

Table 4-1

Soil Associations Impacted by the Proposed Action

Soil Associations (Map Unit Number)	Acreage			
	Horseshoe/Galaxy Mine	Process Area	Top Area	Total Acreage
1 Pookaloo-Cavehill-Rock outcrop (100)	30	--	--	30
2 Hutchley-Tusel-Suak (226)	--	--	230	230
3 Pioche-Segura-Cropper (480/481)	158	--	37	195
4 Segura-McIvey-Hutchley (500)	--	--	217	217
5 McIvey-Segura-Cropper (566)	--	--	9	9
6 Cavehill-Grink-Rock Outcrop (670)	30	--	83	113
7 Upatad-Cropper-Atlow (753)	34	--	--	34
8 Abgese-Yody-Shabliss (920)	--	169	--	169
9 Hunnton-Chiara (1010)	--	278	--	278
10 Bobs-Fax-Parisa (1081)	171	--	--	171
11 Wardbay-Hardol-Adobe (1372)	--	--	4	4
Totals	423	447	580	1,450

proposed Horseshoe/Galaxy Mine; 447 acres at the Process Area; and 580 acres at the Top Area (see Table 4-1).

Approximately 2.4 to 4.9 million cubic yards of growth medium would be available for salvage from the 1,450 acres of proposed disturbance. This estimate assumes the following:

- Soils yardage values were derived from the draft Soil Conservation Service Soil Survey of White Pine County. Since soil mapping for the survey was conducted at the soil association level, salvage depths are presented as a range to reflect the characteristics of the soils within the soil association.

- Suitable growth medium is restricted to material lying above duripan layers, material above bedrock, and material that is not extremely gravelly, stony, or cobbly.

- Available growth medium is equally distributed across the Top Area, Horseshoe/Galaxy Mine, and Process Area.

- Waste rock and salvageable soil material would not be mixed.

Since growth medium from one part of the Proposed Action area (i.e., Top Area, Horseshoe/Galaxy Mine, or Process Area) would not be salvaged for use in other parts of the Proposed Action area, it is possible that some areas may not contain sufficient amounts of growth medium for reclamation. The volume of salvageable growth medium could be limited by shallow soils or soils with high percentages of coarse fragments, and consequently not provide 6 to 12 inches of growth medium for revegetation as specified in the reclamation plan. In such cases, salvaged material would be placed above waste rock and the area ripped to achieve 6 to 12 inches of loosened material for plant growth. Results from the test plot program would provide input on reclamation success and practices that would be employed during reclamation, including amendments that could be added to the growth medium on waste rock areas.

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

Ripping or otherwise loosening compacted surfaces prior to placement of growth medium and revegetation, as proposed, would aid in reclamation. Reclamation vegetation root depths would be limited in the heap areas due to the compacted layer and success of some plant species, such as shrubs, with greater root depth needs. Available water holding capacity could also be limited in 6 to 12 inches of growth medium.

Exposure and disturbance of soils could increase the potential for accelerated soil erosion from sites affected by construction. Excavation, transportation, and placement of growth medium also could promote the breakdown of soil aggregates into loose soil particles and increase the potential for wind and water erosion on the stockpiles. Blading and/or excavation of remaining subsoil materials to achieve desired grades and soil conditions for the facilities could result in steeper slopes on exposed soils, mixing of soil materials, and the additional breakdown of subsoil aggregates. Measures to stabilize and protect growth medium stockpiles and embankments, such as protected stockpile locations and stockpile seeding as proposed in the reclamation plan, would be implemented to minimize soil loss and additional disturbance to soils on-site.

Potential indirect effects of soil destabilization and erosion would be dust generation and off-site deposition. Off-site stream sedimentation would be minimized by using the erosion control practices described in the reclamation plan. Increased sediment loads and deposition in streams below the areas of disturbance are not anticipated, as there are no perennial streams in the vicinity of the new disturbance and sediment catchment berms would be placed around the soil stockpiles and at the base of dump slopes. Dust generated by vehicular traffic would be reduced by using dust abatement techniques, such as wetting and binding agents, on the haul roads. Movement of exposed soil particles from stockpiles and disturbed areas by surface winds could reduce air quality and/or result in the deposition of soil particles on surfaces off-site. Wind erosion abatement measures, as proposed in the reclamation plan, would help to reduce soil losses.

Other direct effects to soils from operation of the constructed facilities could result from releases of hydrochloric acid, leach solutions, or mill and process reagents. Spill prevention and dust control measures, which would be implemented for the Proposed Action, are discussed in Chapter 2.

4.1.1.2 Mine Closure/Reclamation

Salvaged soil would be utilized as the only plant growth medium on reclaimed areas. Under the Proposed Action, between 2.4 and 4.9 million cubic yards of salvageable growth medium would be available for reclamation. Soil would be redistributed to depths of 6 to 12 inches on all disturbed areas, as available.

Although stripping, stockpiling, and redistribution adversely affect soil characteristics, including alteration of soil profiles and soil structure, the benefits of using soil for revegetation outweigh the adverse effects of soil handling. Interim and final reclamation/revegetation efforts would return some areas of soil disturbance not involved with operations to productivity following construction, thereby reducing the duration and magnitude of impact. Loss of soil or discontinuation of natural soil development, decreases in infiltration and percolation rates, decreases in available water-holding capacities, breakdown of soil structures, and loss of organic material occurring as a result of mine operation activities would be reversed by natural soil development over an unknown amount of time following reclamation. Loss of soil fertility, soil microorganisms, and vegetative productivity would be reversed after successful reclamation.

4.1.2 Vegetation

4.1.2.1 Mine Development/Operation

Direct impacts to vegetation would result from the removal of vegetation during project development. These impacts include the short-term loss of vegetation and vegetative productivity and subsequent change in community. Impacts to vegetation indirectly affect other resources such as soils, wildlife, wild horses, livestock, water, and watershed.

The major effect of the Proposed Action would be the direct removal of vegetation within the Proposed Action area. Project components that would impact vegetation include the process and leach areas, new pits, pit expansion areas, waste rock dump sites, access roads, and soil stockpile areas. Vegetation also may be impacted in other areas as a result of clearing and grading of temporary access roads, storage or staging areas, and monitoring well sites. Construction impacts to vegetation would occur over a period of years, as the mine components are sequentially constructed. Most of the surface disturbance areas would be continuously disturbed during the life of the project. Interim reclamation would occur on a limited basis within the Proposed Action area.

Development associated with the Proposed Action would remove vegetation on approximately 1,450 acres of previously undisturbed land (see Table 4-2). Development would impact approximately 743 acres of the big sagebrush vegetation type that is present throughout the Proposed Action area. Approximately 238 acres of the piñon-juniper vegetation type would be disturbed, primarily at the East Sage waste rock dump, Horseshoe dump, and Galaxy and Saga sites. Impacts to the low sagebrush vegetation type would involve about 112 acres at the Top Area, Sage Flats pit, and East Sage waste rock dump. Approximately 353 acres of the mixed shrub vegetation type would be affected at the Top Area, Sage Flats pit, East Sage dump, and Horseshoe pit and dump. A small area (4 acres) of the mountain mahogany vegetation type closely associated with the piñon-juniper type would be impacted at the northern edge of the East Sage waste rock dump. Facility construction would result in the loss of available wood products from the removal of 238 acres of piñon-juniper woodland. The anticipated short-term loss and long-term change to vegetation within these vegetation types is considered minimal, as these vegetation types are widely distributed throughout the region (see Appendix B). However, the disturbance of woody vegetation (i.e., mountain mahogany, mixed shrub) would result in a long-term loss of this vegetation type.

Indirect impacts resulting from construction activities include increased weed invasion in the disturbed areas. Previous and existing mining operations in the Proposed Action area and vicinity reveal a high potential for invasion of weeds, particularly Russian thistle and halogeton. The proposed revegetation and erosion control measures outlined in the reclamation plan would minimize, not eliminate, the potential for weedy plant species to invade disturbed areas.

4.1.2.2 Mine Closure/Reclamation

Construction and soil salvage operations would permanently alter the existing soil profiles in the Proposed Action area. This alteration also would change the floristic composition of plant communities in reclaimed areas. Most native vegetation is adapted to particular soil types in this area, and any alteration of the soil character would affect the type of vegetation that would re-establish on the disturbed soil. Existing plant communities would be replaced by other plant communities following reclamation.

The change in species and structural diversity from existing plant communities to reclaimed plant communities would be a long-term change in vegetation composition. Following closure and reclamation of the process area and mine sites, plant communities would be dominated by weedy

Table 4-2

Vegetation Types Impacted by the Proposed Action

		Acreages			
Vegetation Type	Range Site[1]	Horseshoe/Galaxy Mine	Process Area	Top Area	Total Acreage
Big sagebrush	Gravelly clay, 10-12" (28BY086)	---	447	---	447
Big sagebrush	Gravelly clay, 12-14" (28BY087)	130	---	76	206
Big sagebrush	Calcareous loam, 10-14" (28BY094)	90	---	---	90
Low sagebrush	Mountain ridge, 12-14" (28BY034)	---	---	112	112
Mixed shrub	Calcareous loam, 16+" (28BY085)	---	---	196	196
Mixed shrub	Loamy slope, 12-16" (28BY015)	15	---	142	157
Mountain mahogany	Stony mahogany savanna (28BY032)	---	---	4	4
Piñon-juniper woodland	Piñon-juniper WSG, 12-14" (28BY062) Piñon-curlleaf mountain mahogany WSG, 14-22" (28BY058)	188	---	50	238
Totals		423	447	580	1,450

[1]Piñon woodland vegetation type includes two Woodland Suitability Groups (WSG).

species, other forbs, and grasses for the first 5 to 7 years. Grasses and native forbs *would be expected to* become more prevalent within the reclaimed plant communities within approximately 7 to 10 years after reclamation. Desirable plant species would eventually dominate the reclaimed plant communities in time and weedy species would contribute less to total forage production. Depending upon climatic conditions, previous vegetation communities, and land use following reclamation, mature shrubs would *be expected to* become more dominant in 10 to 15 years, and mature piñon in 50 to 100 years.

4.1.3 Geology and Minerals

4.1.3.1 Mine Development/Operation

Approximately 182 million tons of material would be mined under the Proposed Action between 1996 and 2005. This would yield approximately 711,500 ounces of gold. Approximately 165 million tons of waste rock and 17 million tons of ore (leach pad material) would be generated and left on site at the cessation of mining. The existing estimated recoverable resource for gold in the Buck and Bald Mountain area would be decreased by about half from the present 1.4 million ounces.

Expansion of the waste rock dumps in the Top Area and construction of new waste rock dumps in the Sage Flat and Horseshoe/Galaxy areas would not impact any known recoverable resources. Similarly, expansion of the leach facilities and construction of a new tailings facility at the current Bald Mountain Mine plant facility would not impact any known recoverable resources.

4.1.3.2 Mine Closure/Reclamation

No impacts to geology or minerals are anticipated as part of the closure and reclamation.

4.1.4 Water Resources

4.1.4.1 Mine Development/Operation

Components of the Proposed Action that could affect water resources include: 1) installation of a new well for production water at the Bald Mountain Mine Process facility, increasing the total groundwater withdrawal to approximately 1,200 gallons per minute (gpm) from the current 400 to 500 gpm; 2) installation of a new production water well in north Mooney Basin that would withdraw groundwater at approximately 500 to 700 gpm; 3) covering part of the recharge area for Cherry Spring with the East Sage waste rock dump; 4) construction of 4 new waste rock dumps and expansion of 1 waste rock dump totaling 508 acres, 2 new leach pads totaling 314 acres, and 1 new tailings facility at the Bald Mountain Mine (138 acres), and 5) construction of 8 new open pits and expansion of 1 pit totaling 189 acres that would remain open at the cessation of mining.

Groundwater

The Bald Mountain Mine would obtain water from a well field in southern Huntington Valley. This water would come from an unconfined alluvial aquifer in gravel at depths of 1,000 to 1,600 feet. Pumping of the Bald Mountain Mine wells at a rate of 1,200 gpm at the end of 10 years would result in a drawdown of the unconfined water table in southern Huntington Valley of 6 to 10 feet at a distance of 2 miles from the well field (Shepherd Miller 1994). However, project pumping would not impact springs in the area, because they are fed by perched water that lies well above the alluvial groundwater. Groundwater withdrawal would not affect Huntington Creek since the main drainage of the creek is over 2 miles from the well field. Also, groundwater withdrawal at the Bald Mountain Mine well field is not expected to impact the waters of the Humboldt River system because the expected use would be less than the estimated annual recharge of groundwater to Huntington Valley (see Appendix B). Any shallow stock wells within a 1 to 2 mile radius of this well field would be affected after 8 to 10 years of pumping. Stock wells at a radial distance of 2 to 3 miles or more from the well field would not be impacted.

The Proposed Action also includes a new well for production water in north Mooney Basin. This well would pump 400 to 500 gpm for approximately 4 years to supply the proposed leach facility. The proposed new well would be 5 miles or more from any existing wells. Drawdown from pumping of this new well in north Mooney Basin at 500 gpm for 10 years would not overlap with the two existing wells in southern Ruby Valley. Thus, this proposed new well would not substantially impact bedrock groundwater in Mooney Basin or southern Ruby Valley. Also, stock wells in Mooney Basin obtain water from alluvium and would not be impacted by this proposed new well.

All of the open pits currently being mined and those planned as part of the Proposed Action are above the permanent water table. Storm water diversion drains have been or would be installed around all pits. Thus, the main impact of these open pits would be infiltration of water through the pit bottoms due to rainfall and snowmelt. The estimated recharge to groundwater from existing pits in the Bald Mountain-Mooney Basin area is 9.01 acre-feet/year (see Appendix B). This includes the current pits at Bald Mountain, Little Bald Mountain, and the Casino/Winrock pits. Estimated recharge to groundwater after completion of the Proposed Action would be 18.04 acre-feet/year. This estimated increase in groundwater recharge due to an increase in the number of open pits may partially offset any decrease in recharge caused by additional leach pads, tailings facilities, and waste rock dumps.

Temporary accumulations of rainwater and snowmelt may occur in depressions within and adjacent to new pits included in the Proposed Action. These temporary accumulations of water are expected mainly in the spring and may last for only a few days to at most a few weeks. These temporary accumulations of water are not expected to impact water quality because the expected short duration of ponds would not allow for equilibration between rock and water. Infiltration of this limited amount of water would be no different than infiltration of rainwater or snowmelt and should not pose a problem for groundwater quality.

The Proposed Action would entail construction of a new leach facility in north Mooney Basin with one new leach pad added to that area. The existing leach facility at the Bald Mountain Mine processing facility would be expanded and combined with the proposed new tailings impoundment. A total of 315 acres of new leach pads would be constructed as part of the Proposed Action. The new tailings impoundment at the Bald Mountain Mine would total 138 acres. The leach pads and the tailings impoundment would be composite-lined with a synthetic liner. Both the leach pads and the tailings facility would have leak detection and capture systems installed, as required by the State of Nevada for a construction and operation of such facilities. Synthetic lining is considered the safest design for heap leach pads and tailings disposal.

The potential impact of the proposed leaching and tailings facilities to groundwater in southern Huntington Valley and north Mooney Basin is considered to be minimal. The leak detection systems required by the State of Nevada would prevent a major leak from going undetected and uncorrected. The proposed tailings and leach facility at the Bald Mountain Mine processing facility would be located in an area that has a least 500 feet of unsaturated alluvium above the permanent water table. This alluvium should attenuate any leakage that might bypass the leak detection and capture system. The leach facility proposed for north Mooney Basin would be located in the approximate center of the valley and have *200* feet of unsaturated alluvium beneath the leach pad. The permanent water table in this area is within bedrock and should not be impacted by any major leakage that might escape the leak detection and capture system.

Leach ponds are designed to hold dilute cyanide solutions that emanate from the leaching of gold ore on the leach pads. The solution would be held temporarily in the leach pond before it is passed through a gold recovery process. Leach ponds would be lined with 80 mil high-density polyethylene synthetic liners or equivalent, as required by the State of Nevada, and would have leak detection systems installed. The potential impact of leach ponds presented in the Proposed Action to groundwater is considered to be minimal. These lined ponds would have 500 feet of unsaturated alluvium beneath them at the Bald Mountain Mine facility and approximately 30 to 100 feet of unsaturated alluvium above bedrock at the north Mooney Basin facility. Any leakage from these ponds should be detected and remediated before groundwater is threatened.

Surface Water

As part of the Proposed Action, there would be a total of four new waste rock dumps constructed and expansion of one waste rock dump. At the end of mining, five reclaimed waste rock dumps would be left on site in the area of the Proposed Action. The total acreage for waste rock dumps as part of the Proposed Action would be 508 acres (see Table 2-1).

Static acid/base accounting and meteoric water mobility procedure tests on waste rock and ore from the area of current mining at Bald Mountain and the Proposed Action are summarized in Appendix B. These tests are required by the Nevada Division of Environmental Protection and determine if the waste rock or ore is capable of generating acidic seepage (acid/base accounting tests) or generating metal-laden seepage due to the passage of rainwater through the rock either in pit walls and bottoms or in waste rock dumps (meteoric water mobility procedure tests). The results of these tests suggest that waste rock and ore should not be capable of generating an acidic seepage. The static acid/base accounting tests generally have an acid neutralizing potential/acid generating potential ratio well above the minimum value of 1:2 set by the Nevada Department of Environmental Quality. The meteoric water mobility procedure tests show a detection limit for arsenic in the Top Area above the Nevada drinking water standard of 0.05 milligrams per liter, suggesting possible minor exceedences of this standard. Three samples out of 11 in the Top Area showed exceedences for mercury, and the detection limit for selenium in the Top Area also was above the drinking water standard of 0.01 milligrams per liter, again suggesting possible exceedences of this standard. For the Horseshoe/Galaxy area, both samples exceeded the drinking water standard for mercury. For the Saga area, one sample out of seven exceeded the drinking water standard for mercury. There were no exceedences of Nevada stock water standards, although the detection limit for selenium was often above the state standard of 0.05 milligrams per liter for stock water.

The relevance of the exceedences of the Nevada drinking water standards mentioned above needs to be explained. Nevada's meteoric water mobility procedure allows water with a pH around 6.0 to contact waste rock for 24 hours in a closed cell. Readily soluble cations and anions are usually released from the surfaces of the mineral grains in the waste rock and dissolve in the water. The water is then analyzed. The guidelines established by the Nevada Division of Environmental Protection state that if the cations and anions found in the water after 24 hours of contact with the waste rock exceed Nevada drinking water standards by more than 10 times, a potential problem may exist and waste rock disposal would have to be carefully scrutinized. Thus, the "standard" or guideline for waste rock disposal is 10 times the drinking water standards. Waste rock can pass the Nevada meteoric water mobility procedure guidelines, but still generate seepage from waste rock that exceeds the Environmental Protection Agency and Nevada drinking water standards. The Nevada Division of Environmental Protection meteoric water mobility procedure is designed to be only a guide for managing waste rock, not an absolute discharge standard. Drinking water standards are absolute standards set by either the Environmental Protection Agency or the state. Usually, these drinking water standards are identical for most elements. The Bureau of Land Management uses Environmental Protection Agency drinking water standards for impact assessment; therefore, the reference is made to possible exceedences of these standards if seepage were to occur from the waste rock dumps. However, the East Sage waste rock dump is within meteoric water mobility procedure guidelines and thus does not require any special design considerations in order to receive a permit from the State of Nevada.

The potential impact of the proposed East Sage waste rock dump on Cherry Spring is of concern. This spring is fed by a perched aquifer that receives its recharge by infiltration of snowmelt and rainwater through the many faults found in the Top Area. ***This aquifer is approximately 700 to 800 feet vertically below the waste rock dump.*** The ***East Sage*** waste rock dump would cover a portion of the faulted terrain and thus reduce recharge to the perched aquifer that supplies water to Cherry Spring. This has the potential to reduce the seasonal flow at Cherry Spring.

Infiltration and seepage modeling ***for*** the proposed East Sage waste rock dump ***was conducted,*** using the Hydrologic Evaluation of Landfill Performance ***(HELP)*** model***, developed by the Environmental Protection Agency. Results of the modeling*** showed that seepage from the East Sage waste rock dump would be less than 0.5 ***gallon per minute*** and may not occur at all during the first few hundred years after ***construction and reclamation*** of the waste rock dump. This is a standard engineering analysis ***for*** waste rock dump design and suggests that the East Sage waste rock dump***, covered by an average of 9 inches of revegetated growth medium, should have negligible seepage. Given the low seepage and the depth of the perched aquifer,*** water quality impacts to Cherry Spring should not occur.

The construction of new waste rock dumps, pits, and roads could increase the potential for erosion in the area of the Proposed Action. Storm water runoff would be diverted with structures designed to withstand runoff from the 24-hour, 100-year storm event. Waste rock dumps, leach pads, tailings facilities, and haul roads also would be designed to divert storm water. Thus, the potential for increased erosion in the Proposed Action area is minimal.

The Proposed Action, as outlined in Chapter 2, contains provisions for proper handling and storage of solvents, fuels, and lubricants in accordance with state and Federal regulations. Upon cessation of mining, all such materials would be removed from the Proposed Action area. Thus, the potential for leakage of solvents to surface or groundwater is minimal.

4.1.4.2 Mine Closure/Reclamation

Mine closure and associated reclamation would minimize the long-term effects to water resources. Reclamation and revegetation of roads, drill pads, waste rock dumps, leach pads, and eventually tailings facilities would decrease surface erosion during major storms and prevent infiltration through dumps and leach pads. Open pits would remain unreclaimed, but their impact would be no different than discussed previously. Groundwater in the vicinity of the production wells or well fields would recover from the local drawdown caused by pumping. Recovery of the water table to 70 percent of its original level is expected within 20 years.

Waste rock dumps would be reclaimed and revegetated to decrease infiltration of rain water and snowmelt. This would substantially decrease the potential for future seepage from these dumps. As discussed previously, the Hydrologic Evaluation of Landfill Performance modeling and the geochemical tests have indicated that these waste rock dumps should meet Nevada Division of Environmental Protection's standards for reclaimed waste rock dumps.

Leach pads must be rinsed upon closure until the leach water meets the Nevada Division of Environmental Protection standards. Then the leach pads must be revegetated to minimize influx of rain water. Thus, the potential for properly rinsed and revegetated leach pads to impact surface water by leakage of metal-laden fluids is considered minimal. The leach pads to be constructed as part of the Proposed Action and left on site at the cessation of mining should not impact surface or groundwater.

Upon closure of the leach facility, the leach ponds would be drained and evaporated to dryness. After sampling (as described in Chapter 2), the liner would be folded in on itself one or more times and buried in the alluvium. Thus, the leach ponds would not pose a threat to surface or groundwater after mine closure.

4.1.5 Wetlands and Waters of the United States

4.1.5.1 Mine Development/Operation

Construction within the Proposed Action area would not directly impact wetlands. However, approximately 0.04 acre of other waters of the United States (i.e., intermittent drainage) would be directly impacted (i.e., by culvert placement) during the construction of two proposed roads just north of the Horseshoe/Galaxy process and leach area. A portion of the intermittent drainage located farther north of the proposed process and leach area would not be directly or indirectly impacted by mine development and operation. The implementation of environmental protection measures (e.g., sediment control measures) during construction and operation activities would eliminate potential sedimentation impacts to this intermittent drainage (see Chapter 2, Environmental Protection Measures).

Cherry Spring is a non-wetland area located approximately 750 feet below the proposed East Sage waste rock dump. Sedimentation impacts to Cherry Spring would be avoided with the implementation of the environmental protection measures (e.g., water collection and diversion ditches), which would divert discharges and runoff from the proposed East Sage waste rock dump away from Cherry Spring. Additional information regarding these Environmental Protection Measures is provided in Chapter 2. In addition, as presented in Water Resources, the decrease in groundwater recharge from construction of the East Sage waste rock dump could potentially reduce water flow at Cherry Spring.

4.1.5.2 Mine Closure/Reclamation

Impacts to wetlands and other waters of the United States are not anticipated during the closure or reclamation of the Proposed Action area.

4.1.6 Wildlife and Fisheries Resources

4.1.6.1 Mine Development/Operation

The Proposed Action would result in both direct and indirect impacts to wildlife resources and their associated habitats. The degree of impacts would depend on the relative sensitivity of the species, the resource issue, the duration of the activity, and the period of disturbance. The Proposed Action would result in the short-term habitat loss and long-term habitat change of approximately 1,450 acres. This habitat disturbance would result in three primary impacts to wildlife: 1) direct loss or disturbance to forage, breeding areas, and thermal cover; 2) indirect impacts from displacement of animals from the Proposed Action area into adjacent habitats, which are potentially at their associated carrying capacities; and 3) further fragmentation of the habitats from project implementation.

Short-term habitat loss and long-term habitat changes are quantified in Table 4-2 for each vegetation type affected by the Proposed Action. Based on these estimates of vegetation removal, anticipated habitat disturbance from the Proposed Action would total 743 acres of big sagebrush, 112 acres of low sagebrush, 238 acres of piñon-juniper, 353 acres of mixed shrub, and 4 acres of mountain mahogany. In addition, the loss of snags, which are considered unique habitat features, would remove limited nesting habitat for cavity nesters (i.e., birds that depend on cavities for nesting).

The short-term loss and long-term change of 353 acres of mixed shrub habitat would be one of the most important habitat impacts for wildlife resources. The estimated loss of only 4 acres of scattered mountain mahogany is consistent with the Bureau of Land Management's and Nevada Division of Wildlife's goals to minimize the impacts to this vegetation type.

Of the 1,450 acres of vegetation incrementally disturbed by the Proposed Action, 1,316 acres would be reclaimed, leaving 134 acres not reclaimed for post-mining use. Based on the proposed seed mixtures for the Proposed Action area (see Tables 2-11 and 2-12, Chapter 2), native shrub species would regenerate naturally over a long period of time (30 to 60 years) after mine closure, resulting in a long-term impact to forage and thermal cover availability on the 1,316 acres of disturbed habitat types.

Disturbance of native habitats would result in the direct loss of less mobile species (e.g., small mammals, bird nestlings, reptiles) and the displacement of more mobile species (e.g., medium-sized mammals, adult birds, and big game animals). Habitat removal and disturbance to area wildlife species from mine development would affect nesting or breeding habitat, foraging areas, and cover. Direct effects to important habitat would result in displacing animals, increasing competition, and reducing carrying capacities within the adjacent habitats. Loss of habitat and effects to carrying capacity would occur for the life of the project and until reclamation is achieved. Displaced individuals may or may not be able to establish territories in adjacent habitats, depending on variables such as the species' behavior, density, and individual habitat requirements and availability. Habitat fragmentation from the Proposed Action would limit use by some wildlife species.

Removal of the piñon-juniper, mixed shrub, and mountain mahogany vegetation would result in the direct disturbance to a total of 595 acres of potential bird nesting habitat, particularly for nesting passerines. Since vegetation could be removed during the breeding season, eggs and nestlings could be lost, adversely affecting the annual productivity. No known raptor nests would be directly disturbed by the Proposed Action. The ferruginous hawk is discussed in the next section, and the cumulative effects to breeding birds, including neotropical migrants, are discussed further in Appendix B.

As discussed in Chapter 3, a baseline bird survey was performed in July of 1994 (JBR Environmental Consultants 1994b) in response to the Bureau of Land Management's concern regarding effects to neotropical migrants and current bird use of the Proposed Action area. The avian composition and diversity varied with the habitat type. Survey results indicated that the mountain mahogany and piñon-juniper vegetation types supported a more diverse avian community than the other vegetation types examined. Many of the species recorded are considered neotropical migrants; others may remain in the Proposed Action area throughout the year.

Mine operation would reduce hunting or foraging territories of raptors and mammalian predators, likely affecting small numbers of local predators (e.g., coyote, badger, red-tailed hawk, great-horned owl). However, most predators are wide-ranging and it is not likely that the loss of hunting range and associated prey base of this low magnitude would result in long-term effects.

The Proposed Action would result in the short-term loss and long-term change of approximately 1,450 acres within a 295,000-acre crucial mule deer winter range, designated by the Nevada Division of Wildlife. This habitat disturbance would result in the same primary impacts to mule deer, as discussed above for general wildlife species, including loss of winter forage and thermal cover, displacement, and habitat fragmentation. However, the effects to wintering deer from the disturbance of these 1,450 acres would vary, based on the relative snow depth, vegetation, forage availability, and range condition.

Previous concerns have been raised by the agencies and the public that increased mining in the Bald Mountain area might displace mule deer as well as livestock and wild horses into adjacent areas concentrating all large herbivores onto already marginal range affected by drought and overuse. The competition for a decreasing forage base coupled with degraded winter range could result in increased deer mortalities, particularly for overwintering fawns. This effect would have been magnified during both drought periods and heavy snow accumulations.

However, based on the Bureau of Land Management's Full Force and Effect Final Multiple Use Decision for the Warm Springs Allotment implemented in 1994, along with the removal of 347 wild horses from the Buck and Bald Herd Management Area in 1986, 338 in 1989, and 562 in 1994, range conditions in the Proposed Action area are already exhibiting greater productivity and are expected to continue to improve. The Bureau of Land Management's goals and objectives outlined in this allotment evaluation include restoring range conditions surrounding the Proposed Action area. Therefore, the anticipated effects to mule deer from the Proposed Action analyzed under this scenario would mean that the short-term loss of 1,450 acres within a 295,000-acre crucial winter range would not substantially affect wintering deer, given that the overall range condition will continue to improve in and near the Proposed Action area. In addition, the effects to the 1,450 acres would equal less than 1 percent of the 295,000 acres of crucial winter range available to the Ruby Deer Herd.

The impacts to resident mule deer occupying the Bald Mountain area would include short-term habitat loss, habitat fragmentation, and disturbance from increased human presence and activities. Summer range is limiting for resident deer, particularly due to the lack of water in the project vicinity. Therefore, expanded mining activities in the Bald Mountain area would directly affect deer summer range from habitat disturbance and fragmentation and indirectly affect the resident population from increased human use.

Although deer mortalities have not been an issue along the existing haul route through South Water Canyon, hazards to deer moving across the haul road and negotiating the steep, rocky hill adjacent to the road have been recorded. The orientation of the proposed project components from east to west along Big and Little Bald Mountain and Mooney Basin was examined to determine whether the additional development would disturb the north-south migrational and daily movements of mule deer. As discussed above, the east-west orientation could displace deer during migration; however, the observed behavior of migrating deer in and near existing mining operations suggests that development of the proposed project components would not adversely affect these movements and that adequate range remains (Foree 1994). In summary, although the implementation of the Proposed Action would result in habitat fragmentation for mule deer, particularly for resident deer, the project orientation would not likely impede migratory movements between seasonal ranges.

An increase in roads and vehicles in the Proposed Action area would increase the risk of vehicle-related mortalities of mule deer and other area wildlife. However, only two deer mortalities have been reported in the Bald Mountain area within the last 6 years. To minimize this risk, Bald Mountain Mine Properties has committed to posting traffic control signs and imposing speed restrictions on vehicles in the Proposed Action area, as outlined in Environmental Protection Measures, (see Chapter 2).

For the Proposed Action, impacts to upland game birds would be limited to indirect effects to brooding and nesting habitat from mine development and operation. No active sage grouse leks would be affected by the Proposed Action, due to the distance (greater than 3 miles) between lek sites and proposed project activities. However, adverse impacts to nesting and brooding sage grouse would result from the development of the proposed East Sage waste rock dump near Cherry Spring. Currently, this naturally occurring spring has marginal habitat value for wildlife, due to its degraded condition and intermittent flow. However, sage grouse and mule deer do use the spring site; grouse particularly use the available forage and cover during the spring and summer season. The future range condition in this area is anticipated to improve, due to the Bureau of Land Management's final allotment decisions and horse gathers.

Since chukar tend to occupy steeper, more rocky terrain, disturbance to the Top and Sage Flats areas could remove chukar habitat. Impacts to the chukar would parallel that described for sage grouse near Cherry Spring. Impacts to the mourning dove would be minimal, relative to its overall distribution and available habitat in the Proposed Action area.

Noise generated during project development and operation would result in displacement of wildlife species beyond the current operations. Noise effects would be more prominent in areas that are currently undeveloped (e.g., Horseshoe/Galaxy Mine) rather than the effects from expanding existing mining operations (e.g., Top pit). Development of new areas would be expected to displace a greater number of animals. Common wildlife responses to noise disturbances are either avoidance or accommodation. The more secretive and smaller animals would typically coexist with most noise sources. Other animals, particularly those that rely most on vocal and auditory cues for communication and orientation (e.g, birds, bats), would avoid the vicinity of a noise source, moving out of the area until the source dropped to an acceptable background level for that species. Abrupt and intermittent noises (e.g., blasting) are less likely to be accommodated than are the more steady, continuous noises (e.g., truck traffic).

Shafts, adits, or other underground workings that are associated with past mining activities may support bats, in addition to other nongame species, such as passerine birds, amphibians, and reptiles. As discussed in Chapter 3, an initial inventory was conducted to identify open shafts or adits that are present in and near the proposed project components. One partially filled shaft and three open adits were observed near Sage Flats pit and Top pit. The remaining eight underground openings that were found within the Proposed Action area were either closed or located within a current mining operation. The Bald Mountain area had a number of historical mines; therefore, additional shafts or adits may occur within the Proposed Action area that were not apparent during this survey.

The partially filled shaft (approximately 25 feet deep) is located on an open hillside in the area proposed for the Sage Flats pit. No bat sign was observed associated with this shaft. The three open adits in the proposed Top pit expansion area would provide good habitat for roosting or hibernating bats. In the event that bats occupied these adits, development of the Top pit would remove all three adits, resulting in direct habitat loss.

Loss of underground openings occupied by bats could be important, particularly if any of the six sensitive bat species (identified in Threatened, Endangered, or Candidate Species, Chapter 3) were present. As an Environmental Protection Measure, Bald Mountain Mine Properties would avoid existing shafts, adits, or other underground workings, if possible. Underground openings either directly (e.g., removal or closure) or indirectly (e.g., blasting) disturbed by mining-related activities would be surveyed for bats, prior to the proposed disturbances, and disturbance would be avoided when bats are present.

Any wildlife accessing the solution ponds or areas containing lethal levels of sodium cyanide would result in direct mortality. To prevent mortalities and in accordance with the Nevada Division of Wildlife's Artificial Industrial Pond Permit and the Bureau of Land Management's cyanide management policy, Bald Mountain Mine Properties would be required to fence and cover any facilities potentially lethal to wildlife or to neutralize free cyanide below lethal levels. As discussed in Chapter 2 under Environmental Protection Measures, Bald Mountain Mine Properties is proposing to fence and net or cover solution ponds to prevent access by terrestrial wildlife, birds, and bats. No pooling of cyanide solutions on the leach pads is anticipated, due to the high porosity of the ore.

Water Quality Impacts to Wildlife

As discussed for Water Quality and Quantity, no permanent pit lakes are anticipated following project closure, because all pits would be above the permanent water table. Temporary ponding is only expected as a result of a heavy spring snowmelt. Any temporary ponding that might form would not present a threat to water quality or wildlife species using this water (see Water Quality and Quantity).

Leach pads, leach ponds, and the proposed tailings facility at the Bald Mountain Mine would be constructed to State permit standards, with synthetic liners and leak detection systems. Thus, impact of these facilities to groundwater or surface water quality is not expected. Under the Nevada Division of Wildlife's Artificial Pond Permit, no toxic solutions accessible to wildlife would be allowed on site, thereby minimizing the potential for wildlife mortalities (acute toxicity) or chronic effects. The heap leach ponds and pads would be constructed with exclosures to prevent wildlife access to toxic solutions. Potential chronic toxicity from ingestion of leach solutions would not be anticipated, since pooling of water on the pads is not anticipated due to the porosity of the leach materials.

Based on the results of the Hydrologic Evaluation of Landfill Performance modeling presented in the Water Resources section, no seepage from under waste rock dumps is anticipated. Similarly, no seepage from under the East Sage waste rock dump to Cherry Spring and subsequent discharge to the surface is expected. Thus, the exposure of wildlife to water with elevated metals concentrations is not expected to occur.

In summary, no impacts to wildlife from the degradation of water quality are anticipated from the Proposed Action, based on the lack of pit lakes, no effects to naturally occurring seeps and springs, and the protection measures that have been developed and identified in the Environmental Protection Measures in Chapter 2. The project would also be developed in accordance with the Nevada Division of Wildlife's Artificial Pond Permit and Bureau of Land Management's cyanide management policy.

Water Quantity Impacts to Wildlife

The only potential impact to spring water sources would be the possible reduction in flow at Cherry Spring, due to the placement of the East Sage waste rock dump. Although no direct impacts to Cherry Spring would result from mining-related activities, the potential indirect effects to the spring site could include: 1) increased disturbances to wildlife from noise and increased human presence, due to the proximity of the proposed waste rock dump to the spring and 2) possible reduction in seasonal flow, due to the waste rock dump covering part of the recharge area of the spring.

Hazardous Materials and Wastes

The probability of a release of hazardous materials (e.g., hydrochloric acid, diesel fuel, or sodium cyanide) into a sensitive environment during the transport of materials along the two proposed transportation routes is discussed under Hazardous Materials and Wastes. Sensitive resources or receptors crossed by the transportation routes are predominantly located along Highway 228 in Huntington Valley. The sensitive receptors identified along this route consist primarily of riparian zones and the wildlife species dependent upon them. Prominent water sources crossed by, or occurring near, the highway include South Fork of the Humboldt River, Cottonwood Creek, Smith Creek, Ten Mile Creek, and a number of perennial and intermittent drainages flowing out of the western Ruby Mountains. Approximately 6 miles of riparian habitat would be crossed by this route. The presence and amount of water in these areas typically depend on surface water flow from drainage headwaters, seasonal precipitation, and groundwater recharge.

The probability of hazardous material releases over the 12-year project operation was calculated to be 0.013 release for diesel fuel, 0.003 release for sodium cyanide, and 0.006 for hydrochloric acid (see Hazardous Materials and Wastes). However, in order to analyze the highest level of impact if a spill occurred, a scenario was developed and examined for release of either diesel fuel or sodium cyanide into a perennial stream with prominent riparian vegetation. Depending on the concentrations, a diesel release could require a higher level of remediation.

If a truck crashed at a bridge and a large amount of diesel fuel or cyanide were released into a perennial drainage, wildlife species could be directly impacted, depending on the amount of the release, the concentration of the material, and the relative use of the riparian system by wildlife. Habitat would be temporarily impacted; particularly, hydrocarbon contamination would occur to both aquatic and terrestrial organisms that came into contact with a diesel release, likely resulting in mortalities. During the spring and early summer, nesting water birds typically found along a stream would be directly impacted, reducing the annual nesting productivity for that year, and a number of other wildlife species that rely upon the riparian habitat for feeding and cover would be indirectly impacted. During the winter season, mortalities would be limited to aquatic organisms and some terrestrial species.

The level of impact to a riparian system from a hazardous release in terms of duration and length of stream affected would depend upon the size of the spill, time of year, physical characteristics of the water source, cleanup and control techniques, and susceptibility of the dominant or important organisms. The long-term effects to the riparian system would depend on the amount of material spilled; the buffering capacity of the water, soils, and associated vegetation; and the recharge or dilution of the system. Impacts from a hazardous materials release could range from temporary loss of vegetation to the widespread loss of riparian habitat and the organisms that are associated with it. Site remediation would be critical in keeping adverse impacts short-term and re-establishing the riparian system. Ephemeral or intermittent drainages would not be as sensitive to a release as perennial systems.

4.1.6.2 Mine Closure/Reclamation

No additional adverse impacts to wildlife are likely to result from mine closure and reclamation. As vegetation is re-established, habitat quality would improve, resulting in a beneficial impact to wildlife over time. One of the goals of revegetation is re-establishment of wildlife habitat by use of appropriate native species. Restoration of wildlife habitat would be enhanced through use of some native species, development of shrub cover, and creation of habitat diversity. As human activity in the area decreased and revegetation occurred, wildlife use of the area would likely increase. As stated above, the re-establishment of woody species would be a long-term process; therefore, site reclamation would favor wildlife resources associated with grasses and forbs until natural shrub regeneration began.

As discussed for water quality impacts to wildlife, no pit lakes would form after mine closure. Therefore, no impacts to wildlife from ingestion of metals would occur.

4.1.7 Threatened, Endangered, or Candidate Species

4.1.7.1 Wildlife

Mine Development/Operation

The impact assessment for sensitive wildlife species focuses on potential effects to the species identified in Chapter 3; only the applicable project components are discussed for each species examined. The impact analysis associated with water quality effects is tiered from the previous analysis presented for general wildlife.

No impacts to either the American or Arctic peregrine falcon are anticipated. No active peregrine eyries occur in the Proposed Action area, no extensive riparian habitat would be removed that could support primary prey species for the peregrine, and both migrant or foraging birds would likely avoid the expansion areas during project development.

No direct or indirect impacts to wintering bald eagles would result from mine development, since no habitat would be affected in the Proposed Action area that supports wintering birds. The probability of a diesel fuel, cyanide, or hydrochloric acid release along the transportation routes, particularly along Highway 228 in Huntington Valley, is discussed under Hazardous Materials and Wastes. Although this probability is very low, a diesel release into a water resource could remove prey items of wintering bald eagles and prevent foraging birds from using the area until cleanup had been completed. This event would result in a insignificant, short-term loss of foraging habitat for eagles along the specific reach impacted by the release. No additional impacts to wintering bald eagles are anticipated, since contaminated animals (e.g., waterfowl) would be removed from the area by the spill response team, and the presence of the emergency personnel would prevent wintering bald eagles from using the area for foraging until the area had been remediated.

Although the ferruginous hawk is a prominent breeder in the vicinity of the Proposed Action, no occupied nest sites have been documented in the Proposed Action area. Based on the Bureau of Land Management's annual nest surveys, it is not anticipated that mining-related activities would affect nesting or foraging ferruginous hawks.

No burrowing owl nests have been documented in the Proposed Action area. Potential habitat would be primarily limited to the low sagebrush vegetation type. Approximately 112 acres of this vegetation type would be removed for mine development and operation. This would not be an important habitat loss for this species.

The six sensitive bat species would be impacted if any of these species occupied the abandoned adits that would be disturbed by the proposed

Top pit expansion. No other potential habitat (e.g., open water ponds, rock outcrops) has been identified that would be affected by the Proposed Action. Environmental Protection Measures (see Chapter 2) have been developed to avoid existing shafts, adits, or other underground workings, if possible. If underground openings would be either directly (i.e., removal or closure) or indirectly (e.g., blasting) disturbed by mining-related activities, the Bureau of Land Management would be notified, and a survey for bats would be conducted prior to the proposed disturbances.

Potential habitat for the pygmy rabbit could be affected by the Proposed Action. However, effects would be minor, since available habitat is widespread in the region, and this species is a game species within the state of Nevada.

Impacts to the Sierra Nevada red fox are not likely, since this species is rare in the region. Also, no impacts to the spotted frog would occur, since no perennial water sources that could support this species would be affected.

Mine Closure/Reclamation

Impacts to special status wildlife species are not anticipated during mine closure and reclamation activities.

4.1.7.2 Plants

Mine Development/Operation

No documented populations of Federally-listed threatened or endangered plants are known to occur within the Proposed Action area. The Nachlinger catchfly *(a Category 2-candidate species)* may occur in habitat that would be disturbed by the Proposed Action *in the Top Area. Based on existing information obtained from the Nevada Natural Heritage Program (NNHP) database, documented populations of Nachlinger catchfly are known to occur on limestone outcrops and gravelly slopes with pine woodland, mountain mahogany woodland, or sagebrush meadow vegetation at 9,400 to 10,700 feet (Morefield 1995). The Top Area contains limestone outcrops with mountain mahogany woodland vegetation at approximately 8,000 feet in elevation. The* nearest documented population *of Nachlinger catchfly* occurs more than 15 miles north of the Proposed Action area, *and the species has been documented only at elevations above 9,400 feet. It is unlikely that the Nachlinger catchfly occurs in the Top Area, and adverse effects are not expected.* Habitat for Holmgren smeloskia is not present in the Proposed Action area.

Mine Closure/Reclamation

No impacts to sensitive plant species would occur during mine closure and reclamation activities.

4.1.8 Wild Horses

4.1.8.1 Mine Development/Operation

Overall impacts to wild horses associated with the Buck and Bald Herd Management Area would be expected to be low. Impacts to wild horses from mine development and operation would be relative to the: 1) increased activities in areas occupied by wild horses, 2) increased harassment by additional people and vehicles, 3) disruption of migration routes, 4) stress to pregnant mares and foals from mining-related disturbances, and 5) a small, short-term loss of forage from habitat removal.

Specifically, the short-term effects from mine blasting, equipment operation, and increased human presence in the Proposed Action area would temporarily displace animals within the Buck and Bald Herd Management Area. Vehicle-related mortalities already occur and would likely continue at the current levels (fewer than five per year). The location of project components (e.g., haul roads) could intersect with daily movement routes between foraging areas and with seasonal migrational corridors; however wild horses have adapted to existing mining activity and are expected to adjust to the Proposed Action. Flagging installed on new fences, such as those proposed for the tailings pond and reclaimed areas, would minimize injuries to wild horses. The anticipated habitat loss would be a short-term (i.e., life-of-mine) impact to available forage, until reclamation is completed.

As discussed for mule deer, mining operations would displace livestock and wild horses into adjacent areas. The Bureau of Land Management's final allotment decisions and control of the numbers of wild horses in the herd management area would maintain wild horse populations at the appropriate carrying capacity of the range. This would minimize the potential for direct conflicts between mine activities and horse use of the Proposed Action area.

In addition, Bald Mountain Mine Properties has committed to specific environmental protection measures to minimize mortality to wild horses (see Chapter 2, Environmental Protection Measures). Potentially toxic solutions would be fenced to prevent access, and new fences would be flagged in the appropriate areas to improve the visibility of the fences, reducing the injury potential. Mine personnel would be educated about the penalties for harassing wild horses. Traffic control signs would be posted to minimize the collision potential with mine vehicles within the Proposed Action area and along the access roads.

4.1.8.2 Mine Closure/Reclamation

As vegetation is re-established, habitat quality and forage availability would improve, resulting in a beneficial impact to wild horses over time. No additional adverse impacts to wild horses would occur from mine closure and reclamation activities.

4.1.9 Cultural Resources

Direct physical impacts to cultural resources could occur during ground-disturbing activities. Indirect impacts could result from increased erosion or improved access, which makes sites more vulnerable to accidental or deliberate disturbance and illegal collecting.

An undertaking or action is regarded as having an effect on a cultural property if it alters any of the characteristics that may qualify the property for inclusion in the National Register of Historic Places. The significance of a cultural resource is an assessment of the importance of the cultural resource to the citizens of the United States and indicates that a site has attributes that qualify it for inclusion on the National Register of Historic Places. An adverse effect is one that diminishes the integrity of any of these characteristics. Adverse effects to a cultural resource that is eligible for inclusion in the National Register of Historic Places is considered a significant impact. An undertaking is always considered to have no adverse effect or no effect, if all sites in the area have been shown to be not significant or the impacts to the qualities that make the sites significant are mitigated, as defined in 36 Code of Federal Regulations 800.9(c)1. Potential impacts would be mitigated using guidelines presented in the Programmatic Agreement. Discussions of project impacts are limited to sites within the Proposed Action area deemed to be significant or eligible for inclusion on the National Register of Historic Places.

4.1.9.1 Mine Development/Operation

Ground-disturbing activities could result in direct impacts to prehistoric, proto-historic, and historic cultural resources in the form of vertical and horizontal displacement of soils containing cultural materials and in the loss of integrity of the cultural deposits, loss of information, and alteration of site setting. Additionally, construction could result in direct impacts to proto-historic and historic resources known to exist within the Proposed Action area by altering site settings and isolating the resource from access and further study.

Construction of access roads also could result in indirect impacts by making cultural sites more vulnerable to vandalism and casual collecting. Subtle changes in topography due to mine road construction could result in indirect impacts to cultural resources due to alteration of the amount or patterns of erosion.

Avoidance of impacts is the primary mitigation for cultural resources. When disturbance of National Register of Historic Places-eligible sites is unavoidable, impacts would be mitigated according to a site-specific treatment plan that would be formulated in consultation among Bald Mountain Mine Properties, the Bureau of Land Management, State Historic Preservation Officer, and the Advisory Council on Historic Preservation, following procedures stipulated in the Programmatic Agreement. These plans could include avoidance/protection, recording/documentation, collection, partial or complete excavation, and treatment or maintenance.

If previously undocumented sites, or subsurface components of documented sites, are discovered during construction, activities would be halted until the resources are examined by professional archaeologists. If the resources are determined to be eligible for the National Register of Historic Places, pursuant to the Programmatic Agreement, impacts would be mitigated through the appropriate data recovery program.

At least 20 known sites eligible or potentially eligible for the National Register of Historic Places have been identified within the Proposed Action area. These include eight sites judged eligible pending State Historic Preservation Officer concurrence, six sites judged eligible pending further evaluation, and six sites that are eligible for the National Register of Historic Places. In the proposed Horseshoe/Galaxy Mine area, six sites judged eligible (46-7545, 46-7546, 46-7549, 46-7555, 46-7556, and 46-7559), pending the State Historic Preservation Officer's concurrence, would be directly affected by the Proposed Action. Three sites, including one site judged eligible pending State Historic Preservation Officer concurrence (46-7554); one site judged eligible (7240); and one site determined eligible pending further evaluation (046-2726) would be avoided but could experience indirect impacts.

Within the proposed Top Area modification, four sites would be directly affected by the Proposed Action. These sites include 6869, 26Wp1682/046-2733, 046-7172, and 046-7168. Final National Register of Historic Places eligibility determinations for these four sites are still pending. Seven other sites (046-7167, 046-7166, 46-7563, 46-7566, 046-7077, 26Wp1921, and 513-9) located in the area would be avoided but could experience indirect impacts such as an increase in casual collecting. Three of these sites (046-7077, 26Wp1921, and 513-9) are eligible to the National Register of Historic Places. Two sites (46-7563 and 46-7566) are judged eligible, pending State Historic Preservation Officer concurrence. The remaining two sites have not received final National Register of Historic Places eligibility determination. The sites directly affected by the proposed mine construction and operation would be mitigated under conditions specified under the Programmatic Agreement prior to implementation of the Proposed Action.

Reports and maps of cultural resource surveys conducted in the Proposed Action area indicate that some locations in the area remain to be surveyed. These areas include portions of the processing/leach pad area, South Water Canyon waste rock dump, existing haul road, and proposed Top pit expansion area.

4.1.9.2 Mine Closure/Reclamation

Previously identified cultural sites would be mitigated under conditions specified under the Programmatic Agreement prior to commencement of mine closure and reclamation. Subtle changes in topography due to mine waste dump reclamation could result in indirect impacts to cultural resources due to alteration of the amount or patterns of erosion. Under guidelines established in the Programmatic Agreement, these potential impacts would be assessed and mitigated as necessary.

4.1.9.3 Native American Concerns

In addition to the scoping letters, letters requesting comments on the Proposed Action have been sent to the Native American representatives listed below:

Duckwater Shoshone Tribe
Ely Colony Council
Te-Moak Tribes
Elko Band
South Fork Band
Goshute Indian Reservation
Western Shoshone National Council
Western Shoshone Historic Preservation Society
Citizen Alert, Native American Program

Telephone calls to these tribes were also made by the Egan Resource Area Manager. As of the printing of this document, no comments had been received concerning this notification letter and no information specific to Native American religious or traditional use in the Proposed Action area has been received.

4.1.10 Air Quality

4.1.10.1 Mine Development/Operation

Air quality in the study area would be affected by both construction and operation of mining facilities. Activities associated with the expansion project would cause an increase in fugitive and gaseous emissions in the local area. Gaseous pollutants include nitrous oxides, carbon monoxide, and sulfur dioxide from exhaust emissions from the electrical generators, vehicles, and other mobile equipment. Exhaust emissions would be small compared to fugitive emissions and would not affect regional air quality.

Dust generated from open sources is termed "fugitive" because it is not discharged to the atmosphere in a confined flow stream (e.g., stack, chimney, or vent). The principal sources of fugitive dust would be related to mining activities, including land clearing, earth moving, scraping, hauling, materials storage and handling, drilling and blasting, truck loading operations, wind erosion from stockpiles, and ore handling operations. In addition, other fugitive emissions would be caused by mud/dirt carryout onto paved surfaces. Fugitive emissions would continue for the lifetime of the mining operations.

Particulate levels from mining activities would vary, and impacts would depend on the activity location and the daily wind and weather. These activities would require a surface disturbance permit from the Nevada Division of Environmental Protection, which would require that watering or other measures be taken to limit fugitive dust emissions. While measures such as watering would reduce the amount of emissions from such activities, some level of fugitive dust emissions would be unavoidable due to the nature of the work. Although some impacts on air quality would inevitably occur during mining, they would be transitory and temporary, limited in duration, and would end at the completion of that particular phase of the work. Once reclamation was completed, pollutant concentrations would return to background levels.

The air quality impact of a fugitive dust source depends on the quantity and drift potential of the dust particles released into the atmosphere. The larger dust particles settle out closer to the source, while finer particles are dispersed over much greater distances. Theoretical drift distances, as a function of particulate diameter and mean wind speed, have been computed for fugitive dust emissions. For a typical wind speed of 10 miles per hour, particles larger than 100 micrometers (μm) are likely to settle out within 20 to 30 feet from the source. (For comparison, a human hair has a thickness of about 100 μm.) Particles 30 to 100 μm, depending on the extent of atmospheric turbulence, are likely to settle within a few hundred feet. Dust particles smaller than 30 μm are generally recognized as emissions that may remain suspended indefinitely. The fractions of fugitive emissions in the various size categories are derived from the major emission source categories for a typical mining operation and are summarized in Table 4-3 (United States Environmental Protection Agency 1985).

Results from modeling various mine sources at the Yankee Mine show that maximum concentrations of particulate matter less than 10 μm in size (PM_{10}), oxides of nitrogen, carbon monoxide, and sulfur dioxide would not exceed state or Federal ambient air quality standards (Nevada Division of Environmental Protection 1994). Impacts from the proposed Horseshoe/Galaxy Mine and ***Process/Top*** Area Modifications are expected to be similar. Process emissions from the facilities would be less than 100 tons per year. ***Air quality standards are set to protect human health and welfare, and significant impacts are not expected if the standards are not exceeded. This includes toxic substances (e.g., metals and crystalline silica) that may make up a small component of the PM-10 emissions. Nevertheless,*** the State of Nevada would have to grant air quality operating permits for the proposed operations, and the project would have to comply with all air quality standards in Nevada. As required by permit conditions, the mine operator would apply air pollution controls to reduce emissions during construction and operation of the mine. The control system for the crushing, screening, and conveying circuit would consist of fogging water sprays. Fugitive dust from all disturbed areas would be controlled using watering, chemical stabilization, or other controls approved by the Nevada Bureau of Air Quality.

Table 4-3

Estimated Particle Size Percentages for a Typical Mining Operation

Process	Diameter (µm)[1]					
	<2.5	2.5-5.0	5.0-10.0	10.0-15.0	15.0-30.0	>30.0
Material Handling	13	10	13	12	25	27
Unpaved Roads	10	10	16	14	30	20
Composite	11	10	14	13	28	24

Source: United States Environmental Protection Agency 1985.

[1]Micrometer.

4.1.10.2 Mine Closure/Reclamation

Reclamation and revegetation would stabilize exposed soil and control fugitive dust emissions. As vegetation becomes established, particulate levels should return to what is typical for a dry desert environment.

4.1.11 Social and Economic Resources

The proposed mine expansion and the continuation of mining and processing operations in the Proposed Action area would require only a minor increase in the current workforce. At present, Bald Mountain Mine Properties employs 208 process and mine personnel. The Proposed Action would entail shifting existing mine personnel to new locations in the mine complex and would result in the addition of approximately 25 new process and mine personnel. Based on the residency patterns of the existing workforce, it is estimated that 20 of the new workers would locate in Ely; the other 5 workers would locate in the Elko area. It has been assumed that no workers would come from Eureka County based on demographics of the current work force.

In most cases, it is the changes in population that generate social and economic impacts. New population, depending on the magnitude, can stress or strain capacity limits of nearby and affected communities. Housing stock, employment opportunities, services such as water, wastewater, schools, fire and police protection, and medical services can be affected. In addition, with incoming population, cultural and social changes can be forthcoming. However, given the magnitude, the proposed increase of 25 new positions would have negligible effects on local communities.

The current conditions prevailing in White Pine County and Elko County with respect to population and demography, total employment, housing, water supply, wastewater treatment, schools, solid waste disposal, law enforcement, fire protection, health care, and social services would not be noticeably impacted by the addition of 25 persons to the existing 208-person mine workforce. That is not to say that the agencies and offices administrating the above services are operating efficiently and effectively, only that the addition of 25 new employees would not noticeably impact the provision of these goods and services.

The Proposed Action would result in the continuation of benefits and costs associated with the original mine operation. For example, current mine operations and the resulting increased human presence in the Bald Mountain vicinity have impacted county conditions. In particular, the 208 employees travelling from various county locations and from areas outside the county converge in the mine vicinity, creating greater vehicular traffic than would occur in the absence of a mining operation. According to the White Pine County Sheriff, the increased traffic has led to an increase in wear-and-tear on Sheriff's Department vehicles (due to the distance between Ely and the mine site - 75 miles), as well as an increase in Department workload (Romero 1994). Bald Mountain Mine Properties has attempted to offset this impact caused by the traffic through the provision of employee transportation to and from the mine. This provision has minimized the use of private vehicles to some extent. Under the Proposed Action, the existing traffic flows and the increased workload and fleet miles on the Sheriff's Department would continue for the life of the project. Although this does pose a continued impact on the Sheriff's Department, it does not appear to be excessive. White Pine County has *a ratio of 2.44 sworn deputies per 1000 population (Franconi 1995). The Nevada state-wide average for 1994 was 2.59 deputies per 1000 population, and the national average was 2.3 deputies/officers per 1000 population (Souligni 1995).*

Likewise, the Proposed Action would generate positive impacts for the County. The primary socioeconomic impact identified with the Proposed Action would be the continued employment of 208 existing mine employees plus the additional 25 workers and the continued financial contribution made to the White Pine and Elko Counties through property, sales and use, and net-proceeds-from-mines (net proceeds) taxes. The project also would generate tax revenue for Elko County and the state. The socioeconomic impact assessment, therefore, focuses on the financial impacts of the proposed project.

The Proposed Action was evaluated for issues relating to the social, cultural, and economic well-being, and health of minorities and low income groups. Such issues are termed environmental justice issues, and none were identified for the Bald Mountain Mine Expansion Project. Social and economic impacts of the Proposed Action would not affect minority or low income groups disproportionately.

4.1.11.1 Mine Development/Operation

Impacts associated with the Proposed Action would be the continuation of contributions to county and state tax revenues throughout its projected 12-year life span (1996 to 2007) and the continued employment of 208 mine and process employees. Additional impacts, although negligible, would be generated by the addition of 25 mine and process employees. Continued county revenue would be generated from property, sales and use, and net-proceeds-from-mines (net proceeds) tax revenues. The net proceeds tax, which is assessed in lieu of property tax on the ore body, is collected annually on the estimated net revenues from mineral extraction. The balance of any improvements to the mine property would generate increased property tax. The mine also would generate sales and use tax revenue to the state and local governments. Continued and increased payroll due to the proposed mine expansion would generate business activity and tax revenue as well.

Table 4-4 presents the recent contributions to local revenue generated by the existing mine complex. Bald Mountain Mine Properties has estimated tax contributions for 1994 (which will be due in total in 1995 representing the typical 12-month lag from generation to county collection). The estimations for property, sales and business tax were then projected into the future using a 4 percent rate of adjustment (Jenkins 1994a; Jenkins 1994b). Projections for the net proceeds tax were calculated based on an estimated cost of gold production of $212 per ounce and a market value of $380 per ounce (Wall Street Journal 1994). The net proceeds tax was then divided between the county and the state based on the ad valorem tax rate of 3.38 percent (Bishop 1994).

Table 4-4 illustrates that total tax contributions have increased since 1992, with a slight downturn at the county level in 1994. The existing Bald Mountain Mine Properties mine will have generated in 1994, due in total in 1995, an estimated $865,680 in tax revenues for White Pine County, $35,000 for Elko County, and $309,320 for the State of Nevada. Table 4-4 presents the estimated annual contributions to 2005 when mining at the proposed pits is

Table 4-4

Past and Projected Tax Revenue Contribution ($) of the Current Project and Proposed Action

Year Tax Due[1]	1992[2]	1993[2]	1994[2]	1995[2]	1996[3]	1997[3]	1998[3]	1999[3]	2000[3]	2001[3]	2002[3]	2003[3]	2004[3]	2005[3]
White Pine County														
Property Tax	95,000	127,000	134,000	260,000	270,400	281,216	292,465	304,163	316,330	328,983	342,143	355,828	370,061	384,864
Sales and Use Tax	205,100	193,900	254,800	315,000	327,600	340,704	354,332	368,505	383,246	398,575	415,518	431,099	448,343	466,279
Net Proceeds Tax	32,130	229,824	117,648	290,680	452,069	470,152	488,958	508,576	347,505	361,405	375,861	390,896	406,532	455,793
Subtotal	332,230	550,724	506,448	865,680	1,050,069	1,092,072	1,135,755	1,181,244	1,047,081	1,088,963	1,133,522	1,177,823	1,224,936	1,306,936
Elko County														
Sales and Use Tax	24,500	23,100	29,890	35,000	36,400	37,856	39,370	40,945	42,583	44,286	46,058	47,900	49,816	51,809
State of Nevada														
Business Tax	3,800	14,800	16,600	20,000	20,800	21,632	22,497	23,397	24,333	25,306	26,319	27,371	28,466	29,605
Sales and Use Tax	98,400	93,000	122,010	150,000	156,000	162,240	168,730	175,479	182,498	189,798	197,390	205,285	213,497	222,037
Net Proceeds Tax	30,870	106,176	54,352	139,320	216,672	225,339	234,352	243,727	160,149	166,555	173,217	180,146	187,352	194,846
Subtotal	133,070	213,976	192,962	309,320	393,472	409,211	425,579	442,603	366,980	381,659	396,926	412,802	429,315	446,488
Total Tax Contribution	489,800	787,800	729,300	1,210,000	1,479,941	1,539,139	1,600,704	1,664,792	1,456,644	1,514,908	1,576,506	1,638,525	1,704,067	1,805,233

[1] Taxes are generated throughout the year and are due in full in the following year. The years started on the table refer to the year following tax generation.

[2] These are estimates provided by Bald Mountain Mine Properties (Jenkins 1994a, Jenkins 1994b).

[3] Property tax, sales tax, and Nevada Business tax projections are based on the 1995 estimates and a 4 percent constant rate of inflation. Net Proceeds tax is based on a cost of production of $212/ounce, a market price of $380, and the White Pine County tax rate of 3.38 per $100 of taxable proceeds. These have also been adjusted using a 4 percent constant rate of inflation.

expected to cease. No estimates were calculated for the closing period estimated to be from 2005 to 2007. Mine contribution projections are based on the estimations provided by Bald Mountain Mine Properties for 1994 (due in 1995) and on a constant rate of adjustment of 4 percent. In reality, these projections will fluctuate with the world gold market as well as with national economic business cycles and other unforeseen circumstances. The projections are only meant to give a reasonable assessment of the financial impact of the Proposed Action.

Assuming continuous production, White Pine County can anticipate a relatively constant tax contribution from the proposed mine extension. Table 4-4 indicates that estimated tax contributions due in total in 1995 would amount to approximately 9 percent of the combined City of Ely and White Pine County's estimated 1994-95 budget of $9,557,000 (White Pine County Economic Diversification Council 1994).

Elko County would accrue a minor tax contribution in terms of sales tax. The State of Nevada would see an increase due to net proceeds in 1994 and then benefit from a relatively constant contribution thereafter.

The Proposed Action would continue to generate an approximate annual payroll of $8,130,000 (1994 inflation adjusted dollars) during the operational period of the mine (Jenkins 1994a). In addition, 25 new employees would increase this payroll by approximately $977,000 (based on an estimated current average wage of $39,080), for a total payroll of $9,107,000. It is estimated that of this payroll, approximately 70 percent, or $6,374,900 is disposable income or after-tax income spent on goods, services, and savings. Applying an income multiplier of 2.57 (Dobra 1988) to the total payroll income, the total annual direct and induced income effect would be $23,404,990 per year. If it is assumed that 35 percent of total income is spent on local taxable items, sales and use tax on employee expenditures would amount to approximately $552,943 (using a sales tax of 6.75 percent). This would generate approximately $387,060 annually in county (combined White Pine and Elko) sales tax revenue and $165,883 in state sales tax revenue.

The Proposed Action would include the addition of approximately 25 new mine personnel. Applying an employment multiplier for the mining industry of 2.25 (Dobra 1988), the total employment effect would be the creation of approximately 56 total jobs, or 31 indirect jobs in addition to the 25 new mining employees. According to Dobra (1988), of the additional 1.25 jobs created for every job in the mining industry, 0.75 are in the local or regional economy, and 0.50 are in the metropolitan economies of the state. Therefore, of the 31 indirect jobs created as a result of the Proposed Action, 19 jobs would be created in the local economy (White Pine and Elko Counties) and an additional 12 jobs in the urban supply centers of the state.

In summary, and as shown in Table 4-4, the project would continue contributions to public revenues, income, and employment in White Pine and Elko Counties and to the state. These effects are expected to continue during the 12-year operations phase.

4.1.11.2 Mine Closure/Reclamation

The social and economic impacts from closure, abandonment, and reclamation of the Proposed Action would be the loss of the approximately 233 jobs associated with the mine operation. If Bald Mountain Mine Properties were not expanding operations into another nearby area at the time of closure, the jobs could be permanently lost.

When mine operations cease, tax revenues would no longer be accrued from mining operations. This would entail dramatic decreases in net proceeds tax revenues, property tax revenues for White Pine County, and the sales and use tax revenues related to the operation of the mine. The salaries from these jobs, and their multiplier effect in the local communities, also would be lost. Elko County would experience reductions in sales tax revenues similar to those outlined in Table 4-4.

The workers would likely attempt to acquire work at other mines in the Ely or Elko areas, depending on the jobs available at that time. If jobs were unavailable, the unemployed workers would either remain in the area, continuing their demands on community services, or would relocate to another area for employment. If workers left the area at a time when there was a net loss in population in the communities, there could be underutilized infrastructure (schools, housing, etc.) in the communities, resulting in an inefficient use of resources.

The White Pine County economy has experienced periods of economic hardship in the past. Efforts taken by Bald Mountain Mine Properties to phase out operations over several years would minimize impacts by allowing the affected population to adequately adjust and plan for their future.

4.1.12 Recreation

4.1.12.1 Mine Development/Operation

No parks, concentrated recreational use areas, Bureau of Land Management Wilderness Study Areas designated wilderness areas, or protected natural areas would be directly impacted by the proposed project. The Proposed Action would reduce opportunities for dispersed recreationists, primarily hunters and off-highway vehicle users, during the operation and reclamation activities. Overall, the displacement of dispersed recreationists would be a minimal adverse impact because existing recreational use in the Proposed Action area is relatively light, and the Egan Resource Area has abundant acreage of public, open space lands available for dispersed recreational opportunities. Public access would be available around the Proposed Action area. Although no specific recreational use data for public lands directly affected by the proposed project are available, the number of dispersed recreationists affected is expected to be minimal, and their displacement would not create overuse of other areas or degradation of the resource. Impacts to big game population numbers are not anticipated (see Wildlife); consequently, impacts to hunting opportunities are not expected.

The Proposed Action would be consistent with the management objectives for the Loneliest Highway Special Recreation Management Area and for establishing a back country byway within the Bald Mountain Mining District. Both recognize the opportunities available in the Proposed Action area to utilize the ongoing and historical mining operations for interpretive information and programs as well as informing the public about mine land reclamation.

Most of the Proposed Action area would be located within the roaded natural Recreation Opportunity Spectrum class, with a portion of the South Water Canyon Waste Rock Dump and the Saga pits within the semiprimitive motorized Recreation Opportunity Spectrum class. The Proposed Action would be consistent with the physical, social, and managerial settings for these two Recreation Opportunity Spectrum classes, and would not result in any changes to the existing Recreation Opportunity Spectrum classifications.

4.1.12.2 Mine Closure/Reclamation

The closure, abandonment, and reclamation of the Proposed Action would return public lands to their premining land use as rangeland, wildlife habitat, and dispersed recreation. Except for the mine pits, all other facilities would be reclaimed. Public access would be re-established through the area.

4.1.13 Visual Resources

Visual impacts have been assessed in accordance with standard Bureau of Land Management visual resource management contrast rating principles (Bureau of Land Management 1986). The contrast rating process is used to systematically identify the nature and degree of visible modification to the landscape that would occur as a result of a Proposed Action. The degree of contrast is then compared to visual resource management guidelines for the area to determine the level of impact or compatibility. To facilitate this evaluation and best assure consistency, application of the contrast rating process has been divided into three distinct steps. The first step is to accurately characterize the nature and extent of the on-site disturbance to the landform and the vegetation and through the addition of structures. Second, the level of visibility is determined from each potentially affected viewpoint, through consideration of variables such as distance, duration, orientation, screening, backdrop, angle of view and scale. Third, the level of on-site contrast modified by visibility level is used as the basis to determine the level of visual contrast (i.e., the nature and degree of contrast that is seen by the viewer). As stated above, visual impacts are determined based on the compatibility of the predicted levels of visual contrast with the visual resource management class (see Visual Resources, Chapter 3).

The Horseshoe/Galaxy Mine would be visible from the Ruby Marsh Road from Hobson Pass to near Mahoney Canyon, a distance of just over 5 miles. Most prominent in this regard would be the Mooney Basin processing facility which is immediately adjacent to the Ruby Marsh Road. The Galaxy and Saga pits would be within approximately 1 mile of the road and would be highly visible, while the Horseshoe pit is more distant and topographic features reduce its visibility from Ruby Marsh Road. Visual contrast of these proposed modifications would be high because of the natural condition of the lands in this area. These lands are managed as visual resource management Class III. High levels of visual contrast would exceed the management guidelines for visual resource management Class III lands, and as a result the proposed Horseshoe/Galaxy project would result in high visual impacts.

Figure 4-1 shows three views looking west across the Horseshoe/Galaxy area from the Hobson Pass cutoff road (Viewpoint 1 on Map 3-7, Chapter 3). The first is an existing scene, the second is a computer-generated photosimulation showing the process area and the Horseshoe pit as it would appear near the height of mining; the proposed Galaxy pit would be concealed by the heap leach in the foreground. The third in this series shows the area as it would appear following successful reclamation. As this image illustrates, all structures would have been removed, some recontouring would have taken place, and except for the pits, all areas would have been revegetated. Visual contrasts at this point in time would primarily result from the

Existing Conditions

During Proposed Operation

Figure 4-1. Visual Simulation of the Mooney Basin Process Area


Following Successful Reclamation

Figure 4-1. Visual Simulation of the Mooney Basin Process Area

Figure 4-1. Visual Simulation of [illegible] remaining unnatural landform modifications and would be high for the Mooney Basin process area, moderate for the Galaxy and Saga sites, and low for the Horseshoe site. The long-term visual impacts of the Horseshoe/Galaxy operation would be substantially reduced in both degree and extent over the active mining conditions due to proposed reclamation efforts. However, because of the scale of the remaining, unnatural landform and the high level of visibility of this area, visual contrasts would remain high for the process area, resulting in long-term high visual impacts.

The proposed East Sage dump would be visible from a short segment (less than 2 miles) of the Ruby Marsh Road in the vicinity of Mahoney Canyon. This overlaps the visibility of the Horseshoe/Galaxy project. The distance from the viewpoint (approximately 3 miles) is the primary reason for contrast ratings being at a moderate level. This would result in a moderate visual impact level. This area also would be visible from a 2-mile segment of the Overland Road immediately west of the Maverick Springs Range. Visual contrast levels and impacts would be low from this distance (approximately 9 miles).

Figure 4-2 shows a view looking southwest from the Ruby Marsh Road toward the proposed East Sage dump (Viewpoint 2 on Map 3-7, Chapter 3). The first is an existing scene, and the second is a computer-generated photosimulation of this area as it would appear at the height of mining. The third in this series is also a photosimulation of this area following successful reclamation. As this last image illustrates, visual contrasts would be largely the result of the unnatural form of the remaining landforms. The color contrasts would be largely eliminated, reducing overall noticeability and visual contrast to moderate to low when seen from this viewpoint. Long-term visual impacts would therefore be reduced to low.

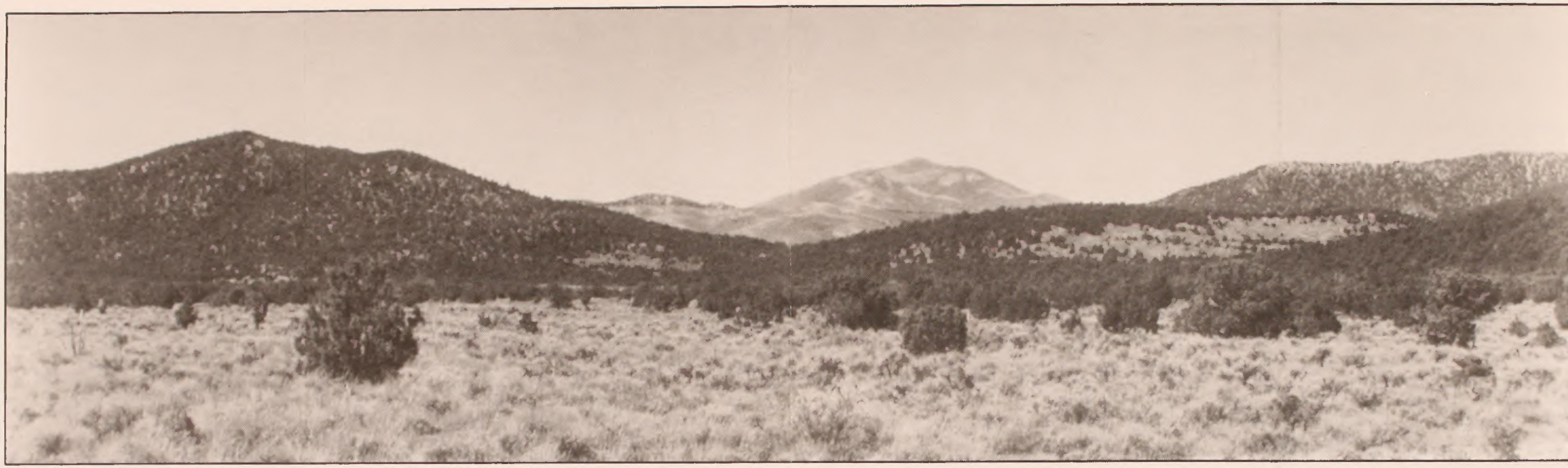
The South Water Canyon dump and proposed process expansion facilities would be visible from portions of the Newark and Huntington Valley Roads and adjacent portions of the Overland Trail at distances of greater than 5 miles. From these viewpoints, most of the existing Bald Mountain Mine operations also are visible. The large scale of the proposed modifications combined with the location of the South Water Canyon dump on the skyline would create a readily noticeable difference in the existing landscape. Within this context, visual contrast levels would be moderate to low. Visual impacts also would be moderate to low.

Figure 4-3 shows a view looking east from the intersection of the Overland Pass and Huntington Valley Roads (Viewpoint 3 on Map 3-7, Chapter 3). The first in this series is an existing scene, and the second is a computer-generated photosimulation showing this area near the height of mining. The third also is a photosimulation showing conditions from this viewpoint following successful reclamation. As this last image illustrates, all structures would have been removed, regrading of the rock dumps would have been accomplished, and the disturbed area aside from the pits would have been revegetated. As with other areas, the remaining visual contrast would be the result of unnatural form (pit, dump and leach areas) and color (pit wall) contrasts.

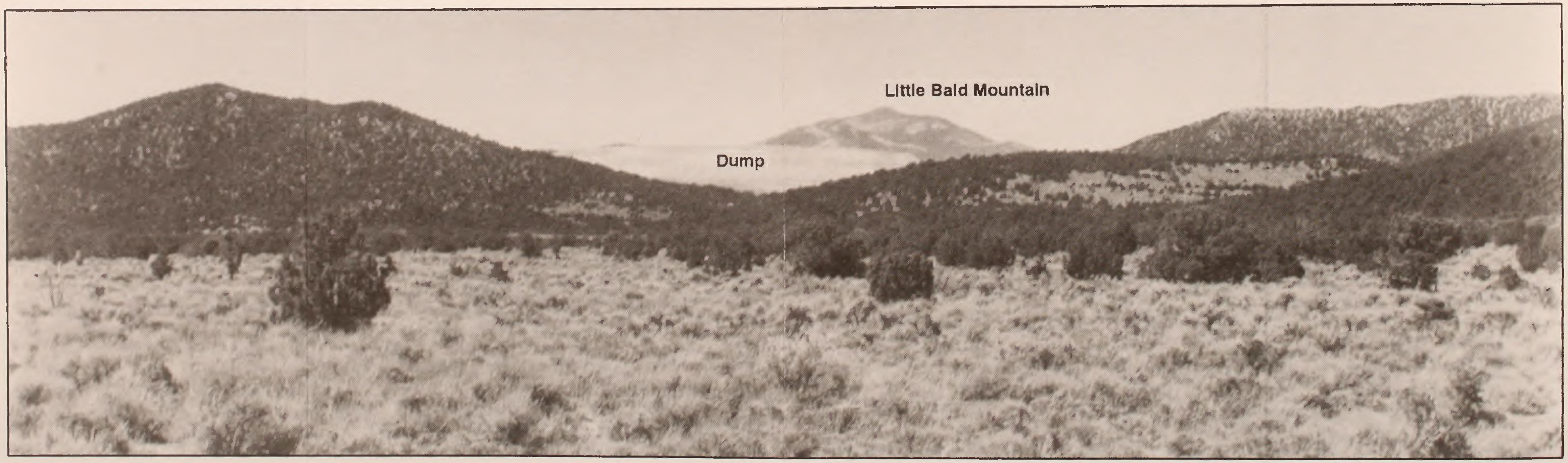
While noticeable contrast remains, the overall visual contrast would have been substantially reduced. At this distance, long-term visual impacts would be low.

4.1.14 Paleontological Resources

No impacts to significant or critical fossil resources requiring protection are anticipated as part of the Proposed Action. None of the

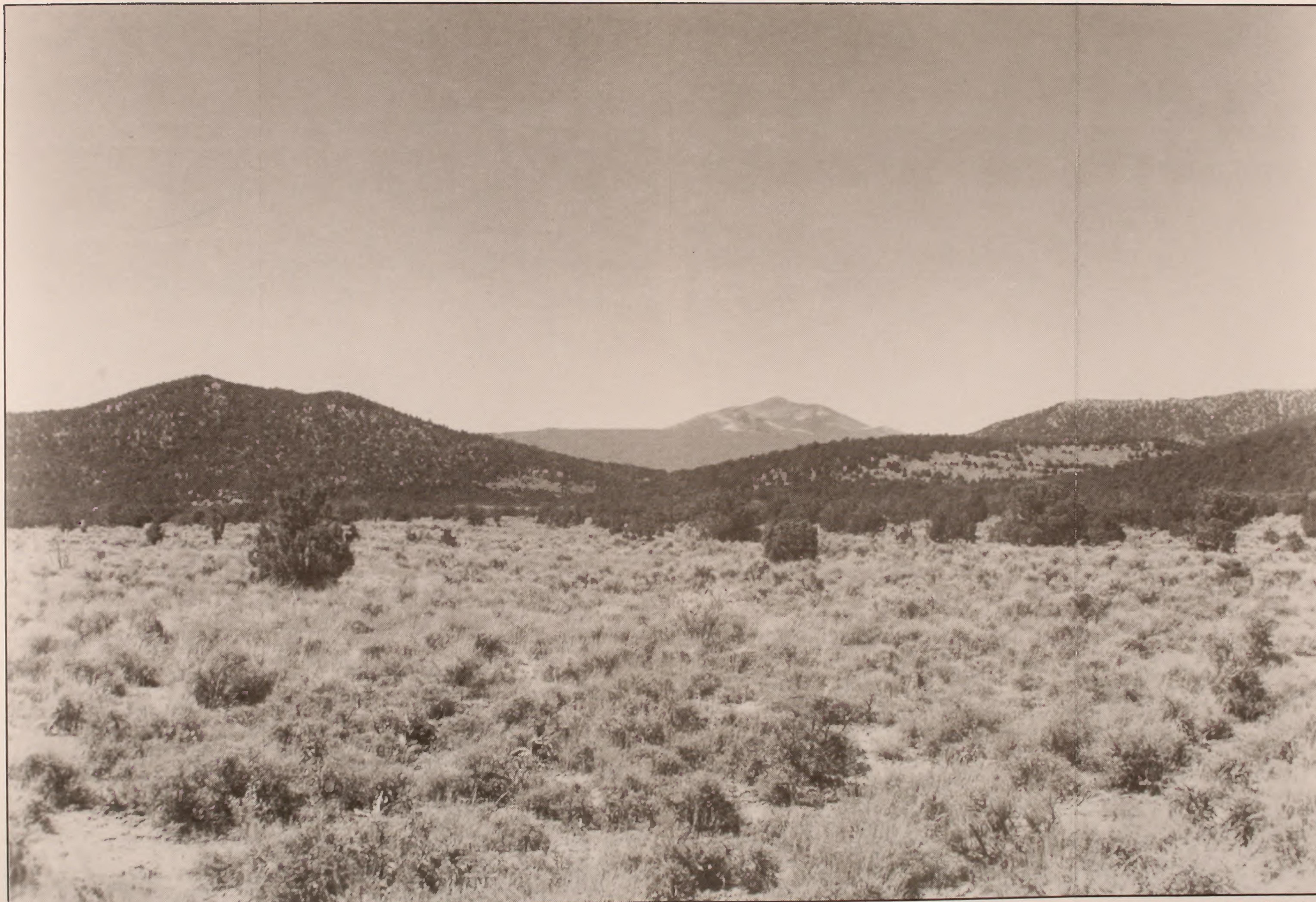


Existing Conditions



During Proposed Operation

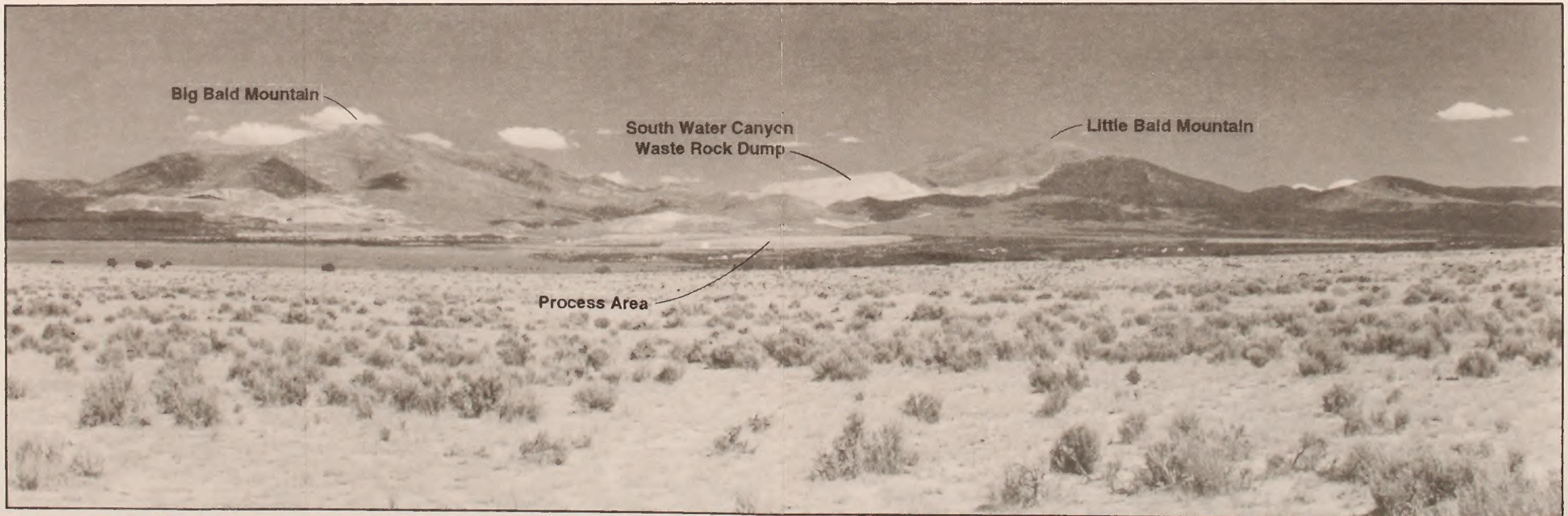
Figure 4-2. Visual Simulation of the East Sage Waste Rock Dump



Following Successful Reclamation

Figure 4-2. Visual Simulation of the East Sage Waste Rock Dump

Existing Conditions



During Proposed Operation

Figure 4-3. Visual Simulation of the Process and Top Area Modifications

Following Successful Reclamation

Figure 4-3. Visual Simulation of the Process and Top Area Modifications

paleontological resources identified in the Proposed Action area appear to have critical scientific or educational value. Potential direct impacts to the resources from the Proposed Action would be limited to areas of disturbance.

4.1.15 Reclamation

Under the Proposed Action, a total of 1,450 acres are expected to be disturbed (see Table 2-1); more than 90 percent of this total is expected to be reclaimed. Results of a test plot program would provide site-specific information addressing the optimum reclamation techniques to be utilized. All of the 447 acres of disturbance associated with the Process Area Modification would be reclaimed; unreclaimed acreage at the Horseshoe/Galaxy Mine and the Top Area (28 and 106 acres, respectively) would consist of portions of pits and haul roads that are returned to local access (see Table 2-1, Chapter 2).

The test plot program to be undertaken in conjunction with the Proposed Action would assess growth medium management practices; seedbed preparation techniques; revegetation goals; seeding techniques, mixtures, and rates; and the effectiveness of growth medium amendments (see Chapter 2, Reclamation Plan). The results of the test plot program would be applied to reclamation efforts in the Proposed Action area and should improve reclamation efforts at ongoing project sites in the vicinity. Reclamation would require fugitive dust emission control, not only during earth moving activities but also as a part of growth medium stockpile management.

4.1.16 Hazardous Materials and Wastes

As part of the Proposed Action, process chemicals and fuel would be transported by truck along the highways in the region (United States Highway 50, Highway 228, and Ruby Marsh Road), just as these materials have been transported to existing mines in the area. The impacts associated with the Proposed Action largely represent a continuation of waste management practices in use at the existing mines in the area.

Trucks also would be used to transport small quantities of hazardous waste on an infrequent basis; all contracted waste carriers would comply with all applicable regulations governing the transfer of hazardous wastes, including 49 Code of Federal Regulations and Department of Transportation Federal Motor Carrier Safety Regulations. Solid wastes would be split into hazardous and nonhazardous categories according to the regulatory framework outlined in Chapter 2. An application for a Class III sanitary landfill would be made in order to accommodate nonhazardous waste generated at the proposed Horseshoe/Galaxy Mine and ore processing facility. Antifreeze, lead-bearing wastes, waste oil, and solvent would be recycled at off-site facilities.

Fuel storage would be in aboveground tanks with secondary containment structures capable of completely containing 110 percent of the volume of the largest tank. Because of the engineered controls; emergency response plan; and leak detection monitoring system that would govern daily operations under the Proposed Action, a chemical or fuel release to the environment would be more likely during transport to or from the Proposed Action area.

4.1.16.1 Probability of a Release

Process chemicals and waste materials could be accidentally released during transport to and from the Proposed Action area. The Proposed Action would require additional quantities of sodium cyanide, sodium hydroxide, lime, hydrochloric acid, and antiscalants used in processing, and a slightly greater quantity of diesel fuel would be used in mine operations (see Appendix A). Of these compounds, only hydrochloric acid, sodium cyanide, and diesel fuel represent substantial (greater than 10,000 pounds or 10,000 gallons per year, respectively) increases in process chemicals that would be transported to the mine site in liquid form.

The probability of a truck accident involving hazardous materials was estimated from national accident statistics, haul distances, and number of deliveries per year. For the purposes of this analysis, the primary emphasis was placed on the release of liquid materials that could pose an immediate human health hazard or an off-site contaminant hazard.

The majority of the project-related truck transport is assumed to be between Elko and the mine site, a distance of approximately 75 miles. The probability of a truck accident resulting in the release of a hazardous material (such as diesel fuel) has been calculated using a national rate for such events of 0.28 releases per million miles traveled (Abkowitz et al. 1984). It is assumed that diesel fuel would be delivered at the rate of one load per week; sodium cyanide at the rate of one trip per month; and hydrochloric acid at the rate of two trips per month. The release probability for diesel fuel, hydrochloric acid, and sodium cyanide over the 12-year mine life are calculated as follows:

Diesel Fuel: 624 truck deliveries x
75-mile truck haul distance x
0.00000028 accidents per mile =
0.013 release (probability of 13 in 1,000)

Hydrochloric Acid: 288 truck deliveries x
75-mile truck haul distance x
0.00000028 accidents per mile =
0.006 release (probability of 6 in 1,000)

Sodium Cyanide: 144 truck deliveries x
75-mile truck haul distance x
0.00000028 accidents per mile =
0.003 release (probability of 3 in 1,000)

The above analysis indicates a very low likelihood of an accidental release of these liquid materials during the entire life of the project. Due to the infrequent pickup of hazardous waste (once per month), an accident resulting in this type of a release is not anticipated during the life of the project. Table 4-5 presents recent release statistics between 1983 and 1992 for trucks operating in the United States and Nevada. The probability of a spill in a populated area (e.g., the outskirts of Elko) is expected to be approximately 100 times less than the above estimates, because less than 1 mile of the 75-mile route would be in developed areas.

A release into a wetland or riparian area would not be likely since only 6 miles of the 75-mile route crosses this sensitive resource area. Prominent perennial water sources along the transportation route include South Fork of the Humboldt River, Cottonwood Creek, Smith Creek, Ten Mile Creek, and a number of other drainages flowing out of the western Ruby Mountains.

Table 4-5

Reported Annual Highway Incidents[1] Involving Hazardous Materials in the United States and Nevada 1983 - 1992

	United States	State of Nevada
1992	7,771	26
1991	7,629	27
1990	7,274	31
1989	6,037	46
1988	4,906	35
1987	4,953	23
1986	4,616	11
1985	4,752	13
1984	4,507	8
1983	4,869	6
Total	57,314	226
Average	5,731	23

[1]Incident = Unintentional release of material during transportation.

Source: United States Department of Transportation 1993.

4.1.16.2 Effects of a Release

The environmental effects of a release would depend on what is released, how much is released, and where it is released. The releases calculated above assume a hazardous material, but do not address volume or location. Potential releases could include a small amount of diesel fuel spilled during transfer operations at Horseshoe/Galaxy Mine or the loss of several thousand gallons of hydrochloric acid, diesel fuel, or sodium cyanide into a riparian drainage, such as Cottonwood Creek. In general, the materials of greatest concern would be diesel fuel and hydrochloric acid.

Potential impacts to the terrestrial and aquatic life resulting from a hazardous materials release in a riparian zone are discussed previously for wildlife resources and threatened or endangered species. Hydrochloric acid spilled onto the ground or into a water body has the potential to cause severe short-term damage to localized terrestrial and aquatic habitats. The oxidizing action of the acid destroys plant and animal cells.

An acid release into a stream or other water body has the potential for migrating much farther from the spill site, lowering the pH of the water, and likely reducing populations of aquatic invertebrates, amphibians, and fish. Acid spills may be neutralized by alkaline soils.

A release of diesel fuel also would "burn" vegetation in high concentrations. Although unlikely, such a spill also could ignite from the accident and cause a range fire. A spill into a water body would contaminate the water and sediment, possibly impacting local aquatic populations. Because cleanup actions would take place immediately, diesel contamination would not result in long-term increases in various hydrocarbons in soils, surface water, and possibly groundwater.

Sodium cyanide (NaCN) is used in the process solutions to leach gold. The effects of a sodium cyanide release would be highly variable, much more so than a release of hydrochloric acid or diesel fuel, and would depend on the amount of the release, the location of the release (e.g., dry upland area, wet meadow area, or flowing stream area), the organisms exposed, and the chemical conditions at the release location. The most likely effect of a release of sodium cyanide would be the poisoning of terrestrial and aquatic species. Animal species that drink contaminated water would suffer severe effects or death depending on the concentration of cyanide and the volume of the water consumed. Animals that survive an acute cyanide poisoning recover rapidly due to the natural detoxification processes within the body that remove the contaminant from the body. Environmental effects of a cyanide spill or leak would be limited in extent and time of contamination due to the rapid degradation of cyanide within the environment.

A large-scale release of fuel, acid, *or cyanide* would have implications for public health and safety. The location of the release would again be the primary factor in determining its importance. A release in a populated area could have effects ranging from simple inconvenience during cleanup to potential loss of life if an explosion and fire were involved. However, the probability of a release anywhere along a transportation route is very small; the probability of a release within a populated area is smaller; and the probability of a release involving an injury or fatality is smaller still. United States Department of Transportation statistics show that for the state of Nevada between 1983 and 1992, an average of 0.03 injuries or deaths occurred for each hazardous materials highway incident (United States Department of Transportation 1993). It is not anticipated that a release involving severe effects to human health or safety would occur during the life of the project. None of the process chemicals or fuels to be used in large quantities are carcinogenic. No increases in cancer risk as a result of a release or mining activity are expected.

The release of a hazardous material or waste into a sensitive area (such as stream, wetland, or populated area) is judged to be very unlikely. Again, depending on the material released, the amount released, and the location of the release, an accident resulting in a release could impact soils, water, biological resources, and people.

Response to a Release

Hydrochloric acid, diesel fuel, and sodium cyanide are designated as a "hazardous substance" for purposes of the release reporting requirements of the Comprehensive Environmental Response, Compensation and Liability Act (40 CFR Table 302.4). All releases of a "reportable quantity" of such hazardous substances must be reported to the National Response Center and the Nevada Divisions of Environmental Protection and Emergency Management. In addition, guidelines used by the Nevada Division of Environmental Protection require that areas affected by a release of cyanide be cleaned up until the concentration of cyanide in the soil is less than 2 milligrams of cyanide per kilogram of soil. Bald Mountain Mine would comply with all provisions of Federal and state law and ensure that all releases of hazardous substances would be reported promptly and thoroughly cleaned up.

In the event of a release enroute to the Proposed Action area, the transportation company would be responsible for response and cleanup. Local and regional law enforcement and fire protection agencies also may be involved to initially secure the site and protect public safety.

The emergency response plan would detail the appropriate response, treatment, and cleanup for a material spilled onto land or into water. For example, a release of hydrochloric acid could require neutralizing the spill with lime, flushing the area with water, or removing contaminated soil. Specific procedures would be developed for fuels, acids, and other hazardous materials. Any cleanup would be followed by appropriate restoration, which could include replacing removed soil, regrading the disturbed area, and seeding the area to prevent erosion and to return the land to its previous use.

4.1.17 Access and Land Use

4.1.17.1 Mine Development/Operation

The Proposed Action could affect land use resources and public access patterns both directly and indirectly by exerting a physical and/or visual influence. Direct effects may result in the termination or modification of the existing land uses in the Proposed Action area. Indirect impacts may result in altered land use or access patterns to use areas adjacent to or within view of the Proposed Action area. Indirect effects also would result if the Proposed Action stimulated or encouraged the development of land uses not presently anticipated.

The following criteria were integrated to determine impacts to land uses and public access: 1) potential conflicts with existing land use plans and studies (e.g., Bureau of Land Management Resource Management Plan; Buck and Bald, Maverick, and Diamond Mountains HMP; White

Pine County land use plan and zoning ordinances, Western Regional Corridor Study); 2) termination or modification of existing public access opportunities; 3) termination or modification to an existing land use, or a land use incompatibility; and 4) a general characterization of impact type (including duration, quantity, and quality of the impact). Direct impacts would affect primarily land ownership, public access patterns, livestock grazing allotments, wildlife and wild horse habitat, recreational opportunities, and woodland products. Impacts to recreation resources, wildlife, and wild horses are discussed earlier in this chapter.

Land Jurisdiction/Ownership

The total proposed land disturbance from the Proposed Action would be approximately 1,450 acres. All of this disturbance would occur on public lands administered by the Ely District Bureau of Land Management. The proposed development generally would preclude any public use of the affected lands for the life of the project. For both safety and security reasons, public access to the active mining and processing areas would be precluded to the maximum extent permitted by law during the life of the Proposed Action.

Land Use Plans

The Proposed Action would be consistent with existing land use plans. All mining and processing activities would take place on public lands administered by the Bureau of Land Management and, therefore, would not require a conditional use permit from White Pine County.

Access

The existing public access road at the north end of Mooney Basin (running near Horseshoe and East Bida pits) (see Map 2-2, Chapter 2) would be closed to the public during the life-of-mine operation. However, other public access roads exist in the area, including Ruby Marsh Road and Overland Road, and the road through the south end of Mooney Basin that connects with the Elko-Hamilton Stage Line Road. These roads would remain open during mining operations. At final closure, public access through the Top Area would be re-established.

Grazing Management

Approximately 1,450 acres of public rangeland administered by the Bureau of Land Management would be changed to mining or fenced off from the remainder of the Warm Springs Allotment. Table 4-6 summarizes forage production and animal unit months impacted by the Proposed Action. The Proposed Action would result in the short-term loss of an average of 138 (range of 88 to 188) tons per year of forage potentially utilized by livestock, and short-term displacement of 347 (range of 22 to 472) animal unit months (used by both livestock and wild horses). Approximately 345 animal unit months are expected to be recovered following reclamation. The long-term loss is expected to be 2 animal unit months (average impacted acreage minus reclaimed acreage), which represents less than 1 percent of the total animal units months for livestock and wild horses. Removal of land from the grazing allotment could direct the remaining livestock use into smaller portions of the allotment. Construction and operation of the proposed East Sage waste rock dump could reduce flow in Cherry Spring by reducing recharge to the perched aquifer that feeds the spring (see Water Quantity and Quality). In addition, construction of

Table 4-6

Forage Production and AUMs Impacted by the Proposed Action

Vegetation Types	Range Sites[1]	Acres Impacted	Potential Forage Production (lbs/ac/yr)[2]	Potential Available Forage Prodution (lbs/ac/yr)[3]	Adjusted Potential Forage Production[4] (lbs/ac/yr)	Potential Loss of Adjusted Forage[5] (tons/yr.)	Number of AUMs Displaced[6]
Big sagebrush	Gravelly clay, 10-12" (28BY086)	447	350-800	193-440	116-264	26-59	65-148
Big sagebrush	Gravelly clay, 12-14" (28BY087)	206	450-900	248-495	149-297	15-31	38-78
Big sagebrush	Calcareous loam, 10-14" (28BY094)	90	400-800	240-480	144-288	6-13	15-33
Low sagebrush	Mountain ridge, 12-14" (28BY034)	112	100-350	45-158	27-95	2-5	5-13
Mixed Shrub	Calcareous loam, 16+" (28BY085)	196	700-1,500	350-750	210-450	21-44	53-110
Mixed Shrub	Loamy slope, 12-16" (28BY015)	157	700-1,500	350-750	210-450	17-35	43-88
Mountain Mahogany	Stony mahogany savanna (28BY032)	4	75-300	26-105	16-63	<1	2
Piñon-juniper woodland	Piñon-juniper WSG, 12"-14" (28 BY 62) Piñon-curleaf mountain mahogany WSG, 14"-22" (28 BY 58)	238	There is no forage production associated with piñon-juniper woodland				
	TOTALS	1,450				88-188	221-472

Table 4-6 (Continued)

FOOTNOTES:

N/A = Not Applicable

[1]Piñon-juniper woodland vegetation type includes two Woodland Suitability Groups (WSG).

[2]Values were obtained from the Soil Conservation Service ecological site descriptions and indicate air dry forage production during unfavorable and favorable growing conditions.

[3]Values indicate amount of forage available for use by livestock.

[4]Values represent amount of forage typically utilized by livestock. Assumed utilization rate of 60 percent.

[5]Values were calculated using the amount of potentially utilized forage multiplied by the impact acres divided by 2,000.

[6]Values were calculated using the loss of potentially utilized forage divided by the average amount of forage required for 1 AUM (800 lbs of forage/AUM).

the proposed Process Area modification would disturb approximately 447 acres of the 3,536-acre Julian and West Bald seedings.

Woodland Products

The Proposed Action would result in the long-term loss of productivity on approximately 242 acres of manageable woodlands. This includes 238 acres of existing piñon/juniper trees, which are currently lightly used by the public for Bureau of Land Management-permitted harvesting of fuelwood, Christmas trees, and piñon nuts, and approximately 4 acres of mountain mahogany currently lightly used by the public for fuelwood harvesting. This short-term loss and long-term change in vegetation represents less than 1 percent of the manageable woodland in the Egan Resource Area.

Construction of the proposed project would remove the growth potential for between 21 and 25 cords of fuelwood per year for the 60 to 80 years estimated for natural reclamation, for a total of 1,260 to 2,000 cords of wood. Approximately 476 standing Christmas trees would be removed during construction of the proposed project. It is assumed that there is an ingrowth of an equal number of Christmas trees every 5 to 7 years; consequently, there would be a total productivity loss of between 2,380 and 3,332 Christmas trees over 35 years (estimated average age of a 6-foot Christmas tree). Finally, it is assumed that there is an average of 169 trees per acre, 3 inches or greater in diameter at the root collar. Of these, 70 percent would be piñon pine, or 118 piñon trees per acre, with an annual production of 5 pounds of piñon nuts per tree, and a rotation rate of 5 to 7 years. This would represent approximately 84 to 118 pounds of piñon nuts per acre on an annual basis (118 trees per acre x 5 pounds of nuts per tree/5 to 7 years); a rate of production that would be attained about 60 years after reclamation is initiated. Therefore, construction of the Proposed Action would result in the productivity loss of between 19,992 to 28,084 pounds of piñon nuts per year (238 acres of woodland habitat x 84 to 118 pounds per acre on an annualized basis), or 1.2 to 1.7 million pounds of piñon nuts over a 60-year assumed natural reclamation time period.

The long-term change in vegetation and loss of woodland products productivity would be minor impacts because the project area involves an area where public demand for woodland products is low due to its distance from population. The woodland products, if not removed to implement the action, would not be harvested but would be added to the biomass over time.

4.1.17.2 Mine Closure/Reclamation

Approximately 345 animal unit months are expected to be recovered following reclamation. The long-term loss is expected to be two animal unit months (average impacted acreage minus reclaimed acreage), which represent less than 1 percent of the total animal unit months for livestock and wild horses.

The closure, abandonment, and reclamation of the Proposed Action area would return public lands to their premining land uses as rangeland, wildlife and wild horse habitat, and dispersed recreation. Except for the mine pits and public access roads, all other areas would be reclaimed. Public access would be re-established through the area.

4.2 NO ACTION ALTERNATIVE

Under the No Action Alternative, impacts from the Proposed Action to the following resources, as described in the previous section, would not occur:

- Recreation
- Paleontological Resources
- Access and Land Use

Impacts to other resources within the Proposed Action area that are associated with current gold operations would continue. These ongoing impacts would end sooner under the No Action Alternative than under the Proposed Action (that is, mining would end 3 years sooner and reclamation would be complete 11 years sooner). These issues are discussed below.

A comparison of the No Action Alternative to the Proposed Action is found at the end of Chapter 2.

4.2.1 Soils

Approximately 1,450 acres of disturbance to soil associated with the Proposed Action would not occur under the No Action Alternative. About 68 acres of existing exploration disturbance in the Horseshoe/Galaxy area would be reclaimed.

4.2.2 Vegetation

Approximately 1,450 acres of native vegetation would not be impacted, as would occur under the Proposed Action. The test plot program intended to enhance growth medium management program, improve seeding techniques, and provide useful vegetation communities would not be developed under the No Action Alternative.

4.2.3 Geology and Minerals

Under the No Action Alternative, no additional resources would be permitted for mining. The current mining activities would continue until all permitted resources were extracted. The estimated total resource remaining would be approximately 1.4 million ounces of gold. Also, approximately 93,000 ounces of gold that would be recovered by processing permitted ore through the proposed carbon-in-leach facility would not be recovered.

4.2.4 Water Resources

The No Action Alternative, the existing water quantity and quality as outlined in Chapter 3 would remain. Cherry Spring would not potentially be impacted by the proposed East Sage waste rock dump.

4.2.5 Wetlands and Waters of the United States

Approximately 0.04 acre of other waters of the United States located near the proposed Horseshoe/Galaxy process and leach area would not be impacted under the No Action Alternative. Also, Cherry Spring, wetlands, and other waters of the United States present within the project vicinity would not be subjected to indirect impacts resulting from potential increases in sedimentation or erosion, or the decrease of hydrological recharge.

4.2.6 Wildlife and Fisheries Resources

Approximately 1,450 acres of native wildlife habitat would not be affected, as for the Proposed Action. Of those 1,450 acres, 353 acres of mixed shrub, 238 acres of piñon-juniper, and 4 acres of mountain mahogany would not be affected, preventing potential impacts to nesting birds. Under the No Action Alternative, displacement of animals, particularly mule deer, and habitat fragmentation would not increase. No additional crucial mule deer winter range would be affected, but movements of mule deer in the Bald Mountain area would continue to be affected by the South Water Canyon haul road, which would not be reclaimed. No effects to upland game bird nesting and brooding habitat would occur. Noise levels in the Proposed Action area would tend to decrease, as existing mining operations cease and areas are reclaimed. Potential effects to seasonal water flow at Cherry Spring would not occur. The potential for a hazardous waste release along the two transportation corridors to the Proposed Action area would continue at its current level, decreasing as existing mining operations move toward closure.

4.2.7 Threatened, Endangered, or Candidate Species

Under the No Action Alternative, no impacts to threatened, endangered, or other sensitive wildlife species would occur. No impact to populations or habitat of the Nachlinger catchfly or Holmgren smeloskia would occur.

4.2.8 Wild Horses

Under the No Action Alternative, impacts from mining to wild horses would remain at current levels within the Buck and Bald Herd Management Area.

4.2.9 Air Quality

Under the No Action Alternative, dust emissions would continue from the current gold activities. Emission levels would generally decrease with time, as the gold production ceases and vegetation is re-established on those areas previously disturbed by past mining activities. Vehicle emissions from the current gold operations and from employees traveling to and from the mine also would continue.

4.2.10 Cultural Resources

Under the No Action Alternative, impacts to cultural resources would not occur. There would be continued erosional effects and illegal collecting occurring at a similar rate to what is currently taking place in the area.

4.2.11 Social and Economic Resources

Under the No Action Alternative, the economies of White Pine and Elko Counties would not benefit from the addition of 25 new direct mining jobs and 19 additional indirect jobs associated with the Proposed Action. The 208 existing mining jobs would be lost when current gold production ceases. At that time, tax revenues would decrease or no longer be accrued from the mine, including net-proceeds-from-mines revenues for White Pine County and the State of Nevada, property tax revenues for White Pine County, and sales and use tax revenues related to the operation of the mine. The salaries from these jobs, and their multiplier effect in the local communities, also would be lost. The workers would likely attempt to acquire work at other mines or other businesses in the area, depending on the available jobs at that time. If jobs were unavailable, the unemployed workers would either remain in the area, continuing their demands on community services, or would relocate to another area for employment. If workers left at a time when there was a net loss of population in the communities, there could be under-used infrastructure (schools, housing, etc.) in the communities.

4.2.12 Visual Resources

Under the No Action Alternative the visual resource management guidelines for visual impacts on Class III lands would not be exceeded.

4.2.13 Reclamation

Under the No Action Alternative, 1,450 acres associated with the Proposed Action would not be disturbed. In addition, the test plot program to be developed as part of the Proposed Action would not be developed under the No Action Alternative. As a result, improved techniques for growth medium management, seedbed preparation, seeding, and revegetation success would not be developed for the Proposed Action area.

4.2.14 Hazardous Materials and Wastes

Under the No Action Alternative, the transport, transfer, storage, use, and disposal or consumption of process chemicals and fuel would continue, although increased quantities of specific chemicals such as hydrochloric acid and sodium cyanide would not be required for the carbon-in-leach circuit, which would not be used. The probability of a release would be reduced as mining operations slow and the need for chemicals or fuel declines.

4.3 ALTERNATIVE TO BACKFILL PITS AT THE HORSESHOE/GALAXY MINE

Impacts to the following resources from backfilling Horseshoe/Galaxy pits would be the same as those described under the Proposed Action:

- Wetlands and Waters of the United States
- Social and Economic Resources.
- Visual Resources
- Paleontological Resources

4.3.1 Soils

Under the Backfill Alternative, the disturbance to three soil associations (Pookaloo-Cavehill-Rock outcrop, Upatad-Cropper-Atlow, and Bobs-Fax-Parisa) would be reduced by 2, 15, and 1 acre, respectively (see Table 4-7). A total of 18 fewer acres would be disturbed under this alternative than under the Proposed Action (1,450 acres).

4.3.2 Vegetation

Under the Backfill Alternative, the disturbance to two vegetation types would be reduced as compared to the Proposed Action (see Table 4-8). The impact to big sagebrush (range site: gravelly-clay 12 to 14") would decrease by 9 acres and 9 fewer acres of piñon-juniper woodland would be disturbed. The undisturbed piñon-juniper acreage would have potential for woodland product harvesting, and both vegetation types would provide wildlife habitat.

4.3.3 Geology and Minerals

Backfilling of the pits in the Horseshoe/Galaxy area would impact the known resources in the vicinity of the pit areas, and thus would not be

Table 4-7

Soil Association Acreages Impacted by the Proposed Action and Alternatives

Soil Associations (Map Unit Number)	Proposed Action	Backfill Alternative	South Water Canyon Dump Alternative	East Sage Dump Alternative	3:1 Side Slope Alternative
1 Pookaloo-Cavehill-Rock outcrop (100)	30	28	30	30	30
2 Hutchley-Tusel-Suak (226)	230	230	253	190	268
3 Pioche-Segura-Cropper (480/481)	195	195	170	168	194
4 Segura-Mclvey-Hutchley (500)	217	217	215	239	215
5 Mclvey-Segura-Cropper (566)	9	9	10	12	14
6 Cavehill-Grink-Rock Outcrop (670)	113	113	121	131	112
7 Upatad-Cropper-Atlow (753)	34	19	34	34	34
8 Abgese-Yody-Shabliss (920)	169	169	169	169	169
9 Hunnton-Chiara (1010)	278	278	278	278	278
10 Bobs-Fax-Parisa (1081)	171	170	171	171	171
11 Wardbay-Hardol-Adobe (1372)	4	4	4	4	4
Previously disturbed soil (Rat dump and existing haul road)	---	---	---	---	113
Totals	1,450	1,432	1,478	1,426	1,602

[1]Differences in acreages from the Proposed Action occur at Horseshoe/Galaxy Mine.

[2]Differences in acreages from the Proposed Action occur at the Top Area.

Table 4-8

Vegetation Types and Range Sites Impacted by the Proposed Action and Alternatives

Vegetation Types	Range Sites[1]	Proposed Action	Backfill Alternative	South Water Canyon Dump Alternative	East Sage Dump Alternative	3:1 Side Slope Alternative
Big sagebrush	Gravelly clay, 10-12" (28BY086)	447	447	454	457	447
Big sagebrush	Gravelly clay, 12-14" (28BY087)	206	197	269	261	227
Big sagebrush	Calcareous loam, 10-14" (28BY094)	90	90	92	91	90
Low sagebrush	Mountain ridge, 12-14" (28BY034)	112	112	93	76	116
Mixed shrub	Calcareous loam, 16+" (28BY085)	196	196	148	165	195
Mixed shrub	Loamy slope, 12-16" (28BY015)	157	157	177	133	170
Mountain mahogany	Stony mahogany savanna (28BY032)	4	4	3	1	2
Piñon-juniper woodland	Piñon-juniper WSG, 12" - 14" (28BY 62) Piñon-curlleaf mountain mohogany WSG, 14" - 22" (28BY58)	238	229	242	242	242
Previously disturbed area (Rat dump and existing haul road)	N/A	N/A	N/A	N/A	N/A	113
	TOTAL	1,450	1,432	1,478	1,426	1,602

[1]Piñon-juniper woodland vegetation type includes 2 Woodland Suitability Groups (WSG).

N/A = Not Applicable

reasonable with respect to anticipated future mining in this area. The backfilling of the pits either completely or partially with waste rock would reduce the feasibility of recovering the remaining resources and reduce the feasibility of mining the proposed pits. Secondly, the potential of additional resources in the Galaxy and Saga areas is very high. Gold mineralization in the Mooney Basin area occurs along high-angle faults trending northwest and northeast, and at the contact between the Devil's Gate Limestone and the Pilot Shale. The proposed pits meet both geologic criteria and as future drilling is completed in the vicinity of the pits, additional resources are anticipated to be located.

As previously stated, backfilling the Horseshoe/Galaxy pits would greatly increase the mining costs. For partially backfilling the Horseshoe pit, mining costs would increase by an estimated $319,700 ($0.58/ton of waste for 550,000 tons). This increase in costs includes the additional time necessary for the trucks to haul the waste rock the 1.9 miles, the increased cost to maintain the 1.9 miles of haul road, and the increased cost to backfill Horseshoe pit. The increased cost of backfilling Horseshoe pit with waste rock would bring into question the feasibility of mining the deposit under current conditions.

For backfilling the Saga 1 and 2 pits, mining costs to backfill 1,142,000 tons of waste rock would increase by $376,800 or $0.33/ton of waste rock. This increase in costs includes the additional time necessary for the trucks to haul the waste rock from pits 3 and 4 uphill to pits 1 and 2. The additional cost also includes construction of the haul road to access the upper rim of pits 1 and 2 and the maintenance of this additional haul road. The increased cost of backfilling these pits with waste rock would bring into question the feasibility of mining the deposit under current conditions.

Due to the unknown resources in the mining areas, the only potential operational method to backfill the pits would be total and complete rehandling of the waste rock. This would involve mining the pits as in the Proposed Action and building the waste rock dumps as proposed. At the end of the currently projected mine life, an evaluation would have to be performed to determine if additional resources remained in the area. If it were determined that no resources remained, the waste rock would have to be moved back into the pits. Because the ore was removed, it would not be possible to completely backfill all the pits. Operational considerations would determine which pits would be backfilled and subsequently reclaimed. Although the remaining resource in the immediate pit areas may not be economically feasible to mine at that current time period, it still would be a potential resource area. Finally, the cost to rehandle the waste material to backfill pits in this manner would render the Horseshoe/Galaxy project infeasible.

4.3.4 Water Resources

Backfilling of pits in the Horseshoe/Galaxy area would reduce the potential recharge to groundwater in this area by approximately 1 acre-feet/year as compared to the Proposed Action. Backfilling of pits would not have any impact on groundwater quality.

4.3.5 Wildlife and Fisheries Resources

Under the Backfill Alternative, overall impacts to wildlife and fisheries resources would essentially be the same as those listed for the Proposed Action. The amount of both big sagebrush and piñon-juniper woodland removed would be 9 acres (18 acres total habitat) less than that affected by the Proposed Action (see Table 4-8). The total unreclaimed areas also would be reduced by 9 acres, since the backfilled pits would be reclaimed.

4.3.6 Threatened, Endangered, or Candidate Species

Under the Backfill Alternative, impacts to sensitive wildlife and plant species would be the same as those described for the Proposed Action. The amount of native habitat removed would be 18 acres less than that for the Proposed Action, 9 acres of big sagebrush and 9 acres of piñon-juniper woodland.

4.3.7 Wild Horses

Under the Backfill Alternative, impacts to wild horses would be the same as those described for the Proposed Action. The 18 fewer acres of habitat loss would not substantially change impacts to wild horses.

4.3.8 Cultural Resources

Under the Backfill Alternative, the areas of the two waste rock dumps would be reduced. It is anticipated that the reduction of the dump site at the Saga waste rock dump would reduce but not eliminate impacts to site 46-7559. Reduction in the size of the Galaxy waste rock dump would have no effect on known cultural resources.

4.3.9 Air Quality

Under the Backfill Alternative, fugitive dust emissions associated with the increased number of haul trips for backfilling would cause a temporary decline in air quality. Oxides of nitrogen, carbon monoxide, and sulfur dioxide levels also would rise due to the increased vehicular emissions.

4.3.10 Recreation

Under the Backfill Alternative, overall impacts to recreation resources during mine development and operation would be the same as those described under the Proposed Action. However, 18 fewer acres would be disturbed under this alternative, and because Saga pits would be backfilled and reclaimed, an additional 9 acres would be available for post-mining land use, including dispersed recreation.

4.3.11 Reclamation

Under the Backfill Alternative, the area disturbed would be reduced by 18 acres by not constructing the Galaxy dump and reducing the Saga dump. Saga pits 1 and 2 would be backfilled and reclaimed, thus reducing the area not reclaimed by 9 acres to 125 acres. The Horseshoe pit would not be completely backfilled and would not be reclaimed.

4.3.12 Hazardous Materials and Wastes

Under the Backfill Alternative, an estimated 60,000 additional gallons of diesel fuel would be required for mine equipment used to backfill Horseshoe and Saga 1 and 2 pits. This quantity represents a 2 percent increase over the Proposed Action, assuming that backfilling efforts would occur during year 3 of the life of the Horseshoe/Galaxy Mine. Transporting this fuel to the mine site would result in only a very small increase in the probability of an accident and spill. Emergency response procedures would be the same as for the Proposed Action.

4.3.13 Access and Land Use

Under the Backfill Alternative, impacts to land use, including land jurisdiction/ownership, land use plans, access, livestock management, and woodland products during mine development and operation would be the same as those described under the Proposed Action. However, the area disturbed would be reduced by 18 acres, and because two of the four Saga pits would be backfilled and reclaimed, an additional 9 acres would be available for post-mining land use, including livestock grazing and/or dispersed recreation.

Table 4-9 summarizes forage production and animal unit months impacted by the Backfill Alternative. Approximately 1,432 acres of public rangeland administered by the Bureau of Land Management would be changed to mining or fenced off from the remainder of the Warm Springs Allotment. This alternative would result in the short-term loss of an average of 137 tons per year (range of 88 to 186) of forage potentially utilized by livestock and short-term displacement of 344 animal unit months (used by both livestock and wild horses). Approximately 343 animal unit months are expected to be recovered following reclamation. The long-term loss is expected to be 1 animal unit month (average impacted acreage minus reclaimed acreage), which represents less than 1 percent of the total animal unit months for livestock and wild horses.

4.4 ALTERNATIVE TO RELOCATE HAUL ROAD AND MODIFY SOUTH WATER CANYON DUMP

Impacts to the following resources from relocating a haul road and modifying South Water Canyon dump would be the same as those described under the Proposed Action.

- Water Resources
- Air Quality
- Social and Economic Resources
- Visual Resources
- Paleontological Resources
- Hazardous Materials and Wastes

4.4.1 Soils

Under the South Water Canyon Dump Alternative, the disturbance to three soil associations, the Hutchley-Tusel-Suak, the Cavehill-Grink-Rock Outcrop, and the Mclvey-Segura-Cropper, would increase by 23, 8, and 1 acres, respectively, as compared to the Proposed Action (see Table 4-7). The disturbance of two soil associations, the Pioche-Segura-Cropper and the Segura-Mclvey-Hutchley, would decrease by 25 and 2 acres, respectively. A total of 28 more acres would be disturbed under this alternative.

4.4.2 Vegetation

Under the South Water Canyon Dump Alternative, the disturbance to the mixed shrub and low sagebrush vegetation types would be reduced by 28 and 19 acres, respectively (see Table 4-8). The disturbance to the big sagebrush vegetation type would increase by 72 acres.

4.4.3 Geology and Minerals

Implementation of the South Water Canyon Dump Alternative would cost $1,980,000 less than for the Proposed Action over the project life based on the following assumptions:

1. Hauling would be 50 percent of mining cost.

Table 4-9

Summary of Forage Production and AUMs Impacted by the Backfill Alternative

Vegetation Types	Range Sites[1]	Acres Impacted	Potential Forage Production (lbs/ac/yr)[2]	Potential Available (lbs/ac/yr)[3]	Adjusted Potential Production (lbs/ac/yr)[4]	Potential Loss of Production (tons/yr)[5]	Number of AUMs Displaced[6]
Big Sagebrush	Gravelly clay, 10-12" (28BY086)	447	350-800	193-440	116-264	26-59	65-148
	Gravelly clay, 12-14" (28BY087)	197	450-900	248-495	149-297	15-29	38-73
	Calcareous loam, 10-14" (28BY094)	90	400-800	240-480	144-288	6-13	15-33
Low Sagebrush	Mountain ridge, 12-14" (28BY034)	112	100-350	45-158	27-95	2-5	5-13
Mixed Shrub	Calcareous loam, 16+" (28BY085)	196	700-1,500	350-750	210-450	21-44	53-110
	Loamy slope, 12-16" (28BY015)	157	700-1,500	350-750	210-450	17-35	43-88
Mountain Mahogany	Stony mahogany savanna (28BY032)	4	75-300	26-105	16-63	<1-<1	2-2
Pinyon-juniper woodland	Piñon-juniper WSG, 12"-14" (28 BY 62) Piñon-curleaf mountain mahogany WSG, 14"-22" (28 BY 58)	229	There is no forage production associated with piñon-juniper woodland.				
Size	TOTAL	1,432				88-186	221-467

Table 4-9 (Continued)

FOOTNOTES:

N/A = Not Applicable

[1]Piñon-juniper woodland vegetation type includes two Woodland Suitability Groups (WSG).

[2]Values were obtained from the Soil Conservation Service ecological site descriptions and indicate air dry forage production during unfavorable and favorable growing conditions.

[3]Values indicate amount of forage available for use by livestock.

[4]Values represent amount of forage typically utilized by livestock. Assumed utilization rate of 60 percent.

[5]Values were calculated using the amount of potentially utilized forage multiplied by the impact acres divided by 2,000.

[6]Values were calculated using the loss of potentially utilized forage divided by the average amount of forage required for 1 animal unit month (800 lbs of forage/animal unit month).

2. Actual haulage time would be 67 percent of hauling cost (33 percent is fixed cost).
3. Haul road construction would be $200,000.

Total haul distance for this alternative would be 16 percent less than for the Proposed Action.

4.4.4 Water Quantity and Quality

Under the South Water Canyon Dump Alternative, the haul road would be relocated and constructed so that there would be no impact to water flow or water quality in the springs and seeps of North Water Canyon. The road would be properly built with berms and gutters to prevent sediment-laden runoff into North Water Canyon. Proper construction of the haul road coupled with the diversion drains to maintain flow of the springs to the intermittent drainages in North Water Canyon should allow use of the haul road without any noticeable impact on spring flow rates or spring water quality.

4.4.5 Wetlands and Waters of the United States

Under the South Water Canyon Dump Alternative, construction of this alternative would not directly impact wetlands. However, as described for the Proposed Action, approximately 0.04 acre of other waters of the United States (i.e., intermittent drainage) would be directly impacted by placement of culverts during the construction of haul roads near the proposed Horseshoe/Galaxy process and leach area. A portion of the intermittent drainage located north of the proposed process and leach area would not be directly or indirectly impacted by mine development and operation. The implementation of environmental protection measures (e.g., sediment control measures) during construction and operation activities would eliminate potential sedimentation impacts to this portion of the intermittent drainage (see Chapter 2).

Wetlands and other waters of the United States located in North Water Canyon would not be directly impacted by mine development and operation. Erosion control measures, as described in Chapter 2, would be implemented to minimize potential sedimentation impacts to these wetlands and intermittent drainages. However, minor indirect impacts to these wetlands and intermittent drainages may occur during construction and operation of the proposed haul road in North Water Canyon. The erosion of soils along the haul road embankments during high precipitation events and snowmelt may cause minor sedimentation impacts to these wetlands and intermittent drainages.

Potential impacts to Cherry Spring would be avoided with the implementation of environmental measures as described for the Proposed Action.

4.4.6 Wildlife and Fisheries Resources

Under the South Water Canyon Dump Alternative, generally, impacts to wildlife would be the same as that described for the Proposed Action. However, this alternative also would result in increased impacts to a number of wildlife species along North Water Canyon, particularly those associated with the naturally occurring seeps and springs in the area.

General habitat differences between this alternative and the Proposed Action would include an additional 72 acres of big sagebrush affected, 19 fewer acres of low sagebrush removed, and 28 fewer acres of mixed shrub affected. The reduced impacts to mixed shrub habitat would be beneficial to wildlife resources when compared with Proposed Action.

The primary impacts to wildlife resources from the South Water Canyon Dump Alternative would be the effects to wildlife dependent on the North Water Canyon Spring, in addition to species that use the adjacent seeps located along the canyon bottom. The current haul road placement would physically avoid directly impacting these seeps and springs. However, the primary impact would be the associated noise, vehicle traffic, and disturbance from continual truck traffic between the Top Area and the processing facility.

Resident mule deer rely heavily upon the North Water Canyon Spring during the summer season. Continual truck traffic would restrict deer access to the water source, particularly resident deer that occupy the Proposed Action area on a year-long basis, preventing deer from accessing this spring. Mine operation would result in the loss of this available water source for deer, wild horses, and livestock use. Mule deer winter range occurs throughout North Water Canyon, with deer concentrations located on the hill and ridge between the canyon and the existing haul road to the south. However, effects to wintering deer would not be as great, since the animals are more dispersed than resident deer that use the spring as a primary water source.

Potential vehicle-related mortalities for mule deer would be about the same as for the Proposed Action. Since the existing haul road would be recontoured upon reclamation, the potential for injuries to deer would decrease, as they cross the existing road and negotiate the steep, rocky hill. However, the relocation of the haul road into North Water Canyon would increase the potential for vehicle-related mortalities of both resident and migratory mule deer from mine traffic. The loss of the south-facing slope associated with the South Water Canyon waste rock dump would be an adverse impact for wintering deer, since this area is used heavily during the winter season.

A red-tailed hawk nest is located in a chokecherry grove adjacent to the enclosure associated with North Water Canyon Spring. Depending on final road alignment, this nest would be within 100 to 300 feet of the 80-foot-wide haul road. Use of the haul road by mine traffic could result in nest abandonment by the breeding birds.

Because of the diversity of habitats, North Water Canyon is a predominant foraging area for other raptors, including the golden eagle, Cooper's hawk, sharp-shinned hawk, northern harrier, and great-horned owl. The proposed relocation of the haul road would impact raptor foraging, likely resulting in birds moving out of the canyon system. This loss would be considered a long-term impact of valuable foraging habitat.

Finally, the North Water Canyon Spring system also supports breeding and migratory passerines and upland game birds, including sage grouse, mourning dove, and chukar. Because of the associated habitat diversity, the Bureau of Land Management has documented high use of this canyon for both nesting, brooding, and foraging activities. Haul road relocation would result in a loss of nesting, brooding and foraging habitat, in addition to increased disturbances to brooding birds and their young. With continued use of the haul road, passerine and upland game bird use of this system would decrease.

In summary, the habitat associated with North Water Canyon is important to a number of area wildlife species. Proposed mine operations under this alternative would adversely affect wildlife use of this riparian system.

4.4.7 Threatened, Endangered, or Candidate Species

Under the South Water Canyon Dump Alternative, the impacts to sensitive wildlife species would be about the same as those described for the Proposed Action and for this alternative discussion for wildlife resources. No listed or candidate species have been documented in North Water Canyon, but it would provide valuable foraging habitat for a number of species, including the peregrine falcon, ferruginous hawk, all six candidate bat species, and possibly the pygmy rabbit. Impacts to sensitive plant species would be the same as those described for the Proposed Action.

4.4.8 Wild Horses

Under the South Water Canyon Dump Alternative, anticipated impacts to wild horses would be about the same as those described for the Proposed Action and for this alternative discussion for wildlife resources. The relocation of the haul road into North Water Canyon would directly impact wild horse use of the spring, and increase the potential for vehicle collisions with wild horses. Essentially, the impacts to wild horses would parallel that described for mule deer.

4.4.9 Cultural Resources

Under the South Water Canyon Dump Alternative, impacts to cultural resources would be identical to those identified for the Proposed Action. Portions of the proposed North Water Canyon haul route and South Water Canyon dump would require inventorying.

4.4.10 Recreation

Impacts to recreation under the South Water Canyon Dump Alternative would differ from the Proposed Action in the number of acres affected. An additional 28 acres of Bureau of Land Management-administered public land currently available for dispersed recreation opportunities would be converted to mining.

4.4.11 Reclamation

Under the South Water Canyon Dump Alternative, 28 additional acres would be disturbed and reclaimed. The overall length of the 2.2:1 reclaimed waste rock dump slope would be reduced. This would reduce the potential for erosion from the longer slopes associated with the Proposed Action. This would also enhance revegetation by having more flat surfaces. The final waste rock dump slope would not encroach on the reclaimed Rat area. Approximately 5,500 feet of the existing South Water Canyon haul road would be covered by the reclaimed dump. Currently, existing deep road cuts impede deer movement through the area. Under this alternative, a portion of the steep slopes associated with the road cuts would be reclaimed, allowing better movement of deer through the area. In addition, the North Water Canyon haul road would have few deep cuts to be reclaimed.

4.4.12 Access and Land Use

Under the South Water Canyon Dump Alternative, impacts to land use plans, access, and woodland products would be the same as those described under the Proposed Action. Impacts to land jurisdiction/ownership and livestock management under this alternative would differ from the Proposed Action in the number of acres affected. An additional 28 acres of Bureau of Land

Management-administered public land would be converted from existing land uses, such as dispersed recreation, wildlife and wild horse habitat, and livestock grazing, to mining. In addition, based on the anticipated vegetation loss under this alternative, additional livestock grazing animal unit months would be displaced within the Warm Springs livestock grazing allotment.

Table 4-10 summarizes forage production and animal unit months impacted by the South Water Canyon Dump Alternative. This alternative would result in the short-term loss of an average of 141 tons per year of forage (range of 90 to 191) potentially utilized by livestock and short-term displacement of approximately 350 animal unit months (range of 222 to 478) used by both livestock and wild horses. Approximately 353 animal unit months are expected to be recovered following reclamation. The long-term gain is expected to be 3 animal unit months.

4.5 ALTERNATIVE TO RELOCATE HAUL ROAD AND MODIFY EAST SAGE DUMP

Impacts to the following resources from relocating a haul road and modifying the East Sage dump would be the same as those described under the Proposed Action:

- Air Quality
- Social and Economic Resources
- Visual Resources
- Paleontological Resources
- Solid and Hazardous Wastes

4.5.1 Soils

Under the East Sage Dump Alternative, the disturbance to two soil associations, the Hutchley-Tusel-Suak and the Pioche-Segura-Cropper, would be reduced by 40 and 27 acres, respectively (see Table 4-7). In addition, the disturbance of three soil associations, Segura-McIvey-Hutchley, McIvey-Segura-Cropper, and Cavehill-Grink-Rock Outcrop would be increased by 22, 3, and 18 acres, respectively. A total of 24 fewer acres would be disturbed under this alternative than under the Proposed Action.

4.5.2 Vegetation

Under the East Sage Dump Alternative, 24 fewer acres of vegetation would be disturbed. The disturbance to the mixed shrub, low sagebrush, and mountain mahogany vegetation types would be reduced by 94 acres (see Table 4-8). The impact to low sagebrush would drop by 36 acres, to mixed shrub by 55 acres, and to mountain mahogany by 3 acres. The disturbance to the big sagebrush (66 acres) and piñon-juniper woodland (4 acres) vegetation types would be increased by 70 acres.

All vegetation types have habitat or forage value for wildlife or livestock, respectively.

4.5.3 Geology and Minerals

Implementation of the East Sage Dump Alternative would cost $2,385,000 less than for the Proposed Action over the project life based on the same assumptions presented under Geology and Minerals for the Alternative to Relocate Haul Road and Modify South Water Canyon Dump. Total haul distance for this alternative would be 18 percent less than for the Proposed Action.

Table 4-10

Summary of Forage Production and AUMs Impacted by the South Water Canyon Dump Alternative

Vegetation Types	Range Sites[1]	Acres Impacted	Potential Forage Production (lbs/ac/yr)[2]	Potential Available Forage (lbs/ac/yr)[3]	Adjusted Potential Forage Production (lb/ac/yr)[4]	Potential Loss of Forage Production (tons/yr)[5]	Number of AUMs Displaced[6]
Big Sagebrush	Gravelly clay, 10-12" (28BY086)	454	350-800	193-440	116-264	26-60	66-150
	Gravelly clay, 12-14" (28BY087)	269	450-900	248-495	149-297	20-40	50-100
	Calcareous loam, 10-14" (28BY094)	92	400-800	240-480	144-288	7-13	17-33
Low Sagebrush	Mountain ridge, 12-14" (28BY034)	93	100-350	45-158	27-95	1-4	3-11
Mixed Shrub	Calcareous loam, 16+" (28BY085)	148	700-1,500	350-750	210-450	16-33	39-83
	Loamy slope, 12-16" (28BY015)	177	700-1,500	350-750	210-450	19-40	46-100
Mountain Mahogany	Stony mahogany savanna (28BY032)	3	75-300	26-105	16-63	<1-<1	<1 - <1
Piñon-juniper woodland	Piñon-juniper WSG, 12"-14" (28 BY 62) Piñon-curleaf mountain mahogany WSG, 14"-22" (28 BY 58)	242	There is no forage production associated with piñon-juniper woodland.				
	TOTAL	1,478				90-191	222-478

FOOTNOTES:

NA = Not Applicable

[1]Piñon-juniper woodland vegetation type includes two Woodland Suitability Groups (WSG)

[2]Values were obtained from the Soil Conservation Service ecological site descriptions and indicate air dry forage production during unfavorable and favorable growing conditions.

[3]Values indicate amount of forage available for use by livestock.

[4]Values represent amount of forage typically utilized by livestock. Assumed utilization rate of 60 percent.

[5]Values were calculated using the amount of potentially utilized forage multiplied by the impact acres divided by 2,000.

[6]Values were calculated using the loss of potentially utilized forage divided by the average amount of forage required for 1 animal unit month (800 lbs of forage/animal unit month).

4.5.4 Water Resources

The East Sage Dump Alternative would not reduce flow to Cherry Spring as much as compared to the Proposed Action because the amount of recharge area covered by waste rock would be reduced from 235 acres to 166 acres.

4.5.5 Wetlands and Waters of the United States

Construction of the East Sage Dump Alternative would not directly impact wetlands. However, as described for the Proposed Action approximately 0.04 acre of other waters of the United States (i.e., intermittent drainage) would be directly impacted during the construction of the haul roads near the proposed Horseshoe/Galaxy process and leach area.

Wetlands and other waters of the United States located in North Water Canyon would not be directly impacted by mine development and operation. Erosion control measures, as described in Chapter 2, would be implemented to minimize potential sedimentation impacts to these wetlands and intermittent drainages. However, minor indirect impacts to these wetlands and intermittent drainages may occur during construction and operation of the proposed haul road in North Water Canyon. The erosion of soils along the haul road embankments during high precipitation events and snowmelt may cause minor sedimentation impacts to these wetlands and intermittent drainages.

Cherry Spring is a non-wetland area located approximately 2,000 feet below the proposed East Sage waste rock dump. Potential sedimentation impacts to Cherry Spring would be avoided with the implementation of environmental protection measures (i.e., water collection and diversion ditches) which would divert discharges and runoff from the proposed East Sage dump away from Cherry Spring. Additional information regarding these Environmental Protection Measures is provided in Chapter 2. In addition, as presented under Water Resources, the decrease in groundwater recharge from construction of the East Sage waste rock dump could potentially reduce water flow at Cherry Spring.

4.5.6 Wildlife and Fisheries Resources

Generally, impacts to wildlife under the East Sage Dump Alternative would be the same as that described for the Proposed Action. A comparison of habitat loss for this alternative would include an additional 66 acres of big sagebrush, 4 additional acres of piñon-juniper, 36 fewer acres of low sagebrush, 55 fewer acres of mixed shrub, and 3 fewer acres of mountain mahogany.

This alternative would result in the same adverse effects to wildlife resources from the relocation of the haul road into North Water Canyon, as those described for the South Water Canyon Dump Alternative. The difference in the East Sage waste rock dump configuration would be more beneficial to wildlife than the dump configuration for the Proposed Action. Decreasing the size of the dump would reduce the amount of recharge area covered by waste rock from 235 to 166 acres, thereby decreasing the potential impacts to flow at Cherry Spring.

4.5.7 Threatened, Endangered, or Candidate Species

Under the East Sage Dump Alternative, the impacts to sensitive wildlife species would be about the same as those described for the Proposed Action, for this alternative discussion under wildlife resources, and for the South Water

Canyon Dump Alternative discussion for both wildlife and for threatened or endangered species. Impacts to sensitive plant species would be the same as those described for the Proposed Action.

4.5.8 Wild Horses

Under the East Sage Dump Alternative, the impacts to wild horses would be about the same as those described for wildlife resources for the Proposed Action and for both wildlife and for wild horses for the South Water Canyon Dump Alternative. The relocation of the haul road into North Water Canyon would directly impact wild horse use of the spring, and increase the potential for vehicle collisions with wild horses. Essentially, the impacts to wild horses would parallel that described for mule deer. Minimizing the potential groundwater effects to Cherry Spring would be a beneficial impact to wild horses.

4.5.9 Cultural Resources

Under the East Sage Dump Alternative, impacts to known cultural resources would be the same as those identified for the Proposed Action. In addition to the areas identified under the Proposed Action, portions of the proposed North Water Canyon haul road would require cultural surveys.

4.5.10 Recreation

Under the East Sage Dump Alternative, impacts to recreation under this alternative would differ from the Proposed Action in the number of acres affected. Approximately 24 fewer acres of Bureau of Land Management-administered public land currently available for dispersed recreation opportunities would be converted to mining.

4.5.11 Reclamation

Under the East Sage Dump Alternative, 24 fewer acres would be disturbed and reclaimed. The overall length of the 2.2:1 reclaimed waste rock dump slope would be reduced. This would reduce the potential for erosion from the longer slopes associated with the Proposed Action. This would also enhance revegetation by having more flat surfaces. The final waste rock dump slope would not encroach on the reclaimed Rat area. Approximately 6,000 feet of the existing South Water Canyon haul road would be covered by the reclaimed dump. Currently, existing deep road cuts impede deer movement through the area. Under this alternative, a portion of the steep slopes associated with the road cuts would be reclaimed, allowing better movement of deer through the area. In addition, the North Water Canyon haul road would have few deep cuts to be reclaimed.

4.5.12 Access and Land Use

Under the East Sage Dump Alternative, impacts to land use, access, and woodland products would be the same as those described under the Proposed Action. Impacts to land jurisdiction/ownership and livestock management under this alternative would differ from the Proposed Action in the number of acres affected. Approximately 24 fewer acres of Bureau of Land Management-administered public land would be converted from existing land uses, such as dispersed recreation, wildlife and wild horse habitat, and livestock grazing, to mining. In addition, based on less vegetation loss under this alternative, additional livestock grazing animal unit months would be available within the Warm Springs livestock grazing allotment.

Table 4-11 summarizes forage production and animal unit months impacted by the East Sage Dump Alternative. The East Sage Dump Alternative would result in the short-term loss of an average of 135 tons per year of forage (range of 86 to 184) potentially utilized by livestock and short-term displacement of approximately 336 animal unit months (range of 213 to 459) used by both livestock and wild horses. Approximately 339 animal unit months are expected to be recovered following reclamation. The long-term gain is expected to be 3 animal unit months.

4.6 RECLAMATION ALTERNATIVE

Impacts to the following resources from the Reclamation Alternative would be the same as those described under the Proposed Action:

- Wetlands and Waters of the United States
- Social and Economic Resources
- Visual Resources
- Paleontological Resources

4.6.1 Soils

Under the Reclamation Alternative, 152 additional acres of soils would be disturbed, of which 113 acres have been previously disturbed and 39 acres would be previously undisturbed (see Table 4-7). The disturbance to two soil associations, Hutchley-Tusel-Suak and Mclvey-Segura-Cropper, would be increased by 43 acres, in addition to the 113 acres of previously disturbed land. A total of four fewer acres of three soil associations would be disturbed.

4.6.2 Vegetation

Under the Reclamation Alternative the disturbance to 4 vegetation types (big sagebrush, low sagebrush, mixed shrub, and piñon-juniper) would be increased by a total of 42 acres (see Table 4-8). In addition, 113 acres of barren land would be impacted. Two fewer acres of mountain mahogany and 1 fewer acre of mixed shrub would be disturbed.

4.6.3 Geology and Minerals

Under the Reclamation Alternative, the reclamation to a 3:1 slope would cost $5,964,743 more than the Proposed Action (2.2:1 slope). The breakout of these estimated costs would be as follows:

	Recontour Cost	Total Reclam. Cost
Prop. Act. (2.2:1)	$1,478,543	$5,645,679
Alter. (3:1)	$6,347,331	$11,611,422

4.6.4 Water Resources

Under the Reclamation Alternative, changing the slope of the East Sage waste rock dump from 2.2:1 to 3:1 would flatten the slope face of the pile and increase the area near Cherry Spring covered by waste rock from 235 acres to 274 acres. This could potentially reduce the flow in Cherry Spring to a greater extent than the Proposed Action.

4.6.5 Wildlife and Fisheries Resources

Under the Reclamation Alternative, overall impacts to wildlife would be the same as those described for the Proposed Action, except that the use of native revegetation species would be more beneficial to wildlife. Although native species may

Table 4-11

Summary of Forage Production and AUMs Impacted by the East Sage Dump Alternative

Vegetation Types	Range Sites[1]	Acres Impacted	Potential Forage Production (lbs/ac/yr)[2]	Potential Available Forage (lbs/ac/yr)[3]	Adjusted Potential Forage Production (lbs/ac/yr)[4]	Potential Loss of Forage Production (tons/yr)[5]	Number of AUMs Displaced[6]
Big Sagebrush	Gravelly clay, 10-12" (28BY086)	457	350-800	193-440	116-264	27-60	66-151
	Gravelly clay, 12-14" (28BY087)	261	450-900	248-495	149-297	19-39	49-97
	Calcareous loam, 10-14" (28BY094)	91	400-800	240-480	144-288	7-13	16-33
Low Sagebrush	Mountain ridge, 12-14" (28BY034)	76	100-350	45-158	27-95	1-4	3-9
Mixed Shrub	Calcareous loam, 16+" (28BY085)	165	700-1,500	350-750	210-450	17-37	43-93
	Loamy slope, 12-16" (28BY015)	133	700-1,500	350-750	210-450	14-30	35-75
Mountain Mahogany	Stony mahogany savanna (28BY032)	1	75-300	26-105	16-63	<1-<1	<1-<1
Piñon-juniper woodland	Piñon-juniper WSG, 12"-14" (28 BY 62) Piñon-curleaf mountain mahogany WSG, 14"-22" (28 BY 58)	242	There is no forage production associated with piñon-juniper woodland.				
	TOTAL	1,426				86-184	213-459

Table 4-11 (Continued)

FOOTNOTES:

N/A = Not Applicable

[1]Piñon-juniper woodland vegetation type includes two Woodland Suitability Groups (WSG).

[2]Values were obtained from the Soil Conservation Service ecological site descriptions and indicate air dry forage production during unfavorable and favorable growing conditions.

[3]Values indicate amount of forage available for use by livestock.

[4]Values represent amount of forage typically utilized by livestock. Assumed utilization rate of 60 percent.

[5]Values were calculated using the amount of potentially utilized forage multiplied by the impact acres divided by 2,000.

[6]Values were calculated using the loss of potentially utilized forage divided by the average amount of forage required for 1 animal unit month (800 lbs of forage/animal unit month).

take longer to establish, thereby increasing the erosion hazard, native vegetation would provide appropriate forage and cover for wildlife species occupying the Proposed Action area. A comparison of habitat loss for the 3:1 slope option can be found on Table 4-8. A total of 39 acres of additional area would be disturbed by regrading. Steep road cuts associated with the South Water Canyon haul road would be reclaimed thereby eliminating most effects to mule deer movement caused by this existing road.

4.6.6 Threatened, Endangered, or Candidate Species

Under the Reclamation Alternative, the impacts to sensitive wildlife species would essentially be the same as those described for the Proposed Action and for this alternative discussion under wildlife resources. Impacts to sensitive plant species would be the same as those described for the Proposed Action.

4.6.7 Wild Horses

Under the Reclamation Alternative, the impacts to wild horses would be about the same as those described for the Proposed Action. About 39 additional acres of big sagebrush, low sagebrush, mixed shrub, and piñon-juniper would be lost through regrading to 3:1 slopes (see Table 4-8).

4.6.8 Cultural Resources

Under the Reclamation Alternative, no effects to cultural resources are anticipated from the use of native seeds.

In addition to the six sites identified as directly affected under the Proposed Action in the Top Area, one additional site (46-7563) would be directly affected under the side slope alternative. The site has been judged eligible to the National Register of Historic Places pending State Historic Preservation Officer concurrence. The areas identified under the Proposed Action as requiring cultural resources inventories also would require inventorying under this alternative. Any impacts to cultural resources would be mitigated using guidelines established under the Programmatic Agreement.

4.6.9 Air Quality

Under the Reclamation Alternative, fugitive dust emissions associated with grading from 2.2:1 to 3:1 slopes would cause a temporary decline in air quality. Oxides of nitrogen, carbon monoxide, and sulfur dioxide levels also would be expected to rise temporarily, due to the increased vehicular emissions.

4.6.10 Recreation

Impacts to recreation under the Reclamation Alternative would differ from the Proposed Action in the number of acres affected. An additional 39 acres of Bureau of Land Management-administered public land currently available for dispersed recreational opportunities would be converted to mining.

4.6.11 Reclamation

Under the Reclamation Alternative, the proposed Reclamation Plan incorporates both native and non-native plant species. The native species option would use only native species. A sample seed mixture composed of all native species was developed for initial evaluation in the test plot program (see Table 2-14). Although the native seed mix proposed for this option would potentially allow for greater species diversity, native plants generally take longer to become established than non-native species. A prolonged establishment period may increase the time that disturbed land is susceptible to erosion. This would be confirmed under the test plot program. Native species used in reclamation would enhance the value of wildlife habitat and the visual aesthetics of the area. A mixture of native and introduced species may produce better forage for livestock grazing but, in turn, may potentially decrease the value of wildlife habitat and reduce the aesthetics of the reclaimed area. Great Basin wildrye is less palatable to livestock as the growing season progresses, due largely to plant structures (e.g., awns, sharp-pointed seeds) associated with this species that are injurious to livestock. The test plot program would determine the effectiveness of native seed mixes. The use of a native seed mix would cost $143,823 (or 102 percent) more than the proposed seed mix. The estimated cost of the proposed mix is $140,716; the native seed mix is estimated to cost $284,539.

Under the side slope option, side slopes on reclaimed waste rock dumps in the Top Area would be reduced to 3:1 as opposed to 2.2:1 under the Proposed Action. In general, flatter slopes would have less erosion and soil movement downslope, would generally revegetate more successfully, and would allow for greater variety in the type of equipment used in reclamation. However, flatter reclaimed slopes disturb more area and are more costly to build due to the additional volume of material to be graded. Areas where 3:1 slopes without design benches might be used include the East Sage dump and the South Water Canyon dump. Approximately 1,602 total acres of soil and vegetation would be disturbed under this alternative of which 113 acres would be previously disturbed. The increased dump footprint of the East Sage dump would disturb 39 acres of additional, previously undisturbed land; while 113 acres of previously disturbed land would be affected by the increased size of the South Water Canyon dump. About 56 acres of the reclaimed Rat Dump would be disturbed and reclaimed a second time, and 57 acres of the existing haul road would be covered and reclaimed. This option would disturb and reclaim an additional 152 acres. The probability of achieving revegetation success on waste rock to which growth medium has been reapplied would be higher on a shallower slope; however, with the proper revegetation technology, 2.2:1 slopes also can be successfully reclaimed.

4.6.12 Hazardous Materials and Waste

Under the Reclamation Alternative, an estimated 526,000 additional gallons of diesel fuel would be required for mine equipment used to regrade final slopes from 2.2:1 to 3:1. This quantity represents a 5 percent increase over the Proposed Action, assuming that regrading efforts would occur over 4 years. Transporting this fuel to the mine site would result in only a very small increase in the probability (0.013 to 0.014) of an accident and spill. Emergency response procedures would be the same as for the Proposed Action.

4.6.13 Access and Land Use

Under the Reclamation Alternative, impacts to land use and woodland products would be the same as those described under the Proposed Action. Impacts to land jurisdiction/ownership and livestock management under this alternative would differ from the Proposed Action in the number of acres affected. An additional 39 acres of Bureau of Land Management-administered public land would be converted from existing land uses, such as dispersed recreation, wildlife habitat, and livestock grazing, to mining. In addition, based on the anticipated vegetation loss under this alternative, additional livestock grazing animal unit months would be displaced within the Warm Springs livestock grazing allotment. The dump footprints would cover the existing South Water Canyon haul road.

Table 4-12 summarizes forage production and animal unit months impacted (range of 90 to 195) by the 3:1 slope option. The 3:1 slope option would result in the short-term loss of an average of 143 tons per year of forage (range of 90 to 195) potentially utilized by livestock and short-term displacement of approximately 356 animal unit months (range of 224 to 487) used by both livestock and wild horses. Approximately 385 animal unit months are expected to be recovered following reclamation. The long-term gain is expected to be 29 animal unit months.

4.7 POTENTIAL MITIGATION AND MONITORING

4.7.1 Mitigation

Issue: Loss of migratory birds, nests, and/or nestlings due to project construction.

Measure 1: Removal of piñon-juniper, mixed shrub, and mountain mahogany vegetation on previously undisturbed lands in the Proposed Action area would be prohibited between May 1 and July 31 to protect nesting birds, particularly neotropical migrants. As an option to this construction constraint period, breeding bird surveys, as approved by the Authorized Officer, could be conducted during the breeding season and prior to site disturbance to identify if any occupied territories or active nest sites occur within the areas to be disturbed.

Effectiveness: Constraint periods for removal of these vegetation types would minimize loss of resident and migratory birds. Breeding bird surveys would identify any sensitive breeding areas prior to site disturbances.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Loss of nesting trees for cavity-nesting birds through clearing of piñon-juniper woodland for mining operations.

Measure 2: Wildlife snag trees would be created by girdling one 12-inch diameter or greater tree per acre over 50 acres in areas selected by ***an*** Ely ***Bureau of Land Management*** wildlife biologist within the Buck and Bald Mountain area. These trees would be located a minimum of 0.5 mile away from vehicle access and would be marked with appropriate signs provided by the Bureau of Land Management so that they are not cut for firewood.

Effectiveness: This measure would provide suitable habitat for cavity nesters and replace habitat lost through removal of piñon-juniper woodland.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Disturbance of breeding raptors in the North Water Canyon area.

Measure 3: Prior to disturbance within North Water Canyon, a raptor survey would be conducted during the breeding season (May 1 to July 15) to determine if any breeding raptors occupied the canyon area. In the event occupied nest sites were located, the Bureau of Land

Table 4-12

Summary of Forage Production and AUMs Impacted by the 3:1 Slope Option

Vegetation Types	Range Sites[1]	Acres Impacted	Potential Forage Production (lbs/ac/yr)[2]	Potential Available Forage (lbs/ac/yr)[3]	Adjusted Potential Forage Production (lbs/ac/yr)[4]	Potential Loss of Forage Production (tons/yr)[5]	Number of AUMs Displaced[6]
Big Sagebrush	Gravelly clay, 10-12" (28BY086)	447	350-800	193-440	116-264	26-59	65-148
	Gravelly clay, 12-14" (28BY087)	227	450-900	248-495	149-297	17-34	43-85
	Calcareous loam, 10-14" (28BY094)	90	400-800	240-480	144-288	6-13	15-33
Low Sagebrush	Mountain ridge, 12-14" (28BY034)	116	100-350	45-158	27-95	2-6	5-15
Mixed Shrub	Calcareous loam, 16+" (28BY085)	195	700-1,500	350-750	210-450	20-44	50-110
	Loamy slope, 12-16" (28BY015)	170	700-1,500	350-750	210-450	18-38	45-95
Mountain Mahogany	Stony mahogany savanna (28BY032)	2	75-300	26-105	16-63	<1-1	<1-<1
Piñon-juniper woodland	Piñon-juniper WSG, 12"-14" (28 BY 62) Piñon-curleaf mountain mahogany WSG, 14"-22" (28 BY 58)	242	There is no forage production associated with piñon-juniper woodland.				
Previously disturbed land	N/A	113	N/A	N/A	N/A	N/A	N/A
	TOTAL	1,602				90-195	224-487

Table 4-12 (Continued)

FOOTNOTES:

N/A = Not Applicable

[1]Piñon-juniper woodland vegetation type includes two Woodland Suitability Groups (WSA)

[2]Values were obtained from the Soil Conservation Service ecological site descriptions and indicate air dry forage production during unfavorable and favorable growing conditions.

[3]Values indicate amount of forage available for use by livestock.

[4]Values represent amount of forage typically utilized by livestock. Assumed utilization rate of 60 percent.

[5]Values were calculated using the amount of potentially utilized forage multiplied by the impact acres divided by 2,000.

[6]Values were calculated using the loss of potentially utilized forage divided by the average amount of forage required for 1 animal unit month (800 lbs of forage/animal unit month).

Management and the Nevada Division of Wildlife would be contacted. Appropriate mitigation measures could include avoidance, moving the nest site, or constructing a new nest platform.

Effectiveness: Breeding raptor surveys would identify occupied or active nest sites that would be affected by mining operations. Protection measures would minimize impacts to raptors in North Water Canyon, particularly the red-tailed hawk nest located there.

Application: This measure would apply to the South Water Canyon Dump Alternative and the East Sage Dump Alternative.

Issue: Temporary loss of mule deer winter range from mining activities.

Measure 4: Bald Mountain Mine Properties would provide monies, equipment, and/or personnel for conversion of vegetation to improve deer winter range. Areas for vegetation conversion have been identified in the Buck, Bald, Maverick, and Diamond Mountain Habitat Management Plans. The Authorized Officer would select those areas on which mitigation would be implemented, and the appropriate environmental documentation would be prepared.

Effectiveness: Enhancement of mule deer winter range habitat would provide additional forage for mule deer on critical winter range and would help compensate for cumulative impacts within the deer winter range.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Interference by the existing haul road with mule deer movements across South Water Canyon.

Measure 5: The South Water Canyon waste rock dump would be designed during active mining to reach approximately to the southern edge of the existing South Water Canyon haul road. During reclamation, the haul road would be covered with waste rock to levels of the existing terrain, as practicable.

Effectiveness: This measure would partially reclaim the existing haul road and minimize the existing road cuts. This would reduce the cumulative effects of mining disturbance to north-south deer movement/migration.

Application: This measure would apply to the Proposed Action.

Issue: Loss of wildlife access to water resources in North Water Canyon due to increased human activity along the alternative haul road.

Measure 6: Bald Mountain Mine Properties would either install or provide the funding for installation of two guzzlers north of the North Water Canyon haul road in proximity to the North Water Canyon seeps to provide water for wildlife, especially mule deer. The company would also provide for regular maintenance of these guzzlers during mining operations, so that they are in continual working order.

Effectiveness: By providing water north of the potential North Water Canyon haul road, deer and other wildlife would not have to cross the road to get to a water source when the North Water Canyon seeps dry up as part of their annual cycle.

Application: This measure would apply to the South Water Canyon Dump and East Sage Dump Alternatives.

Issue: Potential reduction in flow of Cherry Spring due to construction of the East Sage waste rock dump.

Measure 7: Two springs within the ***Warm Springs*** grazing allotment would be improved through installing a headbox, pipe, and water trough at the spring head. These springs would be fenced. Additional storage capacity could be provided by construction of a small reservoir.

Effectiveness: Improvement of these springs would provide additional water for wild horses, livestock, and wildlife to supplement water that might be lost as a result of decreased water flow in Cherry Spring.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Loss of cultural resources due to project-related activities.

Measure 8: Mitigation of indirect impacts could be accomplished by continuing to limit employee access to known archeological sites, educating Bald Mountain Mine Properties employees as to the significance of cultural resources and their vulnerability, and implementing a strict Bald Mountain Mine Properties management policy restricting casual collecting of artifacts from project lands.

Effectiveness: This measure would reduce, but not eliminate, indirect impacts to cultural resources on project lands.

Application: This measure would be applied to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Impacts to visual resources in the Bald Mountain area.

Measure 9: As allowable by safety regulations, and in consultation with the Authorized Officer, project components would be painted with a neutral, nonreflective paint that would not contrast with the surrounding landscape setting. This would be particularly important for mine processing facilities because of their scale and concentration.

Effectiveness: This measure would be effective in reducing the visual contrast of project-related structures.

Application: This measure would be applied to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Loss of 447 acres of the Julian/West Bald Seeding from construction of the Process Area Expansion at the Bald Mountain Mine.

Measure 10: Approximately 1,400 acres of the remaining area in the Julian/West Bald Seeding would be maintained by chemical application, discing, interseeding, and/or drilling where necessary.

Effectiveness: Maintenance of approximately 1,400 acres within the Julian/West Bald Seeding would replace the forage lost through removal of the 447 acres, which have an average production of 600 pounds/acre. An additional 200 pounds of forage produced per acre could be gained over the present condition through maintenance of the rest of the seeding.

Application: This measure would apply to the Proposed Action and all alternatives except the No Action Alternative.

Issue: Impacts to the Nachlinger catchfly (Silene nachlingerae), a Federal candidate-Category 2 species.

Measure 11: Within appropriate habitat for the Nachlinger catchfly *(limestone outcrops with mountain mahogany in the Top Area)*, a presence/absence survey would be conducted prior to site disturbance. This survey would be conducted by a qualified *botanist*, using standard survey protocols for this species. In the event that sensitive plant species were found, *Bald Mountain Mine Properties* would coordinate with the Authorized Officer to minimize impacts to these plants from mine development.

Effectiveness: The survey results would determine whether this sensitive plant species could occur within the *Top* Area. Coordination with the Bureau of Land Management to minimize potential impacts would ensure protection of important plant populations.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action. Based on potential habitat, the area of survey emphasis would be located in and near *the* Sage Flats *area*.

Issue: Increased work load and fleet miles on the Sheriff's Department from providing services to Bald Mountain Mine Properties' projects.

Measure 12: Bald Mountain Mine Properties would meet with the White Pine County Sheriff's Department to discuss compensation for services to company projects in the Buck and Bald Mountain area.

Effectiveness: Compensation would effectively mitigate any continuing or increased operating expenses to the White Pine County Sheriff's Department from Bald Mountain Mine Properties' projects. Compensation to the Sheriff's Department cannot be required by the Bureau of Land Management, but could be negotiated between the Department and the company.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

4.7.2 Monitoring

Issue: Potential increase in dissolved metals and/or decrease in flow from Cherry Spring.

Measure *A*: Monthly water quality and flow rate monitoring at Cherry Spring would be initiated and maintained during all months for which there is flow. All recorded data would be reported to the Bureau of Land Management and the Nevada Division of Wildlife. Water quality would be analyzed for all metals specified by the Nevada Division of Environmental Protection for meteoric water mobility procedure tests. If any metal value should exceed the standards set by the Nevada Division of Environmental Protection, both the Bureau of Land Management and the Nevada Division of Wildlife would be consulted *and site-specific mitigation measures would be developed, as appropriate.*

Effectiveness: Monthly monitoring of water quality and quantity at Cherry Spring would identify any increase in metals that may be consumed by wildlife and/or a change in water availability. Consultation with the Bureau of Land Management and Nevada Division of Wildlife would facilitate the development of appropriate *mitigation* measures.

Application: This monitoring would apply to the Proposed Action and all alternatives, except for the No Action Alternative.

Issue: Loss of nesting trees for cavity-nesting birds through clearing of piñon-juniper woodland for mining operations.

Measure B: The Ely *Bureau of Land Management* wildlife biologist would monitor a sample of the created snag trees (see Measure 2) each year for 10 years to identify variables that improve the effectiveness of this mitigation.

Effectiveness: This monitoring would be used to increase the effectiveness of mitigation for future projects.

Application: This monitoring would be applied to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Potential impacts to water quantity or quality.

Measure C: Copies of annual reports provided to the Nevada Division of Environmental Protection by February 28 of each year would be sent to the Bureau of Land Management, Ely District for information on review purposes.

Effectiveness: Copies of annual reports would provide the Ely District with current information on compliance status and environmental problems associated with project located on public land. This report would include activities/problems that could affect water resources, test plot programs, and yearly activity reports, livestock, wildlife, and/or wild horses.

Application: This monitoring would be applied to the Proposed Action and all alternatives, except the No Action Alternative.

4.8 UNAVOIDABLE ADVERSE IMPACTS

Implementation of the environmental protection measures (see Chapter 2) and the potential mitigation measures identified earlier in this chapter would reduce most adverse impacts that would result from the Proposed Action. Those unavoidable adverse impacts that would remain are summarized below by resource. Unavoidable adverse impacts for the action alternatives would be the same as those for the Proposed Action, except where specifically noted. Table 2-16 in Chapter 2 provides a summary comparison of impacts among alternatives.

4.8.1 Soils

- Disturbance of 1,426 to 1,602 acres of native soils, depending on the alternative selected (see Table 2-16).

- Reduced soil productivity on the 1,292 to 1,468 acres to be reclaimed, depending on the alternative selected (see Table 2-16).

4.8.2 Vegetation

- Clearing of 1,426 to 1,602 acres of vegetation, depending on the alternative selected (see Table 2-16).

- Change in vegetation composition on the 1,292 to 1,468 acres expected to be reclaimed, depending on the alternative selected (see Table 2-16).

- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals onto vegetation along the proposed transportation routes.

4.8.3 Geology and Minerals

No unavoidable adverse impacts.

4.8.4 Water Resources

- Potential for reduced flow at Cherry Spring due to covering a portion of the recharge area by the East Sage waste rock dump.
- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals into surface water along the proposed transportation routes.

4.8.5 Wetlands and Waters of the United States

- Disturbance of 0.04 acre of other waters of the United States by culvert placement near the proposed Horseshoe/Galaxy process and leach area.
- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals into a sensitive area along the proposed transportation routes.

4.8.6 Wildlife and Fisheries Resources

- Short-term loss and long-term changes on up to 1,489 acres of native wildlife habitat, depending on the alternative selected (see Table 2-16), including big sagebrush, low sagebrush, mixed shrub, mountain mahogany, and piñon-juniper woodland.
- Short-term disturbance of up to 1,489 acres within a 295,000-acre of crucial mule deer winter range and reduced forage productivity on up to 1,468 acres of reclaimed land, depending on the alternative selected (see Table 2-16).
- Displacement of wintering mule deer.
- Potential increases in vehicle-related wildlife mortalities.
- Potential effects to wildlife, including upland game birds, that utilize Cherry Spring.
- If barriers become damaged, the possibility of cyanide ingestion from access to solution ponds exists.
- Potential to impact resident bat species by closing or disturbing underground openings that support nursery colonies, hibernacula, or bachelor roosts.
- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals into a sensitive area along the proposed transportation routes.
- For the South Water Canyon Dump and East Sage Dump Alternatives, disturbance to resident mule deer and a potential increase in vehicle-related mortalities to deer.
- For the South Water Canyon Dump and East Sage Dump Alternatives, disturbance to an inactive red-tailed hawk nest.
- For the South Water Canyon Dump and East Sage Dump Alternatives, disturbance to foraging raptors, nesting and brooding upland game birds, and other wildlife species dependent on the North Water Canyon Spring and its surrounding mesic habitat.

4.8.7 Threatened, Endangered, or Candidate Species

- Potential removal of pygmy rabbit habitat within the Proposed Action area.
- If barriers become damaged, the possibility of cyanide ingestion from access to solution ponds exists.
- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals into a sensitive area along the proposed transportation routes.
- For the South Water Canyon Dump and East Sage Dump Alternatives, potential disturbance to foraging raptors (e.g., peregrine falcon, ferruginous hawk) in North Water Canyon.

4.8.8 Wild Horses

- Short-term removal of 1,426 to 1,489 acres of range within the herd management area, depending on the alternative selected (see Table 2-16).
- Displacement of wild horses.
- Potential increases in vehicle-related mortalities.
- Potential decreased flow at Cherry Spring.
- For the South Water Canyon Dump and East Sage Dump Alternatives, disturbance to wild horses, a potential increase in vehicle-related mortalities.

4.8.9 Cultural Resources

- Direct and indirect impacts to cultural resources.

4.8.10 Air Quality

- A small, short-term increase in fugitive dust emissions, as well as vehicle- or equipment-generated oxides of nitrogen, carbon monoxide, and sulfur dioxide.

4.8.11 Social and Economic Values

No unavoidable adverse impacts.

4.8.12 Recreation

No unavoidable adverse impacts.

4.8.13 Visual Resources

- Alteration of existing visual resources resulting in high impacts at the Mooney Basin process area and low impacts in the Bald Mountain Mine area.

4.8.14 Paleontological Resources

No unavoidable adverse impacts.

4.8.15 Reclamation

No unavoidable adverse impacts.

4.8.16 Hazardous Materials and Wastes

- Potential for a spill of hydrochloric acid, diesel fuel, or other process chemicals into a populated area or sensitive environment along the proposed transportation routes.

4.8.17 Access and Land Use

- Temporary loss of livestock grazing forage productivity (approximately 88 to 188 tons per year) on the disturbed areas and a short-term displacement of approximately 347 livestock grazing animal unit months.
- Long-term productivity loss of 1,260 to 2,000 cords of wood (an annual growth loss of 21 to 25 cords per year), 2,380 to 3,332 Christmas trees, and between 1.2 to 1.7 million pounds of piñon nuts.

4.9 RELATIONSHIP BETWEEN THE LOCAL SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Short-term is defined as the life of the Bald Mountain Mine Expansion Project through closure and reclamation (2011). Long-term is defined as the future beyond reclamation. Many of the impacts associated with the Proposed Action would be short-term and would cease following successful reclamation. However, decreases in long-term soil and vegetation productivity in reclaimed areas are expected. Long-term soil and vegetation productivity under the Reclamation Alternative is expected to be generally the same as under the Proposed Action. A tabulation of changes in long-term productivity is presented below.

- Soils - Production would be lost from vegetation; 134 acres would not be reclaimed. Long-term reclamation productivity would be reduced on 1,316 acres reclaimed.
- Water Resources- Long-term flows from Cherry Spring could be reduced.
- Land Use - Long-term productivity for grazing and woodland product harvesting would be lost on the 134 acres not reclaimed and would be reduced on the 1,316 acres reclaimed. Most of the reclaimed area would eventually be reopened for livestock grazing, but woodland product harvesting from 238 acres of piñon/juniper woodland disturbed could take up to 100 years to recover.

4.10 IRREVERSIBLE/ IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction and operation of the Bald Mountain Mine Expansion Project could result in either the irreversible or irretrievable commitment of certain resources. Irreversible is a term that describes the loss of future options. It applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over very long periods of time. Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. For example, livestock forage production from an area is lost irretrievably while an area is serving as a mining area. The production lost is irretrievable, but the action is not irreversible. If the use changes and the mine is reclaimed, it is possible to resume forage production. Irreversible and irretrievable impacts of the Proposed Action are summarized in Table 4-13.

Table 4-13

Irreversible/Irretrievable Commitment of Resources - Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Soils	No	No	Soils from pit areas would be salvaged for use in reclaiming other areas.
Vegetation	Yes	Yes	Irreversible impacts to 134 acres of vegetation would result from pit development.
Geology and Minerals	Yes	Yes	Once mineral reserves are mined, they would no longer be available for future production.
Water Resources	Yes	No	Changes in recharge to Cherry Spring would be irreversible.
Wetlands and Waters of the United States	No	No	Disturbance of 0.04 acre of waters of the United States near the proposed Horseshoe/Galaxy process and leach area would be a long-term loss but culvert placement would occur in the drainage and no wetlands would be affected.
Wildlife and Fisheries Resources	Yes	Yes	About 134 acres of wildlife habitat would be irreversibly lost.
Threatened, Endangered, or Candidate Species	Yes	Yes	About 134 acres of potential habitat for resident and migrant species would be irreversibly lost.
Wild Horses	Yes	Yes	About 134 acres of wild horse range would be irreversibly lost.
Cultural Resources	Yes	Yes	Disturbance of cultural sites would result in the permanent loss of site context.
Air Quality	No	No	Emissions from the project would not deteriorate the existing air quality in the Proposed Action area.
Social and Economic Resources	No	No	There would be ongoing productivity from the mines for the life of the project, including production of gold reserves, the creation of 25 mining jobs with an annual payroll of $997,000, 31 additional indirect jobs, and additional revenue support for White Pine County, Elko County, and the State of Nevada.

Table 4-13 (Continued)

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Recreation	No	Yes	The 134 acres lost to pit development would minimally affect recreation. There would be an irretrievable loss of public land available for dispersed recreational opportunities until reclamation is sufficient to allow dispersed recreational activities to resume.
Visual Resources	Yes	No	Impacts to visual resources would be reduced through successful reclamation procedures and implementation of the environmental protection measures, but permanent changes would result.
Paleontological Resources	No	No	No disturbance to paleontological resources is expected.
Reclamation	No	No	Vegetation productivity on disturbed lands is expected to recover in the long-term following reclamation due to increases in grass/forb vegetation types.
Hazardous Materials and Wastes	No	No	A spill of hazardous materials into a sensitive resource, such as a stream or wetland, is not expected during the life of the project. However, if one did occur, impacts could last for several months.
Access and Land Use	Yes	Yes	There would be no irreversible impacts to access; public access patterns would be maintained. About 134 acres would be irreversibly lost for livestock grazing and woodland product harvesting. There would be an irretrievable loss of public land available for livestock grazing, wildlife habitat, dispersed recreational opportunities, and firewood and Christmas tree harvesting until reclamation is sufficient to restore productivity and allow these activities to resume. Forage production is expected to recover in the long-term following reclamation, with a loss of only 2 animal unit months.

4.11 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Since the alternatives to the Proposed Action differ primarily in the fate of waste rock, there would be only small differences in the energy requirements of the four action alternatives and only limited conservation potential. Waste rock would be deposited in dumps and in the case of the Proposed Action, all pits and dumps are near one another. The Backfill Alternative would require hauling waste rock from the Galaxy pit to the Horseshoe pit, a distance of about 1.9 miles.

This would result in the consumption of approximately 60,000 additional gallons of diesel fuel by the haul trucks in year three of operations. The Reclamation Alternative (3:1 side slopes) would require the consumption of approximately 526,000 additional gallons of diesel fuel to grade the East Sage and South Water Canyon waste rock dumps (2.2:1 side slopes with benches under the Proposed Action). The following operational information for the Proposed Action also would apply to all action alternatives. These figures represent initial energy requirements; the Top Area action alternatives would have the same energy consumption for transportation.

- Propane (for heating all mine buildings)
  Annual Use: 214,000 gallons
  Life-of-Project (1996-2011): 3 million gallons.

4.12 CUMULATIVE IMPACTS

Cumulative impacts resulting from the Proposed Action and a number of Interrelated Projects are discussed in detail in Appendix B. An area of approximately 366,000 acres, encompassing the Proposed Action and Interrelated Projects, was considered for cumulative impacts. Within this area, 1,450 acres would be disturbed by the Proposed Action and 24,985 acres would be disturbed by Interrelated Projects. Of the 26,435 acres total disturbance between 1996 and 2011, 25,628 acres would be reclaimed or would revegetate naturally. This would leave approximately 807 acres not revegetated, mostly in mined-out pits.

These cumulative disturbances would directly affect surface resources such as soils, vegetation, wildlife habitat, wild horse range, livestock grazing, and woodland products harvesting. However, the 807 acres not revegetated would represent about 0.2 percent of the cumulative effects area, and cumulative impacts were judged to be minimal.

An estimated 101 cultural resource sites would be affected by the cumulative disturbance, and these sites would be permanently lost. However, impacts to significant sites must be mitigated prior to disturbance, so cumulative impacts were judged to be minimal.

Cumulative impacts were judged to be high for visual resources. Mining disturbance along the Ruby Marsh Road and near the Overland Road would result in impacts ranging from moderate to high. Appendix B presents the specific locations and projects resulting in these cumulative impacts.

Mitigation measures that would be applicable to the identified cumulative impacts are also presented in Appendix B.

5.0 CONSULTATION AND COORDINATION

5.0 CONSULTATION AND COORDINATION

5.1 DRAFT ENVIRONMENTAL IMPACT STATEMENT PREPARATION

In preparing the Draft and Final environmental impact statements, the Bureau of Land Management communicated with and received input from many Federal, state, and local agencies, as well as other organizations and individuals. The following is a list of those who provided input:

Federal Government Agencies

Department of Agriculture
Forest Service - Humboldt National Forest (Elko, Ely)

Department of the Interior
Bureau of Mines (Reno)
Fish and Wildlife Service (Reno)
Fish and Wildlife Service (Ruby Lake National Wildlife Refuge)
Geological Survey (Denver)

Department of Transportation

Environmental Protection Agency (San Francisco)

State Government Agencies/Universities

Nevada Department of Taxation
Nevada Division of Wildlife (Elko, Ely)
Nevada Natural Heritage Program (Carson City)
Northern Nevada Community College

Local Governments

White Pine County Assessor
White Pine County Economic Diversification Program
White Pine Regional Planning Commission

Private

Western Cultural Resource Management, Inc.

5.2 DRAFT ENVIRONMENTAL IMPACT STATEMENT REVIEW

In the course of preparation of the Draft and Final environmental impact statements for the Bald Mountain Mine Expansion Project, the Bureau of Land Management communicated with and received input from many Federal, State, and local agencies; elected representatives; environmental and citizens groups; industries; and individuals. Approximately 275 copies of the Draft environmental impact statement were distributed by mail to various individuals, organizations, and government agencies. A listing of the agencies, organizations, and individuals who received copies of the Draft environmental impact statement in April 1995 is presented below.

Agencies, Organizations, and Individuals Who Received Copies of the Draft Environmental Impact Statement

Federal Agencies

Department of Agriculture
- U.S. Forest Service - Humboldt National Forest - Elko, NV - Mary Beth Marks
- U.S. Forest Service - Humboldt National Forest - Ely, NV - Jerry Green
  - Humboldt National Forest - Ruby Mountain Ranger District - Wells, NV

Department of Defense
- Army Corps of Engineers - Reno, NV - Kevin Roukey
- Army Corps of Engineers - South Pacific Division - San Francisco, CA
- Army Corps of Engineers - Sacramento, CA - Kevin Roukey
- Bolling AFB - Washington, D.C. - HQ-USAF/LEEV
- Office of Deputy, A/S of the USAF - Washington, D.C.

Department of Energy
- Office of Environmental Compliance (EH-23)

Department of the Interior
- Bureau of Land Management - Elko, NV; Lakewood, CO; Reno, NV; Washington, D.C.
- Bureau of Mines - Branch of Mineral Assessment - Washington, D.C.
- Bureau of Mines - Spokane, WA - Tim Spear
- Bureau of Reclamation - Denver Federal Center (D150) - Denver, CO
- Fish and Wildlife Service - Reno, NV; Washington, D.C.
  - Ruby Lake National Wildlife Refuge - Ruby Valley, NV - Dan Pennington
- Minerals Management Service - Washington, D.C.
- National Park Service - Washington, D.C.
  - Environmental Quality Division 774 - Washington, D.C.
  - Great Basin National Park - Baker, NV - Al Hendricks
- Office of Environmental Policy and Compliance - Washington, D.C.
- U.S. Geological Survey - Reston, VA

Department of Transportation
- Environmental Division - Office of Transportation and Regulatory Affairs - Washington, D.C

Federal Highway Administration - Office of Environmental Policy (HEV-1) - Washington, D.C.
Library of Congress - Washington, D.C. - Exchange and Gift Division
U.S. Environmental Protection Agency
Office of Environmental Review - Washington, D.C.
Region 9 - San Francisco, CA - Jeanne Geselbracht

State Agencies

Commission for the Preservation of Wild Horses and Burros - Sparks, NV - Cathie Barcomb
Nevada Bureau of Mines & Geology - Reno, NV - Jonathan G. Price, Ph.D., Ron Hess, and Joseph V. Tingley
Nevada Department of Conservation and Natural Resources
Nevada Division of Environmental Protection - Carson City
Nevada Division of Forestry - Carson City, NV - Lowell V. Smith
Nevada Division of Forestry - Elko, NV - Mike Jordon
Nevada Division of Forestry - Ely, NV - Jim Luce
Nevada Division of Historic Preservation & Archaeology - Carson City, NV - Ron James
Nevada Division of Minerals - Carson City, NV - Russell A. Fields
Nevada Division of Minerals - Las Vegas, NV - Walter Lombardo
Nevada Division of State Lands - Carson City, NV - Pamela B. Wilcox
Nevada Division of Transportation - East Ely, NV - Glen Mouritsen
Nevada Division of Wildlife - Elko, NV - Larry Barngrover and Rory Lamp
Nevada Division of Wildlife - Ely, NV - Curtis Baughman
Nevada Division of Wildlife - Eureka, NV - Dale Elliott and Mike Podborny
Nevada State Clearing House - Department of Administration - Carson City, NV - Julie Butler
Nevada State Historical Society - Reno, NV
Nevada State Office of Attorney General - Carson City, NV - C. Wayne Howle
Northwestern University, Center for Urban Affairs and Policy Research - Evanston, IL - Dr. Paul Friesen
University of Nevada Las Vegas - Las Vegas, NV - Maggie Parhamovich
University of Nevada Libraries - Reno, NV
University of Nevada - Office of Hazardous Materials - Reno, NV - Erick Landau

County Agencies

Elko County Library - Elko, NV
Eureka Branch Library - Eureka, NV
Eureka County Commissioners - Eureka, NV
Lincoln County Commissioners - Pioche, NV - Keith Whipple
Nye County Commissioners - Tonopah, NV - Chairman
White Pine Chamber of Commerce - Ely, NV - Annette Kinterknecht
White Pine County Commissioners - Ely, NV - John Chachas
White Pine County Library - Ely, NV - Lori Williams

White Pine County Schools - East Ely, NV - Jan Cahill
White Pine County Sheriff's Department - Ely, NV - Bernie Romero
White Pine Regional Planning Commission - Ely, NV - Chairman

Local Agencies

City of Ely - Ely, NV - Kevin Carnes
Ely City Manager - Ely, NV
Los Angeles Department of Water & Power - Los Angeles, CA - William W. Glauz

Elected Officials

Senator Richard Bryan - Reno, NV; Carson City, NV; Washington, D.C.; Las Vegas, NV
Assemblyman John Carpenter - Dist. #33 - Elko, NV
Assemblywoman Marcia DeBragia - Fallon, NV
Mayor Joanne Malone - City of Ely - Ely, NV
State Senator Mike McGinnis - Fallon, NV
Governor Bob Miller - Carson City, NV
Senator Harry M. Reid - Carson City, NV; Reno, NV; Las Vegas, NV; Washington, D.C.
Representative Barbara Vucanovich - Reno, NV; Elko, NV; Washington, D.C.

Tribal Organizations

Citizen Alert, Native American Program - Reno, NV - Virginia Sanchez
Duckwater Shoshone Tribe - Duckwater, NV - Boyd M. Graham
Elko Band, Tribal Chair - Elko, NV - Raymond Gonzales
Ely Colony, Tribal Chair - Ely, NV - Jerry Charles
Goshute Indian Reservation, Tribal Chair - Ibapah, UT - Harlan Pete
Native American Consultant - Elko, NV - David Platerio
South Fork Band, Tribal Chair - Lee, NV - Vincent Garcia
Te-Moak Tribes, Tribal Chair - Elko, NV - Dale Malotte
Western Shoshone Historic Preservation Society - Elko, NV - Larry Kibby
Western Shoshone National Council - Reno, NV - Jack Orr

Organizations

American Bashkir Curly Register - Ely, NV - Mrs. Sunny Martin
American Mustang and Burro Association - Lincoln, CA
Animal Protection Institute of America - Sacramento, CA - Nancy Whitaker
Eastern Nevada Miner's and Prospector's Association - Ely, NV
Georgia Earth Alliance - Riverdale, GA - Gloria Wilkins
I.B.E.W. Local 401 - Reno, NV - Frank Grunstead

International Society for the Protection of Mustang & Burros - Scottsdate, AZ - Karen A. Sussman
LASER Committee - Portland, OR - John Williams
Mineral Policy Center - Washington, D.C. - Philip M. Hocker
National Audubon Society - Washington, D.C. - Brock Evans
National Mustang Association, Inc. - Newcastle, UT - Jane Sewing
Natural Resources Defense Council - Washington, D.C.
Nevada Cattleman's Association - Elko, NV
Nevada Mining Association - Reno, NV
New White Pine Sportman's Club - Ely, NV - Robert Marcum
Ozark Heartwood - Boonville, MO - Charles Phillips
Sierra Club, Toiyabe Chapter - Reno, NV - Marge Sill, Lois Snedden, and Rose Strickland
The Nature Conservancy - Reno, NV - Jan Nachlinger
The Nature Conservancy - Western Regional Office - Boulder, CO
The Wilderness Society - San Francisco, CA - Barbara Spolter
The Wilderness Society - Washington, D.C. - Director of BLM Programs
Wild Horse Organized Assistance - Reno, NV - Dawn Lappin
Wild Horse Spirit, LTD - Carson City, NV - Bobbi Royle

<u>Industries/Businesses</u>

Alta Gold Co. - Ely, NV - Gary W. Cummings
Amada Mineral Corp. - Denver, CO - Raymundo Chico
Barrick Goldstrike Mines Inc. - Elko, NV
Battle Mountain Gold - Oroville, WA - Jeff White
Blue Jay Ranch - Ruby Valley, NV - Raymond & Sandy Rosenlund
Conoco, Inc. Land Exploration - Casper, WY - P.J. Turner
Cooper & Sons, Inc. - Ely, NV
Cultural Resources Services - Basin Research Associates - San Leandro, CA - Colin I. Busby
Dames and Moore - Reno, NV - Phil Davis, Ph.D.
Desert Mountain Realty - East Ely, NV - Dave Tilford
Economic Diversification Council - Ely, NV - Barlow White
Elko Daily Free Press - Elko, NV - Adella Harding
Elko Independent - Elko, NV
Ely Daily Times - Ely, NV
Environmental Management Association, Inc. - Reno, NV - Richard Delong
Givens & Huntley - Boise, ID - Joe Baird
Greystone - Englewood, CO - Charlene Lopez and Jerry Koblitz
Hecla Mining Co. - Lovelock, NV - Rocky Chase
Hemlo Gold Mines (USA), Inc. - Reno, NV - Melody Hefner
Independence Mining - Elko, NV - Julia Bosma-Douglas
Infotech Research, Inc. - Fresno, CA - Barry A. Price
JBR Consultants - Sandy, UT - Brian Buck

KDSS 92.7 FM Radio - Ely, NV
KELY Radio - Ely, NV
Kennecott - Salt Lake City, UT - Cindy Emmons
Magma Copper Company - Tucson, AZ - Tim Dyhr
Mt. Wheeler Power Co. - Ely, NV - Jim Lewis
Northern Nevada Railroad Corporation - East Ely, NV - Bryan R.R. Whipple
Parsons, Behle & Latimer - Salt Lake City, UT - Dave Deisley
Petro Sources Corp. - Salt Lake City, UT - Larry Bardwell
Pioneer Oil & Gas - Midvale, UT - R. Heggie Wilson
Placer U.S., Inc. - Elko, NV - Bill Upton
Plumbers and Pipefitters - Sparks, NV - Jack Chesney
REDEV, Inc. - 29 Palms, CA - Mear Lloyd
Riverside Technology, inc. - Fort Collins, CO - Valerie Randall
Rural Economic & Community Development Services - East Ely, NV
Santa Fe Pacific Gold - Albuquerque, NM - Paula Templeton
Schafer and Associates - Bozeman, MT
Science Applications International Corporation - McLean, VI - Jack Mozingo
Simon Hydro Search - Reno, NV - Lori Frisch
Sitex Environmental - Salt Lake City, UT - Terry Crawford
Terra Matrix - Steamboat Springs, CO - Mike Neumann
The Lincoln County Record - Caliente, NV - Connie Simkins
Uhalde Lease - Reno, NV - John H. Uhalde
USMX Inc. - Lakewood, CO
R. K. Vierra Associates - Reno, NV - Robert K. Vierra
WESTEC - Reno, NV - Bill Reich
WESTEC - Elko, NV - Val Sawyer
Western Mining Corp. USA - Reno, NV - Mary Jane Smith
Western States Minerals - East Ely, NV - Gaylen Cropper
Western Cultural Resource Management - Boulder, CO - Thomas J. Lennon
Whitman & Co. - Tucson, AZ - Kathy Whitman
Yates Petroleum Corporation - Artesia, NM - Lands Department
D. L. Zerga Associates - Crystal Bay, NV

Individuals

Steve Aaker - Reno, NV
Sam Bida - Ely, NV
Steve D. Bowman
Douglas Braid - Ely, NV
John Breitrick - Ely, NV
David Buchaner
Fred H. Carpenter

Loretta Cartner - Ely, NV
Bob Chaplin - Gardnerville, NV
Christopher Christie - Jamul, CA
Paul Clifford, Jr. - Cleveland Heights, OH
K. C. Cooper
Phil Davis - Reno, NV
Bob Decker
Craig Downer - Minden, NV
Karl A. Frost - Reno, NV
Norman L. Goeringer - Ely, NV
Peter and Julian Goicoechea - Eureka, NV
Mason Gorda - Reno, NV
Troy Gordon - Columbia, MO
Lee Griswold - Elko, NV
Caroline Hilton - Ely, NV
Doris Holahan - Reno, NV
Sue Holloway - East Ely, NV
Walter B. Johnson - Tallahassee, FL; Ely, NV
Loyd Levi - Denver, CO
R. C. McClymonds - Carmichael, CA
Clifton Mee - Eureka, NV
Glen Miller - Reno, NV
Russell Moore - Fort Collins, CO
Tina Nappe - Reno, NV
Dave Naslund - Edgewater, CO
Pete Paris, Jr. - Elko, NV
Linda Priest
Justin Reginato
Edgar Robinson - Garland, TX
Dan Russell - Rancho Cordova, CA
Daniel Russell - Eureka, NV
Charles D. Snow - Reno, NV
Roger C. Steininger, Ph.D. - Reno, NV
Steve Sutherland - Reno, NV
George Swallow - Ely, NV
Edward S. Syrjala - Centerville, MA
C. Neil Upchurch - Reno, NV
Ron Walker - Woodland, CA
Cy Wilsey - Sparks, NV
Bill Wilson - East Ely, NV

5.3 PUBLIC MEETING COMMENTS AND RESPONSES

During the 45-day public comment period, a few of those who received copies of the Draft environmental impact statement submitted written comments and/or presented verbal comments at the public meetings held in Ely, Elko, and Reno, Nevada on May 8, 9, and 10, 1995, respectively. Those comments are presented and responded to in the following sections.

5.3.1 Ely, Nevada - May 8, 1995

This public meeting, held in the Bureau of Land Management Ely District Office, had 30 attendees. Seven of the attendees represented themselves or a local agency, while 23 were affiliated with Bald Mountain Mine/Alligator Ridge Mine/Placer Dome U.S. Two people presented statements. Both spoke in support of the Bald Mountain Mine Expansion Project, and no deficiencies in the Draft environmental impact statement were mentioned. The key points from each statement are presented below. No responses are necessary for any of these statements.

Ken Kliewer - representing White Pine Chamber of Commerce

- The Chamber of Commerce Executive Committee and Board of Directors wish to go on record in support of the project.
- The mining industry is an important employer in White Pine County.
- The economic benefits to the County far out weigh any negative environmental impacts of the project, which should be minimal.

Brent Eldridge - Ely resident

- Mr. Eldridge also supports the project and believes the economic benefits far outweigh the minimal impacts.
- White Pine County needs the 25 new jobs that would be provided.
- Mr. Eldridge (also a County Commissioner) will make sure the project gets on the Commission agenda so that a formal position on the Draft environmental impact statement can be provided before the end of the comment period.

5.3.2 Elko, Nevada - May 9, 1995

This public meeting at the Stockman's Motor Hotel had 34 attendees. Eleven of the attendees represented themselves, organization, or other companies, while 23 were affiliated with Bald Mountain Mine/Alligator Ridge Mine/Placer Dome U.S. No person presented statements or comments. One question regarding the place of residence of current employees of Bald Mountain Mine was asked, and the mine superintendent, Dan Banghart, provided a response. About 70 percent reside in Ely and about 30 percent in Elko.

5.3.3 Reno, Nevada - May 10, 1995

This public meeting at the Sands Regency Hotel had 26 attendees. Ten of the attendees represented themselves, agencies, organizations, or other companies, while 16 were affiliated with Bald Mountain Mine/Alligator Ridge Mine/Placer Dome U.S. Three people presented statements. Two indicated that they would submit written comments at a later date, and one had specific comments on the Draft environmental impact statement. The key points from each statement are presented below.

Dr. Glenn Miller - representing the Toiyabe Chapter of the Sierra Club

- Dr. Miller approves of the use of a systematic approach for the analysis of cumulative impacts from multiple sites. The cumulative impact analysis is quite clear and well written.
- The use of numerical standards for reclamation bond release is commendable. Bald Mountain Mine has done a good job of reclaiming current disturbance at the site.
- The Draft environmental impact statement does not address the discharge of metals onto Public lands from the reclaimed heaps over the long term (20 to 30 years). This should be included in the Final environmental impact statement. Dr. Miller is most concerned with arsenic and selenium, and possibly with mercury and salts. The effluent would not meet drinking water standards and might even be considered a hazardous waste.

  Current water quality experience with existing reclaimed heaps in Nevada should be presented, along with the locations of discharge from the reclaimed heaps at the proposed mines. Bald Mountain Mine should develop a plan to manage discharge from reclaimed heaps, and Bureau of Land Management should include these potential problems in its bonding for the project. Several approaches for analyzing the impacts to water quality were suggested, including TCLP (toxicity characteristic leaching procedure), EPA Test 1312, and hydrologic modeling.

Responses to the comments of Dr. Glenn Miller follow.

Heap leach pads must be decommissioned and reclaimed according to a Closure Plan approved by the Nevada Division of Environmental Protection. This plan must ensure that the closed facility would not cause potential degradation of waters of the state. Decommissioning methodologies cannot be predetermined at this time, as they are dependent upon the particular physical and chemical composition of the heap at the time of closure. Examples of alternative methods may include, but are not limited to, such things as carbon treatment of the rinsate, biological treatment (addition of metals or cyanide metabolizing bacteria), capping with impervious material, and various methods to chemically destruct cyanide compounds. The specific goals to be achieved for all constituents of concern will be stipulated in the state-approved closure plan for the heaps. Sampling of rinsed heaps is specified in detail in Nevada Division of Environmental Protection regulations and policy documents. The sampling protocols/ methodologies, timing, analytical requirements and final constituent levels will be included in the approved closure plan.

It is anticipated that post-closure monitoring for the heap leach pads may be performed for 30 years after closure, as provided for in state regulations. The monitoring period may be shorter or longer, depending upon the levels of constituents monitored and their relation to the closure levels specified in the approved closure plan. Monitoring would be terminated once the state has determined that the pads are chemically stabilized and do not have the potential to cause degradation of waters of the state. This determination is based upon the closure methodologies, levels of constituents in the closed units, monitoring results (groundwater, rinsate, etc.), and the potential for any constituents to degrade waters of the state.

The heap leach pads may not be decommissioned and reclaimed until rinsing with fresh water shows the effluent would meet Nevada Division Environmental Protection closure standards. Then the heap leach pads can be revegetated to reduce infiltration and allow them to blend in with the surrounding environment. Infiltration into a rinsed and drained heap leach pad would be low in an arid state like Nevada and would be controlled by the surface cover placed over the pad. Metalloids such as selenium and arsenic may accumulate in these pads due to leaching of ore with cyanide; however, release of these metals by infiltrating rainwater or snowmelt is not likely, even in the long term, for the following reasons. (1) The infiltration rates must be high for a substantial length of time to saturate the heap and produce seepages at the base, an unlikely scenario in Nevada for properly rinsed, drained, and reclaimed heaps. (2) Infiltrating rainwater or snowmelt would have a difficult time mobilizing metalloids such as selenium and arsenic, because the near neutral pH is usually below the ZPC (zero point of charge) of the metalloids, thus minimizing their release from oxide and clay surfaces. Metalloids usually adsorb to clay and oxide surfaces in the pH ranges of 4 to 7.5. They can desorb at pH values above about 7.5 to 8.0. Desorption, however, is a kinetically controlled process, and equilibrium modeling to estimate the amount of metalloid that might desorb leads to overestimation of the amount of metal that could be released. Thus, the release of metalloids such as mercury, arsenic, and selenium is possible in the short term if: (1) the rinsing of the pads is not thorough and complete and (2) a major infiltration event allows for the flushing of residual metalloids trapped in small pores, etc. within the pad.

Over the long term, infiltration into a reclaimed leach pad is not likely to generate seepage out the base. Also, if seepage should occur, it is anticipated that only the first few seepage events might carry elevated metalloids. Subsequent events, should they occur (and this is highly unlikely), would have to desorb metalloids from oxide and clay surfaces to yield an effluent with metalloids elevated above drinking water standards. Because desorption is a slow kinetically controlled process, it is considered unlikely that seepage from reclaimed and properly rinsed heap leach pads would provide water to the surface that exceeds Nevada drinking water standards for metalloids.

Lastly, as discussed on page 4-9 in the Draft and Final environmental impact statements, the facilities in the Process Area would be constructed over 500 feet of unsaturated alluvium, while those at Mooney Basin would be over 200 feet of unsaturated alluvium. The metalloid concentration in any seepage from the reclaimed leach pads would be attenuated by clay as the seepage passes through the alluvium. No surface pooling of seepage would be expected, due to the permeability of the soils and alluvium.

Paul Scheidig - representing the Nevada Mining Association

- The Draft environmental impact statement seems well done, especially the cumulative impact analysis.

- The Nevada Mining Association will submit written comments before the end of the comment period.

Russ Fields - representing the Nevada Division of Minerals

- The Draft environmental impact statement seems well done.

- Bald Mountain Mine has done an exemplary job with concurrent reclamation on its existing disturbance.

- The Division of Minerals will submit written comments through the State Clearinghouse.

5.4 WRITTEN COMMENTS AND RESPONSES

The Bureau of Land Management received 12 letters addressing the Draft environmental impact statement during the 45-day public comment period. All letters were reviewed, and comments needing a response were identified. Responses were provided to clarify the contents of the Draft environmental impact statement, modify or correct the Draft environmental impact statement, or provide additional information in the Final environmental impact statement. Comments that did not require one of these responses but may be relevant to the Bureau of Land Management's ultimate decision regarding the Bald Mountain Mine Expansion Project were given the response "Comment noted." Where changes (modification, correction, or addition) have been made to the text contained in the Draft environmental impact statement, these changes have been presented in the Final environmental impact statement in ***bold-italic type***.

Table 5-1 lists each of the comment letters by author and reference number assigned to the letter. All letters have been reproduced in their entirety, and all material has been reviewed and considered. Responses have been prepared for the comments identified and are presented in this section. All letters have been reviewed and considered by the Bureau of Land Management in determining the agency preferred alternative for the proposed project.

Following Table 5-1, the comment letters and responses are presented. Each comment is identified by a bracket and reference number keyed to the letter reference number. Thus, Comment 4-3 refers to the third comment in Letter 4. The response to each comment accompanies the letter and is identified by the reference number of the respective comment (e.g., Response to Comment 4-3).

Table 5-1

Comment Letters
(in order of receipt by the
Bureau of Land Management)

Letter Number	
1	John Endrihs *(pronounced Endress)*
2	Abb and Theona Richie
3	Nevada Department of Conservation and Natural Resources, Division of Wildlife, Rory E. Lamp
4	White Pine County Board of County Commissioners, Brent Eldridge
5	Nevada Department of Administration, State Clearinghouse, Julie Butler
6	Nevada Department of Conservation and Natural Resources, Natural Heritage Program
7	Nevada Wild Horse Commission
8	Nevada Department of Business and Industry, Division of Minerals, Bill Durbin
9	United States Environmental Protection Agency, Region IX, David J. Farrel
10	Nevada Department of Conservation and Natural Resources, Division of Water Resources, Thomas K. Gallagher, Michael J. Anderson
11	Plumbers & Pipefitters, Robert Lopes
12	Laser, Inc., Jim Wilson

Letter 1

5-8-95

(ENDRESS)

1-1 JOHN ENDRIHS. 289-4403

WILL JOBS BE FOR W. P. COUNT. FIRST, OR

WILL YOU BRING IN OUTSIDE HELP.

Response to Letter 1

1-1 As discussed on pages 4-23 and 4-25 of the Draft and Final environmental impact statements, respectively, of the 25 new process and mine personnel, approximately 20 would locate in Ely and 5 would locate in Elko. Jobs would be advertised in White Pine County, but hiring preference would not be given to county residents.

U S Bureau of Land Management
Ely District Office
HC33 Box 33500
Ely, Nevada 89301-9408

May 9, 1995

RE: Bald Mountain Mine Expansion Project
Draft Environmental Impact Statement Summary

Gentlemen:

2-1 We would like to go on record as supporting the above project based on the following observations:

- Placer Dome has shown a sincere concern for the environment through it present and past mining practices. Reclamation, environmental concerns, and prevention of loss of wildlife hold high priority.

- Mining is a part of Nevada heritage and therefore making a living in mining is natural and normal. The amount of land disturbance is minor compared to the vast unused land. Mining has greatly improved. The use of chemicals is much more controlled. Many old traces of mining have disappeared due to nature and mining reclamation.

- Nevada economics should be diversified. Mining should be a part of the economics as well as tourist and ranching. Manufacturing and farming contribute little and mining adds a lot. Mining also effects other industry with a chain reaction of needs for equipment, parts and service as well as services and facilities for employees.

- White Pine County definitely needs the presence of Bald Mountain Mine. The addition to the tax base is essential. Magma is not established, nor yet proven stable, and an alternate employment center is definitely appealing.

As a nation grows it is not only in the cities you can see this growth. Bald Mountain Mine is just part of Nevada's growth. We feel their record speaks for itself with regards to responsibility, the need is obvious and the disturbance is low.

Mr. & Mrs. Abb Richie

Abb and Theona Richie
P. O. Box 1094
Mc Gill, Nevada 89318

MAY 1995
Received
Bureau of Land Management
Ely, Nevada

2-1 Comment noted.

Letter 3

BOB MILLER
Governor

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF WILDLIFE

1100 Valley Road
P.O. Box 10678
Reno, Nevada 89520-0022
(702) 688-1500 • Fax (702) 688-1595

PETER G. MORROS
Director
Department of Conservation and Natural Resources

WILLIAM A. MOLINI
Administrator

May 31, 1995

Gene Drais, Area Manager
Egan Resources Area
Bureau of Land Management
HC 33 Box 33500
Ely, NV 89301-9408

RE: SAI # 95300132, Bald Mountain Expansion Project Draft Environmental Impact Statement, Placer Dome U.S., Inc. - BLM

Dear Mr. Drais:

We appreciate the opportunity to review and provide comments on the subject document. Our review of the document found it to be satisfactory in describing the impacts of the proposed action on wildlife resources. We appreciate the opportunity to be involved in the preparation of this document. We will continue to work with the Bureau of Land Management and Placer Dome to provide the best benefits and least impacts to wildlife in the Buck and Bald Mountain area. Please feel free to contact me, or Rory Lamp of my staff, for any additional information or comments concerning this letter.

Sincerely,

Rory E. Lamp
Biologist
1375 Mountain City Highway
Elko, NV 89801
(702) 738-5332

RL
cc: Habitat Bureau
Doug Zimmerman, Chief, Bureau of Mining Regulation and Reclamation, NDEP
Shannon Dunlap, Bald Mountain Mine
Region II
File

BUREAU OF LAND MGMT
ELY, NEVADA
RECEIVED
JUN 6 1995

RT	OFFICE	INIT	DATE
	[illegible]		
	RES		
	OPS		
	ADM		
✓	EGN		
	SCH		
	C. F.		

Comments:

(O)-5386

Response to Letter 3

3 Thank you for your letter. No response necessary.

Letter 4

Wayne Cameron
Carol O. McKenzie
Julio C. Costello
Brent Eldridge
Claude Rose

Courthouse Annex
953 Campton St.
Ely, Nevada 89301
(702) 289-8841
Fax. (702) 289-8842

White Pine County
Board of County Commissioners

BUREAU OF LAND MGMT
ELY, NEVADA
RECEIVED
JUN 9 1995

RT	OFFICE		
	D.M.		
	RES		
	OPS		
	ADM		
	EGN Dan		
	SCH		
	C. F.		

Comments:

June 5, 1995

Bureau of Land Management
Daniel R. Netcher, Project Leader
HC 33, Box 33500
Ely, Nevada 89301

RE: M46-83-004P
3809/1793 (NV-930.1)

Dear Mr. Netcher,

During the Commission meeting held on the morning of June 1, 1995 the Board reviewed the Draft Environmental Impact Statement for the expansion of gold mining at the Bald Mountain Mine and the development of the Horseshoe/Galaxy Mine in the Bald Mountain Mining District.

4-1 The White Pine County Commission formally went on record supporting the above stated expansion project, and would ask that the selected EIS alternative not unduly hinder or jeopardize the expansion operation. Of the 5 suggested alternatives listed, this Board unanimously supported the reclamation alternative, and the establishment of a reclamation plan with special consideration for the use of native species. It was also felt that terrace method would utilize less ground and may have the least impact on the environment.

This Commission has always been strong supporters of mining activities in White Pine County. Your solicitation of our comments is greatly appreciated. If you require further remarks, please feel free to contact this office.

Sincerely,

BOARD OF COUNTY COMMISSIONERS

Brent Eldridge

Brent Eldridge,
Chairman

BE/dm

Response to Letter 4

4-1 Comment noted. Please refer to Section 2.9 in the Final environmental impact statement for a discussion of the Agency Preferred Alternative.

Letter 5

BOB MILLER
Governor

STATE OF NEVADA

JOHN P. COMEAUX
Director

DEPARTMENT OF ADMINISTRATION
Capitol Complex
Carson City, Nevada 89710
Fax (702) 687-3983
(702) 687-4065

BUREAU OF LAND MGMT
ELY, NEVADA
RECEIVED
JUN 15 1995

RES		
CPS		
ADM		
EGN		
SCH		
C. F.		
Comments:		

June 13, 1995

Dan Netcher
Project Leader
Bureau of Land Management
Ely District Office
HC 33 Box 33500
Ely, NV 89301

Re: SAI NV # 95300132 Project: DEIS -- Bald Mountain Mine Expansion Project

Dear Mr. Netcher:

5-1 Thank you for allowing the State of Nevada the opportunity to review the Draft EIS for the Bald Mountain Mine Expansion Project. In general, the State supports efforts by Placer Dome, Inc. to develop known gold resources which will ensure stable employment of over 200 people for the next twelve years.

Placer Dome, Inc. is working to protect wildlife from mine-related hazards. For example, the company hauls water to mine-remote areas in order to steer wild horses away from roads and active mining areas. Placer Dome is also committed to mining reclamation. As a result, in 1992, Placer Dome was awarded the Nevada "Excellence in Reclamation" award for the Bald Mountain Mine.

5-2 One agency, however, has a few concerns about the Draft EIS's analysis and discussion of the project's impact to threatened and endangered species. The conclusion that the project will not affect the Nachlinger catchfly's habitat is unwarranted. Most areas in Nevada have not been completely explored for their plant resources, including the project area. In addition, the DEIS does not document the presence or absence of the Nachlinger catchfly or any other threatened or endangered species on the project site. Therefore, the State urges the BLM to conduct a site survey by qualified biologists to determine the presence of any sensitive species on the project site. Such a survey would help to characterize the site and to aid in preventing any new species from being listed as Threatened or Endangered.

Response to Letter 5

5-1 Comment noted.

5-2 Comment noted. Please refer to Responses to Comments 6-1 and 6-2 for a discussion of the Nachlinger catchfly. The BLM believes that the conclusion that this plant is not likely to be affected is correct. The rationale for this conclusion is explained further in the responses and the modified text in Section 4.1.7.2 (page 4-19) in the Final environmental impact statement.

Letter 5 Continued

5-3 Next, the State warns against the use of non-native plant species for reclamation activities. Use of non-native species can potentially cause severe impacts to plants and wildlife. 5-4 The DEIS should also discuss the effects of sodium cyanide releases and state why such releases are considered less harmful than other types of releases. Finally, the BLM should ensure that 5-5 Placer Dome follows the requirements of NRS 527.060 - 527.120, which regulates the removal of commercial quantities of cacti, yuccas, and Christmas trees.

Thank you for the opportunity to comment on the Draft EIS for the Bald Mountain Mine Expansion Project. The State looks forward to reviewing the Final EIS once it is complete. If you have any questions, please call me at (702) 687-6367.

Sincerely,

Julie Butler

Julie Butler, Coordinator
Nevada State Clearinghouse/SPOC

JB/jb
Enclosures

cc: Cathy Barcomb, Wild Horse Commission
Glenn Clemmer, Natural Heritage Program
Bill Durbin, Division of Minerals

c:\winword\comment.132

Response to Letter 5

5-3 Comment noted. Please refer to Response to Comment 6-3 for a discussion of the use of non-native plants for reclamation.

5-4 Please refer to Response to Comment 6-4 for a discussion of sodium cyanide releases.

5-5 Comment noted. Please refer to Response to Comment 6-5 for a discussion of the commercial removal of cacti, yuccas, and Christmas trees.

Nevada Natural Heritage Program

Department of Conservation and Natural Resources
1550 East College Parkway * Carson City, Nevada 89710
(702) 687-4245

*** please note our new address *** 2 May 1995

Comments on Nevada SAI # 95300132, DEIS, Bald Mountain Mine Expansion Project
Comment due date June 12, 1995.

6-1 1. The DEIS acknowledges that potential habitat for Nachlinger catchfly (Silene nachlingerae) exists in the project area, but concludes that the species is not likely to be impacted because no populations have been documented in the project area, the nearest being 15 miles to the north. This conclusion is unacceptable for the following reasons: 1) most areas of Nevada have not been thoroughly explored for their botanical resources, including the project area, and 2) apparently no attempt was made to try to document the presence or absence Nachlinger catchfly or any other T-E-S species on the project site. One cannot draw conclusions about the likelihood of impacts to resources until one knows what those resources are. We strongly recommend that a site survey using accepted protocols be conducted by qualified biologists to document the presence or absence of sensitive species on the project site. We cannot properly evaluate this DEIS until such surveys have been completed.

6-2 2. We are concerned that the loss of habitat (occupied or potential) for Nachlinger catchfly or other yet undocumented T-E-S species on the project site may contribute to cumulative impacts leading to the eventual need to list new species as Threatened or Endangered. The financial and regulatory burdens to the state and its residents are much reduced when such listings can be avoided, and the DEIS should include alternatives and mitigation measures toward that end.

6-3 3. We discourage the use of non-native species in the reclamation measures contained in the proposed alternative. Along with the many weedy species certain to invade areas disturbed by this project, these will likely result in permanent changes to the native vegetation of the state, with unknown but potentially severe (e.g., the current cheatgrass and halogeton infestations throughout northern Nevada) impacts to vegetation and sensitive species habitat.

6-4 4. In section 4.1.16.2 (p. 4-38 to 4-40) on the effects of hazardous materials releases, only hydrochloric acid and diesel fuel are addressed. The DEIS should document why the potential effects sodium cyanide releases was considered of lesser concern by discussing those potential effects.

6-5 5. The proposal should ensure that the requirements of N.R.S. 527.060 to 527.120 inclusive, which regulates the removal of commercial quantities of cactuses, yuccas, and christmas trees (as defined in the statute), are met.

MAY - 4 1995
DEPT. OF ADMINISTRATION
DIRECTOR'S OFFICE

6-1 As a result of your comment, the text in Section 4.1.7.2, page 4-19, of this Final environmental impact statement has been expanded to clarify the discussion of impacts to the Nachlinger catchfly. The basic conclusions presented in the Draft environmental impact statement have not changed. An additional mitigation measure has been added to Section 4.7 of this Final environmental impact statement, which addresses incorporating a site survey for the Nachlinger catchfly within appropriate habitat prior to new disturbance. Please see Measure 11 in Section 4.7.

6-2 Please see Response to Comment 6-1 for a discussion of additional mitigation for the Nachlinger catchfly. The Bureau of Land Management feels that the applicable mitigation measures developed for the Proposed Action are adequate to protect any rare or unique habitats or plants.

6-3 Comment noted. Please refer to Section 4.6.11 on pages 4-67 and 4-68 in the Draft and Final environmental impact statements, respectively, for a discussion of the environmental consequences of using only native species for reclamation. The seed mixes proposed in the reclamation plan are predominately native species. The test plot program would evaluate which species are most appropriate for the Bald Mountain Mine Expansion Project. All species listed on Tables 2-11 and 2-12 (pages 2-34 and 2-35) in the Draft and Final environmental impact statements would be tested, and the final seed mix would be determined by those results, the cover and composition standards, and seed availability. It is expected that several seed mixes may be used, depending on the area of the project to be reclaimed. It is important to keep in mind that a seed mix of native species only may not become established and stabilize an area as rapidly as a mix including introduced species. The Bureau of Land Management's first goal for reclamation is to stabilize the soil, so the erodibility of a site and the time required to establish vegetation would be primary factors in selecting the final seed mixes. This would be followed by the objective to minimize the invasion of undesirable weeds.

Response to Letter 6

6-4 As a result of your comment, the text in Section 4.1.16.2, page 4-41, of this Final environmental impact statement has been expanded to clarify the effects of a sodium cyanide release. The basic conclusions presented in the Draft environmental impact statement have not changed. Additional information on the toxic effects of cyanide is presented in this response. Cyanide occurs in several forms and its toxicity varies with the form in which it occurs. Free cyanide (the most toxic form) includes both the cyanide ion (CN^-) and hydrogen cyanide (HCN). The relative concentrations of CN^- and HCN are dependent upon the pH of the solution, with HCN being more abundant below a pH of about 9.4. Cyanide is toxic to most forms of life above varying threshold concentrations. The toxicity of sodium cyanide depends upon the ease with which free cyanide is liberated from the cyanide compound. Free cyanide and hydrogen cyanide are readily absorbed by living tissue and interfere with the process of respiration. The cyanide ion reacts with the metal constituents of enzymes, inactivating the enzymes and preventing the utilization of oxygen by cells. Cells of the nervous system are particularly sensitive to reduced levels of oxygen, and therefore, death may result from depression of the central nervous system.

The lethal level of cyanide concentration varies for living organisms, mostly as a function of body weight. The lethal concentration in water for fish varies from about 0.025 mg/l to about 0.3 mg/l. Cyanide also has deleterious effects on fish reproduction and the growth and development of offspring. The Environmental Protection Agency recommends a concentration not to exceed 0.2 mg/l Weak Acid Dissociable (WAD) CN for ambient water quality standards to protect animals from direct consumption of contaminated water or from fish within contaminated water. Reported concentrations that are lethal to various animals include 0.1 mg/kg ingestion for birds and 3 mg/kg ingestion for mice. Toxic levels of cyanide for plants are not well documented.

Cyanide is a highly reactive substance and is, therefore, short-lived in the environment. It is degraded or transformed by the processes of volatilization (of hydrogen cyanide), formation of ammonia and formate, oxidation, complexation with heavy metals, biological activity, conversion to thiocyanate (SCN^-), and sorption. Some iron cyanide complexes decompose in the presence of sunlight. Natural degradation through volatilization of hydrogen cyanide accounts for about 90 percent of cyanide degradation, while other process are responsible for the degradation of lesser amount of cyanide.

6-5 Bald Mountain Mine does not plan to remove cactus, yucca, or Christmas trees in commercial quantities. Under N.R.S. 527.050, cactus, yucca, and trees that would be cut or destroyed and would not be removed from the property do not require registration or permitting by State or Federal agencies. Any products removed from Federal land in anticipation of project actions would be under Federal permit. Any commercial quantities removed would be transported with a shipping permit in cooperation with the Nevada Division of Forestry.

Letter 7

NEVADA STATE CLEARINGHOUSE
Department of Administration
Planning Division
Blasdel Bldg., Rm 200
(702) 687-4065
fax (702) 687-3983

RECEIVED
JUN - 6 1995

DATE: April 20, 1995

Governor's Office	**Legislative Counsel Bureau**	Conservation-Natural Resources
Business & Industry	Communications Bd.	**Director's Office**
Agriculture	Emp. Training & Rehab.	**State Lands**
Minerals	Research Division	**Environmental Protection**
Economic Development	**PSC**	Forestry
Tourism	**Transportation**	**Wildlife**
Fire Marshal	**UNR Bureau of Mines**	Conservation Districts
Human Resources	UNR Library	State Parks
Aging Services	**Wild Horse Commission**	**Water Resources**
Health Division	**Historic Preservation**	Water Planning
Colorado River Commission	**Emergency Management**	Nuclear Projects Office
	Washington Office	**Natural Heritage**

Nevada SAI # 95300132 **Project: DEIS–Bald Mountain Mine Expansion Project**

CLEARINGHOUSE NOTES:
Related SAI 94300106.

Enclosed, for your review and comment, is a copy of the above mentioned project. Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than **June 12, 1995**. Use the box below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference.

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

- ____No comment on this project
- ____Proposal supported as written
- ✓ Additional information below
- ____Conference desired (See below)
- ____Conditional support (See below)
- ____Disapproval (Explain below)

AGENCY COMMENTS:

Effects are minimal and no permanent loss of water sources is anticipated. mining Co. is already hauling other waters to keep horses away from Roads to avoid deaths, as well as other measures to mitigate impacts to horses.

Response to Letter 7

7 Thank you for your letter. No response necessary.

Letter 8

STATE OF NEVADA
DEPARTMENT OF BUSINESS AND INDUSTRY
DIVISION OF MINERALS
400 W. King Street, Suite 106
Carson City, Nevada 89710
(702) 687-5050 • Fax (702) 687-3957

BOB MILLER
Governor

LAS VEGAS BRANCH
4220 S. Maryland Pkwy
Suite 304
Las Vegas, Nevada 89119
(702) 486-7250
Fax (702) 486-7252

RUSSELL A. FIELDS
Administrator

June 2, 1995

RECEIVED
JUN - 7 1995

Julie Butler, Coordinator
Nevada State Clearinghouse
Department of Administration, Planning Division
Blasdel Bldg., Room 200
Carson city, NV 89710

Re: Nevada SAI #95300132 -- Draft EIS -- Bald Mountain Mine Expansion Project -- Due Date: June 12, 1995.

The Nevada Division of Minerals has reviewed the Draft Environmental Impact Statement (DEIS) for the proposed Bald Mountain Mine expansion project.

The cooperative efforts of Placer Dome U.S., Inc., and the Bureau of Land Management (BLM) have come together to produce an excellent environmental document for this project. When approved, the Bald Mountain Mine expansion project will ensure the development of known gold resources, and the continuation of employment for over 200 people into the next century.

8-1 The Preferred Alternative provides for mining and processing operations that will result in the least amount of overall disturbance. Reclamation plans are detailed and complete and provide for both concurrent and post-mining efforts.

Placer Dome U.S., Inc. has a proven track record of efficient and environmentally conscientious mining and an excellent history in the area of mine land reclamation. Placer Dome U.S., Inc. was awarded the Nevada "Excellence in Reclamation" award in 1992 for the Bald Mountain Mine.

8-2 The Division of Minerals welcomes the opportunity to review the final EIS once it becomes available. Selection of the Preferred Alternative for the Bald Mountain Mine expansion project has the full support of the Division.

Please contact Division staff at any time for assistance or additional information.

Sincerely,

Bill Durbin

Bill Durbin
Resource Geologist

Response to Letter 8

8-1 Comment noted.

8-2 Comment noted.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105-3901

BUREAU OF LAND MGMT
ELY, NEVADA
RECEIVED
JUN 19 1995

RT	OFFICE	INIT	DATE
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✓	EGN		
	SCH		
	C. F.		

Comments:

June 15, 1995

Timothy B. Reuwsaat, District Manager
Bureau of Land Management Ely District
HC 33 Box 33500
Ely, Nevada 89301

Dear Mr. Reuwsaat:

The U.S. Environmental Protection Agency (EPA) has reviewed the **Bald Mountain Mine Expansion Project Draft Environmental Impact Statement (DEIS)**, White Pine County, Nevada. Our comments on this DEIS are provided pursuant to the National Environmental Policy Act (NEPA), the Council of Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Clean Air Act §309.

The proposed project involves the excavation of seven pits and the construction of three waste rock dumps at the Horseshoe/Galaxy Mine and construction of an ore processing facility in Mooney Basin. In the Process and Top Areas at Bald Mountain Mine, the project would also involve excavation of a new pit and expansion of an existing pit, construction of a new waste rock dump and expansion of an existing dump, and construction of a new ore processing facility. Roads and other ancillary facilities would be included as well. A total of 1,450 acres of public land would be disturbed over 12 years.

We have rated the DEIS as EC-2 -- Environmental Concerns-Insufficient Information (see enclosed "Summary of Rating Definitions and Follow-Up Actions"). Our rating is based on our concerns regarding the proposed project's potential impacts to water quality from waste rock dumps, as well as the need for additional information in the Final Environmental Impact Statement (FEIS) regarding potential impacts to water and air quality, waste rock characterization and disposal, mitigation, and monitoring. Our specific comments are enclosed.

We appreciate the opportunity to review this DEIS. Please send a copy of the FEIS to this office at the same time it is officially filed with our Washington, D.C., office. If you have

Letter 9 Continued

any questions, you may call me at (415) 744-1584, or have your staff contact Jeanne Geselbracht at (415) 744-1576.

Sincerely,

David J. Farrel, Chief
Office of Federal Activities

Enclosures

002182/95-149

cc: Dick Reavis, NDEP
Rory Lamp, Nevada Division of Wildlife

Response to Letter 9

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO-Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC-Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO-Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU-Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of environmental quality, public health or welfare. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommend for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1-Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2-Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3-Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From: EPA Manual 1640, "Policy and Procedures for the Review of Federal Actions Impacting the Environment."

Letter 9 Continued

Water Quality

9-1 We are concerned about the potential impacts of the East Sage waste rock dump on Cherry Spring. The DEIS (p. 2-8) states that the rock types that would be encountered at waste rock dumps would not exceed the Nevada Division of Environmental Protection (NDEP) discharge standards for waste rock. Elsewhere in the DEIS (p. 4-10), however, it is stated that if seepage were to occur from the waste rock dumps, Nevada drinking water standards may be exceeded for arsenic, selenium, and possibly mercury in the Top Area. The FEIS should explain how Nevada's Meteoric Water Mobility Procedure is used to predict exceedences of water quality standards by seepage from waste rock dumps, tailings, and spent ore. The FEIS should also describe in more detail the hydrogeologic conditions for transport of seepage, should it occur, from the East Sage waste rock dump to Cherry Spring and include an estimate of transport time.

9-2 The DEIS states that Table 2-7 outlines procedures for waste rock characterization. However, Table 2-7 is only a table of contents for the plan. The FEIS should discuss the procedures required in the Waste Rock Characterization and Disposal Plan. If waste rock from the proposed project is capable of generating either acid seepage or metal-laden seepage, BLM oversight and enforcement of a sound waste rock characterization and disposal plan are important to ensuring protection of water quality. We recommend the BLM not approve the Plan of Operation (POO) until a thorough waste rock characterization and disposal plan has been completed and incorporated into the POO.

9-3 The plan should specifically prescribe and discuss the frequency and type of waste rock sampling; testing methods to be used; criteria for determining when different methods are appropriate; and requirements for reporting test results. The plan should describe how the appropriate mixing ratio of neutralizing rock to acid-generating rock would be determined for complete isolation/neutralization of acid-generating rock if it is present at the project site.

9-4 The plan should describe how waste rock dumps would be situated and designed to minimize infiltration of meteoric water. The DEIS (p. 2-42) indicates that evapotranspiration would reduce or eliminate infiltration of meteoric water into waste rock dumps after reclamation. However, the infiltration rate of snowmelt and its contribution to water in waste rock dumps is not addressed. Furthermore, according to the DEIS (pp. 3-16, 4-10), rain water and snowmelt currently infiltrate through faults and fractures to recharge perched aquifers that feed springs. If the

Response to Letter 9

9-1 Based on your comment, page 4-10 in this Final environmental impact statement has been expanded to more clearly present the relationship between the results of the Nevada meteoric water mobility procedure and the Nevada drinking water standards. Please refer to page 4-10 in the Draft and Final environmental impact statements and Responses to Comments 9-4, 9-5, and 9-7 for discussions regarding the probability of seepage from beneath the East Sage waste rock dump. The analysis conducted indicates that seepage should not occur or would be very small. If seepage should occur at the base of the East Sage waste rock dump, it would first encounter soil and then fractured bedrock. The soil would attenuate the seepage somewhat and would cause a decrease in some potentially adverse constituents, such as arsenic, by adsorption onto clays and organics in the soil. Passage through fractured bedrock would cause a further decrease in arsenic, selenium, and mercury by dispersion into the myriad of fractures that characterize the bedrock. The perched water that feeds Cherry Spring is approximately 700 to 800 feet vertically below the East Sage waste dump. So any seepage would have to traverse this distance of unsaturated (dry) rock. This would attenuate the seepage and prevent the seepage from ever reaching the perched water table. It is not possible to accurately estimate the transport time to the perched water that feeds Cherry Spring because the hydrology of the 700 to 800 feet of unsaturated rock is not known. However, the expected seepage is so low (less than 0.5 gallon per minute and may not occur during the first few 100 years) and the depth to the perched water so large that it is unlikely that this seepage would ever reach the perched water.

9-2 The State of Nevada requires a waste rock characterization and management plan before an operating permit would be issued to any mine. This plan would be on file with the Nevada Division of Environmental Protection. The waste rock characterization completed for the Proposed Action does not indicate the potential for acid generation (see page 4-9 in the Draft and Final environmental impact statements). The waste rock is mainly oxide ore, which has a low potential to generate acid-rock drainage. The State of Nevada has closely monitored waste rock sampling and characterization at the Bald Mountain Mine and would continue to do so in the future. A Waste Rock Characterization Plan, as well as annual air and water monitoring reports, prepared for the state would also be submitted to the Bureau of Land Management.

9-3 Comment noted. These items would be included in the Waste Rock Characterization Plan, as outlined on Table 2-7, page 2-28, in the Draft and Final environmental impact statements.

Letter 9 Continued

9-4 existing undisturbed vegetation does not preclude infiltration of meteoric water, it is unclear how a revegetated reclaimed surface would preclude meteoric water, especially snowmelt from infiltrating into the waste rock dumps. The FEIS should include an accounting of all meteoric water, including snowmelt. Furthermore, in light of the East Sage waste rock dump's proximity to Cherry Spring and the flat topography upon which the dump would be located, the FEIS should discuss in further detail the transport and fate of meteoric water once it reaches the bottom of that dump.

9-5 If rain water and/or snowmelt would contribute water to the waste rock dumps, BLM should consider requiring a low-permeability cap (with a hydraulic conductivity of no more than 1 x 10^{-6}cm/second) of adequate thickness beneath the growth medium layer. The cap should be designed to withstand the climatic conditions in the area, such as freeze/thaw and wet/dry cycles.

9-6 The FEIS should discuss specific remedial measures that could be taken should Cherry Spring become contaminated.

9-7 The DEIS (p. 4-10) states that with a soil base of at least two inches, seepage from the East Sage waste rock dump would be less than 0.5 gallons per minute and may not occur at all during the first few hundred years. The DEIS does not provide specifications for the waste rock dumps' soil base, but we assume that the reference to a two-inch base is a typographical error. The FEIS should clarify this discrepancy. The FEIS should provide the thickness and hydraulic conductivity required for the waste rock dump bases and summarize the quality assurance provisions required for constructing these bases.

9-8 The FEIS should describe the leak detection systems for heap leach pads, solution ponds, and tailings impoundments. The FEIS should also discuss how monitoring would be accomplished with reliability in light of the project area's fractured and faulted bedrock.

Mitigation Measures

9-9 The DEIS (p. B-56) states that after mining ceases, spring flow would return to present levels. The FEIS should indicate how long it would take for spring flows to return to present levels. In addition, the DEIS states that Western States Mining plans to provide supplemental water at springs during mining. However, we recommend that the company provide supplemental water for as long after mining as it takes for springs to return to present flow rates.

Response to Letter 9

9-4 Please refer to Response to Comment 9-1 for a discussion of the fate of meteoric water once it seeps out of the base of the East Sage waste rock dump and Response to Comment 9-6 for potential remedial measures for Cherry Spring.

The other issue presented in this comment appears to focus on snowmelt infiltration through a revegetated cover on a waste rock dump. The Environmental Protection Agency has designated and frequently improved its HELP (Hydrologic Evaluation of Landfill Performance) model for estimating infiltration into, through, and out of the base of landfills and waste rock dumps. This model was used to estimate the potential seepage from the East Sage waste rock dump, and input data included precipitation equivalent to the expected average snowmelt.

The infiltration of precipitation through faults and fractures in the bedrock, which may extend directly to the surface and have a thin or no soil covering, is an entirely different phenomenon than infiltration through a waste rock dump with a reclaimed surface. Waste rock reclamation involves installing a layer of growth medium on top of the waste rock and then revegetating the growth medium. Section 2.1.6.9 in the Draft and Final environmental impact statements (page 2-42) indicates that a 6- to 12-inch cover of growth medium would be placed on top of the East Sage waste rock dump. For modeling, the cover was assumed to be 9 inches thick and have a low hydraulic conductivity of 1.0 x 10^{-5} cm/s (0.03 feet/day). The growth medium on top of the waste rock acts to hold water because of its high porosity (up to 50 percent) and its low hydraulic conductivity. By holding the water, it allows evaporation and transpiration to occur during the dry period that follows snow melt, so that very little water actually infiltrates into the waste rock. In arid states like Nevada, evaporation is 30 to 50 inches per year, while precipitation is around 10 to 15 inches per year in the area of the Proposed Action. Thus, snowmelt is held in the cover on top of the waste rock, and most of the water evaporates or is transpired by the vegetation.

Seepages that reached the base of the waste rock dump would tend to move laterally along the lower permeability soil base described in Response to Comment 9-7. When the seepage reached bedrock, either beneath or at the edges of the dump, it would encounter faults and fractures, where flow would involve dispersion of the water into a myriad of small passages that often do not connect. This dispersion of the infiltrating water into many small fractures or faults would result in dilution of the infiltrating water by water already in the fractures of the bedrock, thus reducing the concentration of the metal ions in the water. The net result is that infiltrating water flowing through bedrock fractures and faults often does not reach the permanent water table, or if it does, it has been diluted by water in the bedrock. Only in the case of a large fault that connects directly from the surface to the groundwater table can infiltrating water reach the groundwater without dilution due to dispersion. This is not expected to be the case at the East Sage waste rock dump or with the aquifer that supplies Cherry Spring.

9-5 The waste rock dump design would limit the amount of surface runoff on the dumps. The only precipitation on the dumps would be rain and snow melt. Also, the design of the dumps, which includes reclamation recontouring and revegetation, would minimize the amount of moisture that would enter the dumps. Placing a cap under the growth medium would impede vegetation establishment on the waste rock dumps. Small grasses would establish, but roots of shrubs and trees could not penetrate through the proposed barrier and would not persist. The water infiltration Hydrologic Evaluation of Landfill Performance (HELP) modeling results on the East Sage waste rock dump determined that water seepage would not likely occur within the first few 100 years after reclamation of the dump.

9-6 If Cherry Spring should become impacted by seepage from the East Sage waste rock dump, several remedial measures are possible. These measures could include adding a clay cap on the waste rock dump by removing the vegetation growth medium; adding a compacted clay cap of 12 to 24 inches, then reinstalling the vegetation growth medium; or drilling a deep well and installing a pump to replace Cherry Spring with deep groundwater that is not contaminated. The specific remedial measure selected would depend on the exact nature of the impact to the spring.

Letter 9 Continued

9-10 Shallow stock wells could be adversely affected by pumping the Bald Mountain Mine supply wells in southern Huntington Valley. The FEIS should discuss how significant the impacts would be, whether mitigation would be required and, if so, what the mitigation measures would be.

Air Quality

9-11 The DEIS does not provide estimated emissions of air pollutants for the proposed project or alternatives. The FEIS should include these estimates, as well as discuss the potential for air quality and visibility impacts to Great Basin National Park.

Response to Letter 9

9-7 The thickness of a soil base for the East Sage waste rock dump was an input parameter to the Environmental Protection Agency's HELP model used to estimate infiltration through and out of the base of the waste rock dump. It was assumed that a 4-inch soil base would be left during construction. The 2-inch soil base for the East Sage waste rock dump was a typographical error, which has been corrected in the Final environmental impact statement. The soil base would be somewhat compacted by the construction machinery prior to installation of the waste rock and would have an average hydraulic conductivity in the range of 1.0×10^{-4} cm/s to 1.0×10^{-5} cm/s (0.3 ft/day to 0.03 feet/day). This is the usual range for hydraulic conductivity in soils of the type found in the area of the Proposed Action.

9-8 The leak detection systems for the heap leach pads, solution ponds, and tailings impoundments would be designed to meet or exceed the Nevada Division of Environmental Protection's requirements, which specifically outline the minimum acceptable criteria for such systems (see Table 2-2, page 2-10, in the Draft and Final environmental impact statements). The completed designs must be submitted to the Nevada Division of Environmental Protection for their review and approval to obtain a Water Pollution Control Permit (WPCP). Preliminary drawings showing the leak detection systems are included in the Plan of Operations and are typical of systems used in the industry today.

The existing heap leach leak detection systems are designed to detect and collect solution from a leak that may occur in the primary liner. The system uses gravity collections and consists of collection lines, segregation berms, and detection ports. The collection lines, located between the primary and secondary liners, transport solution to the detection ports. A slope of a least 1 percent is maintained in the collection lines to their termination at the detection ports. Segregation berms are integrated into the leach pad to direct solution flow and divide the pad into detection zones. Leak collection lines follow the berm and eventually enter leak detection ports. Detection ports are installed vertically and are capped on the bottom. Solution entering the leak detection system would be detected in these ports.

The leak detection systems for the existing solution ponds vary in design. Common leak detection for the solution ponds includes a gravel-packed perforated pipe located in the center of the pond beneath the primary liner, or a geonet drainage layer sandwiched between the primary and secondary liners. Solutions travel by pipe or drainage layer to the downgradient end of the pond. Solution collects in a sump and reports to the leak detection port.

The monitoring frequency for the leak detection systems may vary, depending on the process component and the site conditions. The monitoring frequencies would be approved by the Nevada Division of Environmental Protection.

Monitoring reliability of the leak detection system in light of the areas fractured and faulted bedrock is not germane, as the process solution would be detected and collected prior to migrating past the secondary liner. Should solution migrate past the secondary liner, vadose zone and/or groundwater monitor wells could be installed as dictated by site specific geologic conditions.

9-9 Western States Mining has proposed open pit mining operations at the Bellview Mine, northwest of the Bald Mountain Mine. Groundwater withdrawal at the proposed Bellview Mine might reduce spring flow near the pit during mining due to pit dewatering. These springs are in a part of the Ruby Mountains that receive abundant rainfall and winter snow, especially for Nevada. Thus, it is likely that the springs would return to normal flow rates rather quickly, assuming average precipitation prevails after mining. It is not possible to estimate exactly how long it would take for the springs to return to normal, but the time would probably be on the order of approximately 5 to 10 years and probably not greater than 20 years. The Bellview Mine would be located on the Humboldt National Forest and is not part of the Proposed Action. The Forest Service has prepared a separate environmental assessment for the project.

9-10 As discussed on page 4-7 in the Draft and Final environmental impact statements, the expected maximum drawdown of the water table in southern Huntington Valley, due to the well field at the Bald Mountain Mine, would be 6 to 10 feet at a distance of 2 miles from the well field after 10 years of pumping. This would not be a significant impact to wells that draw water from an unconfined alluvial aquifer. At present, there are no private wells within 2 miles of the Bald Mountain Mine well field. Private wells beyond 2 miles from the Bald Mountain Mine well field would not need to be mitigated, because the drawdown after 10 years would be less than 5 to 6 feet. Any new stock or agricultural wells that may be drilled in the area of effect would take any drawdown into consideration when completing the wells.

9-11 As discussed on page 4-23 in the Draft and Final environmental impact statements, the assessment of air quality impacts for the Bald Mountain Mine Expansion Project was based on modeling that was conducted for the nearby Yankee Mine by the Nevada Division of Environmental Protection. This modeling was part of the air permitting process for the Yankee Mine, and the results were judged to be representative of potential impacts at the proposed Horseshoe/Galaxy Mine and expanded Bald Mountain Mine. Since modeling results did not predict exceedances of State or Federal air quality standards and emission sources would be similar, the specific emission factors used in the modeling were not deemed relevant for the environmental impact statement. As discussed further in Responses to Comments 12-36 and 12-39, site-specific air quality permits from the State of Nevada would be required for all three components of the Proposed Action (i.e., Horseshoe/Galaxy Mine, Top Area Expansion, and Process Area Expansion). The Division of Environmental Protection may choose to conduct modeling for any or all of these components as part of its permitting process.

Great Basin National Park is located approximately 100 miles from the mine and would not be impacted by air emissions from the proposed mine expansion.

Letter 10

BOB MILLER
Governor

STATE OF NEVADA

JOHN P. COMEAUX
Director

DEPARTMENT OF ADMINISTRATION

Capitol Complex
Carson City, Nevada 89710
Fax (702) 687-3983
(702) 687-4065

June 15, 1995

Dan Netcher
Project Leader
Bureau of Land Management
Ely District Office
HC 33 Box 33500
Ely, NV 89301

Re: SAI NV# 95300132 Project: DEIS -- Bald Mountain Mine Expansion Project

Dear Mr. Netcher:

Enclosed is an additional comment from the Nevada Division of Water Resources that was received after our previous letter to you. Please incorporate this comment into your decision making process.

Sincerely,

Julie Butler

Julie Butler, Coordinator
Nevada State Clearinghouse/SPOC

JB/jbw
Enclosures

BUREAU OF LAND MGMT
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Comments:

Response to Letter 10

Letter 10 Continued

BOB MILLER
Governor

STATE OF NEVADA

PETER G. MORROS
Director

R. MICHAEL TURNIPSEED, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
Capitol Complex
123 W. Nye Lane
Carson City, Nevada 89710
(702) 687-4380

June 12, 1995

Nevada State Clearinghouse
Department of Administration
Planning Division
Capitol Complex
Carson City, Nevada 89710

Re: Nevada SAI # 95300132; DEIS for Bald Mountain Mine Expansion

Ladies and Gentlemen:

10-1 In addition to the original comments dated June 16, 1994, this office would like to reiterate the open bore hole plugging requirements set forth in Nevada Administrative Code sections 534.420 et seq. This office also strongly recommends the operator continue to collect as much base line water level and spring discharge data as possible for future reference as to potential impacts (if any) caused by the mining activity. If you have any questions please communicate at your earliest convenience.

Very truly yours,

Thomas K. Gallagher

Thomas K. Gallagher, P.E.
Hydraulic Engineer III

JUN 14 1995
DEPT OF ADMINISTRATION
DIRECTOR'S OFFICE

Response to Letter 10

10-1 Comment noted. Your suggestions have been forwarded to Bald Mountain Mine.

Letter 10 Continued

OB MILLER
Governor

STATE OF NEVADA

PETER G. MORROS
Director

R. MICHAEL TURNIPSEED, P.E.
State Engineer

JUN 17 1994
DIRECTOR'S OFFICE

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
Capitol Complex
123 W. Nye Lane
Carson City, Nevada 89710
(702) 687-4380

June 16, 1994

Nevada State Clearinghouse
Department of Administration
Planning Division
Blasdel Building, Room 200
Carson City, Nevada 89710

Re: Nevada SAI# 943000106; Scoping-Bald Mountain Mine-Alligator Ridge Project

To Whom It May Concern:

10-2 Water diversions from any surface sources must comply with the provisions of NRS 533. All springs in the project area should be identified.

10-3 Water diversions from any underground source must comply with the provisions of NRS 533 and 534.

10-4 Any ponds, dams or diversion structures must comply with the provisions of NRS 535.

10-5 If the Alligator Ridge Tails Dam (Permit J-259) is to be reactivated, provision must be made with the State Engineer.

Sincerely,

Michael J. Anderson
Hydraulic Engineer III

MJA/bk

Response to Letter 10

10-2 Comment noted. No water diversions from surface sources are proposed. Springs in the project area are shown on Map 3-3 (page 3-17) in the Draft and Final environmental impact statements.

10-3 Comment noted.

10-4 Comment noted.

10-5 Comment noted. No activities at the Alligator Ridge Mine are part of the Proposed Action.

Letter 11

PLUMBERS & PIPEFITTERS
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Comments:

June 16, 1995

Attn: Mr. Netcher
BLM-Ely District
HC 33 Box 33500
Ely, Nevada 89301 9508

Re: Bald Mountain Mine

11-1 The DEIS did not present enough detailed data on air quality impacts. Mines typically produce large amounts of dust from the rock crushers and from truck traffic. This dust may contain metals and silica which are dangerous air pollutants. Plumbers and Pipefitter Union Members already suffer from elevated rates of lung disease, and are very concerned that any new projects receive very close scrutiny of their air quality impacts.

11-2 The project will cause losses of deer habitat. Many of our Union Members are avid hunters, probably in a greater percentage than among the general population. We are disturbed about the long-term loss of deer habitat caused by the mine, and we believe the Mine should be required to restore deer habitat elsewhere to make up for this impact.

11-3 The project's water use may further draw down the groundwater and surface waters that recharge the Humboldt River and its drainage basin. Many members of our union work at the Valmy Power Plant and at other projects, that depend on the current supplies of ground and surface water in the Humboldt River Basin. This mine, in combination with the many other mines and other water users, is drawing down the water supply to the Humboldt to such a degree that it threatens the viability of the future of the Valmy Plant, and other projects. The Mines' cumulative contribution to the Humboldt River Basin drawdown should have been comprehensively discussed.

Please feel free to contact me if additional information is helpful.

Yours truly,

Robert Lopes

Robert Lopes
Business Manager
RL:bjm

Mailing Address: Post Office Box 1037, Sparks, NV 89432
Street Address; 1110 Greg Street, Sparks, NV 89431, Phone 702/359-2142, Fax 702/359-2144

Response to Letter 11

11-1 Please refer to Section 4.1.10 in the Draft and Final environmental impact statements for a discussion of air quality impacts. BLM believes that this discussion is adequate, given the level of air quality effects that are anticipated. Also, refer to Responses to Comments 9-11, 12-33, 12-34, 12-40, 12-41, and 12-42 for discussions on other air quality issues. A response to your comment on the potential health effects of dust follows. Toxic air emissions are closely scrutinized and regulated during the air quality permitting process within the State of Nevada. Although trace amounts of metals are present in the fugitive dust generated as a result of mining activities, the amounts of toxic substances present in these emissions are well below the levels of concern for public health and welfare. At the Yankee mine, the air quality modeling predicted a maximum annual concentration of particulates at the point of closest public access beyond the property boundary of 0.53 $\mu g/m^3$. Similar results are expected for the mining areas associated with the Proposed Action. These model results show impacts that are far below the annual background of 9 $\mu g/m^3$, and indicate that the mining operation would not materially contribute to additional health risks to the general public, due to exposure to metals or crystalline silica.

11-2 Please refer to Section 4.1.6.1 on page 4-13 in the Draft and Final environmental impact statements and Section 4.6.2.3, Cumulative Impacts, in Appendix B for a discussion of the anticipated direct, indirect, and short- and long-term effects to mule deer from proposed mine development and from cumulative activities in the Proposed Action area. As discussed in these analyses, the long-term loss of 134 acres would occur within a 295,000-acre area. Also, the long-term change of approximately 1,450 acres of mule deer habitat disturbed during mine operation would not necessarily preclude deer use of those areas upon reclamation. These determinations are based on the following factors: 1) the amount of disturbed habitat relative to the amount of available range, 2) the Bureau of Land Management's Full Force and Effect Final Multiple Use Decision for the Warm Springs Allotment, 3) the reduction of wild horse use on the Buck and Bald Herd Management Area, and 4) the current increase in range productivity and deer population numbers exhibited within the Proposed Action area.

Regarding the off-site habitat restoration for mule deer, Mitigation Measure 4 identified on pages 4-71 and 4-73 in the Draft and Final environmental impact statements, respectively, indicates that Bald Mountain Mine Properties would provide the resources necessary for habitat enhancement relative to the level of impacts to mule deer anticipated from the Proposed Action. As stated, the Authorized Officer would select the areas to be enhanced, based on the Bureau of Land Management's objectives presented in the Buck, Bald, Maverick, and Diamond Mountain Habitat Management Plan.

Finally, the Bureau of Land Management feels that the mitigation measures developed for the environmental impact statement are appropriate for impacts identified for the Proposed Action. Future habitat enhancement for mule deer and other wildlife use would be consistent with current Bureau of Land Management goals and objectives identified in the applicable resource management plans.

11-3 Please refer to Response to Comment 12-49 for a discussion of impacts to the Humboldt River.

LASER, INC.

Legal And Safety Employer Research
AN INDEPENDENT, INCORPORATED DIVISION OF THE WESTERN STATES PIPE TRADES
670 Kentucky Street, Gridley, CA 95948 (P) 916/846-6352 (F) 916/846-5274

By Fax & Mail
14 pages Follow
6-16-95

ATTN: MR. NETCHER
BLM-ELY DISTRICT
HC 33 BOX 33500
ELY NV 89301-9408

Dear Mr. Netcher:

LASER (Legal and Safety Employer Researcher) is a non-profit group that reviews the environmental and socio-economic impacts of large industrial projects throughout the West.

Enclosed are our comments on the Bald Mountain DEIS. Please send the final EIS, the Record of Decision, and the Plan of Operation to our consultant, along with the appeal procedures we must follow if we are still concerned about this project's impacts, after the FEIS is issued.

John Williams
12770 SW Foothill Dr.
Portland, OR 97225
503-626-5736, fax-503-641-2093

If you have any questions about our comments please call Mr. Williams. Thank you very much for your past and future cooperation.

Yours, Jim Wilson by gpr

Jim Wilson, director of LASER

cc: John Williams
attorney Linda Williams
UA #350
EPA
Fish & Wildlife
Nevada Dept. of Wildlife

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Comments:

Letter 12 Continued

1

Here are LASER's comments on the proposed Draft Environmental impact Statement (DEIS) for the Bald Mountain Expansion project.

RECLAMATION AND BACKFILLING ALTERNATIVES
LESS STEEP SLOPES

12-1

LASER supports the 3:1 final side slope option (Reclamation Alternative). LASER questions the allegations that a less steep side slope will have much higher costs. In our conversations with Mine operators throughout the West, including a site visit at Kennecott Bingham Canyon this Spring, Mine operators have told us that a less steep slope can actually be less costly, because it can be graded by with agricultural machinery, rather than having a more expensive bulldozer perform costly earth moving operations. The DEIS admits at p. 4-67 that a gentler slope allows **greater variety in** the types of equiopment used, and increase the likelihood of reclamation success.

Published authorities substantiate this claim:

"(O)ptimum vegetative stability requires slopes of less than 25 % (4:1) EPA, 1972) and the use of agricultural machinery may require that slopes be no greater than 20% (5:1) (Hadley and Toy. Geomorphology and Reclamation of Disturbed Lands) Academic Press, Orlando.)

In addition, a 3:1 slope will be much easier to reclaim, lowering reclamation costs, because of less reseeding and maintenance. The possibility of a more successful reclamation effort would offset the increase in disturbed area caused by gentler slopes.

12-2

The alternative is that the Sage and Water Canyon waste dumps may be regraded to a 2.2:1 slope, which is alleged to approximate the surrounding hillsides (2-40). But in the accompanying figure 2-1, the graphic of the reclaimed slopes is clearly at odds with the slopes of the original topography; this appears to be an significant adverse visual impact, and the alternative of a less steep (3:1) slope, especially for the East Sage dump reclamation, should be selected.

A slope of 3:1 would be in compliance with the advice of many mining experts as follows:

"Overall, where possible, slopes steeper than 2:5 to 1 should be avoided." (Colbert, Stanton, and Trenholme of Radian Corporation, for the National Park Service. Environmental Handbook for Cyanide Leaching Projects. June, 1986. page 40)

The DEIS claims that a 3:1 slope will cost an additional $4.9 million for recontouring, over the costs **of a 2.2:1 slopes.**

Response to Letter 12

12-1 Comment noted. The cost to recontour to a 3:1 side slope is more expensive than the 2.2:1 Proposed Action, mainly due to two factors:

- The average dozing distance would increase by 175 feet (from 300 feet to 475 feet) for the 3:1 option. This increase in distance would be due to the longer slope face required by a 3:1 slope. The slope of the existing topography would also contribute to the increase in distance. This increase in dozing distance would decrease the hourly production rate of the dozer from 619.1 yd^3/hr to 428.6 yd^3/hr.

- The volume of material that would be required to be moved to achieve a 3:1 slope would be 14,643,972 yd^3 (an increase of 9,635,523 yd^3 over the 2.2:1 option). This increase is due to the shallower slopes of the dump face and would be compounded by the slope of the existing topography.

These two factors would increase the time (hours) required to reclaim to a 3:1 slope to 34,167 hours (an increase of 26,282 hours over the 2.2:1 option). This would result in an increase of $4,882,407 in reclamation costs (26,282 hrs x $185.77/hr = $4,882,407), which would include additional topsoil and additional seeding.

It is the Bureau of Land Management's assessment that the reclamation standards for vegetation cover and composition can be met on 2.2:1 slopes. Also, an additional 152 acres of surface disturbance would result from 3:1 slopes. Please refer to the Agency Preferred Alternative (Section 2.9, pages 2-55 and 2-57 in the Draft and Final environmental impact statements, respectively) for the Bureau of Land Management's preference and rationale at the Final environmental impact statement stage of the decision-making process.

12-2 Figure 2-1 on pages 2-41 and 2-43 in the Draft and Final environmental impact statements, respectively, shows the original topography beneath the waste rock dumps and not the topography of the surrounding hillsides. The figure reference on page 2-40 in the Draft environmental impact statement has been clarified on page 2-42 in the Final environmental impact statement. Please refer to Section 4.1.13 on pages 4-29 and 4-30 in the Draft and Final environmental impact statements, respectively, for a discussion of the visual resources impacts of the Proposed Action and the characteristics that determine visual contrast. The slope of the reclaimed waste rock dumps would be only one of the factors in determining long-term visual impacts.

Letter 12 Continued

12-3 If that is an accurate figure, it means the costs of recontouring are over $30,000/acre for the additional 152 acres, given a $4.9 million extra cost, for recontouring an extra 152 acres under the 3:1 slope alternative. (4-63)

The DEIS does not justify this calculation. The total costs of recontouring the 223 acre Top Pit expansion to a 2.2:1 slope are only $1.5 million ($6726/acre). It is questionable whether a 68% increase in the size of the recontouring (from 223 to 375 acres) would produce a 429% increase in the cost (from $1.5 million to $6.3 million).

BACKFILLING PITS

12-4 LASER also supports the complete backfilling of the Horseshoe pit, rather than the partial backfill alternative. Complete backfill of the pit would ultimately create a less offensive site, with far less visible long-term surface disturbance, and less initial disturbance at waste rock piles. A complete backfill may also increase the areas that will be ultimately reclaimed.

12-5 The DEIS says that the pit backfill alternative would only reduce the amount of unreclaimed land by nine acres, from 134 to 125. But even a partial backfilling of the Horseshoe pit may result in less initially disturbed lands. Backfilling would reduce the Galaxy dump by 15 acres, the Saga dump by 14 acres, minus 11 acres of new haul roads. Backfilling would cause reclamation of 9 acres of the Saga Pits, that otherwise would be left unreclaimed. In sum, there would be an increase of 18 acres that are not disturbed, and a additional nine acres reclaimed,.

This is significant, because as noted in various places in the DEIS (for instance 4-3), there are many factors, such as shortages in topsoil, plans to use very steep slopes exceeding 3:1, and requirements than only a 30% canopy cover will be considered a successful reclamation, that support project alternatives that disturb less area as part of the total operation.

12-6 The DEIS complains about the costs of backfilling; about $700,000 (4-49), claiming this would render the project infeasible. These claimed costs, if accepted at face value, only amount to $1/ounce per gold recovered over the project's life

. This is hardly a "deal-breaker" surcharge, given that a $1/ounce/gold price fluctuation happens several times a week in the international gold markets. If the project's economics are so slim, the project should not be allowed to go forward, since normal fluctations in the price of gold may render the project uneconomic, also.

LASER is still supportive of the 3:1 slope alternative, in

Response to Letter 12

12-3 Please refer to Response to Comment 12-1 for a discussion on increased costs for a 3:1 slope configuration.

12-4 Comment noted.

12-5 Comment noted. Your understanding of the acreages involved is correct.

12-6 The Proposed Action involves two separate components, the Horseshoe/Galaxy Mine and the Process/Top Area Modifications. These two components are considered independent from each other. Each project would be considered separately at the corporate level when deciding to commence that particular project. The $700,000 cost of backfilling stated in the comment is the estimated additional cost to backfill the pits within the Horseshoe/Galaxy Mine plan, under Section 4.3, Alternative to Backfill Pits at the Horseshoe/Galaxy Mine, Subsection 4.3.3 on page 4-49 in the Draft and Final environmental impact statements. Based on the information presented in the previous paragraph and Section 2.1.2, page 2-4, 105,000 ounces of gold are estimated to be recovered, resulting in a cost of $6.66/ounce ($700,000/105,000 ounces) of recovered gold over the mine life, as opposed to your claim of $1/ounce of gold recovered. This figure appears to be derived from the total ounces recovered from both components (105,000 ounces + 596,000 ounces). In addition, the $700,000 would be a direct operating expense that would increase the cost per ton of waste rock mined. The increased mining costs would have a direct impact to the ore cut-off grade, thereby affecting the quantity of ore mined.

Letter 12 Continued

12-7 spite of the larger areas initially disturbed, because of the wealth of authoritative evidence that less steep slopes are far more likely to be successfully revegetated.

12-8 Backfilling of the Sage Flats and Top pits is rejected on economic grounds. The DEIS says the costs of handling mined materials twice would cause less ore to be mined initially. Apparently, the costs of backfilling the pits, would be deducted from the costs of mining the pits. So if money must be spent on backfilling, it will not be spent on mining. The DEIS Should explain why funding for backfilling is not available from the profits that will be generated from this long-term, large scale operation, that will mine about $284 million in gold. (2-54)

12-9 The DEIS is inconsistent by not listing and quantifying this alleged impact, of less gold mined under the backfill alternative in Table 2-16.

FLATTEN PIT WALL

12-10 Flattening the pit wall was rejected because it would not ensure future revegetation of the pit wall. If the wall was flattened sufficiently,(even to a 2:1 slope) the decrease in the slope should certainly tend to increase the probability of reclamation.

Regrading of the pit wall was also considered feasible by the BLM regarding the proposed Atlas Mine in Eastern Oregon:

> "Selective blasting ... within the Pit should be considered., This would .... creat(e) short, intermittent talus slopes (and increase diversity of wildlife habitat)." (3/11/91 letter from Ralph Helt of BLM, Vale District, to Atlas Precious Metals)

WASTE DUMP SIZE

12-11 The DEIS did not explain why the Saga waste rock dump will be 235 acres, and the S. Water Canyon dump will be only 189 acres. The DEIS says sixty million tons of waste rock will go from the Saga Pit to the Sage waste rock dump. It also says 80 million tons from the Top Pit, and 20 million tons from the Saga Pit will go to the Water Canyon dump. Since the Saga dump will hold 60 million tons of waste rock, while the Canyon dump will hold 100 million tons of waste rock, there should be an explanation which the Saga dump is 36 acres (16%) larger, while it contains 40% less rock.

LASER considers an accurate measurement of the areas of each mine facility to be very important, because these figures are necessary for an accurate appraisal of the impacts from the different reclamation/backfill alternatives.

HAUL ROAD RELOCATION AND SOUTH WATER CANYON ALTERNATIVE

Response to Letter 12

12-7 Comment noted.

12-8 As discussed in Section 2.7.6 on pages 2-54 and 2-56 in the Draft and Final environmental impact statements, respectively, backfilling as an alternative was rejected, based on mineral resource and economic criteria. A mineral resource would remain below the bottom and behind the walls in both pits. If these mineral resources were buried with wastes, their economic potential would be eliminated. The economic impact can be evaluated from two perspectives:

- Proposed pit design - If the waste from both proposed pits were rehandled and hauled back into the pits, the cost for waste removal would double. The waste dumps would be located in canyons, resulting in a steep, up-hill back haul to the pits. The distance from the toe of the waste dump to the crest of the pits would be over 1,000 vertical feet and 9,000 horizontal feet. This rehandling cost of 160 million tons at an average of $0.60 per ton ($96 million) would eliminate the proposal from economic consideration.

- Redesign pits with added costs - If the added costs for backfilling the pits is considered up-front in the pit design process, it would impact the mining economics the same as any other cost increase, i.e., it would reduce the optimum size of the pit. In this case, the ore cannot pay for as much waste to be mined, since the cost of the waste has increased due to backfilling. The same impact would occur if other operating costs were increased or the price of gold were to decrease. The Top Pit backfilled optimum reserve is 66 percent smaller than the Proposed Action reserve. The Sage Flats backfilled optimum reserve is only 2 percent of the Proposed Action reserve (a 98 percent decrease).

12-9 The Backfill Alternative was not included in Table 2-16 because this alternative was considered but eliminated from detailed analysis, as presented in Section 2.7.6 on pages 2-54 and 2-56 in the Draft and Final environmental impact statements, respectively. Only reasonable project alternatives were summarized in Table 2-16.

12-10 Comment noted. As discussed in Section 2.7.7 on pages 2-55 and 2-56 in the Draft and Final environmental impact statements, respectively, flattening pit walls (especially to a 2:1 slope) would increase overall surface disturbance and would not ensure natural revegetation. The Bureau of Land Management assumes that your comment is addressing the Sage Flat pit and dump and not the Saga pit and dump.

12-11 The underlying topography and the slope of the proposed waste dumps dictate the area of disturbance per ton stockpiled. The South Water Canyon and East Sage dump locations have differing original topography and final slope angles.

Letter 12 Continued

12-12 The DEIS says (2-51) that the South Canyon Dump, when flattened, will cover the existing haul road and Rat Dump, after the Rat Dump was already reclaimed. It is unclear why the mine would reclaim the Rat Dump, knowing it will be covered by the new South Canyon Dump. The DEIS did not explain why it is not feasible to delay fully reclaiming the 56 acres of the rat dump that would ultimately be covered by the South Canyon Dump. If this delay was feasible, it would seem that there would be 56 less acres of disturbance of previously undisturbed areas, because a portion of the new Canyon dump would be on top of the old rat dump.

PAVED HAUL ROAD ALTERNATIVE

12-13 At this point, LASER would like to add that it has consistently argued in many mining reviews, that haul roads should be paved, to drastically reduce the dust from truck traffic, and to eliminate the need for dust control measures.

The constant application of water and/or chemicals for dust controls, have their own adverse environmental impacts, including increased water use, and chemically contaminated runoff of rainwater from chemically treated roads.

12-14 Another alternative would be using conveyors instead of haul trucks to move ore/waste rock. The DEIS says a conveyor may be built next year at the mine site (B-8). It is improper "piecemealing" of this project not to consider the impacts of the alternative of constructing a conveyor in this DEIS.

USE OF EXISTING PROCESSING FACILITIES AND ENCLOSURE OF PROCESS SOLUTIONS

12-15 The alternative of processing ore at the existing Casino or Alligator Ridge Mines, and containing processing solutions in tanks, were rejected in part because of the hauling costs. LASER is concerned that this economic calculation may be flawed. Please provide LASER, under the Freedom of Information Act 5 USC 552, any calculations of the costs of this hauling, and any comparison to the costs of constructing the new processing facilities, and any calculations of the costs of constructing and maintaining tanks, versus the costs of constructing and maintaining open pads, pits, ponds and impoundments, including maintenance and remediation of liner failures.

TANKED SOLUTIONS ALTERNATIVE

12-16 The DEIS not explain why tanking process solutions will not reduce exposure of wildlife to those toxic solutions. Birds and wildlife are frequently killed.by exposure even to "covered" ponds, because many small, birds and mammals area capable to penetrating or getting under and around these covers.

ALTERNATIVE MITIGATION MEASURES--ACQUIRING AND IMPROVING REPLACEMENT LANDS

One hundred thirty four acres would not be reclaimed. This

Response to Letter 12

12-12 The Bureau of Land Management's reclamation policy dictates that the Rat Dump cannot remain unreclaimed for an extended period of time, i.e., until mining the Top Pit is completed, a period of 10 years. Reclamation objectives include stabilizing a mined area as soon after operations have been completed, as practical.

12-13 Comment noted. The use of water and chemical dust suppressants for the control of fugitive dust is a well-proven, highly effective control method, with demonstrated minimal environmental impacts. This control methodology is utilized by virtually all heavy equipment operations, public and private, throughout the country. The reduction of emissions between paving and properly applying water or chemical suppressants would be minimal. Chemically treated dirt roads must be treated with State-approved chemicals. The chemical typically used is magnesium chloride.

12-14 The Top Area Conveyor (described on page B-12 in the Draft and Final environmental impact statements) was considered a reasonably foreseeable future action and was included in the cumulative impacts analysis. However, a conveyor was not considered ripe for analysis as an alternative to the Proposed Action. A conveyor would be analyzed if and when proposed. Because this project was considered a reasonably foreseeable future action, the impacts of the Top Area Conveyor (e.g., 50 acres of new surface disturbance) were considered in the cumulative impacts sections of the Draft and Final environmental impact statements.

12-15 No hauling costs were presented in the Draft and Final environmental impact statements; only relative hauling distances were examined (see Table 2-15 on page 2-53 in the Draft environmental impact statement and on page 2-55 in the Final environmental impact statement). Construction and operating costs were only part of the reasoning to not review these alternatives further. The current facilities would have to be expanded to meet the demands of the new operation, so additional surface disturbance would also occur. This would include new heap leach pads and ponds. The Casino-Winrock facility is located in Ruby Valley and additional heap leach pad and ponds are not desirable, based on the high recreational values of Ruby Lake, which is adjacent to the area. The Alligator Ridge facility does not have the room or the capacity to handle the additional material for this operation. The use of tanks for heap leaching does not eliminate any environmental impacts, as described on page 2-54 in the Draft and Final environmental impact statements. These factors, in addition to the economics of these alternatives, were considered and determined to make these alternatives not reasonable. Therefore, no further analysis was needed.

12-16 The use of tanks to store process solutions would minimize exposure of wildlife to solutions potentially lethal to wildlife. However, as explained in Section 2.7.4 in the Draft and Final environmental impact statements (page 2-54), use of this alternative would still require secondary containment ponds for storm events and overflow. Tanks would provide no environmental advantage over the Proposed Action, as these ponds would require the same type of coverings that are currently proposed for the process solution ponds associated with the Proposed Action.

Letter 12 Continued

12-17

is an unmitigated and significant impact. NEPA urges:

> "Federal agencies shall to the fullest extent possible: ... (f) Use all practicable means .. to restore ... the environment ... and ... minimize any possible adverse impacts..." (40 CFR 1500.2 (f)

12-18

LOST DEER HABITAT

LASER believes that if those 134 acres are not reclaimable, then the mine owner should restore the productivity of other lands degraded (by mining or grazing) within the Egan RA at a ration of 2 acres of restored lands elsewhere, to 1 acre of unreclaimed lands at the Bald Mountain site. This would mean the restoration of about 200 acres. This is a practicable means of restoring the environment and minimizing an adverse impact, as required by NEPA.

This is an important issue because the lost lands include crucial mule deer habitat, which is undergoing cumulative losses throughout the West. The Nevada Division of Wildlife has designated the mine area as crucial deer winter range. Not only are those 134 acres not planned to be restored, the Mine's siting would remove another 1300+ acres of mule deer habitat for the life of the mine. That 1300 acres would remain badly degraded until reclamation efforts are successful, which could take a substantial time; the DEIS estimates at least 5-7 years.

12-19

Losses of deer habitat should be viewed not only as a loss of animal life and habitat, but as an economic and recreational loss to the area. Deer hunting tags are oversubscribed every year (3-49), indicating the popularity of this sport. The sharp decline of 50% between 1993 and 1992 in the number of bucks harvested may indicate that severe pressures on the deer herd are already present.

12-20

Since the DEIS (B-76) mentions deer poaching as a problem, perhaps one mitigation would be for the Mine to fund additional wildlife law enforcement agents.

12-21

The DEIS failed to include impacts on the deer herd in its evaluation of the project's harms to recreation.

12-22

These degraded areas are also habitat for songbirds and sage grouse, including brooding areas near water sources. (3-23)

Despite a specific warning from Fish & Wildlife (6/29/94 letter) that vegetation removal during the avian breeding season may be a (felony) violation of the Migratory Bird Act, the DEIS admits that vegetation could be removed during the bird breeding season (4-12). The FEIS should explain why this type of action is allowed in the DEIS, since during scoping, a federal agency specifically warned this activtiy would be a federal crime.

Response to Letter 12

12-17 The analysis of impacts presented in the Draft and Final environmental impact statements does not indicate that 134 acres of unclaimed pits would be a significant impact to any resource. Reclamation of pits is neither practical nor reasonable and is not included as potential mitigation in Section 4.7 on pages 4-68 and 4-70 in the Draft and Final environmental impact statements, respectively.

12-18 Please refer to Response to Comment 11-2 for a discussion of effects to mule deer, habitat enhancement, and applicable mitigation measures.

12-19 According to the Nevada Division of Wildlife's records, mule deer rifle buck tags within Area 10 are typically oversubscribed. However, in 1994, a total of 561 antlerless tags and 655 archery tags for deer, available from the Nevada Division of Wildlife, were not applied for by hunters. The overall reasons for the population declines documented for mule deer within Area 10 are described in Section 3.6 on page 3-22, in Section 4.1.6 on page 4-13, and in Section 4.6.2, on page B-72 of Appendix B, Cumulative Impacts, in both the Draft and Final environmental impact statements. As discussed in Section 4.1.6 and in Response to Comment 11-2, potential adverse impacts to resident and migratory mule deer from the Proposed Action are not anticipated to affect the Area 10 Herd. Therefore, no additional impact to recreational opportunities or economic benefits from hunting would occur from the implementation of the Proposed Action.

12-20 The Nevada Division of Wildlife and the Bureau of Land Management do not presently perceive the levels of wildlife poaching and illegal shooting to warrant the addition of law enforcement officers to the Buck and Bald Mountain area as potential mitigation.

12-21 Please refer to Responses to Comments 11-2 and 12-19 for discussions of anticipated short- and long-term impacts to mule deer and effects to hunting from project development, respectively.

12-22 The commenter is confused in that the environmental impact statement does not authorize a specific action. The Migratory Bird Treaty Act, as amended, 16 USC Sections 703-711 (50 CFR) 10.13), prohibits the killing, capturing, transporting, etc. of migratory birds, their nests, and eggs. The Bureau of Land Management feels that the proposed mitigation measure described in Section 4.7.1 on pages 4-68 and 4-70 in the Draft and Final environmental impact statements, respectively, and in Section 5.1, Cumulative Impacts, in Appendix B (page B-115) is appropriate for addressing the potential impact to nesting birds, particularly nesting passerines. This measure would protect nesting birds within the piñon-juniper, mixed shrub, and mountain mahogany habitats that could be disturbed by the Proposed Action. An additional discussion of potential effects to neotropical migrants is presented in Section 4.6.2.3 (page B-77) in Appendix B of both the Draft and Final environmental impact statements.

While prohibitions on site clearance during nesting season are suggested later as "potential" mitigation in the DEIS, the possibility of the illegality of this conduct should lead to very strongly worded prohibitions in the DEIS on site clearing in the nesting season.

POTENTIAL RECLAMATION PROBLEMS

12-23 The DEIs' estimate of 5-7 years before reclamation efforts are successful, may be an optimistic prediction, since the DEIS also admits that not there may not be enough growth medium to provide even a 6" layer on all surfaces. (2-33)

Tailings and waste rock piles are difficult to reclaim, because they are often void of soil nutrients, and also contain toxic materials such as measurable concentrations of metals and salts.

NON-NATIVE SPECIES

12-24 Since there are troubling plans to introduce non-native plant species, even "successful" reclamation, if accomplished with non-native species, will provide habitat with reduced productivity, compared with the natural habitat that was there before the mine. Use of non-native species should be rejected.

The EPA has also warned, during scoping, against use of non-native species during reclamation, in their 6/11/94 letter to the BLM. Since non-native species are being used currently, the EIS should explain why the mine operator is ignoring the EPA's advice on this matter, especially, since in the DEIS appendix, it notes that native species provide superior habitat. (3-55)

TYPES OF SPECIFIC HABITAT DESTROYED WILL NOT BE SPECIFICALLY RESTORED

12-25 There is another factor indicating that the reclaimed lands will be far less productive habitat than were previously undisturbed lands, before the mine. This is the destruction, without any apparent in-kind replacement, of several specialized habitats such as big and low sagebrush (important songbird habitat) and pinon-juniper vegetation types. Of 743 acres of big sagebrush vegetation type area, only 447 acres will be reseeded (4-5), leaving a net loss of 296 acres of this specialized habitat. The DEIS does not reconcile this 296 acre loss with the claims of only 134 unreclaimed acres.

12-26 Likewise, even though hundreds of acres of sagebrush/pinon/juniper habitat will be lost, there is no indication in the Table 2-10 through 2-12, than any sagebrush, juniper, or pinon will be replanted. So even though there will be some reclamation, these particular habitat types may be completely lost and not recovered, since it does not appear that these plant and tree types will be replanted.

12-23 Please refer to Section 2.1.6.6 (on pages 2-38 and 2-39 in the Draft and Final environmental impact statements, respectively) and Section 4.1.2.2 (on page 4-7) for discussions on goals for successful revegetation and changes in plant diversity and abundance within reclaimed plant communities. Also, refer to Responses to Comments 12-28 and 12-29 for a discussion on percentage of vegetation cover. Successful reclamation is based on perennial canopy cover and plant diversity. As stated in Section 2.1.6.6, if potential limitations inherent in reclamation in arid climates and varied growth medium (quantity or quality) are encountered, a lesser degree of canopy cover may be appropriate. A test plot program would be used to determine if alternative standards for revegetation success are needed. As discussed in Section 4.1.2.2, it is anticipated that desirable plant species would become increasingly prevalent within reclaimed plant communities as time progressed. Approximately 7 to 10 years after reclamation, desirable plant species should become more abundant and the number of weedy species should decrease. Revegetation success would be based on the standards described in Section 2.1.6.6 and in Responses to Comments 12-28 and 12-29.

12-24 Comment noted. Please refer to Response to Comment 6-3 and Section 4.6.11 on pages 4-67 and 4-68 in the Draft and Final environmental impact statements, respectively, for a discussion of using only native species for reclamation.

12-25 The commenter is confused regarding the areas that would be reclaimed or not reclaimed following mining. The 447 acres of the big sagebrush vegetation type mentioned on page 4-5 in the Draft environmental impact statement are part of the Julian/West Bald Seeding for range improvement. This area has been reseeded to increase the production of grasses for cattle grazing, and the discussion is not indicative of the proposed reclamation measures. The Final environmental impact statement has been modified to clarify this statement (page 4-5). The Draft environmental impact statement was correct in that only 134 acres would be unreclaimed.

12-26 Sagebrush and piñon-juniper habitats are abundant in the Proposed Action area. Based on the anticipated effects from the Proposed Action, appropriate mitigation measures that are in accordance with the Bureau of Land Management's agency objectives have been developed. These measures are presented in Section 4.7 on pages 4-68 and 4-70 of the Draft and Final environmental impact statements, respectively.

Letter 12 Continued

Instead, these species must naturally reseed themselves, a process that the DEIS says will take 30-60 years (4-14). This is a relatively long term, significant unmitigated loss of specialized habitat. It should be mitigated by replanting these species and/or by habitat compensation payments or preservation/restoration of offsite habitat.

12-27 The mitigation suggested in the DEIS (4-73; maintaining the Julian/West Bald seeding) does not provide sufficient monitoring measures to insure that this measure will be carried out sufficiently to fully mitigate this impact.

INSUFFICIENT RECLAMATION REQUIRED

12-28 The apparent reclamation goal in part is 32% canopy coverage on the reclaimed lands. The DEIS does not compare this reclamation lands percentage with the canopy coverage of the natural lands before the mine was sited, to allow reviewers to determine is that is an acceptable canopy coverage goal.

12-29 The DEIS does not describe a meaningful course of action if these canopy goals are not met. Apparently if BLM determines the operator has taken reasonable methods, and use appropriate seed mixtures, the canopy (and diversity of cover) reclamation goals will not be enforceable mitigation measures.

12-30 Even if the developer restores offsite lands to compensate for the permanent losses of the 134 unreclaimed acres, additional offsite compensation may be appropriate to offset the "short-term" losses of the other 1300 acres for the life of the mine and the period of incomplete restoration; about 26,000 "acre-years."

As mentioned previously, LASER believes at least a 1:2 mitigation ratio is appropriate between the acreage of lost lands and the amounts of lands to be restored. There are many factors that degrade habitat, in addition to the actual acreage disturbed. These additional factors include but are not limited to habitat fragmented by developments and roads, the "edge effect" whereas disturbances from a mining operation, such as blasting, will disrupt habitat for a considerable distance away from the edge of the actual disturbed area, and the inevitable deaths of animals from collisions with traffic and power lines, and from possible poisonings by mine reagents.

The United States Department of the Interior, through their Fish & Wildlife Service, specifically requested evaluation of this very same type of mitigation and compensation in their scoping remarks dated 6/16/94.

The DEIS admits that the development will produce increased vehicle related mortalities, and suggest speed restrictions and traffic control signs. These measures are meaningless without

Response to Letter 12

12-27 The Bureau of Land Management would be responsible for adequate implementation of applicable mitigation measures, consistent with the Federal agency's management goals and objectives. This oversight would parallel other vegetation enhancement measures (e.g., vegetation conversion) that are ongoing within the Egan Resource Area.

12-28 The Bureau of Land Management uses canopy cover as one of the key parameters to assess reclamation success. For the Bald Mountain Mine Expansion Project, Range Site Descriptions were used as a measure of ungrazed canopy cover for the different vegetation types present. The Nevada Interim Standards for Successful Revegetation are to achieve as close to 100 percent of canopy cover as possible. Since the Range Site Descriptions for the Proposed Action area average 35 percent, it was determined that this would be the cover requirement for the project. The Draft environmental impact statement had a typographic error, and the canopy cover figure should be 35 percent rather than 32 percent. This correction has been made on pages 2-39 and B-107 in the Final environmental impact statement.

12-29 These measures are enforceable by the forfeiture of the reclamation bond and other legal actions. That portion of the bond dealing with revegetation (15 percent) would not be returned until the following standards are met. Perennial cover would be a minimum of 35 percent. In addition, this 35 percent cover must be comprised of 50 percent grasses representing 4 species, 10 percent forbs representing 2 species, and 10 percent shrubs representing 2 species, as discussed in Section 2.1.6.6 of the Draft and Final environmental impact statements on pages 2-38 and 2-39, respectively.

12-30 Comment noted. Please refer to Response to Comment 11-2 for a discussion of effects to mule deer, habitat enhancement, and applicable mitigation measures. In addition, potential direct impacts to wildlife resources from habitat fragmentation and indirect impacts from increased disturbance, potential power line collision, increased vehicle-related mortalities, and effects from toxic solutions are covered in Section 4.1.6 on pages 4-11 and 4-12 in the Draft and Final environmental impact statements, respectively, and in Section 4.6.2, Cumulative Impacts, in Appendix B.

Letter 12 Continued

12-31

enforcement, which is not described, and should be detailed in the FEIS. The local sheriff has commented (5/16/94 letter) that speeding is a severe problem in the mine area currently, and it is not likely that a letter form the mine and a few signs will change matters, without sterner actions. The Mine should purchase and fund the operation of an additional patrol car for the sheriff, as suggested, both to alleviate the burdens on local county services for the mine, and to allow increased surveillance of speeders. The FEIS should explain why this mitigation measure was not mentioned, since it was suggested during scoping.

12-32

LASER's research of many large industrial developments throughout the West has uncovered copious examples of developers who agree to perform offsite restoration of hundreds, or even thousands of acres of lands, as mitigation for their projects' impacts on habitat. If Bald Mountain is treated as an exception to this general policy, the FEIS should explain why. The FEIS Should also explain why the Fish & Wildlife's request during scoping for discussion of mitigation/compensation for lost habitat, was not discussed adequately in the preparation of the DEIS.

While the DEIS appendix (4-71) states generally, in two short paragraphs, that the developer may provide habitat restoration funding, this mitigation measures is too vague, and the discussion too limited, to assure reviewers that these significant impacts are sufficiently mitigated.

In other EISes, including some in which BLM is a cooperating agency (for instance the Tuscarora Pipeline EIS, 1995, the document presents very specific data about how much area is to be restored, and the annual money amounts to be dedicated by the developer for restoration and maintenance of the mitigation lands.

While there was a discussion of cumulative effects in the DEIS appendix, that discussion did not specifically outline appropriate mitigation measures, and identify specific potential mitigation lands for reviewers to examine for mitigation sufficiency.

AIR QUALITY

12-33

The DEIS claims that air quality standards will not be exceeded by the project. However, significant adverse impacts can be created by air quality impacts that do not exceed standards. The FEIS should contain a comprehensive discussion, including modelling of potential concentrations of air pollutants, including but not limited to fine particulate (PM 10 and PM 2.5). This is necessary because of recent evidence showing adverse health impacts from levels of particulate that are far below the current air quality standard.

Response to Letter 12

12-31 The Draft and Final environmental impact statements indicate that there would be increased vehicle-related mortalities for deer, not humans (see page 4-14). The Bureau of Land Management feels that the environmental protection procedures and applicable mitigation measures are adequate to minimize vehicle-related mortalities to wildlife. As a result of your comment on the White Pine County Sheriff's Department, the text in Section 4.1.11, on page 4-25 of this Final environmental impact statement, has been expanded to clarify the discussion of impacts to the Sheriff's Department and law enforcement. Also, Mitigation Measure 12 has been added to Section 4.7 in the Final environmental impact statement (page 4-75) to address the scoping comments of the White Pine County Sheriff. The basic conclusions presented in the Draft environmental impact statement have not changed.

12-32 Please refer to Responses to Comments 11-2, 12-22, 12-26, and 12-27 for a discussion of habitat enhancement, applicable mitigation planning, and adequate mitigation implementation. Mitigation and monitoring measures developed for the cumulative impact analyses are presented in Section 5.0, Cumulative Impacts, in Appendix B (page B-115) of the Draft and Final environmental impact statements.

12-33 Results from modeling all point and fugitive sources at the Yankee mine site (judged to be representative of the Proposed Action) show that concentrations of PM_{10}, NO_2, CO, and SO_2 would not exceed State or Federal Ambient Air Quality Standards (see Response to Comment 9-11). It must be kept in mind that these standards are set to protect human health and welfare, and significant impacts are not expected if the standards are not exceeded. Modeling studies at the Yankee Mine also show that maximum 24-hour PM_{10} concentrations fall below 18.66 $\mu g/m^3$ within about 1 kilometer of the source and that annual concentrations of PM_{10} are less than 0.1 $\mu g/m^3$ within 1 kilometer of the mine (NDEP 1994). At the present time there are no ambient air quality standards for $PM_{2.5}$. Since these smaller particles make up a small fraction of the PM_{10} particulates, concentrations would be lower than PM_{10}. Please see Response to Comment 11-1 for further discussion of toxic air emissions.

Letter 12 Continued

12-34 The DEIS says that diesel powered generators will be used, apparently at the Horseshoe/Galaxy operation. The EIS should have provided additional details such as hours of operation of these generators, the types and amounts of fuel to be consumed, nameplate rating and types of the generators, and the expected air pollution from these units, which is potentially a significant impact, and could trigger PSD (Prevention of Significant Deterioration) thresholds.(2-11)

12-35 At p. 2-19, the DEIS says that a new power line will provide electricity, apparently to the Sage/Top operation. But the DEIS failed to explain why electricity cannot be supplied to the Horseshoe/Galaxy operation, also. This alternative should have been discussed.

TOXIC AIR AND DIESEL EMISSIONS

12-36 The DEIS does not explain the potential air quality impacts from the electrowinning circuit, possibly from evaporation of the any solvents and stripping solutions. (p. 2-17) This circuit may need to be periodically purged of contaminated of its solvents, acids or stripping compounds, that have acquired excessive waste materials such as metals from wear of the anodes and cathodes. This destiny of this waste stream should be presented.

DUST CONTROLS

12-37 Please describe what kinds of "approved dust suppression" methods will be authorized. Many chemical dust suppression agents may have toxic effects if these chemicals taint rain runoff from treated areas. (p 2-7)

12-38 Please explain why 6 acres of haul road will not be reclaimed. This may be a long-term source of dust.(2-8)

12-39 Water sprays/foggers may be used to control crusher dust. These are not the most efficient dust controls. These methods should be compared to an alternative of baghouses and enclosures at the crushers, to further reduce dust. This is an important issue because as mentioned previously, new scientific evidence indicates that particulate is far more dangerous to human health than previously thought.

12-40 The DEIS claims there will be less than 100 tons/year of dust emissions per year. This is unlikely, given the size of the operation, the throughput of the crushers, and the amounts of truck traffic. Environmental assessments of many other similarly sized Western hard rock metal mines have concluded that several hundreds or even thousands of tons of dust will be emitted every year.

For example, one EPA AP-42 emission factor is that there will be 1.2 tons of dust emitted per acre of disturbance every month. Since this is a 1450 acre disturbance, there will be

Response to Letter 12

12-34 Diesel fuel consumption by mobile sources is controlled under State and Federal motor vehicle regulations. All stationary engines planned for the mine would have to be included in the air quality permitting process and would be required to meet all State and Federal ambient air quality standards, as well as new source performance standards. Present and planned facilities described in the Plan of Operations would result in actual emissions below the PSD threshold of 250 tons per year of criteria pollutants. Less than 5 percent of the diesel fuel used at the mine would be consumed by stationary sources. Mine emissions from all sources would result in concentrations that are below State and Federal Ambient Air Quality Standards.

12-35 The 69-kV transmission line would provide electricity for the operation of the Bald Mountain Mine, primarily the processing and support facilities. The line would not replace the diesel-powered haul trucks or loaders in the pits. Construction of a power line to the Horseshoe/Galaxy Mine was not considered as an alternative, because the short operating life of this mine (4 years) would not justify the environmental impacts and economic cost of the construction and removal of a line.

12-36 Prior to construction and operation of the refining circuit, the appropriate air quality permits must be obtained from the Nevada Division of Environmental Protection, Bureau of Air Quality. These permits contain various restrictions for operating the facility, based on a detailed analysis of air quality impacts. The permits specify the air pollution equipment that is required to be installed and operated and the emission limits for each source. The permits also specify operating parameters that must be maintained. Control equipment would be installed and operated as required by the permits, and the facility would be operated in compliance with all permit restrictions.

Solutions and chemicals used in the refining and stripping processes are contained the same as other process solutions. All refining and stripping solutions are returned to the process in a closed loop system. Therefore, no solutions resulting from these processes are disposed of or released from the system.

12-37 The Draft and Final environmental impact statements indicate that approved dust suppression methods would be used. These methods may change as technology changes. Under current practices at the existing mine site, water and magnesium chloride are used for dust suppression. Magnesium chloride has been successfully used over the past several years in the United States, with demonstrated minimal environmental impact. When properly applied, fortified magnesium chloride is locked in the target soil area and will not migrate into other parts of the environment and cause toxic effects.

12-38 The 6 acres not reclaimed would be the existing acreage of public access disturbance within the Horseshoe/Galaxy Mine boundary. These 6 acres would be returned to public access.

12-39 An analysis of this proposed alternative is not reasonable. Prior to construction and operation of the crushing system, the appropriate air quality permits would be obtained from the Nevada Division of Environmental Protection, Bureau of Air Quality. During the permitting process, Nevada Division of Environmental Protection would estimate the emissions expected to occur from the crushing operation. The Nevada Division of Environmental Protection would perform modeling to determine the air quality impact that can be expected to occur from the operation of the crushing system.

The air quality permits would contain various restrictions for operating the facility. The permits specify the air pollution equipment that is required to be installed and operated and the emission limits for each source. Water sprays are proposed for the crusher, but the Bureau of Air Quality would make the final determination of the required control technology. The permits also specify operating parameters that must be maintained. Control equipment would be installed and operated as required by the permits, and the facility would be operated in compliance with all permit restrictions.

Letter 12 Continued

about 2000 tons of dust emitted sheerly from site preparation. This, alone, exceeds the claim of less than 100/tons/year of dust emitted from the project. There will be additional vast amounts of dust emitted by truck traffic on the proposed unpaved roads, , but the DEIS did not provide, either in its text or appendix, sufficient data such as numbers of daily truck trips, silt factors, etc, to calculate the total dust emissions.

12-41 The DEIS completely failed to evaluate toxic air pollution from this site, from mineralized dust emissions, which may contain metals such as lead, copper, chromium, silica, and mercury, all of which are highly toxic and have been detected at elevated levels in dust from Nevada Mines, and from the combustion of about 5 million gallons of diesel (Table 4-8) annually. Diesel emissions typically contain measurable levels of many toxic metals, including but not limited to nickel and chromium.

12-42 While the DEIS did provide the 5 million gallon/year diesel use figure for the existing and proposed projects, it did not break that number down by combustion sources; how much will be burnt in trucks, and how much in the generators. There will likely be very substantial amounts of air pollution from burning this amount of diesel, that should have been calculated and presented in the DEIS. There will be additional air emissions from combustion of gasoline and propane that should be included.

For a rough comparison, a utility boiler would emit about 392 tons/year of sulfur dioxide, and 168 tons/year of Nitrogen Oxide, from combusting 5 million gallons of residual oil annually. These are clearly significant emission rates. (Buonicore and Davis. Air Pollution Engineering Manual. Van Nostrand Reinhold, New York. 1992. page 248, Table 2.)

WATER QUALITY IMPACTS

12-43 The DEIS admits there may be violations of drinking water quality standards for mercury, selenium, and arsenic (4-9) in seepage from waste rock. Since the East Sage dump is modelled to eventually seep about 260,000 gallons/year, this could harm Cherry Spring, a sage grouse brooding ground.

12-44 The DEIS should discuss mitigation measures, including seep water monitoring during and after the several hundred years during which this toxic seep may be generated (4-10). Instead, the DEIS says only that the authorities will be notified. Specific mitigation measures should be described to assure reviewers that these ipmacts would be alleviated.(4-73)

WASTE ROCK DUMPS

12-45 At places in the DEIS, the waste rock dump areas are described as apparently totalling 84 acres (2-8). But in the chart on p. 2-6, the Horseshoe/Galaxy dump by itself is called an

Response to Letter 12

12-40 Based on your comment, Section 4.1.10.1, page 4-23, in this Final environmental impact statement has been modified to clarify that the 100 tons per year includes only process emissions and not fugitive dust emissions. Nevertheless, the conclusion that PM-10 standards would not be violated is still valid.

The commenter is mistaken regarding the amount of fugitive dust emissions from the Proposed Action. Bald Mountain Mine Properties has proposed the control of dust emissions at the Horseshoe/Galaxy Mine and at the expanded Top Area and Process Area at the Bald Mountain Mine (see Response to Comment 12-37). Potential emissions (without controls) are calculated from the emission factors in AP-42. Actual emissions (controlled) are those emissions that would result after controls are put in place. The mine operator would be required to apply air pollution controls to reduce emissions during construction and operation of the mine. Please refer to Section 4.1.10.1 in the Draft and Final environmental impact statements (page 4-22) for a discussion of the controls to be applied at the mine.

12-41 Please refer to Response to Comment 11-1 for a discussion of toxic air pollutants. The comment is incorrect on the amount of diesel fuel that would be consumed by the Proposed Action. As shown on Table A-1, Appendix A, in the Draft and Final environmental impact statements, the Bald Mountain Mine would consume 1.9 million gallons annually, and the Horseshoe/Galaxy Mine would consume 0.53 million gallons annually. Since the Bald Mountain Mine would continue existing operations, the projected consumption cannot be added to the existing consumption, as it is already included in the 2.56-million-gallon figure presented in Table A-1.

12-42 Please refer to Response to Comment 12-34 for a discussion of diesel combustion sources and to Response to Comment 12-41 for a discussion on the amount of diesel fuel that would be consumed.

12-43 Please refer to Response to Comment 9-1 for a discussion of seepage impacts to Cherry Spring. The estimated flow rate using the Hydrologic Evaluation of Landfill Performance (HELP) modeling would be approximately 0.5 gallon per minute or less. This low seepage rate should prevent any seepage from reaching Cherry Spring, because the seepage would have to pass through 700 to 800 feet of unsaturated rock before reaching the perched aquifer that supplies the spring.

12-44 As described on page 4-10 of the Draft and Final environmental impact statements, it is unlikely that water would seep from the East Sage waste rock dump within a few 100 years, based on the results from the Hydrologic Evaluation of Landfill Performance (HELP) model. Monitoring would determine if seepage would occur and if mitigation would be necessary. Site-specific mitigation measures would be developed by the Bureau of Land Management and Nevada Division of Environmental Protection, in the event of water seepage from the East Sage waste rock dump.

12-45 Please refer to Table 2-1 on page 2-5 in the Draft and Final environmental impact statements for a complete listing of the acres to be disturbed by each component of the Proposed Action. Waste rock dumps associated with the Horseshoe/Galaxy Mine and Top Area expansion would total 508 acres. No pits would be backfilled as part of the Proposed Action. The backfill alternatives are discussed in Section 2.3 and 2.7.6 of the Draft and Final environmental impact statements. See pages 2-45 and 2-47 in the Draft and Final environmental impact statements, respectively, for Section 2.3 and pages 2-54 and 2-56, respectively, for Section 2.7.6. If pits at the Horseshoe/Galaxy Mine were backfilled, waste rock dumps would total 479 acres.

Letter 12 Continued

84 acre site, and there is also noted another 414 acres of Saga/South Water waste rock dump areas. What is the total area of the rock dumps, both before and after backfill of any pits?

HEAP LEACH PAD LINER

12-46 The DEIS says this unit will have a composite-lined system, and the secondary liner material would be soils (of unstated thickness and without a description of lift compactation methods) with a permeability of 1 x 10 to the -5 centimeter/second. (2-9) This apparently would not comply with the BLM's Nevada Cyanide Plan, (1991) pages 11 and 12, including the following:

I. Liners

"...soil liners must have a minimum thickness of 12 inches and be compacted in lifts which are no more than 6 inches thick ... a soil liner must have a permeability of not more than that exhibited by 12 inches of 1 x 10-7 cm/sec material."

The FEIS should clearly explain if the proposed leach pad liner, as described in the DEIS, will comply with this BLM regulation. The 10 -5 cm/sec permeability dies not seem sufficiently conservative to protect the environment. On page 11, the BLM Plan states that the soil layer is allowed a maximum permeability of 1 x 10-5 cm/sec when combined with a leak detection system, and apparently a maximum permeability of 1 x 10-6 cm/sec is required for leach pads.

The leach pad liner description does not assure reviewers that this and other BLM regulations will be met by this unit, since the description lacks a dscription of the thickness, engineering, and the type and placement of any leak detection system.

At page 2-17, we learn that the heap leach pad will double as a tailings impoundment. The BLM Cyanide Plan requires tailings impoundments to have an underlying containment equivalent to 12" of soils with no more than 1 x 10-6 permeability. Again, the above cited possibility that the heap leach/tailings impoundment will have an underlying soil layer of unstated depth and a 10-5 permeability, may not comply with this BLM rule.

WATER USE

12-47 The Mine will draw 1600 gallons/minute, or over 840 million gallons/year if water is drawn continuously (4-7,8). This is a huge amount of water use for the desert, especially if there is additional water evaporated from dewatering this operation. The EIS should have discussed the potential impacts of these withdrawals on habitat, on other water users, and alternative

Response to Letter 12

12-46 As a result of your comment, the text on page 2-17 of this Final environmental impact statement has been expanded to clarify the discussion of heap leach pad permeability. The basic conclusions presented in the Draft environmental impact statement have not changed. The liner system for the heap leach pad would be in compliance with the Nevada Division of Environmental Protection, NAC 445.24362. The tailings impoundment would utilize a system of containment equivalent to 12 inches of recompacted native, imported, or amended soils, which have an in-place recompacted coefficient of permeability of no more than 1×10^{-6} (NAC 445.24368). The comment is incorrect in that the heap leach pads and the tailings impoundment would all comply with the Bureau of Land Management's Nevada Cyanide Plan.

12-47 As presented on pages 4-7 and 4-8 in both the Draft and Final environmental impact statements, the Proposed Action would pump groundwater at the Process Area at 1,200 gpm and at Mooney Basin at 400 gpm. These areas are located about 9 miles apart and are separated by Bald Mountain. Further, the Horseshoe/Galaxy Mine would only pump for about 4 years. No dewatering of pits would be required as part of the Proposed Action. Because water would be pumped from deep aquifers, no impacts to wildlife habitat or water users is expected. As stated on page 4-8 in the Draft and Final environmental impact statements, the analysis indicates that impacts would be limited to private wells located within a 2-mile radius of the production well field. At present, there are no known private wells within this 2-mile radius. Also, please refer to Response to Comment 9-10.

water use mitigation proposals. The DEIS admits a drawdown of wells two miles away, but this impact is not mitigated.

12-48 The DEIS alleges that pumping (from regional aquifers) will not affect perched aquifers, only if there is not recharge between aquifers. It is likely that to some degree, there is a connection between the perched and regional aquifers, and therefore there may be an effect. Mitigation should be discussed if this effect becomes pronounced.

12-49 The DEIS failed to closely examine the cumulative effects of this mine (and other water users) on all water flows, including Huntington Creek and regional groundwater flows that feed the Humboldt River. the Mine may affect this Creek by pumping of groundwater that helps recharge this Creek (B-41). A supplemental EIS is underway regarding the Barrick Mine on this topic of cumulative impacts of Mines withdrawing groundwater, and depleting other water bodies) that feed the Humboldt, and this DEIS should have mentioned this potential cumulative impact on the Humboldt.

WATERS OF THE U.S.

12-50 The proposed action area includes stream courses with ephemeral flows. They may be Waters of the United States, and work affecting those courses may require compliance with Army Corps permit requirements. This potential requirement should be discussed. But the DEIS claims these drainages are not surface waters (2-40) and has not even measured the (intermittent) flows (3-16). That is a questionable procedure, and the EPA and Corps should be consulted on this issue.

12-51 The DEIS says that the area's springs are recharged by snowmelt (3-18), but there is no examination of the degree to which snowmelt flows through these ephemeral stream courses, to recharge groundwater. It is possible that the proposed action's disruption of these stream sources may affect downstream springs.

EROSION CONTROLS

12-52 The DEIS claims that Best Management Practices will be used to control erosion, such as sediment traps. The DEIS should have provided the drainage areas to be controlled, and the size of the proposed sediment traps, in order for reviewers to determine if BMPS are actually planned to be implemented. (2-18)

12-48 The regional aquifer is located over 200 vertical feet below the perched aquifers. The regional aquifer does not communicate with the perched aquifers. The perched aquifers are too small to have any recharge effect on the regional aquifer. Therefore, no mitigation is appropriate.

12-49 As discussed on page B-57, Appendix B, in the Draft and Final environmental impact statements, Huntington Creek lies well beyond the 2-mile radius of the production well field at the Bald Mountain Mine, where the maximum expected drawdown would be 6 to 10 feet after 10 years of pumping. Groundwater recharge to Huntington Creek comes from many sources north of this 2-mile radius. There would be no impact from the production well field to Huntington Creek, because it is too far away and receives groundwater recharge from sources located north of the drawdown cone identified by the water data analysis. The Proposed Action and interrelated projects would not affect the Humboldt River; the other projects that may affect the Humboldt River are located outside of the cumulative impacts geographical area for this project.

12-50 Please refer to Sections 3.5 and 4.1.5 in the Draft and Final environmental impact statements (on pages 3-20 and 4-11, respectively) for detailed discussions of waters of the United States. Measurement of flows in intermittent drainages is not required for the delineation of waters of the United States. Drainages in the Proposed Action area have been inventoried for waters of the United States, and a report has been submitted to the Corps of Engineers by Bald Mountain Mine Properties. The environmental impact statement accurately presents the results of this inventory.

12-51 Snowmelt recharges the perched aquifers that feed the springs by infiltration through bedrock faults and fractures, not by flow down mountain streams. Modification of intermittent drainages by the Proposed Action would not affect area springs.

12-52 The Best Management Practices, as defined in the glossary in the Draft and Final environmental impact statements, would be implemented, since they are part of the Proposed Action and alternatives. Application of the Best Management Practices would be on a site-specific basis and would be developed by the Bureau of Land Management, Nevada Division of Environmental Protection, and the applicant during project operation. The Bureau of Land Management's quarterly compliance inspections would ensure that they are implemented.

Letter 12 Continued

CHEMICAL USE

12-53 The flocculants and anti-scalents to be used should have been fully described, including any toxic effects from releases. (2-19) Are these all the chemicals to be used? Which of those chemicals listed will be used to suspend gold in solution for recovery onto the steel wool? Will chemicals be used to strip gold off the steel wool? Will additional chemicals such as sulfur dioxide or chlorine be needed for cyanide destruction? The list at 2-19 may not be complete; on page 2-21 another chemical, nitric acid, is mentioned.

The DEIS Should have discussed the sizing of the containment area for fuel and chemical storage (2-20). Only the fuel island containment is described. The amounts of chemicals to be transported, used and stored monthly, annually, and over the life of the mine should have been provided.

LANDFILL

12-54 This facility is not described at all, its size and liner engineering are not given, and it is not presented on the mine site maps. This is an inadequate discussion of this mining related unit.

12-55 Most of the wastes listed at 2-24 are potentially recyclable. The DEIS should have presented a project alternative that included recycling all or most of these materials, so that this dump would not be necessary, or could be much smaller.

12-56 There is no description of how hazardous and lead wastes will be stored, or their precise ultimate destiny. (2-27)

SLUDGE DISPOSAL AND SITE CLOSURE AND CLEAN-UP

12-57 Under what conditions will sludges be left on site (2-43)?How will hydrocarbon tainted soils be treated,and what amount of hydrocarbon air emissions will be produced by that treatment (2-44)?

The heap leach liner will be buried. Since sludges and toxic residues may be coating this unit, testing is suggested before burial.

MAN CAMP

12-58 The Map 1-4 shows a man camp. Is this camp operating; what is its capacity, how many people are currently residing there, and will there be an increase in its population during the construction, and operation of the mine expansion.?

LAND USE ISSUES

12-59 Please describe the current status of any application b the Mine for a County conditional Use Permit.

Response to Letter 12

12-53 Please refer to Appendix A-1 in the Draft and Final environmental impact statements for a detailed listing of the process chemicals and fuels to be consumed at the Horseshoe/Galaxy and Bald Mountain Mines. Annual rates of use, maximum volumes stored, and methods of storage are presented. Section 4.1.16.2 in the Draft and Final environmental impact statements, beginning on pages 4-38 and 4-41, respectively, discusses the effects of a release of diesel fuel and hydrochloric acid, and has been expanded in this Final environmental impact statement to include sodium cyanide. Response to Comment 6-4 also discusses the effects of a release of sodium cyanide. The probability of a release of other chemicals would be very low, due to the much smaller volumes transported and the containerized storage of many of the chemicals. Responses to your specific questions regarding process chemicals follow.

- The flocculants and anti-scalents that are being used within the process at Bald Mountain Mine are dilute polymer compounds. The Material Safety Data Sheets for these compounds indicate that there are no toxic effects from a release of these materials.
- Gold is not "suspended" in solution in an electrowinning process. Gold is associated with the electrolyte solution in a sodium cyanide/gold cyanide complex in which an electrical charge loads the gold onto the cathode (the steel wool).
- No chemicals are used to separate gold from the steel wool. The process is a smelting process that utilizes the different melting/solidification points and densities to separate the iron slags from the gold and silver. Fluxes like silica and borax are used to enhance the phase separation of the slag from the precious metals.
- Section 2.1.6.10 in the Draft and Final environmental impact statements (page 2-42) reviews oxidation methods of cyanide destruction for the heap leach pads. At this time, the carbon-in-leach process is expected to lower the cyanide levels to "safe" levels for wildlife during the active operating years. For reclamation or if standards change requiring lower levels of cyanide during the production years, proper engineering practices could be implemented using chemicals like peroxide and sulfuric acid (Caro's Acid Detox Process).
- In Section 2.1.4.1 in the Draft and Final environmental impact statements (page 2-20), the reference is made to 110 percent secondary containment for the above-ground fuel tank. This is the minimum sizing of all containment used for the Bald Mountain Mine Expansion Project.

12-54 As noted in the Draft and Final environmental impact statements (page 2-24 and Table A-3 in Appendix A), approval would be requested from the Nevada Division of Environmental Protection for the construction of a Class III landfill at the Horseshoe/Galaxy Mine, and a waiver application would be filed. State of Nevada regulations define and govern the design, operation, and monitoring of a Class III landfill. If the Class III landfill site accepts only inert waste, such as this one would, the Nevada Division of Environmental Protection may adopt less restrictive regulatory standards for the site. A solid waste management authority may waive the requirements for a Class III site, if certain conditions can be demonstrated. Typical wastes proposed to be placed in the landfill are listed in Section 2.1.4.4 of the Draft and Final environmental impact statements (page 2-24). The site would comply with the standards for location, design, construction, operation, and maintenance set forth in NAC 444.733 to 444.747.

The exact location of the landfill has not been determined. Typically, a landfill is placed on an inactive waste rock dump. The location chosen would be easily accessible in all types of weather, would safeguard against water pollution originating from the decomposed solid waste at the site, would safeguard against uncontrolled movement or collection of gas originating from decomposed waste at the site, would have adequate quantity of cover material, and would be approved by the solid waste management authority.

Letter 12 Continued

BONDING

12-60 Bonding should be sufficient to accomplish reclamation, to allow for remediation if any on-site storage tanks may leak, and to provide for several hundred years of monitoring water quality from the potential waste rock and tailings impoundment seeps.

Response to Letter 12

12-55 As is discussed on pages 2-24 and 2-25 in the Draft and Final environmental impact statements, respectively, Bald Mountain Mine would recycle used oil, antifreeze, and solvents. Given the remoteness of the two mine sites, it is not feasible to recycle wastes of low economic value that pose little to no environmental hazard. Such wastes would include glass, plastics, paper, wood, metal, and rubber. However, Bald Mountain Mine continually evaluates recycling options. The Bureau of Land Management does not believe that recycling these wastes represents a reasonable alternative to the Proposed Action.

12-56 Please refer to page 2-25 in the Draft and Final environmental impact statements for a discussion of the disposition of hazardous and lead wastes. These wastes would be temporarily stored on-site and then shipped off-site for treatment, storage, disposal, or recycling. These activities would be conducted following all applicable Federal and State regulations. The specific vendors that would handle the transportation and disposal or recycling of hazardous wastes have not been selected and may change during the life of the project. The precise ultimate destiny of hazardous wastes is beyond the scope of the environmental impact statement.

12-57 The EIS analysis anticipates that the only sludge to be generated would be located in the solution ponds at the completion of heap leach pad rinsing. As stated in Section 2.1.6.11 on pages 2-43 and 2-44 in the Draft and Final environmental impact statements, respectively, analytical testing of the sludge would be performed at closure. If the results were acceptable to the Nevada Division of Environmental Protection, the sludge would be buried on-site, as described in the environmental impact statement. The details of this process would be identified in the Final Plan for Permanent Closure.

If hydrocarbon contaminated soils were generated by the facility as a direct result of mining activity, a permit to construct and manage a bioremediation facility would be applied for. The facility would be constructed and operated in accordance with the appropriate permit. Under certain situations, hydrocarbon contaminated soils may also be disposed of off-site in accordance with local, State, and Federal regulations.

The intent of your final statement is not clear. The heap leach pad liner, with exception of the perimeter containment berms, would be covered by heap leach ore during operation of the facility. Once the rinsing requirements were met at closure and approval for closure was granted by the Nevada Division of Environmental Protection, the rinsed heap leach material would be recontoured for revegetation and would most likely cover the perimeter berms. Therefore, no compounds would exist that could potentially degrade waters of the State.

12-58 Map 1-4 on page 1-6 in the Draft and Final environmental impact statements is of the existing Alligator Ridge Mine. The man camp has the current capacity of 30 units, which include mobile homes and camp trailers. Typically, 20 to 30 spaces are utilized, depending on the season. The man camp is usually full (30 units) during the summer months. The man camp would not be expanded during construction or operation of the Bald Mountain Mine Expansion Project.

12-59 As discussed on pages 4-41 and 4-43 in the Draft and Final environmental impact statements, respectively, a conditional use permit from White Pine County would not be required, because all expansion activities would take place on public lands administered by the Bureau of Land Management.

12-60 As outlined in the Bureau of Land Management's policy, the current and projected bonds for the Proposed Action are based on the reclamation of the current disturbance and projected disturbances. Leaking of storage tank issues were covered under Hazardous Materials and Wastes (Section 2.1.4, beginning on page 2-19 of the Draft and Final environmental impact statements), and any spills or leaks would be mitigated under CERCLA procedures. Bonding is not implemented for long-term effects following successful reclamation.

6.0 LIST OF PREPARERS

6.0 LIST OF PREPARERS AND REVIEWERS

Responsibility	Name	Qualifications
PREPARERS:		
BLM, Ely District		
Team Leader - Mineral resources, hazardous materials, and document review	Daniel Netcher	B.S. Geology; 11 years experience
Assistant Team Leader - Recreation, visual resources, and document review	Martin Hudson	B.S. Recreation/Wildlands Management; A.A. Wildlife Management; 14 years experience
Environmental Coordinator - Document review, cumulative impact analysis	Jake Rajala	M.A. Anthropology; M.S Forestry and Range Management; B.A. Anthropology; 18 years experience
Egan Resource Area Manager - Document review	Gene Drais	B.S. Zoology 21 years experience
T&E animals, wetlands, and riparian habitat	Mark Barber	B.S. Wildlife Management; 23 years experience
Reclamation	Lynn Bjorklund	M.S. Biology; B.S. Biology; B.S. Agronomy; 7 years experience
Recreation and visual resources	Michael Bunker	B.S. Forestry; Outdoor Recreation; 22 years experience
Range management	Fred Fisher	B.S. Range Management; 16 years experience
Range management	Wendy Fuell	B.S. Wildlife and Range Management; 7 years experience
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Responsibility	Name	Qualifications
Soils	Jack Norman	B.S. Soil Science; 7 years experience
Wildlife and fisheries	Michael Perkins	B.S. Wildlife Science; B.S. Fisheries Science; 21 years experience
Woodland products	Harry Rhea	B.S. Forestry; *23* years experience
Wild horses	Joe Stratton	M.S. Wildlife Science; B.S. Fisheries and Wildlife Biology; 4 years experience
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BLM, Nevada State Office		
Minerals, water, and air quality	Larry Steward	B.S. Geology; 26 years experience
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Environmental Coordination	Brian Amme	B.A. Anthropology; 12 years experience
Native American concerns	Cynthia Ellis-Pinto	M.A. and B.A. Anthropology; 4 years experience
BLM, Denver Service Center		
Water resources	Tom Olsen	Ph.D. Geological Engineering; 16 years experience
Bald Mountain Mine - Ely		
Environmental Coordinator, Core Team - Project description and technical review	Shannon Dunlap	B.S. Environmental Engineering 6 years experience

Responsibility	Name	Qualifications
ENSR Consulting and Engineering - EIS Contractor		
Project Manager	Drew Ludwig	M.S. Resource Planning and Conservation; B.S., M.S. Zoology; 22 years experience
Assistant Project Manager - Wildlife, wild horses, and T&E animals	Lori Nielsen	B.S. Wildlife Ecology/Management; 10 years experience
Land use and access, recreation, rights-of-way, grazing, wood projects, and social and economic values	Bill Theisen	M.S. Recreation Resources; B.S. Natural Resources; 12 years experience
Vegetation, soils, wetlands, and reclamation	Phil Hackney	B.S. Botany; 17 years experience
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Cultural and paleontological resources, and solid and hazardous wastes	Karen Caddis-Burrell	B.A. Geography/Anthropology/Journalism; B.S. Resource Management; 11 years experience
Aquatic toxicology	Dave Pillard	Ph.D. Ecology; M.S. Biology; B.S. Biology; 10 years experience
Solid and hazardous wastes	Scott Ellis	B.A. Biology/English; 20 years experience
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Responsibility	Name	Qualifications
Shepherd Miller, Inc. - EIS Subcontractor		
Water Resources and Geology and Minerals	Robert Berry	Ph.D. Geology and Geochemistry; B.S. Geology; Prof. Degree Hydrogeology; 19 years experience
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EDAW - HRV		
Visual Resources	Craig Taggart	M.L.A. Landscape Architecture; B.S. Zoology; 20 years experience
REVIEWERS:		
Nevada Division of Wildlife		
Biologist - Wildlife resources and document review	Rory Lamp	B.S. Zoology 15 years experience
Biologist - Nongame resources	Pete Bradley	M.S. Wildlife B.S. Wildlife 8 years experience
Biologist - Big game resources	Steve Foree	B.S. Wildlife 14 years experience

7.0 REFERENCES

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Abkowitz, M., A. Eiger, and S. Srinivasan. 1984. Estimating the Release Rates and Costs of Transporting Hazardous Waste. In Transportation of Hazardous Materials: Planning and Accident Analysis. Transportation Research Board, Transportation Research Record 977.

Amme, B. and S. McFarlin. 1984. Mitigation/Testing Phase of the Proposed Maverick Warm Springs Division (CR-NV-04-606P amendment). October 9, 1984.

Amme, B. 1984. Mitigation Report for AmSelco Exploration NOI NV-0446-4-026N, Bald Mountain Top Area, Souther Ruby Mountains, Cultural Resources Report CRR-04-673P. September 11, 1984.

_____. 1986. CRR-04-820P Addendum, Proposed Drill Hole Exploration, Placer U.S. Bourne Canyon Claims. August 12, 1986.

Baldrica, A. 1993. Nevada State Historic Preservation Officer. Personal communication with K. Walker, District Manager, Bureau of Land Management, Ely District Office. March 26, 1993.

_____. 1994. Nevada State Historic Preservation Officer. Personal communication with K. Walker, District Manager, Bureau of Land Management, Ely District Office. May 24, 1994.

Becker, A. 1984. Department of Conservation and Natural Resources, Division of Historic Preservation and Archeology. Personal communication with M. DeSpain, District Manager-Bureau of Land Management, Ely District Office. March 29, 1984.

Behnke, J. J. and G. B. Maxey. 1969. An Empirical Method for Estimating Monthly Potential Evaportranspiration in Nevada: Journal of Hydrology, v. 8, pp. 418-430.

Bishop, B. 1994. County Assessor, White Pine County. Personal communication with K. Sable, ENSR Consulting and Engineering, December 15, 1994.

Borell, A. E. and R. Ellis. 1934. Mammals of the Ruby Mountains Region of Northeastern Nevada. Journal of Mammalogy. Vol. 15:41-42.

Bradley, P. 1995. Wildlife Biolotist, Nevada Division of Wildlife. Personal communication with L. Nielsen, ENSR Consulting and Engineering. January 4, 1995.

Bunch, R. L. and J. R. Harrill. 1984. Compilation of Selected Hydrologic Data from the MX Missile-Siting Investigation, East-Central Nevada and Western Utah: United States Geological Survey OFR 84-702.

Bureau of Land Management. 1983. Amendment to the Environmental Assessment (NV-040-3-15) for Placer Amex Corporation's Mining Plan. Signed by Jacob A. Rajala, Bureau of Land Management Environmental Coordinator. July 25, 1983.

_____. 1985. Technical Reference 4400-4, May 1985, Rangeland Monitoring Trend Studies.

_____. 1986a. Visual Resource Management classifications.

_____. 1986b. Visual Resource Management contract rating principles.

_____. 1987. Draft Resource Management Plan and Environmental Impact Statement for the Egan Resource Area. Ely District Office, Nevada. Record of Decision submitted February 3, 1987.

_____. 1989. Buck, Bald, Maverick, and Diamond Mountains Habitat Management Plan. Ely District Office, Ely, Nevada. May 1989. 65pp.

_____. 1990. Nevada State Office. Nevada Recreation Management Strategy and Implementation Plan. February 1990.

_____. 1991a. Ely District Office, Ely, Nevada. Recreation Area Management Plan for the Loneliest Highway Special Recreation Management Area. September 1991.

_____. 1991b. Nevada State Office. Nevada Bureau of Land Management Statewide Wilderness Report. Volume IV: Carson City and Ely Districts. October 1991.

_____. 1991c. Loneliest Highway Special Recreation Management Area, Recreation Area Management Plan.

_____. 1992. Reptile and Amphibian List of the Ely District, Nevada.

_____. 1993. Ely District Office, Ely, Nevada. Egan Resource Management Plan. Proposed Oil and Gas Leasing Amendment and Final Supplemental Environmental Impact Statement. August 1993.

_____. 1994a. Ely District Office, Ely, Nevada. Notice of Full Force and Effect Final Multiple Use Decision for the Warm Springs Allotment. March 14, 1994.

_____. 1994b. 1994 Ferruginous Hawk Nesting Activity Report and Sage Grouse Lek Inventory. Egan Resource Area, Ely District Office.

_____. 1994c. Ely District Office, Ely, Nevada. Final Environmental Impact Statement Robinson Project. September 1994.

_____. 1994d [36d NV-040-3-15-A287]. Amendment NV-040-3-15-A287, Placer U.S. Inc. Plan of Operations, NV46-83-004P amendment 9.

_____. 1994e. Ely District Office, Ely, Nevada. Egan Resource Management Plan. Approved Oil and Gas Leasing Amendment and Record of Decision. May 1994.

Cartner, L. 1995. Minerals Managment Specialist, United States Forest Service, Ely Ranger District. Personal communication with L. Nielsen, ENSR Consulting and Engineering. January 4, 1995.

Council on Environmental Quality. 1993. Incorporating Biodiversity Considerations Into Environmental Impact Analysis Under the National Environmental Policy Act. 29pp.

Craig, G. R. 1994. Raptor Biologist, Colorado Division of Wildlife and Member of Peregrine Falcon Recovery Team. Personal communication with L. Nielsen, ENSR Consulting and Engineering. December 13, 1994.

Crosland, R., S. Billat, and J. Rust. 1995. A Cultural Resource Inventory of 1,850 acres for the Placer Dome U.S., Inc., Bald Mountain Mine Expansion, White Pine County, Nevada. JBR Report #95-1. January 16, 1995.

Dalton, L. B., J. S. Price, and L. A. Romin. 1990. Fauna of Southeastern Utah and Life Requisites Regarding Their Ecosystems. Utah Department of Natural Reosurces, Division of Wildlife Resources. Publication No. 90-11, 254pp.

Dames & Moore. 1992. Southwest Intertie Project Technical Report, Volume IV, Cultural Environment, June 1992.

Dobler, F. C. and K. R. Dixon. 1990. The Pygmy Rabbit *Brachylagus idahoensis*. In. Rabbits, Hares, and Pikas, Status Survey and Conservation Action Plan. Compiled and edited by J. A. Chapman and J. E. C. Flux. IUCN/SSC Lagomorph Specialist Group. 111-115.

Dobra, J. 1988. The Economic Impacts of Nevada's Mineral Industry: Nevada Bureau of Mines and Geology Special Publication 9.

Eakin, T. E. 1960. Groundwater Appraisal of Newark Valley, White Pine County, Nevada: Nev. Dept. Cons. Nat. Res. Water Resources Reconn. Series Rpt 1.

_____. 1961. Groundwater Appraisal of Long Valley, White Pine and Elko Counties, Nevada: Nev. Dept. Cons. Nat. Res. Water Resources Reconn. Series Rpt 3.

_____. 1962. Groundwater Appraisal of Ralston and Stonecabin Valleys, Nye County, Nevada: Nev. State Eng. Groundwater Resources Recon. Ser. Rpt no. 12, 32 pp.

Eakin, T. E. and G. B. Maxey. 1951. Groundwater in Ruby Valley, Elko and White Pine Counties, Nevada: in Contributions to the Hydrology of Eastern Nevada, Nev. State Eng. Water Resources Bull. #12, pp. 67-96.

Foree, S. 1994. Wildlife Biologist, Nevada Division of Wildlife. Personal communication with L. Nielsen, ENSR Consulting and Engineering. September 9, 1994.

Franconi, M. 1995. Captain, White Pine County Sheriff's Office. Personal communication with K. Sable, ENSR Consulting and Engineering. August 2, 1995

Graham, B. 1994. Duckwater Shoshone Tribal Chairman. Communication with K. Walker, Bureau of Land Management District Manager, Ely Distict Office. May 17, 1994.

Gransbery, T. 1994. Property Appraiser, Centrally Assessed Properties, State of Nevada Department of Taxation. Personal communication with K. Sable, ENSR Consulting and Engineering. February 4, 1994.

Green, P. 1988. A Cultural Resources Inventory of Proposed Haul Road for Amselco Alligator Ridge Mine, White Pine County, Nevada (Bureau of Land Management Report No. CRR-04-930p).

Green, J. S. and J. T. Flinders. 1980. Habitat and Dietary Relationships of the Pygmy Rabbit. Journal of Range Management 33:136-142.

Henderson, M. 1978. An Archeological Survey for the bald Mountain burn Fire Rehabilitation Project, Newark Planning Unit, Egan Resource Area, Ely District, White Pine County, Nevada. Bureau of Land Management CRR-4-259p. September 21, 1978.

Henry, W. 1994. Paleozoic paleontologist, United States Geological Survey, Paleontology and Stratigraphy Division. Personal communication with A. McKechnie, ENSR Consulting and Engineering, December 12, 1994.

Holzworth, G. C. 1972. Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States. United States Environmental Protection Agency Office of Air Programs, Research Triangle Park, North Carolina.

Hose, R. K. and M. C. Blake, Jr. 1976. Geology and Mineral Resources of White Pine County, Nevada: Nevada Bureau of Mines and Geology Bulletin, no. 85., 105 p.

Ilchick, R. P. 1991. Geology of the Vantage Gold Deposits, Alligator Ridge, Nevada. In Symposium on Geology and Ore Deposits of the Great Basin, Reno, 1990, Proceedings: Geological Society of Nevada, p. 645-663.

James, R. 1989. Nevada State Historic Preservation Officer. Personal communication with K. Walker, Bureau of Land Management-District Manager, Ely District Office. July 5 and 25 and November 13, 1989.

_____. 1992. Nevada State Historic Preservation Officer. Personal communication with K. Walker, Bureau of Land Management- Ely District Office. March 5. 1992.

JBR Environmental Consultants (JBR). 1994a. Draft Survey Report Regarding Waters of the United States for the Sage Flats, Horseshoe/Galaxy, Alligator Ridge, Yankee, and Casino/Winrock Areas. Submitted to Unites States Army Corps of Engineers, Reno, Nevada. December 16, 1994. 12 pp.

_____. 1994b. Placer Dome U.S. Neotropical Bird Surveys, Bald Mountain Mine, Summer 1994. 27pp.

_____. 1995. Draft Survey Report Regarding Waters of the United States for North Water Canyon. January 13, 1995. 15 pp.

Jenkins, J. 1994a. Bald Mountain Mine Properties. Written communication with B. Theisen, ENSR Consulting and Engineering, September 9, 1994.

_____. 1994b. Bald Mountain Mine Properties. Written communication with B. Theisen, ENSR Consulting and Engineering, December 19, 1994.

Johnston, S. 1984. The Bald City Survey, An Archeological Inventory of an Historic Mining Complex. Bureau of Land Management CR Report No. 688(P). September 17, 1984.

_____. 1986. Placer-Amex Rat Claims and Bourne Canyon Survey (CRR-04-820P). June 30, 1986.

Johnston, S. and B. Lindsey. 1983. Placer-Amex Bald Mountain Gold Mining Operation, Ely District CRR No. 04-567P. March 3, 1983.

Klessig, P. J. 1984. History and Geology of the Alligator Ridge Gold Mine, White Pine County, Nevada: Arizona Geological Society Digest, volume 15, p. 77-87.

Lindsey, B. 1982. Fordham Pipeline Extension Project (CRR No., 04-541N). Bureau of Land Management. August 3, 1982.

Mackay, J. 1994. Wildlife Biologist. United States Fish and Wildlife Service, Ruby Lake National Wildlife Refuge. Personal communication with C. Melcher, ENSR Consulting and Engineering. December 21, 1994.

_____. 1995. Wildlife Biologist, Ruby Lake National Wildlife Refuge. Personal communication with L. Nielsen, ENSR Consulting and Engineering. January 5 and March 13, 1995.

Medin, D. E. 1990. Birds of an Upper Sagebrush-Grass Zone Habitat in East-Central Nevada. Research paper INT-433. Ogden, UT:United States Department of Agriculture, Forest Service, Intermountain Research Station. 7 p.

Mehls, S., R. Kolvet, and R. Carrillo. 1994a. Cultural Resource Evaluation of Bald City Site, White Pine County, Nevada (Bureau of Land Management Report No. 93004-1031D). WCRM. March 3, 1994.

____. 1994b. Cultural Resource Evaluations of the Rat Haul Road Site, White Pine County, Nevada (Bureau of Land Management Report No. CRR-92-04-924C). March 3, 1994.

Michael Clayton & Associates. 1992. Western Regional Corridor Study. Prepared for: Western Utility Group.

Mifflin, M. D. 1968. Delineation of Ground-Water Flow Systems in Nevada: Desert Research Inst. Publ. no. 42004.

Montgomery, J. M. 1990. Final Hydrogeologic Investigation for the Alligator Mine, Ely, Nevada: Tech. Rpt. for Placer Dome, Inc.

Moore, D. 1994. Recorder-Clerk, White Pine County. Personal communication with K. Sable, ENSR Consulting and Engineering, December 15, 1994.

Moore, M. 1991. A Cultural Resources Inventory of Three Parcels for Placer Dome U.S. Corporation's Bald Mountain Mine Project in White Pine County, Nevada (Bureau of Land Management Report CRR-04-1031). ARS. September 20, 1991.

Moore, M., V. Clay, and A. McCabe. 1991. Addendum to Cultural Resource Inventory of the Placer Dome U.S., Inc., Bald Mountain Mine West Rat Claims: 427 Additional Acres. ARS Report No. 678, Bureau of Land Management Report No. CRR-04-924(d) Addendum. November 13, 1991. [Addendum to Young 1988)

Moore, M. and B. Young. 1992. Evaluation of Archaeological Site 26Wp1682 (Bureau of Land Management #046-2733), White Pine County, Nevada. ARS report No. 711, Bureau of Land Management Report No. 46-1031C. September 18, 1992.

Moorehead, J. 1994. Regional Planning Commission, City of Ely and White Pine County, Nevada. Personal communication with B. Theisen, ENSR Consulting and Engineering. August 24, 1994.

Morefield, J. 1995. Botanist, Nevada Natural Heritage Program. Personal communication with J. Alstad, ENSR Consulting and Engineering. August 2, 1995.

Mozingo, H. and M. Williams. 1980. Threatened and Endangered Plants of Nevada. Funded by United States Fish and Wildlife Service and Bureau of Land Management.

National Oceanic and Atmospheric Administration. 1973. Earthquake History of the United States: Environmental Data Service Publication 41-1.

____. 1990. Local Climatological Data, Annual Summary with Comparative Data for Ely, Nevada.

Nevada Department of Employment, Training, and Rehabilitation. 1995. Memo to K. Sable, ENSR Consulting and Engineering. February 15, 1995.

Nevada Department of Processing. Written communication to K. Sable, ENSR Consulting and Engineering. February 15, 1995.

Nevada Division of Environmental Protection. 1994. Application Review of the Alligator Ridge Project, Bald Mountain Mine Yankee Mine Modifications. Carson City, Nevada.

Nevada Division of Wildlife. 1976. The Ruby-Butte Deer Herd. N. J. Papez. Biological Bulletin No. 5. 61pp.

_____. 1984-1994. Big Game Status and Quota Reports and Recommendations.

Nevada Employment Security Department. 1995. Labor statistics as available. Economic statistical information gathered on February 15, 1995.

Nevada Natural Heritage Program. 1994. Correspondence to ENSR Consulting and Engineering identifying sensitive plant and animal species associated with the Bald Mountain Mine Expansion Project. July 18, 1994.

Nevada Statewide Policy Plan for Public Lands. 1985. Department of the Conservation and Natural Resources, State of Nevada, under authority of Senate Bill 40 of the 1983 Nevada Legislature (NRS 321.7355).

NUS Corporation. 1987. Background Document on Bottom Liner Performance in Double-Lined Landfills and Surface Impoundments: prepared for the United States Environmental Protection Agency by Geoservice Inc. Environmental Protection Agency/530-SW-87-013.

Peterson, R. and E. Stoner. 1991. A Cultural Resource Inventory Report on the Phase I Portion of the USMX Yankee Project in White Pine County, Nevada (CRR-04-1026(P). October 5, 1991.

Podborny, P. 1986. Bald Mountain Pipeline (CRR No. 04-830N). July 30, 1986.

Ports, M. 1995. Northern Nevada Community College. Personal communication with L. Nielsen, ENSR Consulting and Engineering. January 4, 1995.

Price, B. 1983. Archaeological Survey of the Proposed Maverick-Warm Springs Division Fence, White Pine County, Nevada. Bureau of Land Management Cultural Resources Report CR-NV-04-606P. September 27, 1983.

_____. 1989. Archeological Survey of Drillsite locations and access roads in five claim blocks for BP Minerals, Bureau of Land Management CRR No. 04-957P. July 25, 1989.

Pupacko, A., et al. 1989. Geohydrologic Data for Selected Springs in Eastern Nevada through 1982, with Emphasis on White Pine County: United States Geological Survey OFR 88-712.

Raible, J. 1994. Property Appraiser, Nevada Department of Taxation, Centrally Assessed Property. Personal communication with K. Sable, ENSR Consulting and Engineering, December 15, 1994.

Rigby, J. K. 1960. Geology of the Buck Mountain-Bald Mountain area, southern Ruby Mountains, White Pine County, Nevada, In: Guidebook to the geology of east-central Nevada: Intermountain Assoc. Petroleum Geologists and Eastern Nevada Geol. Soc., 11th Ann. Field Conf., Salt Lake City, Utah, 1960, p,173-180. (In: Geology and Mineral Resources of White Pine County, Nevada.)

Romero, B. 1994. Sheriff, White Pine County Sheriff's Office. Correspondence to D. Netcher, Bureau of Land Management, Ely District Office. May 16, 1994.

Riggs, T. 1994. Nevada Department of Taxation, Sales Tax. Personal communication and data sent to K. Sable, ENSR Consulting and Engineering, December 21, 1994.

Rush, F. E. and D. E. Everett. 1966. Water-Resources Appraisal of the Huntington Valley Area, Elko and White Pine Counties, Nevada: Nev. Dept. Cons. Nat. Res. Water Resources Reconn. Series Rpt 35.

Russell, C. E., J. W. Hess, and S. W. Tyler. 1987. Hydrogeologic Investigation of Flow in Fractured Tuffs, Rainer Mesa, Nevada Test Site: Desert Research Institute Publication No. 49105.

Savaarad, C. S. and E. J. Crompton. 1993. Hydrologic Data for East-Central Nevada, Water Years 1982-1988: United States Geological Survey OFR 90-153.

Shepherd Miller. 1994. Estimated Drawdown for Mine Production Wells in the Bald Mountain/Buck Mountain Cumulative Impact Area: Report prepared for ENSR Consulting and Engineering and on file with the Ely Office of the Bureau of Land Management.

Silverling, N. 1994. Mesozoic paleontologist, United States Geological Survey, Paleontology and Stratigraphy Division. Personal communication with A. McKechnie, ENSR Consulting and Engineering, December 12, 1994.

Simon Hydro-Search, Inc. 1994a. Regional Hydrogeologic Characterization of the Bald Mountain/Alligator Ridge Area: Technical Report for Placer Dome, U.S., Inc., submitted May 1994.

_____. 1994b. Baseline Water Resource Survey in Support of the Bald Mountain Mine environmental impact statement: Technical report for the Placer Dome Inc., submitted October 1994.

Souligni, B. 1995. Uniform Crime Reporting, Nevada Highway Reporting. Personal communication with K. Sable, ENSR Consulting and Engineering. August 2, 1995.

Statewide Comprehensive Outdoor Recreation Plan. 1987. Recreation in Nevada. Prepared by: State of Nevada, Department of Conservation and Natural Resources, Division of State Parks.

Steward, J. H. 1938. Basin-Plateau Aboriginal Socio-Political Groups. Bureau of American Ethnology Bulletin 120 (1970 reprint). University of Utah Press, Salt Lake City.

Stoner, E. and R. Johnson. 1992. A Class III Cultural Resource Inventory of the USMX Horseshoe/Galaxy Project. BLM Cultural Report No. CR-92-04-1060(P). September 18, 1992.

Tapper, C. J. 1986. Geology and Genesis of the Alligator Ridge Mine, White Pine County, Nevada, Nevada Bureau of Mining Geology, Report 40, p. 85-103.

Taylor, M. 1994. Invertebrate paleontologist, United States Geological Survey, Paleontology and Stratigraphy Division. Personal communication with A. McKechnie, ENSR Consulting and Engineering, December 12, 1994.

Treaty with Western Bands of Shoshone Indians. 1863. Treaty Between the United States of America and the Western Shoshone Indians. October 1, 1863.

Unites States Bureau of Economic Analysis. 1995. Personal communication to B. Theisen, ENSR Consulting and Engineering. February 20, 1995.

United States Department of Transportation, Information Assistance Office, Washington, D.C. 1993.

United States Environmental Protection Agency. 1985. Compilation of Air Pollution Emission Factors, 4th Edition AP42. Office of Air Quality Planning and Standards, Environmental Protection Agency, Research Triangle Park, North Carolina.

United States Fish and Wildlife Service. 1983. Methodological Guidance for Assessing Cumulative Impacts on Fish and Wildlife. October 1983. 102pp.

_____. 1993. Biological Opinion on Implementation of the Draft Oil and Gas Leasing Amendment to the Egan Resource Management Plan. Correspondence from the United States Fish and Wildlife Service Field Supervisor, Reno, Nevada, to the Bureau of Land Management Ely District Manager, Ely, Nevada. Letter dated April 15, 1993.

_____. 1994a. Species list submitted to the Bureau of Land Management on June 29, 1994, for the Bald Mountain Mine Expansion Project in accordance with Section 7 of the Endangered Species Act. United States Fish and Wildlife Service File No. 1-5-94-SP-218.

_____. 1994b. Endangered and Threatened Wildlife and Plants; Animal Candidate Review for Listing as Endangered or Threatened Species, Proposed Rule. 50 CFR Part 17. November 15, 1994.

United States Forest Service. 1992. Final Environmental Assessment Bellview Project, Ruby Mountains District, Wells, Nevada.

United States Geological Survey. 1988. Eastern Great Basin and Snake River Downwarp, Geology and Petroleum Resources, United States Geological Survey OFR 88-450H.

University of Nevada-Reno, 1995. Nevada Small Business Development Center, Bureau of Business and Economic Research, College of Business Administration. Economic statistical information gathered on February 15, 1995.

USMX, Inc. 1993. Waste Rock Characterization Study. Prepared for Bureau of Mining Regulation and Reclamation.

Wai-Ping, V. and M. B. Fenton. 1989. Ecology of Spotted Bat (*Euderma maculatum*) Roosting and Foraging Behavior. Journal of Mammalogy Vol. 70:617-622.

Wall Street Journal. 1994. Gold Price Index. December 16, 1994.

Watson, P., et al. 1976. Quantitative Evaluation of a Method for Estimating Recharge to the Desert Basins of Nevada: Jour. Hydrol., v. 31, pp. 335-357.

Welch, A. H. and R. P. Williams. 1986a. Groundwater Quality for the Elko 1°x 2° Quadrangle, eastern Nevada: USGS OFR 85-648B.

_____. 1986b. Groundwater Quality for the Ely 1° x 2° Quadrangle, eastern Nevada: USGS OFR 85-648C.

White Pine County. Nevada Master Plan of Land Use. March 1970.

_____. 1985. Policy Plan for Public Lands. April 1985.

White Pine County, Economic Diversification Council. 1994. Draft 1994 Overall Economic Development Program.

Wilde, D. B. 1978. A Population Analysis of the Pygmy Rabbit (*Sylvilagus idahoensis*) on the INEL Site. Ph.D. Dissertation. Idaho State University, Pocatello. 172 pp.

Young, B. 1988. Cultural Resource Inventory of the Placer Dome U.S., Inc., Bald Mountain Mine, West Rat Claims. ARS Report 503. July 29, 1988.

Young, B. and V. Clay. 1988. Evaluation of Archaeological Sites 26Wp1920 (BLM #046-5338) and 26Wp1921 (BLM #046-5361), White Pine County, Nevada. ARS Report 516. December 12, 1988.

_____. 1992. A Cultural Resources Inventory of the Bald Mountain Mine's USMX Block A/B Claims, a 350-acre Parcel in White Pine County, Nevada; An Addendum to Report # CRR-04-1031. ARS Project 710. July 8, 1992.

ABBREVIATIONS

ABBREVIATIONS

cfs	cubic feet per second
cm/sec	centimeter per second
dBA	decibels on the A-weighted scale
gpd/ft	gallons per day per foot
gpm	gallons per minute
kV	kilovolt
kWhr	kilowatt hours
L_{dn}	day and night sound levels
$\mu g/m^3$	micrograms per cubic meter
mph	miles per hour
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
ppm	parts per million

GLOSSARY

GLOSSARY

Alluvium	A general term for all detrital deposits resulting from the operations of modern rivers, including the sediments laid down in riverbeds, floodplains, lakes, and fans at the foot of mountain slopes and estuaries.
Ambient (air)	The surrounding atmospheric conditions.
Aquifer	A stratum of permeable rock, sand, etc, which contains water. Water source for a well.
Archaeology	The science that investigates the history of peoples by the remains belonging to the earlier periods of their existence.
Archival	Pertaining to or contained in documents or records preserved in evidence of something.
Artifact	Any object showing human workmanship or modification especially from a prehistoric or historic culture.
Attenuate	To lessen, decrease, reduce a concentration.
Authorized Officer	BLM official(s) responsible for approval and implementation of BLM decisions regarding the Bald Mountain Mine Expansion Project.
Caldera	Large, basin-shaped volcanic depression.
Candidate, Category 1 (C1)	Taxa for which the United States Fish and Wildlife Service has substantial information on hand to support proposing the species for listing as threatened or endangered. Listing proposals are either being prepared or have been delayed by higher-priority listing work.
Candidate, Category 2 (C2)	Taxa for which the United States Fish and Wildlife Service has information to indicate that the listing as threatened or endangered is possibly appropriate. Additional information is being collected.
Candidate, Category 3 (C3)	Taxa that were once being considered by the United States Fish and Wildlife Service for listing as endangered and threatened but are no longer receiving such consideration.
Clean Water Act	Federal Water Pollution Control Act, as amended.
Contrast	The effect of a striking difference in the form, line, color, or texture of an area being viewed.
Cretaceous	Span of time between 136 and 65 million years ago

Critically endangered	State of Nevada Wildlife Species Status Code. State status based on NRS 527.260 - .300.
Cultural resources	Any site or artifact associated with cultural activities.
Endangered species	Any species in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to man.
Environment	The surrounding conditions, influences, or forces that affect or modify an organism or an ecological community and ultimately determine its form and survival.
Ephemeral (streams)	Flowing in response only to direct precipitation
Erosion	The group of processes whereby earth or rock material is loosened or dissolved and removed from any part of the earth's surface.
Fault	A fracture or fracture zone along which there has been displacement of the sides relative to one another parallel to the fracture.
Fault scarp	Steep rock faces formed by shearing of rock.
Floodplain	That portion of a river valley, adjacent to the river channel, built of sediments and inundated with water at least once every 100 years.
Geology	The science that relates to the earth, the rocks of which it is composed, and the changes that the earth has undergone or is undergoing.
Graben	Fault block valley; elongated, depressed crustal block bounded by faults on its long sides.
Habitat	A specific set of physical conditions that surround a single species, a group of species, or a large community. In wildlife management, the major components of habitat are considered to be food, water, cover, and living space.
Horst	Elongated, uplifted crustal block bounded by faults on its long sides.
Hydrology	The science that relates to the water of the earth.

Impact	A modification in the status of the environment brought about by the Proposed Action.
Intrusive rock	Igneous rock formed within surrounding rock as a result of magma intrusion.
Jasperoid	Dense, usually gray, chert-like, siliceous rock; silicified limestone.
Jurisdictional wetlands	Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
Landform	A term used to describe the many types of land surfaces that exist as the result of geologic activity and weathering, e.g., plateaus, mountains, plains, and valleys.
Mil	1/1000 inch
Mineralization	Process by which minerals are introduced into a rock, resulting in an economically valuable or potentially valuable deposit.
One-hundred-year flood	A flood with a magnitude that may occur once every 100 years. A 1-in-100 chance of a certain area being inundated during any year.
Paleontology	The science that deals with the life of past geological ages through the study of the fossil remains of organisms.
Paleozoic	Span of time from end of Precambrian to beginning of Mesozoic ranging from about 570 million to 250 million years ago.
Particulate(s)	Minute, separate particles, such as dust or other air pollutants.
pH	The measure of acidity or basicity of a solution.
Physiographic province	Region in which all parts have similar geologic structure and climate and whose landforms differ significantly from those of other regions.
Porphyry intrusion	Igneous rock containing phenocrysts in a fine-grained, sugary-textured groundmass.
Precambrian	About 90 percent of geologic time more than 2.5 billion years old; precedes Paleozoic.

Raptor	A bird of prey.
Region	A large tract of land generally recognized as having similar character types and physiographic types.
Right-of-way	Strip of land over which the powerline, access road, or maintenance road would pass.
Riparian area	A form of wetland transition between permanently saturated wetlands and upland areas. These areas exhibit vegetation or physical characteristics reflective of permanent surface or subsurface water influence. Lands along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams, glacial potholes, and the shores of lakes and reservoirs with stable water levels are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil.
Sedimentary rock	Rock resulting from consolidation of loose sediment that has accumulated in layers.
Seismicity	The likelihood of an area being subjected to earthquakes. The phenomenon of earth movements.
Species	A group of individuals of common ancestry that closely resemble each other structurally and physiologically and in nature interbreed producing fertile offspring.
Stratigraphy	Form, arrangement, geographic distribution, chronologic succession, classification, and relationships of rock strata.
Study area	A given geographical area delineated for specific research.
Substation	A facility in an electrical transmission system with the capacity to route and control electrical power and to transform power to a higher or lower voltage.
Tectonics	Large-scale structural features of the upper part of the earth's crust.
Tertiary	Span of time between 65 and 3 to 2 million years ago.
Threatened species	Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.
Transmission line	An electric power line operating at a voltage of 69 kilovolts or greater.

Tuff	Compacted deposit of volcanic ash and dust that may contain up to 50 percent sediments, such as sand or clay.
Uplift	Structurally high area in the crust produced by an upthrust of rocks.
Visual Resource Management classes	Classification of landscapes according to the kinds of of structures and changes that are acceptable to meet established visual goals (Bureau of Land Management designation).
Wetlands	Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. BLM Manual 1737, *Riparian-Wetland Area Management*, includes marshes, shallow swamps, lakeshores, bogs, muskegs, wet meadows, estuaries, and riparian areas as wetlands.

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BALD MOUNTAIN MINE EXPANSION PROJECT

APPENDICES

APPENDIX A

HAZARDOUS MATERIALS AND WASTE

Table A-1

Process Chemicals and Fuels Consumed
Bald Mountain Mine Expansion Project

Class	Substance	Use	Annual Rate of Use for Existing Projects[1]	Annual Rate of Use for Proposed Horseshoe/Galaxy Mine	Annual Rate of Use for Proposed Process/Top Area Modifications	Maximum Storage[2]	Storage Method	Transport Route
Process chemical	Sodium cyanide (solid)	Gold leaching	225 tons			60 tons	3000 lb. metal bins	Winnemuca/Elko/Ely
	Sodium cyanide (liquid)	Gold leaching	80,600 gal.	40,300 gal.	350 tons	7,600 gal.	Bulk tank	Winnemuca/Elko/Ely
	Calcium oxide (lime)	Gold refinery	2,250 tons		3,500 tons	100 tons	Bulk tank	Ely
	Sodium hydroxide (caustic soda; solid)	Gold refinery	50 tons		80 tons	5 tons	Silo	Carlin
	Sodium hydroxide (caustic soda; liquid)	Gold refinery	39,800 gal.	3,800 gal.			Drums	Carlin
	Hydrochloric Acid	Carbon regeneration	290 gal.	0	61,000 gal.	6,000 gal.	Bulk Tank	Elko
	Hydrogen peroxide	Cyanide spills					Drums	Elko
	Nitric acid	Carbon Regeneration	20 gal		200 tons		Drums	Elko
	Barochem S319 (antiscalant)	Equip. maint	14,800 gal.	2,400 gal.		7,500 gal.	Drums	Elko
	Antiscalant (Polymer)	Equip. Maint.	70 tons		70 tons	50 tons	Drums	Elko
	Polyacrylic acid S4872 (antiscalant)	Equip. maint.	15,000 gal.	7,500 gal.		7,500 gal.	Drums	Elko
	Barochem S543 (antiscalant)	Equip. Maint.	5,000 gal.			2,000 gal.	Drums	Elko
	XX (flocculent; solid)	Gold refinery			250 tons	50 tons	Drums	Elko
	Agglomeration Aid	Gold leaching	4,500 gal.	4,500 gal.			Drums	Ely, Elko
	Cement	Gold leaching	2,000 tons	2,000 tons		80 tons	Bulk tank	Fernley
	Polymers	Gold leaching				1,500 gal.	Drums	Elko
	Hypochlorite		6 tons		0	3 tons	Drums	Elko
	Activated carbon		6 tons		0	115 tons	Drums	Elko

Table A-1 (Continued)

Class	Substance	Use	Annual Rate of Use for Existing Projects[1]	Annual Rate of Use for Proposed Horseshoe/Galaxy Mine	Annual Rate of Use for Proposed Process/Top Area Modifications	Maximum Storage[2]	Storage Method	Transport Route
Fuels/ Lubricants	Diesel nos. 1 & 2	Equipment/ Electricity	2,560,000 gal.	530,000 gal.	1,900,000 gal.	62,000 gal.	Bulk tank	Ely/Reno
	Gasoline	Equipment	80,000 gal.	10,000 gal.	80,000 gal.	10,000 gal.	Bulk tank	Ely/Elko
	Propane	Heating	200,000 gal.	14,000 gal.	200,000 gal.	62,000 gal.	Bulk Tank	Ely/Elko
	Kerosene	Equipment	2,000 gal.	2,000 gal.			Bulk tank	Reno
	Petroleum Oils	Equipment	70,000 gal.	4,000 gal.	60,000 gal.	21,000 gal.	Drums	Elko
	Methyl/ Alcohol	Equipment		6,000 gal.			Drums	Ely/Elko
	Antifreeze	Equipment	17,900 gal.	100 gal.	17,500 gal.		Drums	Ely/Elko
	Solvent	Equipment	500 gal.	150 gal.	300 gal.	220 gal.	Drums	Elko
Blasting agents	Ammonium nitrate	Blasting	3,400 tons	1,920 tons	3,400 tons	260 tons	Bulk tank	Lehi/Wendover/Ely
	Apex 1000 (Bulk AN emulsion)	Blasting	480 tons	40 tons	480 tons	70 tons	Bulk tank	Lehi/Wendover/Ely
	Class A explosive	Blasting	50 tons	10.2 tons	50 tons	9.5 tons	Bulk tank	Lehi/Wendover/Ely

[1] Includes existing facilities at Bald Mountain mine and process area, Alligator Ridge, Yankee, and Casino-Winrock mines.

Table A-2

Underground and Aboveground Storage Tanks
Bald Mountain Mine Project

Time Frame	Mine	USTs[1]	ASTs[1]	Size (gal.)	Containment	Liner	Reference
Current	Alligator Ridge	None[2]	Waste Oil	10,000	Y	N	Dunlap to Woods 4/13/94; ENSR field trip report/photographs 08/94
			Fuel	10,000	Y	N	
			Fuel	30,000	Y	N	
			Fuel	30,000	Y	N	
			Not used	10,000	Y	N	
			Caustic		Y	Y	
	Bald Mountain	None	Fuel	10,000	Y	N	ENSR field trip report/photographs 08/94; NDEP[1] permit 11/30/92
			Fuel	10,000	Y	N	
			Fuel	3,000	Y	Y	
			Waste Oil	4,000	Y	?	
			Fuel (6 tanks at mine)	?	Y	?	
	Casino/Winrock[3]		Fuel	6,000	Y	N	
			Fuel	12,000	Y	N	
	Yankee	None	Fuel (tanks total)	300	Y	Y	ENSR field trip report/photographs 08/94
			Fuel	500	Y	Y	
			Cyanide	7,600			
			2 Fuel	12,000			
			Kerosene	500			
			Fuel	2,000			
			Oil	1,000			
			Oil	2,000			
			Oil	4,000			
			Oil	1,500			
			Antifreeze	3,000			
			Waste Oil	3,000			
			Methanol	4,000			
	Little Bald Mountain	None	None				
Proposed Action	Horseshoe/Galaxy		Fuel	10,000	Y	Y	Dunlap to Nielsen 12/20/94
	Process/Top Area Modifications		Fuel & existing tanks	10,000	Y	Y	Dunlap to Nielsen 12/20/94

[1] Underground Storage Tanks (USTs); Aboveground Storage Tanks (ASTs); Nevada Division of Environmental Protection.

[2] All but one of the USTs located at the Alligator Ridge Mine were excavated, removed, and taken out of service in 1993. The single exception was the waste oil tank, which was excavated and is currently in use as an AST. No leaks were apparent during excavation of these tanks.

[3] Several drums of oil were also observed during a site visit in August 1994.

Table A-3

Solid Waste Disposal
Bald Mountain Mine Project

Time Frame	Mine	Landfills	Waste Produced	Status	Reference
Current	Alligator Ridge	Trench	500 ft^3/mo.	Application for Class III submitted (SWMI-17-32); no environmental problems at time of BLM inspection.	Undated memo from Ely BLM District Mgr. to NV St. Dir.; ENSR field trip report/ photographs 08/93
	Bald Mountain	Trench	500-1,000 lbs/day	Application for Class III submitted (SWMI-17-35); no environmental problems at time of BLM inspection.	Dunlap to Nielsen 12/20/94
	Casino/Winrock	Trench	50 ft^3/mo.	Application for Class III submitted (SWMI-17-33); no environmental problems at time of BLM inspection; Contains refrigerator and oil filters.	ENSR field trip report/photographs 08/94; BLM memo
	Yankee	Trench	200 ft^3/mo.	Application for Class III submitted (SWMI-17-34); no environmental problems at time of BLM inspection; contains tires, drained oil filters, and primacord, drained oil filters are acceptable wastes.	ENSR field trip report/photographs 08/94; BLM memo
Proposed Action	Horseshoe/Galaxy	Trench	200 ft^3/month	New Landfill	Dunlap to Nielsen 12/20/94
	Process/Top Area Modifications	Trench	500-1,000 lbs/day	Existing Landfill	Dunlap to Nielsen 12/20/94

APPENDIX B

CUMULATIVE IMPACTS

1.0 INTRODUCTION

This technical appendix addresses the issue of cumulative impacts associated with the Bald Mountain Mine Expansion Project. Mining development activity in the Proposed Action area has occurred on a limited basis since the late 1800s. However, with the increase in gold prices in the early 1980s and the improvement of extraction technology, mining activity and associated surface disturbance in the area has greatly increased in the past 15 years. Mining development to date has been permitted through environmental assessments for individual mining units. The Bureau of Land Management is concerned with the need for a more thorough analysis of the cumulative impacts in the Buck and Bald Mountain area not only from mining but also from other activities such as grazing and increased human use. Mining and grazing are seen as the primary causes or impacts, while wildlife, wild horses, and livestock are assumed most likely to be affected by cumulative impacts in the Proposed Action area. Therefore, the Bureau of Land Management decided to prepare an environmental impact statement and technical appendix addressing cumulative impacts for the recently proposed Bald Mountain Mine Expansion Project.

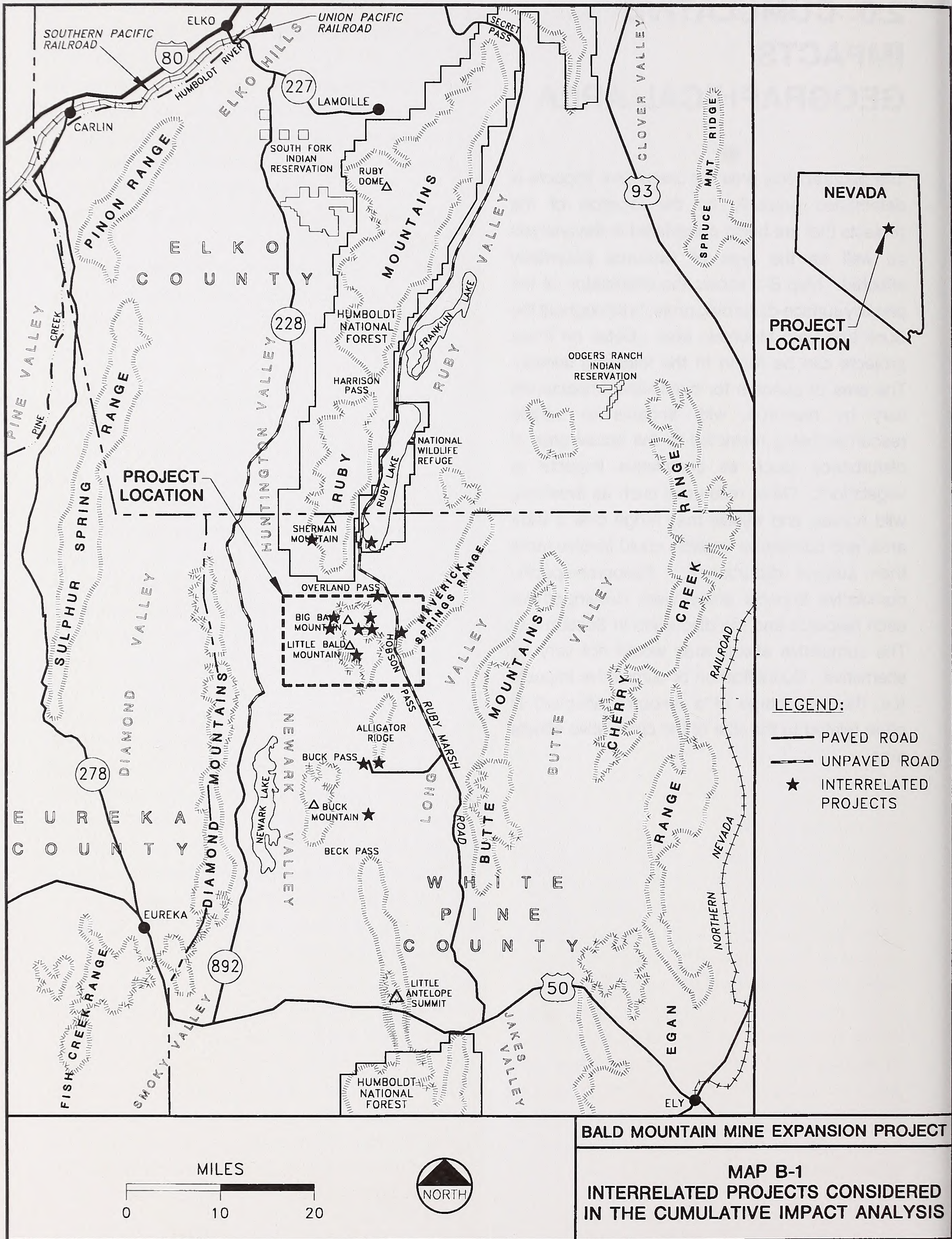
Cumulative impact analysis is not a new requirement for inclusion in an environmental impact statement, but rather has been an integral part of the regulations published by the Council on Environmental Quality since their inception in 1978 (see 40 Code of Federal Regulations, Part 1500). In September 1990, the Bureau of Land Management Nevada State Director issued an Instruction Memorandum (NV-90-435) covering cumulative effects analysis. This was followed by Bureau-wide "Guidelines for Assessing and Documenting Cumulative Impacts" in April 1994. The content of this technical appendix follows the guidance contained in these documents and is intended to serve as a basis for evaluating future proposals in the Buck and Bald Mountain area.

Cumulative impacts are those effects on the environment that result from the incremental impact of the Proposed Action when added to past, present, and reasonably foreseeable future actions (Actions) regardless of what agency (Federal or non-Federal) or private entity undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time (40 Code of Federal Regulations 1508.7).

Bureau of Land Management Instruction Memo NV-90-435 specifies that impacts must first be identified for the Bald Mountain Mine Expansion Project before cumulative impacts with interrelated projects can occur. However, one of the objectives for this technical appendix is to serve as the basis for the evaluation of potential future projects in the Buck and Bald Mountain area. The Bureau of Land Management desired a comprehensive description and evaluation of the environmental resources found in this area regardless of the impacts of the Proposed Action. Thus, even in the absence of cumulative impacts using the strict definition, the technical appendix presents impacts-to-date (past and present) and future impacts for the full range of resources of concern to the Bureau of Land Management and the public. Future environmental assessments and impacts statements can then incorporate by reference the information contained in this environmental impact statement, thus facilitating the review process.

2.0 CUMULATIVE IMPACTS GEOGRAPHICAL AREA

The geographical area for cumulative impacts is determined primarily by the location of the projects that are being considered in the analysis as well as the type of resource potentially affected. Map B-1 shows the distribution of the primary surface-disturbing projects throughout the Buck and Bald Mountain area. Detail on these projects can be found in the following section. The area of concern for cumulative impacts will vary by resource, with impacts to certain resources being restricted to the actual area of disturbance (such as cumulative impacts to vegetation). Other resources such as livestock, wild horses, and wildlife may range over a wide area, and cumulative impacts could involve more than surface disturbance. Resource-specific cumulative impacts areas were developed for each resource and are discussed in Section 4.0. The cumulative effects area would not vary by alternative. Quantification of cumulative impacts (i.e., the percentage of a resource affected) is often related to the size of the cumulative effects area.



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-1
INTERRELATED PROJECTS CONSIDERED IN THE CUMULATIVE IMPACT ANALYSIS

3.0 INTERRELATED PROJECTS

Interrelated projects are defined for this analysis as those with impacts that would interact in a cumulative manner with the impacts of the Bald Mountain Mine Expansion Project (Proposed Action). For ease of presentation, interrelated projects have been divided into subsets of past, present, and future projects, which are discussed in the following sections. The locations of the interrelated projects addressed in this section are shown on Map B-2. More detailed maps showing specific areas, resources, and projects are included in the following discussions.

3.1 PAST PROJECTS

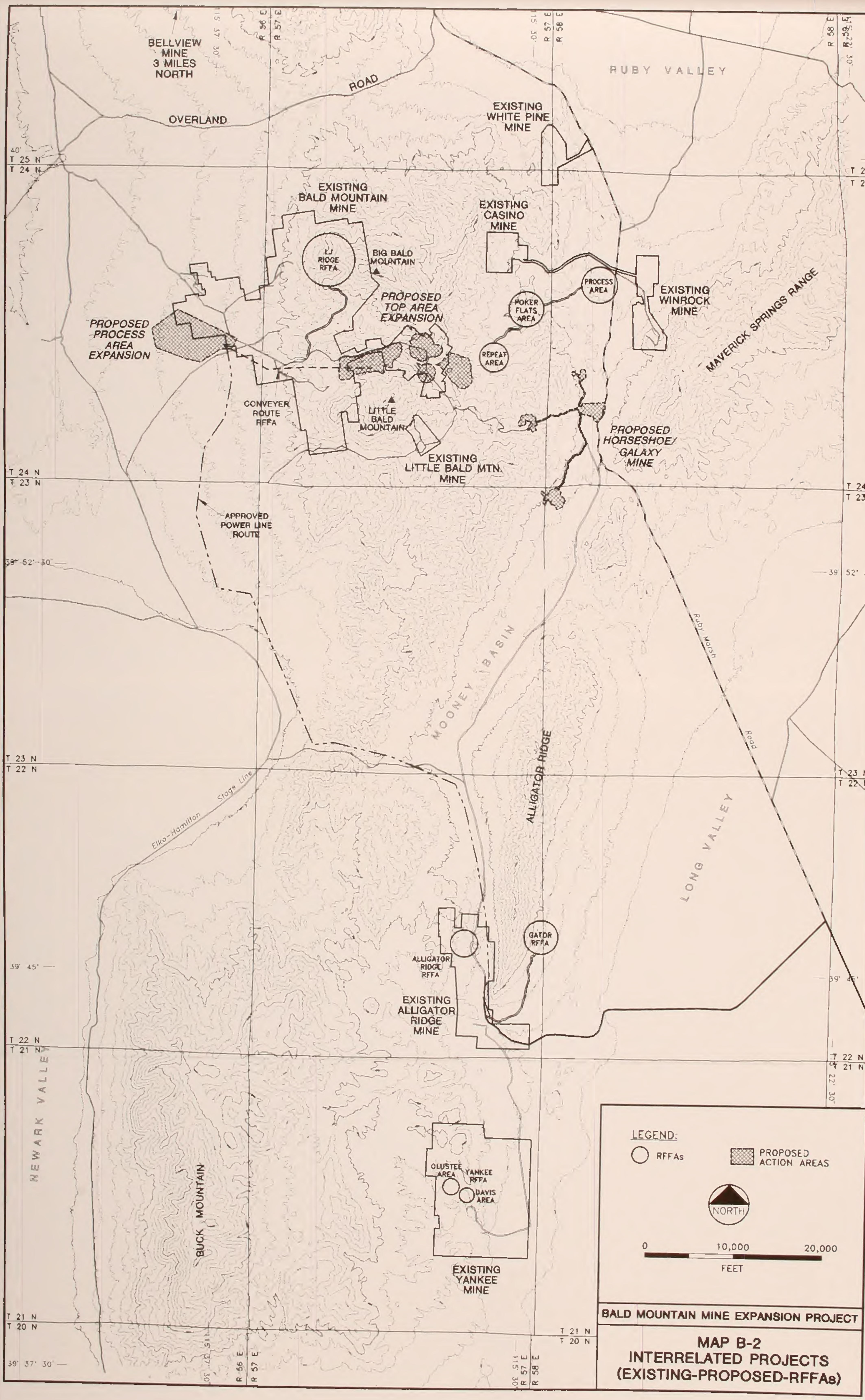
Mining activities in the Buck and Bald Mountain area date back to 1869 when copper, antimony, silver, and gold were mined adjacent to a small granitic intrusion. Resources removed prior to 1980 were related to the quartz monzonite/granodiorite intrusive body located between Little Bald Mountain and Big Bald Mountain. Between 1869 and 1956, a total of 125 ounces of gold, 16,698 ounces of silver, 30,611 pounds of copper, and minor amounts of tungsten and antimony were mined from the Bald Mountain mining district (Hose and Blake 1976). Mining activities in the Alligator Ridge area were limited to an ornamental stone quarry and one small pit along a calcite vein located approximately 5 miles west of the present Vantage gold deposits. The Bald Mountain and Alligator Ridge areas are shown on Map B-2.

Mining that commenced since 1980 is for the most part still ongoing. However, operations have ceased at the Little Bald Mountain Mine and the Casino/Winrock Mine (see Map B-2), and closure and reclamation are expected to be completed in 1995.

The other important impact-generating activities in the area have been associated with the Bureau of Land Management activities. Forage and woodland products in the area have been utilized historically. Forage in the cumulative effects area is used by wildlife, domestic livestock, and wild horses. Fuel wood, Christmas trees, and piñon nuts also are harvested, although demand for these products is low in the cumulative effects area. In recent years, management of these resources has taken place under the provisions of the Egan Resource Area Management Plan approved in 1987. Recent grazing allotment evaluations prompted the Bureau of Land Management to reduce the number of livestock animal unit months historically permitted in the Buck and Bald Mountain area grazing allotments. The new animal unit month reductions (to 7,744 from 25,543) became effective in 1994. Similarly in 1994, the Bureau of Land Management established Appropriate Management Levels for wild horses on the Buck and Bald Herd Management Area at 346, reducing the number of wild horses within those grazing allotments. The Bureau of Land Management, Forest Service, and Nevada Division of Wildlife have treated approximately 15,600 acres for range improvement and about 2,300 acres for wildlife habitat improvement by vegetation conversion. About 600 acres have been cut for Christmas trees and fuel wood. Approximately 140 acres have been disturbed by oil and gas exploration activities. Disturbances for past and present activities in the cumulative effects area is summarized in Table B-1.

3.2 PRESENT PROJECTS

Mining activity continues to be the dominant land use in the Buck and Bald Mountain area. Active mines include (from north to south) the White Pine Mine, Bald Mountain Mine, Alligator Ridge Mine, and Yankee Mine (see Map B-2). Surface disturbances of these mines, as well as the Little Bald Mountain and Casino/Winrock Mines, are shown on Table B-1. The estimated amount of



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-2
INTERRELATED PROJECTS
(EXISTING-PROPOSED-RFFAs)

Table B-1

Disturbed, Reclaimed, and Unreclaimed Acreages for Past and Present Activities Within the Cumulative Effects Area

Past and/or Present Activity	Permitted Disturbance	Area Reclaimed	Remaining Disturbance[1]	Area to be Reclaimed	Area Not Reclaimed
Bald Mountain Mine	1,635	229	1,406	1,174	232
Little Bald Mountain Mine	28	4	24	22	2[2]
Casino/Winrock Mine	217	3	214	194	20[2]
Alligator Ridge Mine	593	50	543	485	58[2]
Yankee Mine	385	15	370	295	75[2]
White Pine Mine	290	0	290	256	34[2]
Mining Exploration	94	0	94	94	0
Oil and Gas Exploration	140	140	0	NA	0
Transmission Line[3]	130	0	130	130	0
Range Improvement[4]	15,556	15,556	0	NA	0
Vegetation Conversion[4]	2,344	1,594	750	750	0
Woodland Products Harvesting	572	NR[5]	NA	NR	NA
Ruby Lake Restocking	0	0	0	0	0
Totals	21,984	17,591	3,821	3,400	421

Table B-1 (Continued)

[1]These acreages represent existing disturbance and areas currently permitted for future disturbance.

[2]The acreage not reclaimed is expected to equal the acreage of permitted pits minus pits that are backfilled.

[3]It is assumed that 20 percent of the transmission line right-of-way will cross piñon-juniper communities where the right-of-way will be maintained tree-free. However, disturbed areas would be reseeded following construction with grasses and forbs.

[4]Impacts to native vegetation are reclaimed through reseeding programs.

[5]Harvested areas have only suitable Christmas trees and/or fuel wood removed. Other vegetation is left inplace and the harvested areas revegetate naturally.

NA = Not Applicable.
NR = Not Reclaimed.

current disturbance for these existing operations is 2,400 acres, with approximately 300 acres recontoured and reseeded. The Little Bald Mountain and Casino/Winrock Mines are currently undergoing closure and reclamation. Concurrent reclamation is taking place at the Bald Mountain and Yankee Mines, with mining disturbance being reclaimed as soon as an area is no longer needed to support mining operations.

A 69-kV transmission line from the Alligator Ridge Mine to the Bald Mountain Mine has been approved by the Bureau of Land Management and is scheduled to be constructed in 1995. The line would provide cost-effective power for operating the crusher, process plants, shops, and offices at the Bald Mountain Mine. It also would provide power for a future Top Area Conveyor being considered for construction (see next section). The line would require a 60-foot-wide right-of-way resulting in a total area of surface disturbance of 130 acres. The transmission line would be constructed, owned, and operated by Mt. Wheeler Power Company. The transmission line would run for 18 miles from the Alligator Ridge substation to a new substation to be constructed at the existing Bald Mountain Mine (see Map B-2).

The Ruby Lake National Wildlife Refuge, located approximately 20 miles north of the Alligator Ridge Mine (see Map B-1), has an ongoing game fish restocking program. Eight species of fish currently inhabit Ruby Lake, six of which are stocked game fish. Stocking began in 1932, when the largemouth bass was introduced to the refuge. Subsequently, five species of trout, including the rainbow, eastern brook, brown, cutthroat, and tiger (German brown and eastern brook hybrid), have been introduced to the refuge. The bass developed a self-sustaining population, whereas the trout must be restocked annually. Ruby Lake fish stock are replenished from the Gallagher Fish Hatchery, which is located on the refuge; the Nevada Division of Wildlife owns and operates the hatchery. Restocking is an on-going project, although species and numbers restocked depend on conditions in the marsh. A severe drought occurred in 1992, resulting in a "dry-out" of the marsh. As a result, largemouth bass, which normally do not need restocking, had to be restocked in 1993. Trout also were restocked in 1993 and 1994.

3.3 PROPOSED ACTION

The Bald Mountain Mine Expansion Project is described in Chapter 2 of the associated environmental impact statement, and the impacts associated with this Proposed Action are detailed in Chapter 4 of the environmental impact statement. Activities would take place at the Horseshoe/Galaxy Mine, Process Area, and Top Area, which are shown on Map B-2. A summary of the acreage proposed for disturbance and reclamation is presented on Table B-2, and the schedule for mining, processing, and reclamation is shown on Figure B-1.

3.4 REASONABLY FORESEEABLE FUTURE ACTIONS

A number of reasonably foreseeable future actions have been identified in the Buck and Bald Mountain area. In order to qualify as a reasonably foreseeable future action for this analysis, a project must impact the same resources as the Proposed Action, must occur within the life of the Proposed Action including reclamation, and must have a reasonable likelihood of going forward. The reasonably foreseeable future actions that were included in

Table B-2

Disturbed, Reclaimed, and Unreclaimed Acreages for Different Components of the Proposed Action

Proposed Action	Proposed Disturbance	Area to be Reclaimed	Area Not Reclaimed
Horseshoe/Galaxy Mine	423	395	28
Process Area Modifications	447	447	0
Top Area Modifications	580	474	106
Totals	1,450	1,316	134

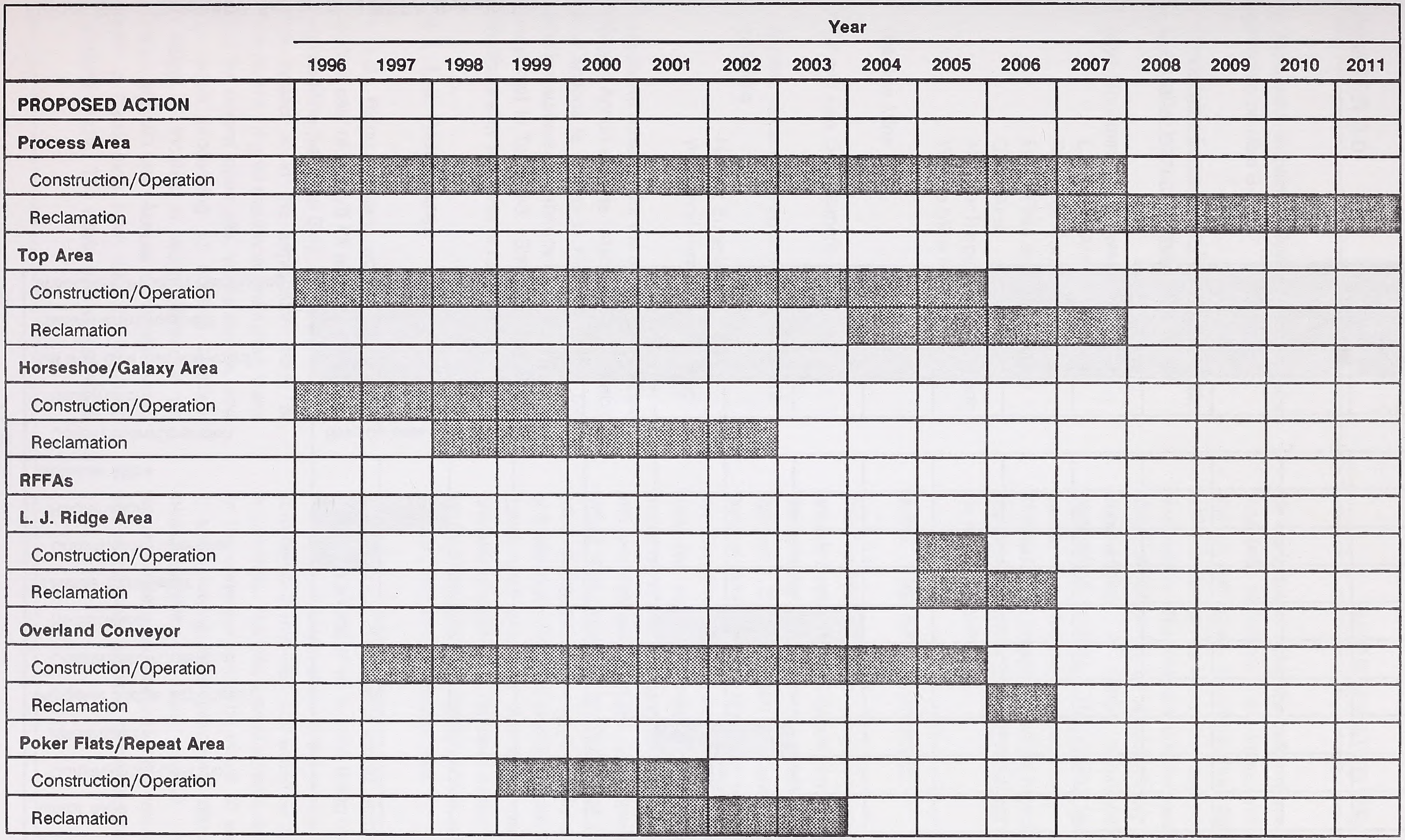


Figure B-1. Proposed Action and RFFA Schedules

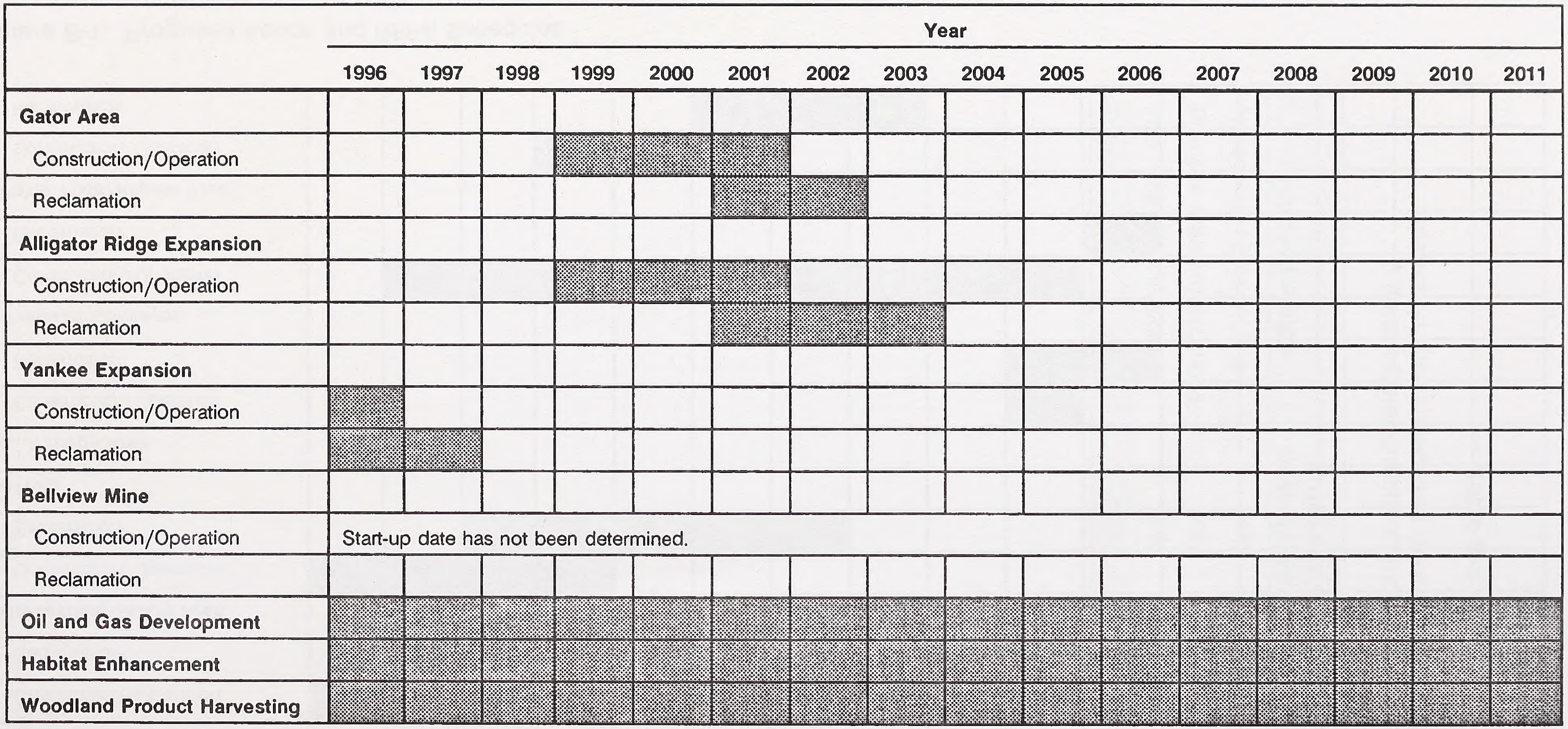


Figure B-1. Proposed Action and RFFA Schedules the cumulative impact analysis are listed below and shown on Map B-2.

Reasonably Foreseeable Future Actions for Cumulative Impacts Analysis

Bald Mountain Mine Developments
- L.J. Ridge Area
- Top Area Conveyor
- Poker Flats and Repeat Area
- Gator Area
- Alligator Ridge Mine Expansion
- Yankee Mine Expansion

Bellview Mine

Oil and Gas Development

Bureau of Land Management Management Activities
- Habitat Enhancement
- Woodland Product Harvesting

The tentative schedule for the development of the Proposed Action and the reasonably foreseeable future actions is shown in Figure B-1, and the estimated surface disturbance for each project is summarized in Table B-3. Short descriptions of each reasonably foreseeable future action follow.

3.4.1 L.J. Ridge Area

The L.J. Ridge project would be located 3,500 feet east of the 2/3 Pit at the existing Bald Mountain Mine (see Map B-2). Currently, the L.J. Ridge project is in the exploration stage of development. If gold resources are mined, there would be several open pits, waste dumps, and heap leach processing at existing facilities. L.J. Ridge is located in steep terrain at an elevation of 8,500 feet. Access to the mine would require a 6-mile-long haul road on an 8 to 10 percent grade. The waste rock dump would be constructed using the valley-fill method. The total area of surface disturbance, including pits, dumps, and roads, would be about 220 acres, of which 25 acres has been disturbed previously by exploration. The project would increase the Bald Mountain Mine life by approximately 9 months, commencing in 2005; prestripping would commence in 2003. The project would begin earlier, if permitting and economic conditions dictated. The project would be implemented by the existing staff at the Bald Mountain Mine, with no new employment.

3.4.2 Top Area Conveyor

The Top Area Conveyor would be constructed to provide a cost-effective means of moving ore from the existing Top Pit to the existing processing facilities at Bald Mountain Mine (see Map B-2). A crusher would feed the conveyor, which would be capable of transporting 2,500,000 tons of crushed rock per year for processing. The conveyor would be 17,000 feet long and would be divided into two continuous lengths. The upper conveyor would start along the southern edge of the Top waste dump, proceed west along the south side of South Water Canyon, over the North Rat waste dump, and over the Rat haul road to the processing facilities. The lower conveyor length would extend from the Rat haul road, over Water Canyon, and to the process area.

Permitting for the project would commence in 1996, with a total of 18 months being allowed for permitting. Construction of the conveyor would commence in mid-1997 and would be completed in mid-1998. The total area of surface disturbance for the conveyor would be about 50 acres, with 27 acres having been previously disturbed by mining activity. The overall employee requirements would be less for the conveyor than what is currently required for hauling the ore by

Table B-3

Disturbed, Reclaimed, and Unreclaimed Acreages for Reasonably Foreseeable Future Actions

RFFA	Total Disturbance	Area to be Reclaimed	Area Not Reclaimed
L.J. Ridge Area	220	187	33[1]
Top Area Conveyor	50	50	0
Poker Flats/Repeat Area	100	85	15[1]
Gator Area	100	75	25
Alligator Ridge Mine Expansion	50	25	25
Yankee Mine Expansion	50	25	25
Bellview Mine	63	48	15
Oil and Gas Exploration	338	224	114
Vegetation Conversion	1,600	1,600	0
Woodland Product Harvesting	430	NR[2]	NA
Totals	3,001	2,319	252

[1]The surface area not expected to be reclaimed (area of pits) was calculated as 15 percent of the total disturbance area.

[2]Harvested areas have only suitable Christmas trees and/or fuel wood removed. Other vegetation is left inplace and the harvested areas revegetate naturally.

NR = Not Reclaimed
NA = Not Applicable

truck. Operation would continue through the mine life of the Top pit area.

3.4.3 Poker Flats and Repeat Area

The Poker Flats and Repeat project would entail mining gold ore from known resources. The resources are located north of the proposed Horseshoe Mine area and east of the proposed Sage Flats Mine area (see Map B-2). Similar to other mining operations in the area, open pit mining and heap leach techniques would be used. The ore would be processed at either the Mooney Basin process facility (part of the Proposed Action) or a new process facility.

To use the first facility, a haul road would need to be constructed along the front of the Bald Mountain range from the Poker Flats and Repeat pits to the Mooney Basin facility. The new process facility would be constructed east of the mouth of an unnamed canyon, which is located between Cherry and Mahoney Canyons. The haul from Poker Flats and Repeat pits to the new facility would be shorter than it would be if the Mooney Basin facility were used for processing. Also, the new facility would centralize the disturbance associated with these projects. Economics and corporate goals would drive the decision as to which facility would be selected.

The total area of surface disturbance, including the pits, waste dumps, haul roads, secondary roads, processing facilities, and ancillary facilities, would be about 100 acres, regardless of which process facility option is selected. About 8 acres of this area have been previously disturbed by exploration activity. Actual disturbance would depend on the size and extent of the resources and the leaching characteristics of the ore. The project would be initiated after mining is completed at Horseshoe/Galaxy. The approximate mine life would be 3 years and would commence in 1999. Employees working on existing projects would fulfill the employment needs for the Poker Flats and Repeat project; therefore, no additional employment is expected. Similarly, new water demands would be incurred, as water demand for the Poker Flats and Repeat project would not exceed those for existing projects.

3.4.4 Gator Area

The Gator project would entail mining gold ore from three known, adjacent ore resources. The resources are less than 2 miles due east of the existing Alligator Ridge Mine. The mine would be approximately 3 miles off the paved road leading to the Alligator Ridge Mine. Open pit mining and heap leach techniques would be used. It is most likely that the ore would be crushed at the Gator area and then hauled to the Alligator Ridge Mine for processing. The known sizes of the resources would not warrant a separate processing facility. However, previous claim holders conducted the exploration and development upon which current size estimates are based. More development is required before resource sizes and facility needs can be confirmed.

A haul road would need to be constructed from Gator to the Alligator Ridge Mine processing facilities. This road would be approximately 3 miles long and would circumnavigate the southern end of Alligator Ridge. The total area of surface disturbance, including the pits, waste dump, haul road, secondary roads, and ancillary facilities, would be approximately 100 acres. Of this, about 14 acres have been previously disturbed by exploration activities. It is assumed that this project would have a mine life of 3 years and would commence in 1999. Similar to the projects described in the previous section, no additional employment or water demands would be expected.

3.4.5 Alligator Ridge Mine Expansion

There are small gold resources in the Vantage, Luxe, and Luxe Saddle areas at the Alligator Ridge Mine. Economic conditions would determine whether or not it would be worth expanding the current Alligator Ridge Mine to include these resources. The most likely period for development would be the 3 years from 1999 to 2001. If any of these small resources are mined, open pit and heap leach techniques would be used, and the ore would be processed at the existing processing facilities. Existing waste dumps and haul roads would be used to the fullest extent possible. The total area of additional surface disturbance, including pits, waste dump(s), and haul road(s), would be about 50 acres. About 35 acres of this area have been previously disturbed by mining activity. Similar to the projects described in the previous sections, no additional employment or water demands would be expected.

3.4.6 Yankee Mine Expansion

The Plan of Operations and amendments for the existing Yankee Mine provide for mining and heap leach pad capacity through 1997. However, exploration for additional resources is being conducted continually. Currently, two additional resources, Olustee and Davis (see Map B-2), are in the advanced phase of development and exploration. It is anticipated that these resources would be mined in 1996.

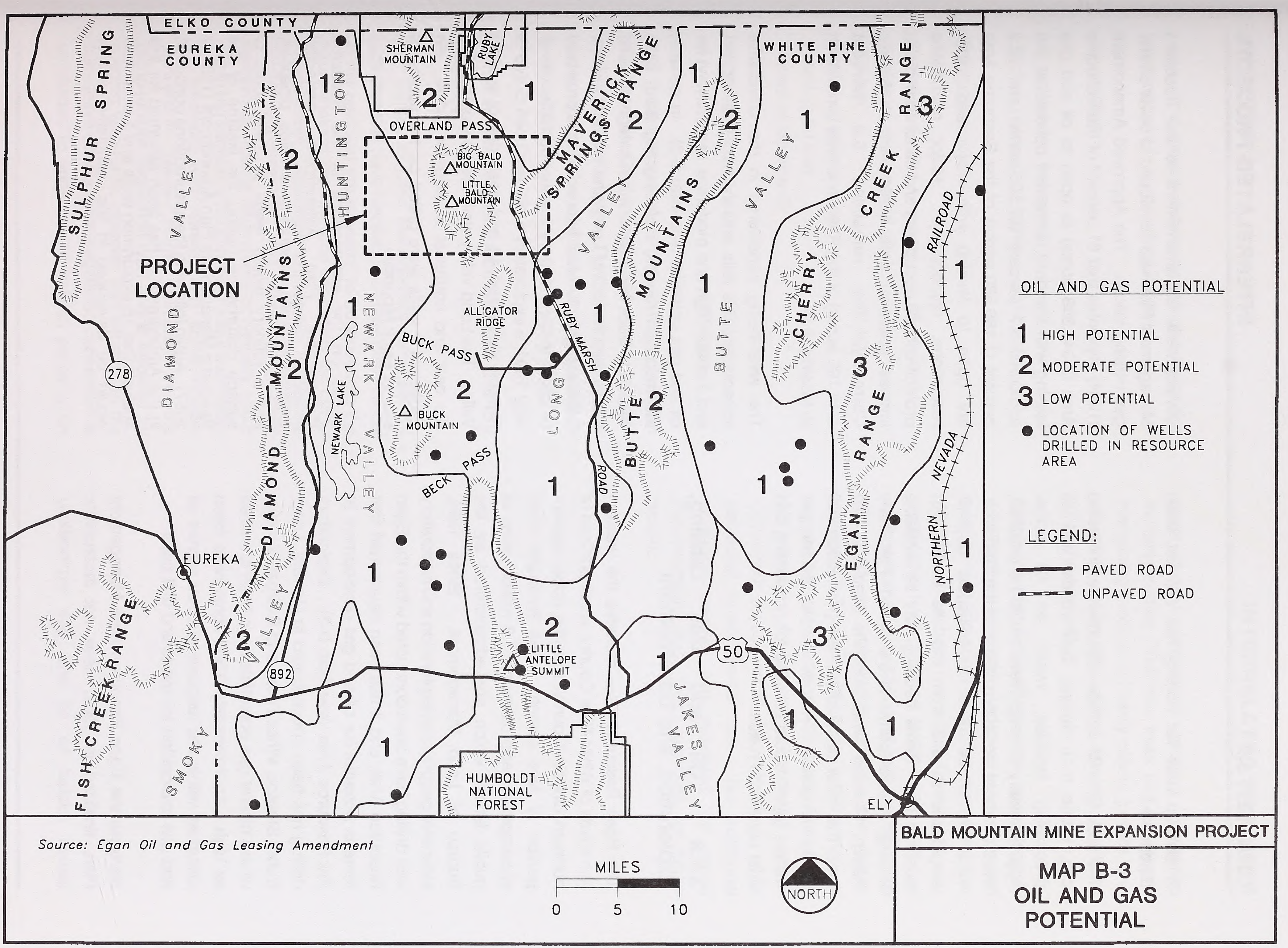
The Olustee resource is located along the Yankee Mine haul road between the Yankee and Monitor Pits. The resource extends east and west of the haul road. Current estimates of the resource sizes would result in 400,000 tons of ore and 600,000 tons of waste. The waste material would be hauled to the Monitor Pit or another mined-out pit for backfilling, to an existing waste dump, or to a new waste dump.

The Davis resource is located to the north of the Yankee Main Waste Dump and east of the Olustee resource. The depth to the bottom of the resource is estimated to be less than 100 feet. Current estimates of resource sizes would result in 100,000 tons of ore grade material, with an estimated stripping ratio of less than 3 tons of waste to 1 ton of ore. More extensive drilling is needed to completely define the resource. The waste material would be placed in a new waste dump adjacent to the pit or used as backfill for one of the existing mined-out pits.

The total new surface disturbance for Olustee and Davis, including pits, haul road(s), and any waste dump(s), would be about 50 acres. The mining operations would be conducted in the same manner currently used at Yankee. The ore would be hauled to the existing crushing and processing facilities. Similar to the projects described in the three previous sections, no additional employment or water demands would be expected. Based on the current production rate at Yankee, Olustee and Davis operations would add approximately 6 months to the life of Yankee Mine.

3.4.7 Bellview Project

Western States Minerals Corporation has proposed to develop a gold mine on the west slope of the Ruby Mountains in the Humboldt National Forest. The site is about 10 miles north-northwest of the Bald Mountain Mine, near Nevada State Highway 228 in Walker Canyon. Open pit mining and heap leach techniques would be used. The project would result in approximately 750,000 tons of ore and 1,940,000 tons of waste rock during the mine life of one year. The stripping ratio would be 2.6:1.



Source: Egan Oil and Gas Leasing Amendment

BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-3
OIL AND GAS
POTENTIAL

A start-up date for mining has not yet been determined.

The total area of surface disturbance, including pits, waste rock dumps, haul roads, and all processing facilities, would be 63 acres. Approximately 33 employees would be required, most of whom would live off-site in the Elko area. Vans would be used to transport dayshift employees to and from the site to Elko or possibly Ely. Some housing may be available through special permit at the Andy's Fort Ruby Ranch, 17 miles away from the mine site. To meet the water demands, a new production well would be drilled. A total of 240 gallons per minute (gpm) would be used for processing and dust control on roads.

3.4.8 Oil and Gas Leasing, Exploration, and Development

The Egan Resource Area includes the western two-thirds of White Pine County, small portions of northern Lincoln County, and the upper eastern portion of Nye County. The Resource Area encompasses approximately 3.8 million acres of public lands, which are administered by the Bureau of Land Management. Since 1984, extensive geophysical exploration and exploratory well drilling have been conducted within the Egan Resource Area, and it has been determined that there is potential for oil and gas development in the Resource Area (see Map B-3). Exploratory drilling has been concentrated in Newark, Long, Butte, Steptoe, White River, and Railroad Valleys, where oil and gas potentials have been identified as high. Approximately 3,500 acres have been disturbed within the resource area by current oil and gas exploration for roads and drill pads.

Because the Egan Resource Area Management Plan, finalized in 1987, does not incorporate issues related to oil and gas exploration/ development, an amendment to the Resource Management Plan was developed to cover oil and gas leasing issues. The Approved Amendment (1994) stipulates that 61 percent of the Resource Area (2,343,388 acres) is open to oil and gas leasing with standard terms and conditions. An additional 1.7 percent (67,500 acres) and 30.9 percent (1,186,580 acres) of the Resource Area are open to leasing with major and minor restrictions, respectively. Major restrictions prohibit surface occupancy and minor restrictions impose seasonal time constraints on leases. Currently, the remaining 6.4 percent (244,195 acres) of the Resource Area is not open to leasing.

The area being considered in the cumulative impacts analysis falls entirely within category 1 and 2 areas (high and moderate, respectively) for oil and gas potential (see Map B-3). In general, the mountain ranges, including Big Bald, Little Bald, and Buck Mountains, fall in category 2, and the valleys, including Long and Newark Valleys, fall in category 1. Most future drilling is projected to occur in the category 1 valley bottoms. As of May 1994, 9 exploratory wells had been drilled in Newark Valley and 10 had been drilled in Long Valley. The Long Valley wells are concentrated to the east and northeast of Alligator Ridge. An additional 2 wells were drilled on the southeast side of Buck Mountain.

Based on the assumptions in the Resource Management Plan Amendment, projected exploratory wells, producing oil fields, pipelines, and a refinery would result in 3,486 acres of surface disturbance during the lifetime of the Resource Management Plan Amendment (1987 to 2007). Again following the assumptions contained in the Amendment, it has been assumed for this analysis that 16 exploration wells and 1 small field would be developed in the cumulative effects area. The surface disturbance involved with this development is summarized below.

Exploration

16 exploration wells and access roads @ 14 acres	224 acres

Production

22 well pads @ 1.14 acres	25 acres
8 miles of service road @ 30 feet	29 acres
6 miles of major access road @ 50 feet	36 acres
2 miles of pipeline @ 15 feet	4 acres
several gravel pits	20 acres
	338 acres

It is further assumed that all of the exploration disturbance (224 acres) and none of the production disturbance (114 acres) would be reclaimed by the end of the cumulative impacts period (2011).

3.4.9 Management Activities of the Ely District

The Bureau of Land Management management activities that have resulted in surface disturbance in the past and are expected to continue into the future include clearing and reseeding for range improvement, vegetation conversion for wildlife habitat enhancement, and woodland product harvesting. Range improvements typically occur within big sagebrush to improve forage availability for livestock, wild horses, and some wildlife. Conversion takes place primarily in the piñon-juniper vegetation type and is followed by seeding with forbs, grasses, and shrubs. In the cumulative effects area, vegetation conversion is conducted to enhance the habitat, primarily for mule deer. Woodland product harvesting includes cutting Christmas trees and fuel wood. Harvesting involves primarily piñon, juniper, and mountain mahogany; areas are not reseeded following harvesting.

Within the cumulative effects area, approximately 15,600 acres have been improved by clearing and reseeding, 2,300 acres have been converted, and 600 acres have been harvested. Over the 16-year cumulative impact period (1996 to 2011), it has been assumed that additional acreage would be disturbed as reasonably foreseeable future actions. This would total 1,600 acres of vegetation converted and 430 acres of harvested (75 percent of currently harvested area). Converted areas would be reclaimed, while harvested areas would not. No additional acreages cleared and reseeded for range improvements have been identified for future actions.

4.0 CUMULATIVE IMPACTS

The following sections discuss the cumulative impacts to the various natural and human resources in the Buck and Bald Mountain area. Impacts to a resource could come from one of two sources, the Proposed Action or an interrelated project (past project, present project, or future action). These impacts could interact in a cumulative manner to produce cumulative effects. If impacts to a given resource would not result from the Bald Mountain Mine Expansion Project, cumulative impacts in a National Environmental Policy Act context would not occur. However, the intent of this technical appendix is to summarize the combined impacts of development in the area regardless of the source or the contribution of the Proposed Action. Thus, each resource section will present the Cumulative Effects Area that has been selected for the resource and the combined effects from the Proposed Action and the interrelated projects. The surface disturbance for the Proposed Action and interrelated projects is summarized on Table B-4, and the resource discussions will refer to the acreages presented on this table. If an alternative to the Proposed Action would affect the cumulative effects in an important way, these implications also will be discussed.

Reclamation activities for the Proposed Action would extend through 2011. Thus, the cumulative impact analysis has been restricted to the 16-year period of 1996 to 2011. In order to be considered in the analysis, the impacts from the reasonably foreseeable future actions must be expected within this time frame. As shown on Figure B-1, reclamation of all the Bald Mountain Mine developments would be completed by 2011. For the reasonably foreseeable future actions for which a specific schedule has not been established, it has been assumed that they also would be completed within the analysis period.

4.1 SOILS

4.1.1 Cumulative Effects Area and Characteristics

Based on the existing draft Soil Conservation Service soil survey of White Pine County, approximately 300 soil associations occur within White Pine County, and approximately 100 soil associations occur within the cumulative effects area. The physical and chemical properties of the soils are discussed in detail in the unpublished soil survey. In addition, the location and extent of each soil association is illustrated on orthophotographic base maps included in the soil survey.

4.1.2 Cumulative Impacts

4.1.2.1 Impacts of the Proposed Action

Eleven soil associations would be affected by the 1,450 acres of disturbance associated with the Proposed Action. Three of the 11 soil associations (Hutchley-Tusel-Suak, Segura-Mclvey-Hutchley, and Hunnton-Chiara) account for half of the 1,450 acres of disturbance. Construction activities affecting soils would include vegetation clearing, excavation, salvage, and storage of growth medium (topsoil and suitable subsoil), cut and fill for haul roads, and grading and contouring. Exposure and disturbance of soils could increase the potential for accelerated erosion from sites affected by construction. Excavation, transportation, and placement of growth medium also could promote the breakdown of soil aggregates into loose soil particles and increase the potential for wind and water erosion on the stockpiles. Blading and/or excavation of remaining subsoil materials to achieve desired grades and soil conditions for the facilities could result in steeper slopes on exposed soils, mixing of soil materials, and the additional breakdown of subsoil aggregates. Measures to stabilize and protect growth medium

Table B-4

Total Number of Acres Disturbed, Reclaimed, and Not Expected to be Reclaimed by Past and Present Activities, the Proposed Action, and Reasonably Foreseeable Future Actions

Activity	Permitted Disturbance	Area Reclaimed	Remaining and Proposed Disturbance	Area to be Reclaimed	Area Not Revegetated
Past and/or Present Activities	21,984(A)[1]	17,591[2]	3,821	3,400	421
Proposed Action	0	NA	1,450(B)[1]	1,316	134
Future Actions	0	NA	3,001(C)[1]	2,319[3]	252
Totals	21,984	17,591	8,272	7,035	807

[1]Note - Total surface disturbance in the area from 1980 through 2011 equals A+B+C or 26,435 acres.

[2]572 acres (not included in this total) have been impacted by woodland products harvesting and are not expected to be reclaimed; however, natural revegetation of these areas is expected over time.

[3]430 acres (not included in this total) would be impacted by woodland products harvesting and are not expected to be reclaimed; however, natural revegetation of these areas is expected over time.

NA = Not Applicable.

stockpiles and embankments would be implemented to minimize soil loss and additional disturbance of soils on site.

Potential indirect effects of soil destabilization and erosion would be dust generation and off-site deposition and off-site stream sedimentation. The implementation of erosion control practices and the reclamation plan would reduce soil erosion resulting from water and wind.

Approximately 2.4 to 4.9 million cubic yards of growth medium would be available for salvage from the 1,450 acres of proposed disturbance. Growth medium from approximately 134 acres (unreclaimed acreage) would be salvaged from the original locations and permanently redistributed within the 1,316-acre reclamation area.

4.1.2.2 Impacts of the Interrelated Projects

Soil impacts that would occur during mine development and operation activities and other activities would include accelerated wind and water erosion rates as a result of soil destabilization. Soil erosion rates would be minimized with the implementation of the erosion control measures and/or reclamation plans. A total of 24,985 acres of soils would be impacted by the interrelated project activities of which 21,984 acres would be affected by past and present activities and 3,001 acres by reasonably foreseeable future actions. Growth medium available within the 24,985-acre interrelated project area would be salvaged and utilized for reclamation activities. Soils from 559 acres (421 acres-past and present activities and 138 acres-future actions) would be salvaged from their original locations and permanently redistributed within the reclamation area. Vegetation types supported by these soils are discussed below for Vegetation resources.

4.1.2.3 Combined Impacts

A total of 26,435 acres of soils would be impacted by the Proposed Action and interrelated projects. Soil erosion rates would increase during a period extending from soil removal to successful reclamation of disturbed land. Growth medium available within the 26,435-acre area would be salvaged and utilized for reclamation activities. Soils from 693 acres (559 acres-interrelated projects and 134 acres-Proposed Action) would be salvaged from their original locations and permanently redistributed within the reclamation area.

4.2 VEGETATION

4.2.1 Cumulative Effects Area and Characteristics

A vegetation map of the cumulative effects area was prepared using several sources of information including high altitude color (1993) and black & white (1983) aerial photography, Soil Conservation Service orthophoto soil maps and mapping unit descriptions (unpublished soil survey of White Pine County), field observations, and the general vegetation map presented in the Egan Resource Area Management Plan. The aerial photography covered most of the cumulative effects area and the Soil Conservation Service orthophotos provided coverage for the entire cumulative effects area. The Soil Conservation Service soil map unit descriptions were reviewed in order to identify range sites and corresponding dominant vegetation within the mapped soil units. This was particularly useful in areas without aerial photo coverage and in areas difficult to delineate vegetation types. The vegetation type boundaries were depicted on United States Geological Survey 7.5 minute topographic maps for the cumulative effects area. Acres of associated vegetation types were identified for the cumulative impact area (see Table B-5). The 7.5 minute topographic maps are the working maps maintained in Bureau of Land Management's file; a reduced version is presented in this report (see Map B-4).

Vegetation types identified within the cumulative effects area include piñon-juniper, big sagebrush, greasewood, shadscale, winterfat, low sagebrush, mixed shrub, and wetland/riparian. Areas disturbed by past or current mining operations were typed based on vegetation likely present prior to the disturbance. In addition, barren and altered habitat (i.e., reseeded, harvested, converted, and burned) areas within the cumulative effects area were delineated and quantified.

Piñon-juniper woodlands generally occur on steep hillsides and mountains at all aspects, between 6,200 and 8,600 feet in elevation. This vegetation type generally occurs on shallow, loamy soils with high percentages of coarse fragments. Singleleaf piñon and Utah juniper dominate the overstory. Included with this type are isolated areas dominated by curlleaf mountain mahogany occurring in association with rock outcrops on summits and sideslopes of hills and mountains. Shrubs present include mountain big sagebrush, bitterbrush, snowberry, and rabbitbrush. Grasses such as Sandberg bluegrass, bottlebrush squirreltail, Indian ricegrass, Great Basin wildrye, and bluebunch wheatgrass are present in the generally sparse understory. These woodlands generally occur along the north-south trending mountains below the low sagebrush and above the big sagebrush types within the cumulative effects area. This type was present in approximately 35 percent of the cumulative effects area. In addition, some piñon-juniper woodlands (approximately 4,440 acres) have been reseeded, harvested, converted, or burned for rangeland improvement or wildlife habitat enhancement.

The big sagebrush type is present on alluvial fans, valley bottoms, and hillsides and occurs on a wide range of soil types and depth, slopes, and aspects. This type occurs at elevations between 5,700 and 8,600 feet. Depending on the location, Basin big sagebrush, Wyoming big sagebrush, or mountain big sagebrush dominate the overstory. Areas of black sagebrush also occur within this type, typically in proximity to piñon-juniper woodlands. Understory species commonly associated with Basin big sagebrush include Sandberg bluegrass, bottlebrush squirreltail, Indian ricegrass, lupine, phlox, and bastard toadflax. Rabbitbrush, Sandberg bluegrass, and phlox occur with Wyoming big sagebrush in addition to crested wheatgrass in reseeded areas. Species occurring with mountain big sagebrush include bluebunch wheatgrass, Sandberg bluegrass, cheatgrass, bottlebrush squirreltail, lupine, and scattered rabbitbrush and bitterbrush. The big sagebrush type is the most common vegetation type within the cumulative effects area (45 percent) and generally dominates the lower to mid-elevation zones in Huntington, Newark, and Long Valleys within the cumulative effects area. In addition, some big sagebrush areas (approximately 14,657 acres) have been converted, reseeded, or burned for rangeland improvement or wildlife habitat enhancement.

The greasewood vegetation type generally occurs in saline areas along drainages, margins of lake beds and marshes, and on flats and basins at elevations between 5,900 and 6,200 feet. Black greasewood dominates this type and associated species commonly include rubber rabbitbrush, iodinebush, shadscale, alkali sacaton, and inland saltgrass. Big sagebrush also occurs in the less

Table B-5

Vegetation Types Found in the Cumulative Effects Area

Vegetation Type	Dominant Plant Species	General Location	Acreage Affected by the Proposed Action	Acreage Affected by Interrelated Projects	Acreage Affected by the Proposed Action and Interrelated Projects	Acreage within the Cumulative Effects Area
Piñon-Juniper	Singleleaf piñon, Utah juniper, curlleaf mountain mahogany, bitterbrush, mountain big sagebrush, Indian ricegrass	Steep hills and mountains on all mountain ranges; near the southern boundary of the Humboldt National Forest; south-southwest of Ruby Lake; west side of Alligator Ridge; south of Little Bald Mountain	242[1]	7,637[2]	7,879	127,035
Big Sagebrush	Basin big sagebrush, Wyoming big sagebrush, mountain big sagebrush, black sagebrush, Thurber needlegrass, Sandberg bluegrass, bluebunch wheatgrass, bottlebrush squirreltail	Alluvial fans, valley bottoms, and hillsides concentrated in Huntington, Newark, and Long Valleys; south of Little Bald Mountain	743	16,834[3]	17,577	164,763
Greasewood	Black greasewood, rubber rabbitbrush, iodinebush, shadscale, bottlebrush squirreltail	Saline drainages, flats, and basins east of Ruby Lakes, and in Newark and Long Valleys	0	0	0	13,851
Shadscale	Shadscale, winterfat, bud sagebrush, black sagebrush, black greasewood, bottlebrush squirreltail	Shallow slightly saline soils in Ruby and Long Valleys	0	0	0	24,409
Winterfat	Winterfat, black sagebrush, shadscale, bud sagebrush, Sandberg bluegrass, Thurber needlegrass	Slightly saline to saline drainages, flats and basins in southern Long Valley and northern Newark Valley	0	0	0	6,330

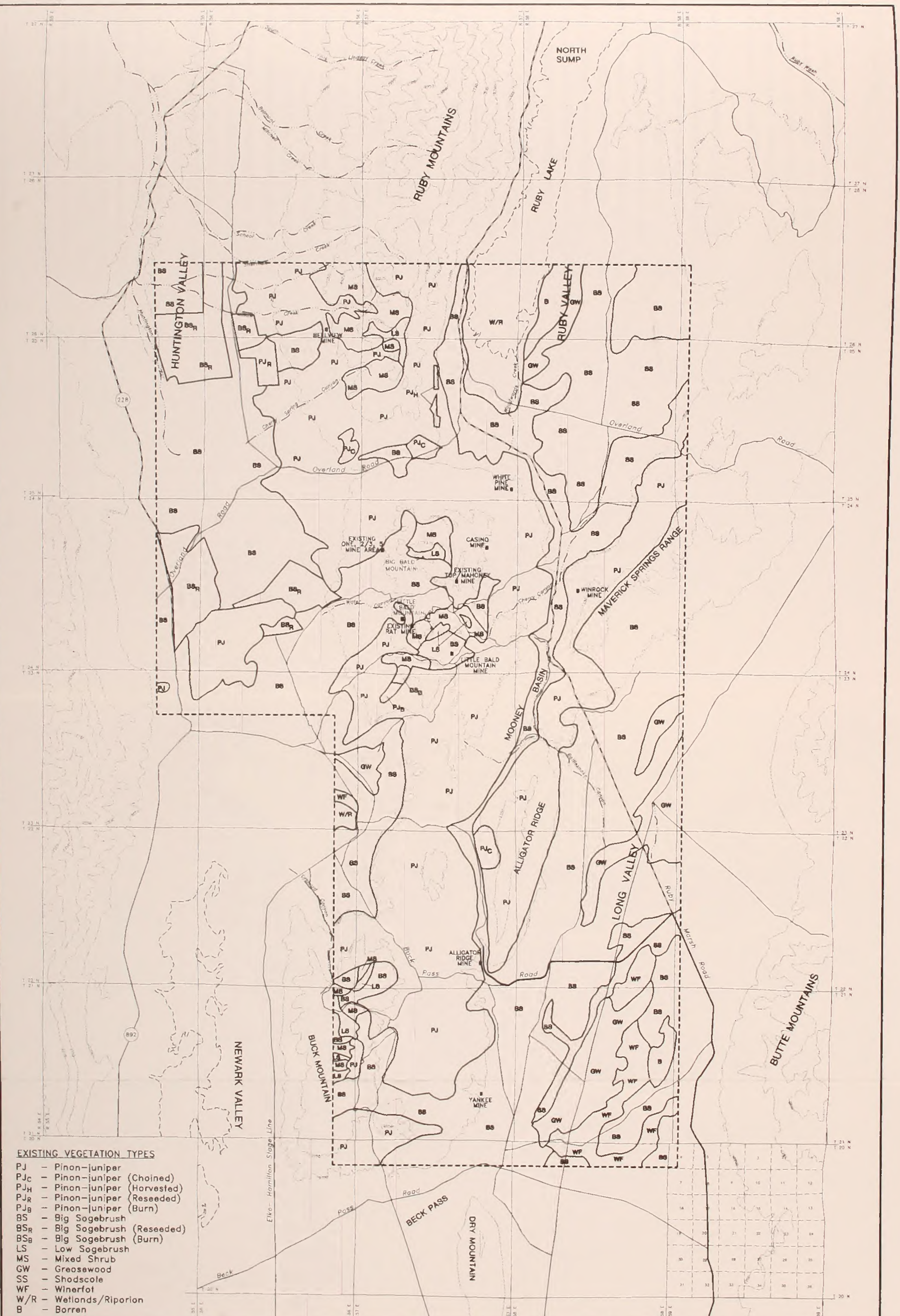
Table B-5 (Continued)

Vegetation Type	Dominant Plant Species	General Location	Acreage Affected by the Proposed Action	Acreage Affected by Interrelated Projects	Acreage Affected by the Proposed Action and Interrelated Projects	Acreage within the Cumulative Effects Area
Low Sagebrush	Low sagebrush, rabbitbrush, Sandberg bluegrass, bottlebrush squirreltail, Sandberg bluegrass	Shallow, rocky soils on mountain ridges at Buck Mountain, Big and Little Bald Mountains, and Maverick Springs Range	112	44	156	4,159
Mixed Shrub	Mountain big sagebrush, snowberry, bitterbrush, rabbitbrush, bluebunch wheatgrass, Thurber needlegrass	Sideslopes and backslopes of hills and mountains at Big and Little Bald Mountains, Buck Mountan, Maverick Springs Range, and Humboldt National Forest	353	470	823	12,357
Wetland/Riparian	Sedges, rushes, cattails, willow	Ruby Lakes; Newark Valley; scattered springs and drainages	0	0	0	9,965
Barren	N/A	Long Valley playa basin; sand dunes north-northeast of Long Valley Slough; east of Ruby Lakes; northeast end of Newark Valley	0	0	0	3,245
TOTAL			1,450	24,985	26,435	366,114

[1]Includes 4 acres of mountain mahogany.

[2]Of the 7,637 acres affected by interrelated projects (i.e., past, present, and future): 1,242 acres of piñon-juniper would be cleared for range improvement; 1,002 acres would be harvested for woodland products; 3,944 acres would be converted for habitat enhancement; 282 acres would be burned; and the 1,167 acres remaining would be disturbed by mining activities, oil and gas exploration, and proposed transmission line construction.

[3]Of the 16,834 acres affected by interrelated projects: 14,314 acres of big sagebrush would be cleared for range improvement and 343 acres would be burned.



LEGEND:

- ROADS
- PAVED MAIN ROAD
- MAIN ROAD NOT PAVED
- CUMULATIVE EFFECTS AREA BOUNDARY
- SURFACE ELEVATION CONTOUR
- INTERMITTENT STREAM
- INTERMITTENT LAKE
- MINE AREA

NORTH

0 18,500
FEET

BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-4
EXISTING
VEGETATION TYPES

saline areas as inclusions and transitions to adjacent vegetation types. The majority of this type within the cumulative effects area is located northwest of Newark Valley, east of Ruby Lake, and in portions of Long Valley.

The shadscale vegetation type occurs on a variety of topographic positions but generally is found on shallow, slightly saline soils subject to periods of drought at elevations between 5,900 and 6,400 feet. Shadscale can occur as an almost pure form (monoculture) or in a mixture with a variety of shrubs including winterfat, bud sagebrush, black sagebrush, and black greasewood. Other species associated with this type are ephedra, fourwing saltbush, low rabbitbrush, kochia, Indian ricegrass, bottlebrush squirreltail, Sandberg bluegrass, needle-and-thread, buckwheats, phlox, and globemallow. This type is concentrated in the eastern and southwestern portions of Ruby Valley and Long Valley, respectively.

The winterfat vegetation type commonly occurs intermingled or in proximity to the two desert shrub types previously described. Winterfat dominates this type that can occur as an almost pure form or as a dominant component of a mixture with black sagebrush, shadscale, or bud sagebrush. The generally sparse understory can include Indian ricegrass, bottlebrush squirreltail, needle-and-thread, globemallow, buckwheats, and princesplume. This vegetation type occurs at elevations between 5,900 and 6,100 feet within the cumulative effects area, at the south end of Long Valley and the northern portion of Newark Valley.

The low sagebrush vegetation type is concentrated on the shallow, rocky soils along mountain ridges on gentle to very steep slopes. Low sagebrush dominates this low-growing type characterized by low species diversity. Other associated plant species are rabbitbrush, Sandberg bluegrass, bottlebrush squirreltail, winterfat, and buckwheat. This vegetation type occupies the higher elevation areas (7,500 to 9,300 feet) within the cumulative effects area including Buck Mountain, Big and Little Bald Mountains, and the Maverick Springs Range.

Mixed shrub vegetation generally occurs on the moderately steep to steep sideslopes and backslopes of hills and mountains at all aspects. This type is commonly found on moist slopes with north and east aspects at elevations, ranging from 6,900 feet to 9,300 feet within the cumulative effects area. These relatively diverse sites are typically supported by shallow to moderately deep, loamy soils. Mountain big sagebrush, snowberry, bitterbrush, and rabbitbrush dominate the shrub canopy layer. Common understory species include needlegrass, bluebunch wheatgrass, mountain brome, Sandberg bluegrass, Great Basin wildrye, sedges, balsamroot, lupine, bastard toadflax, groundsel, and buckwheat. This type occurs at Big and Little Bald Mountains, Buck Mountain, Maverick Springs Range, and the mountainous areas of the Humboldt National Forest.

The wetlands and riparian areas occupy less than 3 percent of the cumulative effects area and are generally limited in size, with the exception of Ruby Lake. Ruby Lake is the largest wetland within the cumulative effects area and supports a variety of plant species within the water body as emergents (e.g., cattails, bulrush, rush, sedges) along the banks, and within the dry lakebed margins that support low plant cover and diversity. In addition to Ruby Lake, the larger wetland/riparian areas are located along the Newark Valley drainage. Small isolated wetlands/riparian areas are located at or near Buck Mountain, Buck Pass, Long Valley Slough, North Water Canyon, Cherry Canyon, Twin Springs, Blue Jay Ranch (southeast of Ruby Valley), and Willow Creek and springs.

4.2.2 Cumulative Impacts

4.2.2.1 Impacts of the Proposed Action

Both direct *and indirect* impacts to vegetation would result from the removal of vegetation during mine development. *Direct* impacts *would* include the short-term loss of vegetation and vegetative productivity and subsequent vegetative structural change in plant communities. *Indirect impacts would include the increased potential for weed invasion into disturbed areas.*

Four vegetation types including big sagebrush, mixed shrub, piñon-juniper, and low sagebrush would be impacted, as a result of the Proposed Action. Approximately 1,450 acres of vegetation would be affected, and this represents less than 1 percent (0.4) of the cumulative effects area. Mine development would impact approximately 743 acres (447 acres reseeded) of the big sagebrush vegetation type that is present throughout the Proposed Action area. Approximately 353, 238, 112, and 4 acres of mixed shrub, pinon-juniper, low sagebrush, and mountain mahogany vegetation would be removed during mine development, respectively. Reclamation would occur on 1,316 acres (91 percent) of the Proposed Action area with 134 acres be unreclaimed land. The change in species and structural diversity from existing plant communities to reclaimed plant communities would be a long-term change in floristic composition. Following closure and reclamation of the process area and mine sites, plant communities would be dominated by herbaceous species (grasses and forbs) for the first 5 to 10 years. Depending upon climatic conditions, previous plant communities, and land use following reclamation, mature shrubs would *be expected to* become more prevalent in 10 to 15 years, and mature piñon in 50 to 100 years.

Indirect impacts from vegetation disturbance would be increased weed invasions, particularly Russian thistle and halogeton. The proposed revegetation and erosion control measures identified in the Proposed Action's reclamation plan would minimize, not eliminate, the potential for weedy plant species to invade disturbed areas.

4.2.2.2 Impacts of the Interrelated Projects

Past and present permitted activities and reasonably foreseeable future actions within the cumulative effects area would account for 21,984 acres and 3,001 acres of disturbance, respectively (see Table B-4). Approximately 24,471 acres (98 percent) of this disturbance would be associated with the big sagebrush (16,834 acres) and piñon-juniper (7,637 acres) vegetation types. The projected acreage for past and present activities and reasonably foreseeable future actions (24,985) is approximately 7 percent of the acreage within the vegetation cumulative effects area. Approximately 693 acres of disturbance would not be reclaimed. *Past activities, including mining operations, have resulted in increased weed invasions in the cumulative effects area.*

4.2.2.3 Combined Impacts

The combination of the Proposed Action and interrelated projects would affect 26,435 acres or approximately 7 percent of the cumulative effects area. The combination of the Proposed Action and interrelated projects would impact 17,577 acres of big sagebrush, 7,879 acres of piñon-juniper woodland, 823 acres of mixed shrub, and 156 acres of low sagebrush. Approximately 24,626 acres (93 percent) of the total surface disturbance would be revegetated; 1,809 acres would not be reclaimed. The 1,809 acres left unreclaimed would consist of

1,002 acres that would be naturally revegetated (woodland harvesting areas) and 807 acres of mining disturbance. ***The amount of acres affected by increased weed invasions from past projects and the Proposed Action cannot be quantified. However, the proposed reclamation plan would minimize the potential impact of increased weed infestations, as discussed in Section 4.15.2.3, Reclamation.***

4.3 GEOLOGY AND MINERALS

4.3.1 Cumulative Effects Area and Characteristics

The discussion for the cumulative effects area associated with geology and minerals was prepared from data available in reports published by the United States Geological Survey and the Nevada Department of Water Resources, and from data available in literature related to the geology and hydrology of Nevada. In addition, data and company reports were provided by Placer Dome US and Western States Minerals.

4.3.1.1 Regional Geological Setting

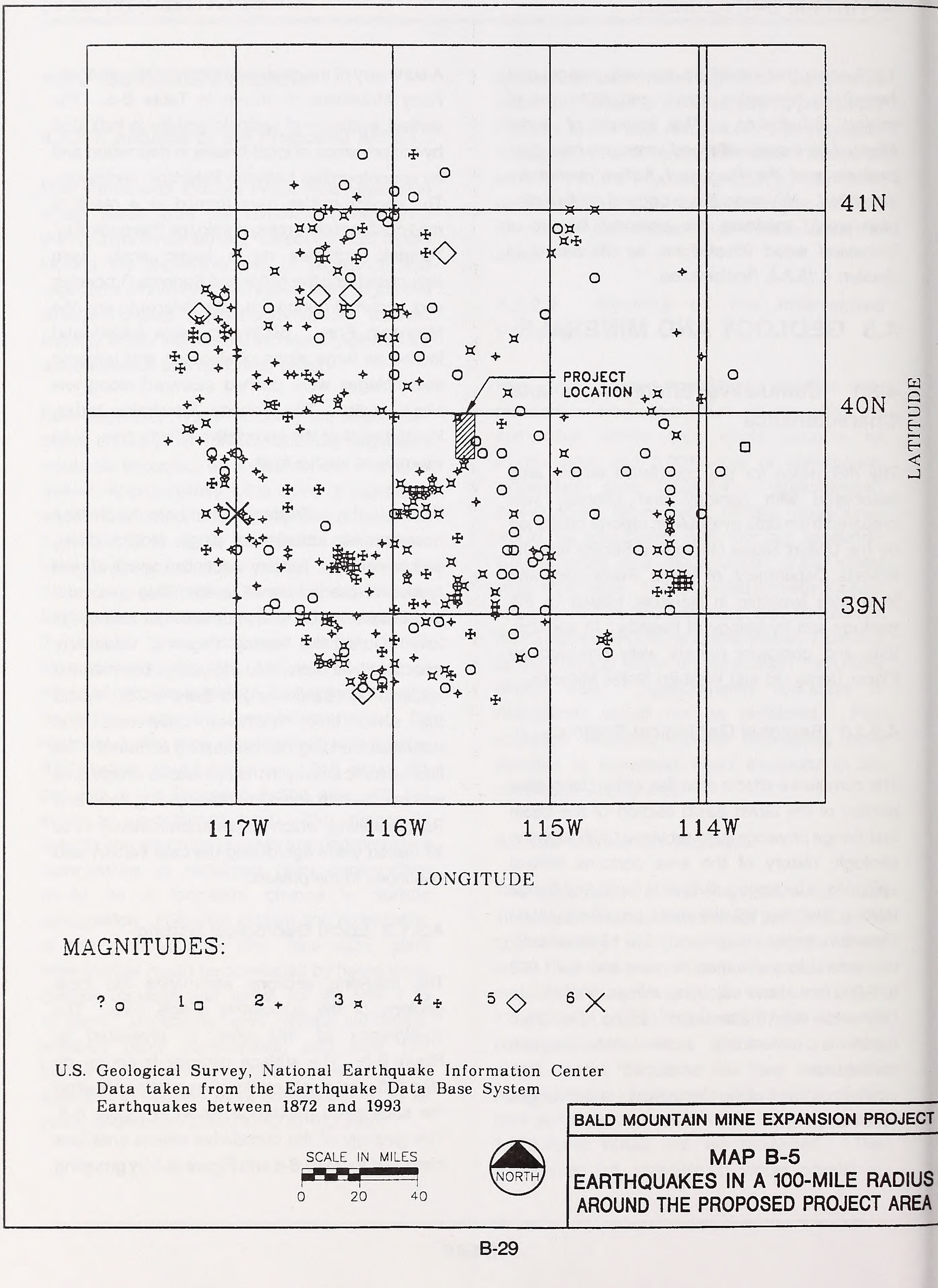
The cumulative effects area lies within the central portion of the Great Basin section of the Basin and Range physiographic province. Although the geologic history of the area contains several episodes of tectonic activity, it is Basin and Range faulting that has left the most prominent mark. Mountain ranges are generally 5 to 15 miles wide, can extend for more than 50 miles and rise 1,000 to 5,000 feet above adjoining valleys. Valleys are often wider than the mountain ranges. The Great Basin is tectonically active with frequent earthquakes and well-developed recent fault scarps common along the margins of the ranges (see Map B-5).

A summary of the geologic history of the southern Ruby Mountains is shown in Table B-6. The earliest evidence of tectonic activity is indicated by the presence of local breaks in deposition and by unconformities between Paleozoic sediments. The unconformities were formed as a result of mild continental warping during the Paleozoic Era. Tectonic activities on a larger scale were associated with the Antler and Sonoma Orogenies and occurred during the Late Paleozoic and the Mesozoic Eras. Sediments were folded and faulted as large slices of siliceous and volcanic assemblages were pushed eastward along low angle faults. The Roberts Mountains thrust, located west of the cumulative effects area, is an example of such a fault.

During the Tertiary, tectonic activities accompanied intrusion of plugs, stocks, dikes, and volcanism. Tertiary volcanism swept across northern Nevada from 25 to 40 million years ago and blanketed the land with ash-flow and air-fall tuffs. During the waning stages of volcanism, extensive lake beds filled the valleys between the volcanic centers (Hose and Blake 1976). About the same time, northwest, east-west, and northeast trending normal faulting occurred. The final tectonic activity in the cumulative effects area was north-south and northeast-trending Basin and Range faulting, which began approximately 18 to 28 million years ago during the Late Tertiary and continues to the present.

4.3.1.2 Local Geological Setting

The following sections summarize the local geology of the cumulative effects area. The stratigraphy of this area is presented in Figure B-2. The surface geology is shown on Map B-6, and a schematic cross-section showing the subsurface geology is given in Figure B-3. The geology of the cumulative effects area was simplified for Map B-6 and Figure B-3 by grouping



MAP B-5
EARTHQUAKES IN A 100-MILE RADIUS AROUND THE PROPOSED PROJECT AREA

Table B-6

Geologic History of the Southern Ruby Mountains

Geologic Time[1]	Geologic Settings	Mineralization
Paleozoic Era (245-570) Cambrian (505-570) Ordovician (438-505) Silurian (308-438) Devonian (360-408) Mississippian (320-360)	Deposition of approximately 13,500 to 18,750 feet of carbonate bank and platform limestone, dolomite, claystone, shale, siltstone, sandstone and quartzite beginning with the Cambrian Lincoln Peak Formation and ending with the Mississippian Diamond Peak Formation. Mild continental warping	No Mineralization
Late Paleozoic Era to Early Mesozoic Era (245-570)	Antler and Sonoma Mountain building events to the west resulting in folding and faulting of the Paleozoic sedimentary rocks.	No Mineralization
Late Cretaceous to middle Cenozoic (97-37)	Extensional forces causing detachment faulting and resulting in low-angle normal faults	No Mineralization
Cenozoic Era (0-65) Eocene (37-58) Oligocene (24-37)	Intrusion of quartz monzonite stocks and quartz feldspar porphyry dikes and sills, and associated volcanic activity during the Eocene and Oligocene. Concurrent northwest, northeast and east-west trending normal faulting.	Mineralization consisting of copper sulfides adjacent to the intrusive body located on Bald Mountain.
Miocene (15-24)	Circulation of mineralized geothermal fluids and silicification along faults and along the contact between the Devils Gate Limestone and the Pilot Shale to form the Bald Mountain and Alligator Ridge Deposits.	Hydrothermal gold mineralization
Pliocene (1.6-5) Pleistocene (0.01-1.6)	Uplift of the Ruby Mountains and Maverick Springs Range and erosion. Initial deposition of lake bed sediments in valleys followed by alluvial sediments. Development of north-south Basin and Range faults.	No mineralization

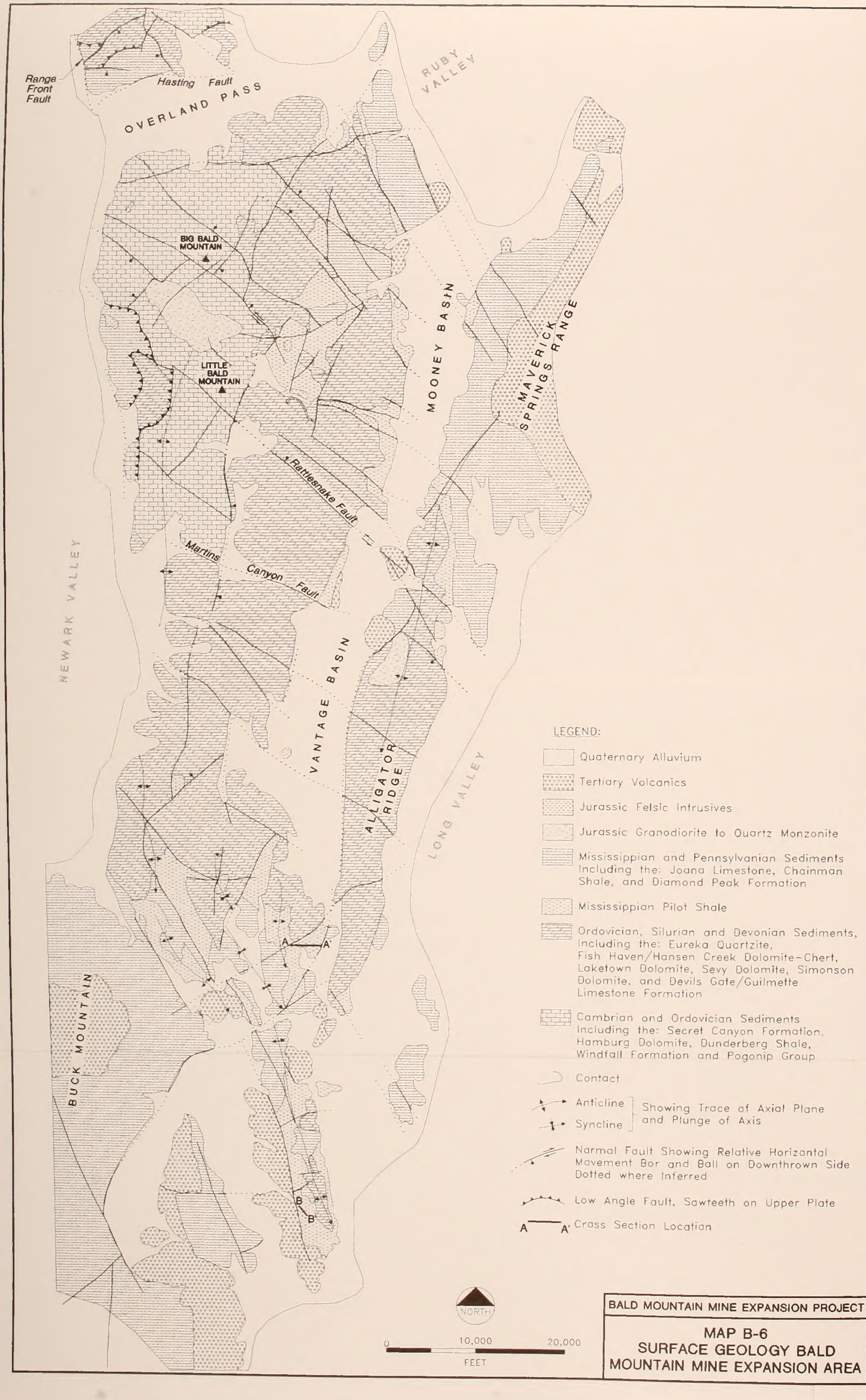
[1]Geologic time in millions of years before present.

Source: (Hose and Blake 1976).

AGE			FORMATION	THICKNESS (feet)
CENOZOIC	QUATERNARY		Recent and Older Alluvium	Up to 1,750
CENOZOIC	TERTIARY		Josperoid, Mossive Silico Replocement	
CENOZOIC	TERTIARY		Volconics and Volconiclostics	Up to 2,400
MESOZOIC	JURASSIC		Felsic Intrusives–Gronodiorite	
MESOZOIC	JURASSIC		Quortz Monzonite	
PALEOZOIC	PENNSYLVANIAN		Moleen Formotion	
PALEOZOIC	MISSISSIPPIAN	White Pine Group	Diomond Peok Formotion	Up to 2,500
PALEOZOIC	MISSISSIPPIAN	White Pine Group	Choinman Shale	900–1,300
PALEOZOIC	MISSISSIPPIAN	White Pine Group	Joano Limestone	100–200
PALEOZOIC	MISSISSIPPIAN	White Pine Group	Pilot Shole	400–500
PALEOZOIC	DEVONIAN	Nevada Formation	Guilmette / Devils Gate Limestone	1,400–2,000
PALEOZOIC	DEVONIAN	Nevada Formation	Simonson Dolomite	600–1,300
PALEOZOIC	DEVONIAN	Nevada Formation	Sevy Dolomite	400–500
PALEOZOIC	SILURIAN		Loketown Dolomite	600–1,800
PALEOZOIC	ORDOVICIAN		Fish Hoven Dolomite	approx. 200
PALEOZOIC	ORDOVICIAN		Eureka Quartzite	100–200
PALEOZOIC	ORDOVICIAN	Pogonip Group	Antelope Valley Formation	200–400
PALEOZOIC	ORDOVICIAN	Pogonip Group	Ninemile Formotion	
PALEOZOIC	ORDOVICIAN	Pogonip Group	Konosh Shole	300–400
PALEOZOIC	CAMBRIAN	Windfall Fm	Bullwhocker Member	400–1,800
PALEOZOIC	CAMBRIAN	Windfall Fm	Cotlin Member	approx. 250
PALEOZOIC	CAMBRIAN		Dunderberg Shole	1,200–1,400
PALEOZOIC	CAMBRIAN		Lincoln Peok Formotion	up to 4,000

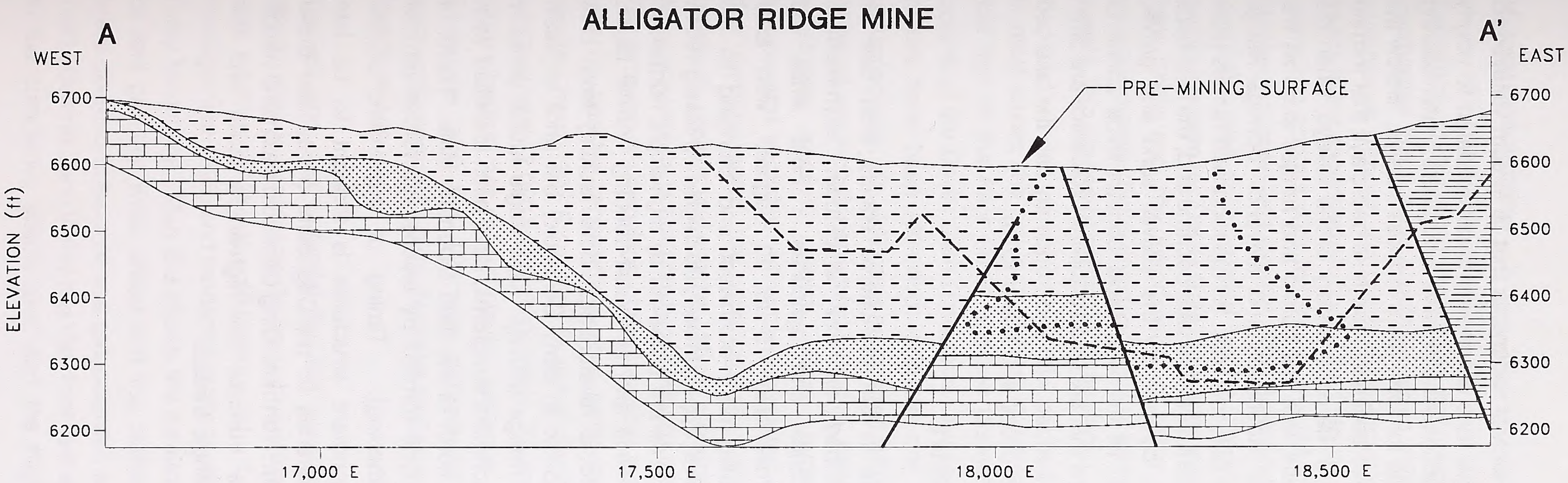
BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE B-2
STRATIGRAPHIC COLUMN
SOUTHERN RUBY MOUNTAINS

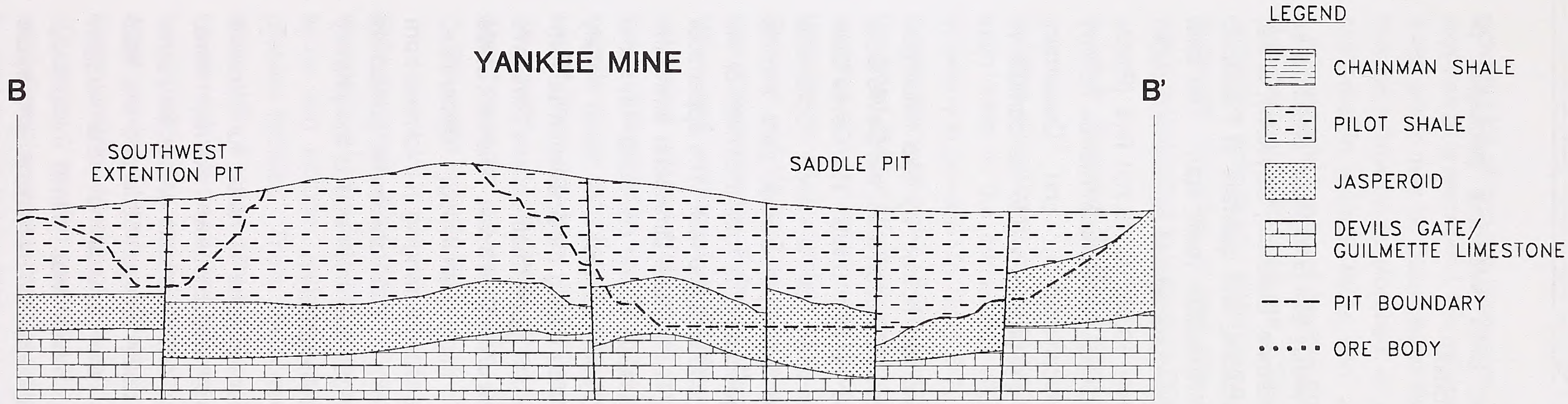


BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-6
SURFACE GEOLOGY BALD MOUNTAIN MINE EXPANSION AREA



From: ILCHICK 1991, Geology of the Vantage Gold Deposits, Alligator Ridge, NV



From: USMX, 1993, Waste Rock Characterization Study

NOT TO SCALE

BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE B-3
CROSS SECTIONS A-A' AND B-B'

the Paleozoic units into four packages of sedimentary rocks.

Stratigraphy

Rocks types within the cumulative effects area consist of limestone, dolomite, claystone, shale, siltstone, sandstone, and quartzite of Paleozoic age (320 to 570 million years ago). The total thickness of the consolidated sedimentary rocks is approximately 13,500 to 18,750 feet (Placer Dome, unpublished). Mesozoic intrusives, Tertiary volcanics, volcaniclastics, and Quaternary alluvium also are present within the cumulative effects area.

Gold resources are hosted by two lithologies within the Proposed Action area: the Devils Gate Limestone and the Pilot Shale. The Devils Gate Limestone consists of a lower dolostone sequence and an upper almost pure micritic limestone sequence. The total thickness of the formation is 1,400 to 2,000 feet. The uppermost portion of the Devils Gate Limestone forms the lowermost boundary of the ore zone. In some places, the upper contact has been totally replaced by silica during mineralization to form massive jasperoid. Conformable above the Devils Gate Limestone is the Pilot Shale. The Pilot Shale consists of thinly laminated, calcareous, carbonaceous siltstone ranging in thickness from 400 to 500 feet. The lowermost portion is approximately 300 feet thick and is the primary host for gold mineralization.

The Bald Mountain area is noted for intrusive rocks, contact metamorphic skarns, veins, volcanic rocks, and Paleozoic carbonate rocks. The intrusive body between Little and Big Bald Mountain is the source of the copper mineralization, which was mined historically. However, the igneous and metamorphic rocks are not usually associated with gold mineralization.

The alluvial sediments that fill stream valleys and alluvial fans are mostly unconsolidated to poorly consolidated and serve as aquifers (water-bearing rocks) for farm wells in these valleys. Below the alluvial sediments are lake-bed clays that formed during the early history of the valleys, when the climate was still humid and ranges such as the Ruby Mountains and Maverick Springs Range were only low hills. As the mountain ranges grew in size and the climate became arid, the lake beds were covered by the alluvial sand and gravel. Many of the lake beds contain thick zones of gravel that are good aquifers. Volcanics are often interbedded with and frequently cap the lake-bed clays (Hose and Blake 1976).

Structure

Folds in the cumulative effects area can be described as low amplitude, asymmetrical anticlines and synclines. Fold limbs dip approximately 10 to 30 degrees, with axes trending north-northwest and plunging to the south at approximately 20 degrees (Klessig 1984). The folds are cross-cut by high-angle northwest, east-west and northeast-trending normal faults. Geologic relationships date faulting from Late Mesozoic to early Cenozoic, but prior to Basin and Range activity. Low angle faults, possibly detachment structures, have been identified west and north of the Bald Mountain Mine. Faults of this type formed by extensional forces (crustal lengthening). Timing of movement of the detachment structures is thought to be late Cretaceous to pre-Oligocene (Hose and Blake 1976). North-trending Cenozoic Basin and Range faults truncate the high-angle faults and the low-angle thrusts.

Mineral Resources

Formation of the gold resources occurred as geothermal fluids were circulated along existing fault planes through the Devils Gate Limestone. As the fluids ascended along the fault planes and came into contact with the less permeable Pilot Shale, circulation was slowed. The slower rate of circulation was accompanied by the removal of carbonate from the Devils Gate Limestone and the Pilot Shale and the introduction of silica and precious metals. Following deposition of precious metals, two stages of oxidation took place.

In most cases, the ore is contained in the lower 300 feet of the Pilot Shale and the uppermost portion of the Devils Gate Limestone. Two types of ore have been identified: oxidized ore and carbonaceous ore. Minerals associated with the oxidized ore include: specular hematite, jarosite, stibiconite, goethite, barite, calcite, gypsum, alunite, and kaolinite. Minerals associated with the carbonaceous ore are: stibnite, pyrite, orpiment, realgar and calcite. Minor amounts of silver are present in both ore types (Klessig 1984). The process of deposition of the precious metals was by passive replacement at a temperature ranging from 190° F to 250° F and a depth of approximately 2,000 feet (Ilchick 1991). Timing of mineralization has been placed between the Oligocene and the Miocene, subsequent to high-angle normal faulting, but prior to Basin and Range activity.

The oil and gas potential for the cumulative effects area is considered to be high in Newark and Long Valleys (Bureau of Land Management 1993) and moderate in the southern Ruby Mountains. Map B-3 shows the location of oil and gas test wells drilled and the outline of areas deemed to have oil and gas potential, as of 1993. Central Long Valley has the most test wells in the cumulative effects area and the highest potential for oil and gas resources. If oil and gas exploration is successful, it is estimated that up to 3,486 acres may be disturbed in the entire Egan Resource Area by development of a maximum of 423 wells in 4 small fields and 2 large fields, 1 refinery, and 7 miles of pipeline (Bureau of Land Management 1993). All but 1,274 acres of this potential estimated disturbance would be reclaimed following oil and gas development, which is estimated to last up to 35 years.

4.3.1.3 Existing Surface Disturbance

Existing disturbance areas were calculated for each mine in the cumulative effects area. A summary is provided in Table B-7; the areas are displayed on Map B-2. Each area of disturbance has been divided into three categories: permitted, existing, and reclaimed areas of disturbance. All data are as of September 1994, except for the Bellview and White Pine Mine areas. Areas of disturbance for the Bellview Mine, White Pine Mine, and additional exploration areas were calculated utilizing 1993 air photos. Additional areas of exploration include those areas that are outside of an established mine area, have had exploration activities, but have not been developed. The total area of permitted disturbance for the cumulative effects area is 21,984 acres in Table B-1.

<u>Bald Mountain Mine Area</u>: Areas of existing disturbance at the Bald Mountain Mine total 987 acres and include: mining, exploration, and process facilities. There are currently 7 mining areas with 6 open pits totaling 151 acres, 11 waste rock dumps totaling 283 acres, haul roads totaling 122 acres, and exploration roads and drill pads totaling 91 acres. Existing process and leach facilities consist of 2 leach pads totaling 221 acres, 9 solution ponds totaling 8 acres and miscellaneous process facilities totaling 31 acres. To date, approximately 229 acres of disturbance

Table B-7

Summary of Existing and Proposed Areas of Disturbance

Area		Open Pits No.	Open Pits Acres	Backfilled Pits No.	Backfilled Pits Acres	Dumps (1) No.	Dumps (1) Acres	Haul Roads	Exploration Roads	Leach Pads No.	Leach Pads Acres	Solution Ponds No.	Solution Ponds Acres	Process Facilities	Devel-opment(2)	Total
Bald Mtn.	Permitted		260		0		558	128	284		352		13	40		1,635
	Existing	6	151	0	0	11	283	122	91	2	221	9	8	31	80	987
	Reclaimed		28		0		179	6	16		0		0	0		229
Little Bald Mtn.(3)	Permitted		2				4	8	NA		7		1	6	0	28
	Existing	1	2	0	0	1	0	8	NA	1	7	1	1	6	0	24
	Reclaimed		0				4	0	0		0			0	0	4
Casino-Winrock	Permitted		20		13		42	67	24		29			22		217
	Existing	2	20	2	13	2	45	50	24	1	19	1	--	35	0	206
	Reclaimed		0		0		0	3	0		0			0		3
Alligator Ridge(4)	Permitted		58		31		128	NA	NA		74			36		
	Existing	8	58	4	31	6	128	NA	NA	4	74	1	--	36	NA	593
	Reclaimed		0		0		0	0	0		0			0		50
Yankee	Permitted		75		42		63	39	78		NA			88		385
	Existing	4	30	3	42	4	38	32	66	1	24	2	--	42	0	274
	Reclaimed		0		0		0	0	15		0			0		15
White Pine	Permitted		0		0		0	0	0		0			0		0
	Existing	4	34	0	0	4	40	10	80	1	19	1	--	107	0	290
	Reclaimed		0		0		0	0	0		0			0		0
Total	**Permitted**	**0**	**415**	**0**	**86**	**0**	**795**	**242**	**386**	**0**	**462**	**0**	**14**	**192**	**0**	**2,265**
	Existing	**25**	**295**	**9**	**86**	**28**	**534**	**222**	**261**	**10**	**364**	**15**	**9**	**221**	**80**	**2,374**
	Reclaime	**0**	**28**	**0**	**0**	**0**	**183**	**9**	**31**	**0**	**0**	**0**	**0**	**0**	**0**	**301**

1 Includes growth medium

2 Development consisits of existing exploration disturbance located within the proposed pit limits

3 Assume permitted disturbance is equal to existing disturbance

4 Leach pad acreage includes 36 acres of tailings. In some cases, individual acreages were not available. However, total of 593 acres approximates total disturbace.

have been reclaimed at the Bald Mountain Mine, including 28 acres of pits, 179 acres of waste rock dumps, 6 acres of haul roads, and 16 acres of exploration roads and drill pads.

Little Bald Mountain Area: Areas of existing disturbance at the Little Bald Mountain Mine total 24 acres and include: mining, exploration, and process facilities. There is currently 1 inactive mining area with 1 open pit totaling 2 acres, 1 waste rock dump totaling 4 acres, and a haul road totaling 8 acres. Areas of disturbance for exploration roads and drill pads is not known at this time. Existing process and leach facilities consist of 1 leach pad totaling 7 acres, 1 pond totaling 1 acre, and miscellaneous process facilities totaling 6 acres. The Little Bald Mountain Mine is currently in the process of closure and reclamation.

Casino/Winrock Mine Area: Areas of existing disturbance at the Casino/Winrock Mine Area total 206 acres and include: mining, exploration, and process facilities. There are currently 2 inactive mining areas with 2 open pits totaling 20 acres, 1 backfilled and 1 partially backfilled pits totaling 13 acres, 2 waste rock dumps totaling 45 acres, and haul roads totaling 50 acres. Exploration roads and drill pads total 24 acres. Existing process and leach facilities consist of 1 leach pad totaling 19 acres, and 1 pond, 1 ore pad stockpile, and miscellaneous facilities all totaling 35 acres. To date, a total of 3 acres of haul road have been reclaimed. The Casino/Winrock Mine area is currently in the process of closure and reclamation. The only activity taking place is the rinsing of the leach pad with fresh water.

Alligator Ridge Mine: Areas of existing disturbance at the Alligator Ridge Mine total approximately 593 acres and include: mining, exploration, process facilities, and offices. The value for the total area of disturbance for the Alligator Ridge Mine was estimated assuming that the total permitted disturbance of 593 acres is reported as disturbed. There are currently 8 open pits (58 acres), 2 partially backfilled pits and 2 backfilled pits (31 acres), 6 waste rock dumps (128 acres), 4 leach pads (74 acres), and 1 leach pond and process facility (36 acres). The low grade leach pad was removed in late 1994. To date, 50 acres have been recontoured and reseeded at the Alligator Ridge Mine.

Yankee Mine Area: Areas of existing disturbance at the Yankee Mine total 274 acres and include: mining, exploration, and process facilities. There is currently 1 active mining area with 4 open pits and 3 backfilled pits totaling 72 acres, 4 waste rock dump areas totaling 38 acres, and haul roads totaling 32 acres. Exploration roads and drill pads total 66 acres. Existing process and leach facilities consist of 1 leach pad totaling 24 acres, 2 ponds, and miscellaneous facilities totaling 42 acres. To date, 15 acres of exploration roads and pads have been recontoured and reseeded.

White Pine Mine: Areas of existing disturbance at the White Pine Mine total approximately 290 acres and include: mining, exploration, and process facilities. There is currently 1 inactive mining area with 4 open pits (34 acres), 4 waste rock dumps (40 acres), haul roads (10 acres), and exploration roads and drill pads (80 acres). Process and leach facilities consist of 1 leach pad (19 acres), 1 pond, and miscellaneous facilities (107 acres). The mine is currently in a temporary state of closure as of December 1993. The only activity taking place is the rinsing of the leach pads.

Bellview Mining Area: Operations at the Bellview Mine Area have not extended past the exploration stage. Areas of disturbance were calculated based on June 1993 air photos (see Table B-3).

It is estimated that a total of 5 acres have been disturbed in the form of exploration drill roads and pads.

Additional Exploration: Disturbances resulting from exploration activities within the cumulative effects area and outside of the existing and proposed Plan of Operations boundaries were calculated for 18 locations based on June 1993 air photos. Also included in the calculation were two borrow pits located outside of the Plan of Operations boundaries. One borrow pit and road is located south of Ruby Lake, the other borrow pit and road is located south of Warm Springs Ranch. An estimated total of 94 acres were disturbed by exploration roads, drill pads, and borrow pits. The areas of disturbances are summarized in (see Table B-8).

4.3.1.4 Mine Closure and Reclamation

Closure of a mined area involves reclaiming and revegetating waste rock dumps to minimize water influx to the waste rock, installation of diversions to keep stormwater runoff away from pits and waste rock dumps, mitigation for any waste rock dumps that may leak acidic and/or metal laden fluids, rinsing and revegetation of leach pads, draining and reclamation of leach ponds, removal of facilities, and possibly backfilling of pits. Many pits would not be backfilled for economic reasons. Currently, the only backfilled pits are at the Alligator Ridge Mine, Yankee Mine, and Winrock Mine where certain pits are partially or completely backfilled. Mine closure and reclamation does not result in a loss of future mineral resources, except in the case of pit backfilling. This can render any remaining resources in the pit uneconomic to pursue in the future.

Facilities that are in closure and reclamation include:

- The Casino/Winrock mine area with 2 open pits totaling 20 acres, 1 partially backfilled pit totaling 10 acres, 1 backfilled pit totaling 3 acres, 2 reclaimed waste rock dumps totaling 45 acres, and 1 leach pad currently being rinsed totaling 19 acres.

- The Yankee mine area with 4 open pits totaling 30 acres, 3 pits in the process of being backfilled totaling 42 acres, and 4 waste rock dumps in the process of being reclaimed that total 38 acres. About 15 acres of exploration roads have been recontoured and reseeded.

- The Alligator Ridge Mine area with 8 open pits totaling 58 acres, 4 partially or completely backfilled pits totaling 31 acres, 6 waste rock dumps totaling 128 acres to be reclaimed, and 4 leach pads in the process of being rinsed totaling 74 acres, 1 low grade ore leach pad that has been removed totaled 7 acres, and 1 tailings facility totaling 36 acres,

- The Little Bald Mountain Mine with 1 open pit totaling 2 acres, 1 reclaimed waste rock dump totaling 4 acres, a haul road totaling 8 acres, a leach pad currently being rinsed that totals 7 acres, and process facilities totaling 7 acres,

- The White Pine mine area with 4 open pits totaling 34 acres, 4 waste rock dumps totaling 40 acres, and a leach pad currently being rinsed that totals 19 acres,

In the Bald Mountain Mine area, the following areas are in closure and reclamation:

- The Rat Mine Area with 1 open pit totaling 50 acres, 2 waste rock dumps to be reclaimed totaling 103 acres, 3 recontoured and reseeded waste rock dumps totaling 90 acres,

Table B-8

Areas of Disturbance Related to Additional Exploration

Exploration Area	Disturbance (acres)
Area north of Yankee	11
Area west of Vantage	9
Bandit	2.4
Bleg	1.2
Border	2.8
Borrow Pit south of Ruby Lake	1.4
Borrow Pit south of Warm Springs Ranch	3.4
Gator	14.1
Hoot Owl Hill	2.8
Last Chance	1.5
Little Bald Mountain south	1.7
Mooney Basin Summit	4.1
North West Little Bald Mountain	5.2
North Winrock	2.4
Pacer	3.6
Petri	3.1
Poker Flats	5.2
Shady Lady	2.1
South Saga	13.8
Repeat	3.1
Total	93.9

Source: 1993 Color Air Photos (1:2,000).

- The RBM mine area with 1 open pit totaling 21 acres, 2 recountoured waste rock dumps totaling 56 acres,
- The 2/3 Mine Area with 1 open pit totaling 35 acres, 1 waste rock dump to be reclaimed totaling 70 acres, 1 recountoured waste rock dump totaling 33 acres,
- The One Mine Area with 1 open pit totaling 21 acres, 2 waste rock dumps to be reclaimed totaling 43 acres.

4.3.2 Cumulative Impacts

4.3.2.1 Impacts of the Proposed Action

Approximately 182 million tons of material would be mined under the Proposed Action between 1996 and 2005. This would yield approximately 711,500 ounces of gold. The existing estimated recoverable resource for gold in the Buck and Bald Mountain area would decrease by about half from the present 1.4 million ounces. Expansion of the waste rock dumps in the Top Area and construction of new waste rock dumps in the Sage Flat and Horseshoe/Galaxy areas would not impact any known recoverable resources. Similarly, expansion of the leach facilities and construction of a new tailings facility at the current Bald Mountain Mine facility would not impact any known recoverable resources.

4.3.2.2 Impacts of the Interrelated Projects

The interrelated projects would be expected to remove the remaining estimated recoverable gold resource of about 700,000 ounces. Future mines would be developed to avoid covering potential resources with project facilities such as leach pads and waste rock dumps.

4.3.2.3 Combined Impacts

The primary geologic impact of open-pit mining is the loss of resources for future generations. However, removal of resources is an inevitable result of mining. It is anticipated that all known mineral resources in the cumulative effects area would be depleted by the year 2005. Loss of resources occurring from placing waste rock dumps or leach pads over potential mineral resources would be avoided by condemnation drilling during the operation of the mines.

4.4 WATER RESOURCES

4.4.1 Cumulative Effects Area and Characteristics

4.4.1.1 Surface Water Resources

The cumulative effects area includes the mountain ranges of Buck Mountain, Bald Mountain, Alligator Ridge, the Maverick Springs Range, and the southern Ruby Mountains. These mountain ranges form a north-south trending mountainous area between Newark Valley and southern Huntington Valley on the west, and Long Valley and Ruby Valley on the east. Precipitation ranges from 9 to 13 inches per year in the Alligator Ridge area, while evaporation is in the range of 48 to 52 inches per year (Behnke and Maxey 1969). Most precipitation falls during the winter months.

Except for the months of November through April, evaporation generally exceeds precipitation and rainfall is lost to evaporation rather than generating surface water flow. From October to April, evapotranspiration in northeastern Nevada is generally less than 4 inches per month (Behnke and Maxey 1969). Thus, snowmelt can be expected to infiltrate up to early April. After that, the evapotranspiration rate climbs rapidly to

10 to 12 inches per month (May through August), and evaporation plus evapotranspiration will slow and possibly prevent infiltration of precipitation.

Streams are ephemeral in the cumulative effects area, except for Huntington Creek, which flows northward down the approximate center of Huntington Valley to join the south fork of the Humboldt River. None of the mountain streams flow year round and most are fed by snowmelt and/or heavy rains during the spring months. Major storms during the summer months can generate temporary stream flow. Mountain springs are quite common in the cumulative effects area and are frequently found at the headwaters of streams. Flow of water from these springs feeds the streams, especially during the spring months when the perched aquifers that source the springs are full with infiltrated water generated by snowmelt. Many springs are dry by mid-summer. Those that do flow year-round are not able to provide sufficient water to streams to maintain stream flow during the summer, fall, and winter months.

Surface Water Quantity

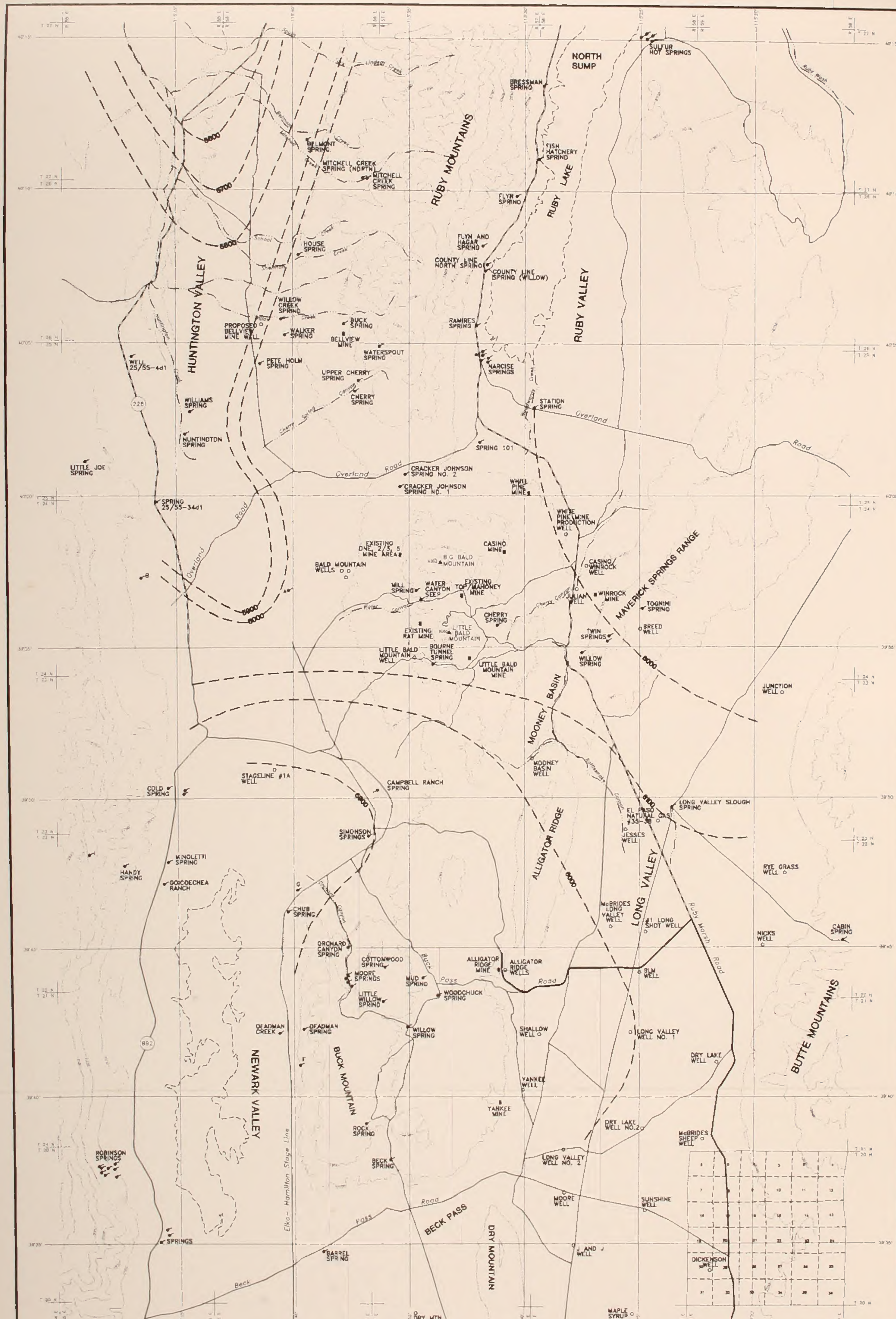
Surface water flow has been gauged in Newark Valley and Huntington Valley. Newark and Long Valleys are closed basins, so no major streams exit these valleys. Newark Valley has one stream gauge that has recorded an average flow of 0.3 cubic feet per second (cfs) (134 gallons per minute [gpm]) from 1962 to 1986 (Savaarad and Crompton 1993). Surface water in southern Ruby Valley flows toward Ruby Lake and generally evaporates or infiltrates into the alluvium before reaching the Lakes. South Huntington Valley contains a gauged perennial stream, Huntington Creek, that flows northward toward the Humboldt River with an approximate average flow rate of 5 to 6 cfs (2,500 gpm), as reported by Rush and Everett (1966).

Spring flow has been measured by Welch and Williams (1986a and 1986b), Mifflin (1968), and Simon Hydro-Search (1994a and 1994b). Spring flow rates are generally less than 1 gpm, but can range up to 2 to 4 gpm for major mountain springs such as Moore Springs and Beck Spring in Buck Mountain (see Map B-7). Springs fed by deep regional groundwater flow, such as Simonson Warm Spring, have flow rates as high as 1,800 gpm. Springs that feed Ruby Lake have flow rates ranging from 100 to 200 gpm, with the Fish Hatchery Spring showing a recorded flow rate of 800 gpm.

Thus, surface water quantity in the cumulative effects area is dependent on springs and on stream flow during the spring months due to snowmelt and heavy rains. Most areas have no surface water flow most of the year, except possibly for springs at the headwaters of creeks that yield up to 4 gpm. Only springs fed by deep regional groundwater have surface flow on a year-round basis.

Surface Water Quality

Surface water quality is dependent on the quality of water flowing from springs and to a limited extent on water quality in Huntington Creek. Huntington Creek obtains water from shallow groundwater inflow (baseflow) and valley springs. This creek eventually flows to the Humboldt River. Water quality in the springs depends on the nature of the flow regime that feeds the springs and the lithology of the rock(s) through which the groundwater flows before it surfaces as a spring. Springs can be classified as perched, local, or regional (Simon Hydro-Search 1994a), depending on how far infiltrating precipitation flows before it breaches as a spring. The four main lithologic groupings that affect spring water quality in the cumulative effects area are: 1) carbonate rocks such as limestones and dolomites, 2) shales and



LEGEND:

- ROADS
- PAVED MAIN ROAD
- MAIN ROAD NOT PAVED
- SPRING
- WELL
- 6000 APPROXIMATE GROUNDWATER ELEVATION CONTOUR (MEASURED ON .....)
- SURFACE ELEVATION CONTOUR
- INTERMITTENT STREAM
- INTERMITTENT LAKE
- MINE AREA

NORTH

0 18,500
FEET

BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-7
SPRING AND WELL LOCATIONS WITH WATER TABLE ELEVATIONS

volcanic rocks, 3) intrusive granitic rocks, and 4) valley-fill alluvium. Table B-9 summarizes the water quality data available for surface and groundwater in the cumulative effects area. Figures B-4 and B-5 illustrate the chemistry of water in the cumulative effects area.

Buck Mountain Area: Springs in this southern part of the cumulative effects area are mainly perched and flow through carbonate rocks (Simon Hydro-Search 1994a). Thus, the water quality is good and dominated by equilibration with the carbonate rocks. Spring water is generally within Nevada drinking water standards with total dissolved solids in the 200 to 500 milligram per liter (mg/l) range, pH values between 7.1 and 8.8, and sulfate values below 50 mg/l. The water is calcium to calcium/sodium bicarbonate dominated.

Alligator Ridge and Southern Mooney Basin: No springs are known from this area and surface water flow is ephemeral. Limited water quality data are available for this area (Simon Hydro-Search 1994b). These analyses suggest that water quality in this area will be the same as the rest of the southern Ruby Range.

Bald Mountain Area: Springs in this area include Cherry Spring, Bourne Tunnel Spring, Water Canyon Spring, Cracker Johnson #1 and #2 Springs, and Mill Spring (see Map B-7). Water quality is generally within Nevada drinking water standards and is calcium to calcium/sodium bicarbonate dominated. The pH values range between 7.3 and 7.9, with chloride values ranging between 2 and 50 mg/l and sulfate usually below 60 mg/l. These are perched springs.

Maverick Springs Range and Upper Mooney Basin: Springs in this area are Willow Spring, Twin Springs, Tognini Springs, and Cabin Springs.

Central Ruby Range: This area is noted for abundant mountain springs on both sides of the central ridge of Sherman Mountain. Springs on the east side feed Ruby Lake. Springs on the west side feed ephemeral streams that flow to central Huntington Valley and Huntington Creek. Water quality is generally within Nevada drinking water standards and calcium/magnesium bicarbonate dominated. The pH values range from 7.8 to 8.1. Sulfate values are low and generally below 50 mg/l, while chloride values range up 10.5 mg/l. The total dissolved solids values are between 180 and 320 mg/l.

Ruby Lake

Ruby Lake is situated at the southern end of Ruby Valley within the Ruby Lake National Wildlife Refuge. Alluvial groundwater comes to the surface along the axis of Ruby Valley to form the lake. The primary sources of water for the lakes are: 1) the springs that form along the eastern fault-bounded edge of the southern Ruby Mountains; 2) alluvial groundwater generated along the eastern side of southern Ruby Valley, where the valley alluvium encroaches upon the western pediment of the Maverick Springs Range; and 3) alluvial groundwater generated at the southern end of Ruby Valley, where the valley pinches out between Bald Mountain and the Maverick Springs Range.

Water quality in the springs that feed Ruby Lake is very good with total dissolved solids values generally below 300 mg/l, sulfate and chloride below 10 mg/l, and pH values in the 7.8 to 8 range. The water coming to the lake from the springs is calcium bicarbonate dominated with temperatures suggestive of very local origin, probably from direct precipitation recharge. Sulphur Hot Springs, at the northeast end of the lake, has sodium bicarbonate dominated water

Table B-9

Results of Well, Spring, and Surface Water Quality Analyses

Sample Location	Latitude	Longitude	Water Source	Flow (gpm)	TDS	Temp (F)	pH	Ca	Mg	Na	K	HCO3	CO3	SO4	Cl	F	SiO2	Fe	Mn
Proposed Action																			
Bald Mountain																			
Bald Mtn. Mine #1 '94	395730	1153730	well		219		8.42	26.40	16.10	12.2	6.1	108		11.2	29.3	.27		1.10	-.01
Bald Mtn. Mine #2 '94	395730	1153800	well		213		8.12	27.60	17.40	9.6	5.3	99		15.8	31.7	.20		.26	.01
Bourne Tunnel Spring	395405	1153356	spring		265		7.81		20.90					11.5	2.5	.10		-.05	-.01
Cherry Spring	395550	1153113	spring		81	34	7.60	5.60		1.4		130	0.0		5.3				
Cracker Johnson Spring #1	400016	1153500	spring		405		8.18		34.50					36.0	32.9	.13		.09	.18
Cracker Johnson Spring #2	400034	1153521	spring		400	35	7.90	55.00	11.00	60.0	1.8	250	0.0	55.0	46.0		43.0		
Mill Spring	395716	1153334	spring		297		8.20		11.00	272.0	15.0	90	8.0	43.0	2475.0	.90			
Water Canyon Seep	395635	1153428	spring		278	54	7.60	18.40		2.9		209	0.0	9.0	12.6				
Water Canyon Seep	395635	1153428	spring			64	7.90		4.70	15.5					3.9	.20			
Water Canyon Seep	395635	1153428	spring			66	7.30		1.30	13.6					2.7				
Maverick Springs Range																			
Tognini Spring	395617	1152449	spring		258		7.50		5.67					18.2	8.6	.19		-.05	-.01
Twin Spring	395536	1152657	spring		135		6.62		3.22					13.0	4.3	.11		-.05	.20
Willow Spring	395518	1152721	spring		256		7.30		5.20					25.7	14.1	.18		-.05	-.01
Willow Spring	395518	1152721	spring		326	34	7.00	24.30	12.70	2.2	200.0	0			21.3				
Interrelated Projects																			
Alligator Ridge																			
Alig.Rdge Mine Well '93	394407	1153100	well		328	109	7.40	65.70	21.00	6.5	19.5	237	0.0	33.4	11.1	.90		-.05	-.03
Alig.Rdge Mine Well 12/94	394407	1153100	well		292		7.49	48.21	15.22	8.3	8.2	172		41.6	12.0	.72		.50	-.01
Casino/Winrock Well '93	395741	1152740	well		226		7.50	50.80	7.70	10.4	3.5	125	0.0	24.0	19.0	.20		.20	-.03
Casino/Winrock Well 12/94	395741	1152740	well		289		8.11	38.08	5.59	5.5	.7	128		23.0	28.0	.28		-.01	5.59
Yankee Well '93	394014	1153002	well		214		7.65	39.60	5.80	10.0	4.0	102	0.0	12.0	20.6	.20		.10	.04
Yankee Well 2/94	394014	1153002	well		232		7.96	32.41	5.45	10.6	6.3	115		13.0	35.5	.30		4.00	.01
Buck Mountain Area																			
Barrel Spring	393408	1153838	spring	1.0		43	8.30												
Beck Spring	393858	1153549	spring		259		7.70		6.90					22.6	17.6	.19		-.05	-.01
Beck Spring	393858	1153549	spring	20.0	263	45	8.10	59.00	6.70	15.0	1.5	216	0.0	15.0	14.0	.10	9.3	.09	
Deadman Creek	394158	1154035	stream	300.0		43	8.40												
Deadman Spring	394222	1153925	spring		389		7.50		14.90					45.4	12.5	.21		-.05	-.01
Deadman Spring	394222	1153925	spring			61	7.20		3.00	13.0					3.4				
Dry Mtn Well	393245	1153424	well		308	48	8.30	33.00	33.00	29.0	7.1	222	0.0	36.0	28.0	.70	12.0	.09	.01
F	394104	1153943	spring			61	8.80		3.60	12.9					4.4	.10			
Lower Moore Spring	394410	453730	spring		290		8.30		8.20					25.0	7.8	.20		-.05	-.01
Moore Spring	394415	1153732	spring		290	36	8.40	12.10		4.5	5.7	20	0.0	31.0	13.6				
Mud Spring	394406	1153415	spring		488	59	7.10	17.50		18.1	3.4	273	0.0	43.0	20.6				
Orchard Canyon Spring	394459	1153726	spring		317	61	8.80	20.00		5.2		232	0.0		16.9				
Rock Spring	393913	1153640	spring		261	34	7.60	14.80		3.2	2.5	117	0.0	10.0	14.1				
Willow Spring	394230	1153456	spring			68	7.90		6.90	31.2					8.3	.10			
Long Valley																			
Long Valley Slough	394932	1152349	spring	300.0	309	39	8.20	47.00	22.00	15.0	4.0	227	0.0	48.0	14.0	.40	10.0		
Long Valley Slough	394932	1152349	spring	80.0	212	64	9.00	30.00	17.00	11.0	3.0	153	21.0	40.0	10.0	.30	12.0		
McBrides Sheep Well	393815	1152203	well		561	54	7.30	95.00	50.00	21.0	3.4	92	0.0	30.0	200.0	.20	12.0		
Newark Valley																			
Campbell Ranch Spring	395000	1153600	springs		268	76		52.00	21.00			268	0.0	20.0	4.5		32.0		
Chub Spring	394613	1154047	spring			36	7.80	18.20		6.9	9.4	206	0.0		18.1				

Note: TDS was calculated using specific conductance. [Specific Conductance (uS/cm) * 0.65 = TDS (mg/l)]
" - " Indicates result below given detection limit.
All results except pH are reported in milligrams per liter. pH is reported in standard units.
Blank = No Data Available

Table B-9 (Continued)

Sample Location	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se	Ag	Zn	WAD Cyanide	Nitrate (N)	Reference
Proposed Action															
Bald Mountain															
Bald Mtn. Mine #1 '94	.02	.31	-.01	-.01	.08		-.01		-.002	-.01	-.01	.08	-.005	5.81	
Bald Mtn. Mine #2 '94	.03	.21	-.01	-.01	-.01		-.01		-.000	-.00	-.01	.02	-.005	3.81	
Bourne Tunnel Spring	-.01	.02	-.01	-.01	-.01	-.05	-.01	-.005	-.000	-.01	-.01	-.01		1.03	Simon Hyd-Srch 1994b
Cherry Spring															Pupacko et al. 1989
Cracker Johnson Spring #1	.02	.33	-.01	-.01	-.01	.09	-.01	.180	-.000	-.01	-.01	-.01		2.69	Simon Hyd-Srch 1994b
Cracker Johnson Spring #2															Welch & Williams 1986
Mill Spring															Pupacko et al. 1989
Water Canyon Seep															Pupacko et al. 1989
Water Canyon Seep															Pupacko et al. 1989
Water Canyon Seep															Pupacko et al. 1989
Maverick Springs Range															
Tognini Spring	.01	.04	-.01	-.01	-.01	-.05	-.01	-.005	-.002	-.01	-.01	-.01		1.74	Simon Hyd-Srch 1994b
Twin Spring	.01	.05	-.05	-.01	-.01	-.05	.20	-.002	-.010	-.01	.01			.94	Simon Hyd-Srch 1994b
Willow Spring	.01	.17	-.01	-.01	-.01	-.05	-.01	-.005	-.002	-.01	-.01	-.01		.52	Simon Hyd-Srch 1994b
Willow Spring															Pupacko et al. 1989
Interrelated Projects															
Alligator Ridge															
Alig.Rdge Mine Well '93	.02	.14	-.01	-.02	-.02	-.05	.14	.030	-.001	-.01	-.02	-.05	-.020	.50	Simon Hyd-Srch 1994
Alig.Rdge Mine Well 12/94	-.03	.18	-.01	-.01	.06		-.02		-.000	-.00	-.03	.02	-.005	.20	Placer Dome Data
Casino/Winrock Well '93	-.03	.08	-.01	-.01	.02	.21	-.02	-.030	-.001	-.01	-.02	.03	-.010	5.50	Simon Hyd-Srch 1994
Casino/Winrock Well 12/94	-.03	.13	-.01	-.01	-.01		-.02		-.000	-.00	-.03	.02	-.005	1.70	Placer Dome Data
Yankee Well '93	-.03	.16	-.01	-.03	-.01	.11	-.03	.040	-.001	-.00	-.02	-.02	-.020	8.17	Simon Hyd-Srch 1994
Yankee Well 2/94	-.03	.19	-.01	-.01	-.01		-.02		.001	-.00	.00	.03	-.020	.70	Placer Dome Data
Buck Mountain Area															
Barrel Spring															Bunch & Harrill 1984
Beck Spring	-.01	.10	-.01	-.01	-.01	-.05	-.01	-.005	-.000	-.01	-.01	.02		1.10	Simon Hyd-Srch 1994b
Beck Spring															Bunch & Harrill 1984
Deadman Creek															Bunch & Harrill 1984
Deadman Spring	.01	.11	-.01	-.01	-.01	-.05	-.01	-.005	-.002	-.01	-.01	.01		1.28	Simon Hyd-Srch 1994b
Deadman Spring															Pupacko et al. 1989
Dry Mtn Well															Bunch & Harrill 1984
F															Pupacko et al. 1989
Lower Moore Spring	.01	.14	-.01	-.01	-.01	-.05	-.01	-.050	-.000	-.01	-.01	-.01		.42	Simon Hyd-Srch 1994b
Moore Spring															Pupacko et al. 1989
Mud Spring															Pupacko et al. 1989
Orchard Canyon Spring															Pupacko et al. 1989
Rock Spring															Pupacko et al. 1989
Willow Spring															Pupacko et al. 1989
Long Valley															
Long Valley Slough															Bunch & Harrill 1984
Long Valley Slough															Bunch & Harrill 1984
McBrides Sheep Well															Bunch & Harrill 1984
Newark Valley															
Campbell Ranch Spring															Pupacko et al. 1989
Chub Spring															Pupacko et al. 1989

Note: TDS was calculated using specific conductance. [Specific Conductance (uS/cm) * 0.65 = TDS (mg/l)]
" - " Indicates result below given detection limit.
All results except pH are reported in milligrams per liter. pH is reported in standard units.
Blank = No Data Available

Table B-9 (Continued)

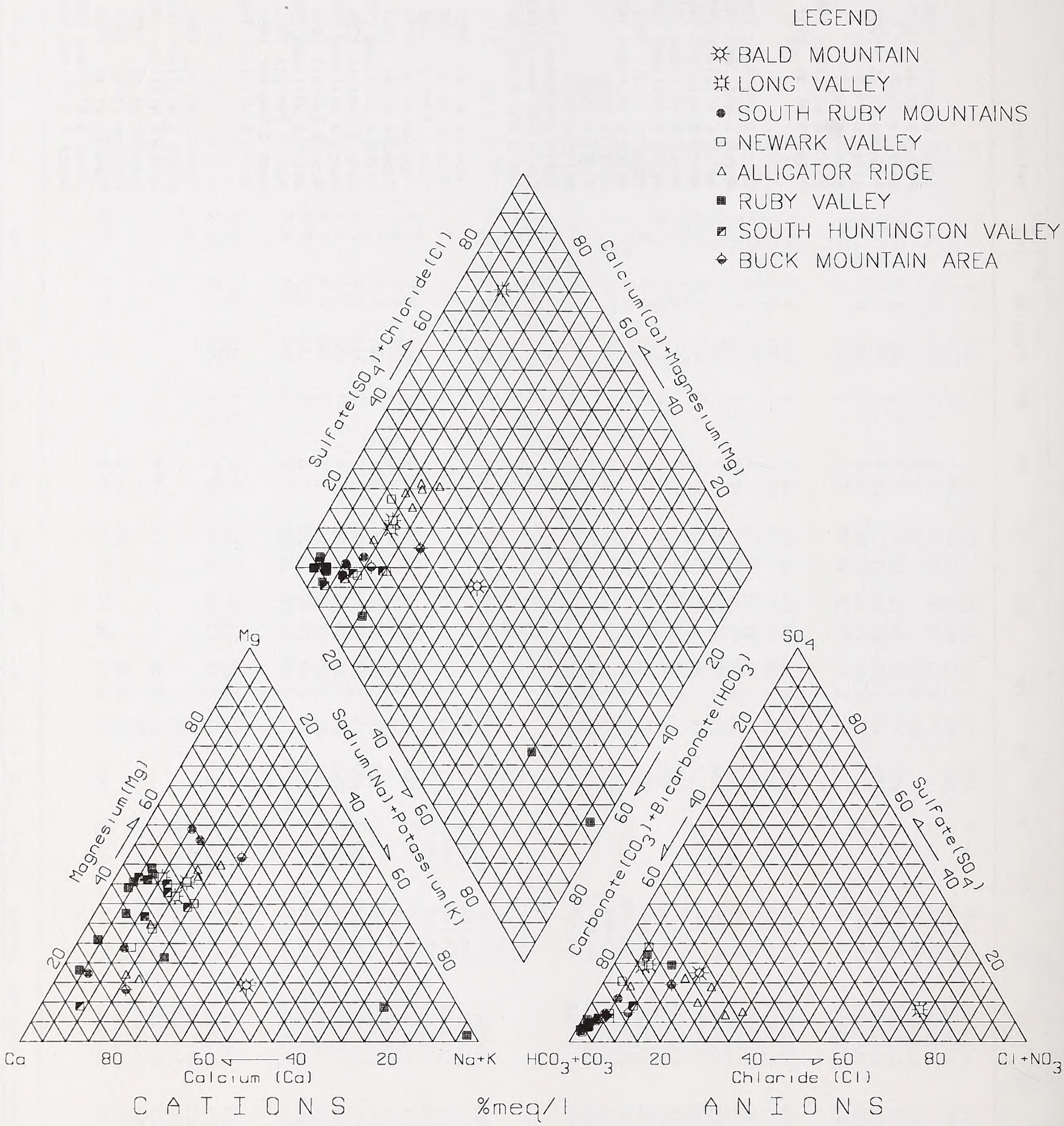
Sample Location	Latitude	Longitude	Water Source	Flow (gpm)	TDS	Temp (F)	pH	Ca	Mg	Na	K	HCO3	CO3	SO4	Cl	F	SiO2	Fe	Mn
Interrelated Projects																			
Newark Valley																			
Cold Spring	395024	1154500	spring	580.0	192	50	8.40	36.00	11.00	10.0	.9	170	0.0	11.0	6.0		10.0	.09	.01
G	394655	1153952	spring			70	8.80		7.20	26.8					7.3	.20			
Giocoechea Ranch Spring	394622	1154521	springs	400.0		62													
Handy Spring	394753	1154730	spring			77	8.90		1.40	11.4					3.2	.10			
Minoletti Springs	394834	1154500	springs	425.0		60													
Robinson Springs	393733	1154740	springs	175.0		60													
Simonson Springs	394847	1153630	spring	1800.0	260	73	8.60	42.00	20.00	18.0	6.7	220	6.5	35.0	6.7	.30	20.0		
Springs	393514	1154530	springs			55	7.50	57.00	13.00	12.0	1.1	155	0.0	42.0	7.0				
Ruby Valley																			
Bressman Spring	401323	1152909	spring		160	52	8.00	31.00	16.00	5.0	.8	200	0.0	5.0	1.2		8.5		
County Line North Spring	400750	1153130	spring		170	52	8.00	40.00	13.00	4.9	.5	190	0.0	6.8	2.3		9.6		
County Line Spring (Willo	400735	1153147	spring	250.0	170	52	7.80	38.00	17.00	3.2	.6	200	0.0	6.2	2.8		7.5		
Fish Hatchery Spring	401104	1152927	spring	800.0	170	52	7.90	36.00	15.00	2.6	.6	190	0.0	9.1	1.3		11.0		
Flyn Spring	400947	1153020	spring	100.0	180	45	7.90	49.00	11.00	3.0	.5	210	0.0	5.3	1.2		10.0		
Flyn and Hagar Spring	400811	1153152	spring	221.0	160	45	7.80	46.00	6.50	2.4	.5	180	0.0	4.1	1.2		6.5		
Narcise Spring	400431	1153150	spring			34	7.90	35.00	19.00	5.0	.8	206	0.0	8.6	2.6				
Narcise Spring	400431	1153150	spring	14.0	180	50	7.90	35.00	19.00	5.0	.8	210	0.0	8.6	2.6		11.0		
Pony Express Spring (Stat	400228	1152938	spring	200.0		52													
Ramires Springs #2	400502	1153208	spring	500.0		52													
Spring 101	400145	1153157	spring	225.0		52													
Sulphur Hot Spring	401500	1154834	hot sp.		400	162		18.00	5.80	79.0	27.0	242	0.0	59.0	12.0	8.00	72.0		
Test Well 32/60-29C1			202'		473			2.00	1.10	125.0	8.0	246	0.0	56.0	27.0		133.0		
Test Well 32/60-29C1			82'		142			24.00	5.40	4.0	10.0	124	0.0	5.6	2.5		29.0		
South Huntington Valley																			
A	395646	1154036	spring			59	8.30		3.10	14.9					4.6	.10			
B	395718	1154614	spring			68	8.80		2.00	12.5					3.8	.10			
Huntington Creek	400611	1154834	stream		230	58	7.70	46.00	11.00	19.0		192	0.0	27.0	12.0				
Huntington Spring	400212	1154439	springs			48	7.80		17.00			164	0.0	105.0	14.0				
Little Joe Spring	400106	1154845	spring		228	36	8.70	12.40		5.7	.1	167	0.0	8.0	22.6				
Pearl Creek Spring	401625	1154019	spring		260	52	8.10	76.00	5.00	7.5	2.8	270	0.0	5.5	2.6		25.0		
Peter Holm Spring	400418	1154123	spring		275		8.00	49.00	13.00	10.0		215	0.0	12.0	7.2				
Peter Holm Spring	400418	1154123	spring	10.0	270	48	7.80	47.00	21.00	22.0	1.0	250	0.0	22.0	17.0		21.0		
Spring 25/55-34d1	395953	1154554	spring	670.0	250	63	7.60	52.00	9.60	9.2		196	0.0	17.0	7.9				
Walker Spring	400515	1154019	spring	300.0	250	54	8.00	47.00	22.00	14.0	1.1	260	0.0	14.0	10.0		16.0		
Well 25/55-4d1	400432	1154651	Well		300		7.50	38.00	9.70	45.0		208	0.0	32.0	20.0				
Williams Spring	400245	1154416	spring		350	48	7.90	53.00	17.00	28.0		164	0.0	105.0	14.0				
Willow Creek Spring	400546	1154029	spring	3.0	380	57	7.70	69.00	35.00	18.0	3.3	400	0.0	20.0	8.9		26.0		
South Ruby Mountain																			
Belmont Spring	401137	1153923	spring			63	7.80	65.00	22.00	14.0	1.3	326	0.0	17.0	7.1				
Buck Spring	400538	1153750	spring	2.0	250	52	7.90	59.00	13.00	11.0	.5	250	0.0	15.0	7.7		15.0		
Cherry Spring	400325	1153718	spring	1.3	300	55	7.80	42.00	37.00	18.0	1.0	300	0.0	31.0	11.0		15.0		
House Spring	400751	1153948	spring		300	36	8.00	60.00	29.00	8.9	1.3	338	0.0	11.0	5.2		19.0		
Mitchell Creek Spring	401022	1153657	spring			66	8.10		15.20	5.0					10.5				
Mitchell Creek Spring (N.	401022	1153659	spring	31.0		54	8.10	59.00	28.00	5.7	1.1	319	0.0	9.1	3.0				
Upper Cherry Spring	400348	1153710	spring		320	68	7.80	49.00	45.00	16.0	.8	340	0.0	22.0	9.5		15.0		
Water Spout Spring	400446	1153619	spring	9.4	180	48	7.80	51.00	7.00	4.5	.5	200	0.0	6.4	2.8		7.8		

Note: TDS was calculated using specific conductance. [Specific Conductance (uS/cm) * 0.65 = TDS (mg/l)]
" - " Indicates result below given detection limit.
All results except pH are reported in milligrams per liter. pH is reported in standard units.
Blank = No Data Available

Table B-9 (Continued)

Sample Location	As	Ba	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Se	Ag	Zn	WAD Cyanide	Nitrate (N)	Reference
Interrelated Projects															
Newark Valley															
Cold Spring															Bunch & Harrill 1984
G															Pupacko et al. 1989
Giocoechea Ranch Spring															Mifflin 1968
Handy Spring															Pupacko et al. 1989
Minoletti Springs															Mifflin 1968
Robinson Springs															Mifflin 1968
Simonson Springs															Welch & Williams 1986
Springs															Pupacko et al. 1989
Ruby Valley															
Bressman Spring															Welch & Williams 1986
County Line North Spring															Welch & Williams 1986
County Line Spring (Willo															Welch & Williams 1986
Fish Hatchery Spring															Welch & Williams 1986
Flyn Spring															Welch & Williams 1986
Flyn and Hagar Spring															Welch & Williams 1986
Narcise Spring															Pupacko et al. 1989
Narcise Spring															Welch & Williams 1986
Pony Express Spring (Stat															Mifflin 1968
Ramires Springs #2															Mifflin 1968
Spring 101															Mifflin 1968
Sulphur Hot Spring															Eakin and Maxey 1951
Test Well 32/60-29C1															Eakin and Maxey 1951
Test Well 32/60-29C1															Eakin and Maxey 1951
South Huntington Valley															
A															Pupacko et al. 1989
B															Pupacko et al. 1989
Huntington Creek															Rush & Everett 1966
Huntington Spring															Pupacko et al. 1989
Little Joe Spring															Pupacko et al. 1989
Pearl Creek Spring															Welch & Williams 1986
Peter Holm Spring															Rush & Everett 1966
Peter Holm Spring															Welch & Williams 1986
Spring 25/55-34d1															Rush & Everett 1966
Walker Spring															Welch & Williams 1986
Well 25/55-4d1															Rush & Everett 1966
Williams Spring															Rush & Everett 1966
Willow Creek Spring															Welch & Williams 1986
South Ruby Mountain															
Belmont Spring															Pupacko et al. 1989
Buck Spring															Welch & Williams 1986
Cherry Spring															Welch & Williams 1986
House Spring															Pupacko et al. 1989
Mitchell Creek Spring															Pupacko et al. 1989
Mitchell Creek Spring (N.															Pupacko et al. 1989
Upper Cherry Spring															Welch & Williams 1986
Water Spout Spring															Welch & Williams 1986

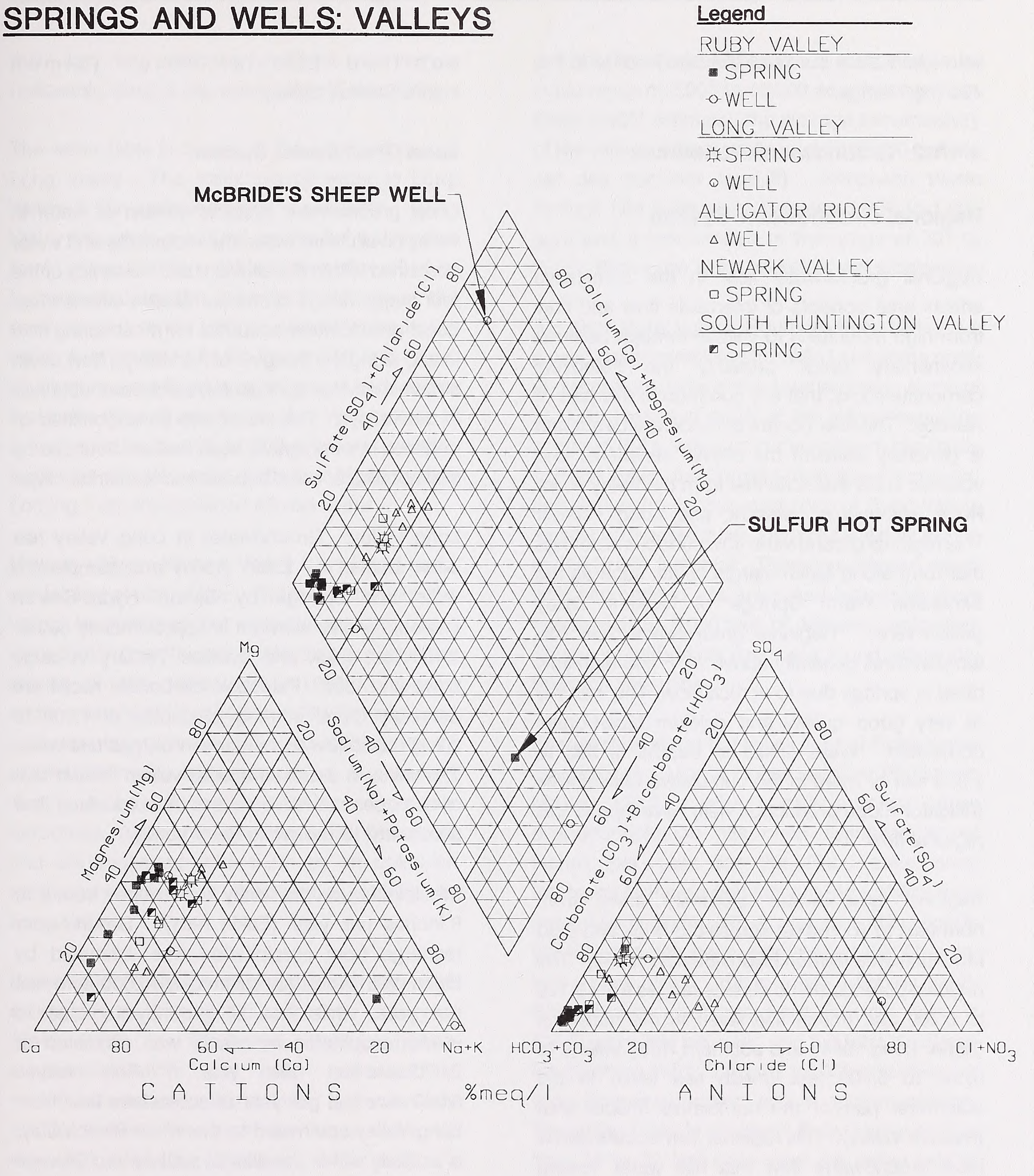
Note: TDS was calculated using specific conductance. [Specific Conductance (uS/cm) * 0.65 = TDS (mg/l)]
" - " Indicates result below given detection limit.
All results except pH are reported in milligrams per liter. pH is reported in standard units.
Blank = No Data Available



BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE B-4
PIPER DIAGRAM: WATER QUALITY IN BUCK-BALD MOUNTAIN CUMULATIVE IMPACT AREA

SPRINGS AND WELLS: VALLEYS



BALD MOUNTAIN MINE EXPANSION PROJECT

FIGURE B-5
WATER QUALITY IN THE SOUTHERN RUBY MOUNTAINS (VALLEYS)

with low sulfate but total dissolved solids in the 400 mg/l range.

4.4.1.2 Groundwater Resources

Regional Groundwater System

Regional groundwater flow in the cumulative effects area consists of interbasin flow and flow from high mountains to valleys through bedrock sedimentary units, primarily the Paleozoic carbonate rocks, that are common in this part of Nevada. The flow occurs at moderate depth and is generally beneath the alluvial sediments and volcanic flows and tuffs that form the valley fill for Ruby, Huntington, Newark, and Long Valleys. This regional groundwater flow surfaces in springs that form along basin-margin faults, such as the Simonson Warm Springs of Newark Valley (Mifflin 1968). Regional groundwater flow has temperatures generally above 70°F and high flow rates in springs due to vertical flow. The water is of very good quality and calcium bicarbonate dominated. Wells drilled to depths of 500 to 1,000 feet or more in the cumulative effects area (Alligator Ridge production well) have tapped this regional flow.

Regional groundwater generally flows from northeast to southwest across the Buck and Bald Mountain area (Simon Hydro-Search 1994a). The regional potentiometric surface ranges from 6,100 to 6,200 feet (mean sea level) in the northeast (upper Long Valley and southern Ruby Valley) to 5,800 to 5,900 feet (mean sea level) in the southwest part of the cumulative effects area (Newark Valley). This regional flow occurs below local groundwater flow that has water flowing from the mountainous areas to the valley centers. Regional and local groundwater regimes are in approximate equilibrium. Potentiometric surfaces for regional bedrock water are roughly the same as potentiometric surfaces for unconfined and confined alluvial water (Simon Hydro-Search 1994a).

Local Groundwater System

Local groundwater systems consist of water in valley-fill alluvium within the mountains and water contained within the alluvium and volcanics of the four major valleys of the cumulative effects area. Local groundwater accounts for most spring flow in and along the margins of the valleys, flow down streams, and for agricultural/stockwater obtained in the valleys. This water can be unconfined or confined in sand/gravel beds that are bounded by beds of alluvial bank deposit and lacustrine clays.

<u>Long Valley</u>: Groundwater in Long Valley has been studied by Eakin (1961) and sampled in wells and springs by Simon Hydro-Search (1994a). Valley alluvium is approximately 300 to 1,100 feet thick and overlies Tertiary volcanic flows and tuffs. Paleozoic carbonate rocks are generally found starting at depths of 1,000 to 2,700 feet below the surface in oil/gas test wells. The valley is a closed alluvial valley. Water that enters does not leave except by subsurface flow southward to the White River Valley.

Precipitation on the valley floor ranges from 5 to 8 inches per year (Eakin 1961). Groundwater recharge from precipitation was estimated by Eakin (1961) to be approximately 10,000 acre-feet per year, while loss of groundwater due to evapotranspiration by plants was estimated at 2,000 acre-feet per year. This leaves 8,000 acre-feet per year of subsurface flow from Long Valley southward to the White River Valley, principally within the alluvial sediments. Storage of water in the valley was estimated at 9,000 acre-feet per foot of saturated thickness, and the perennial yield of the alluvial sediments was estimated at approximately 2,000 acre-feet per year. Perennial yield is the amount of water that can be withdrawn without causing a noticeable drop in the water table (Eakin 1961).

The water table is deeper in the southern part of Long Valley. The main use of water in Long Valley is for agriculture and stockwater. Long Valley Slough is a natural gravity-fed spring that forms where the water table in the valley alluvium is transected by the topographic slope of the northern part of the valley. Alluvial water in the valley is unconfined in the upper 100 feet of the alluvium and confined in sand/gravel beds within lacustrine clays at greater depths. Water yields of a few gpm up to 100 to 200 gpm are possible from the alluvial water, with the higher yields coming from the confined alluvial water.

Newark Valley: Newark Valley is a closed basin containing a playa lake. Water flowing into the valley is balanced by evapotranspiration and evaporation from the playa lake that occupies the center of the valley (Eakin 1960). Alluvial sediments are at least 500 to 1,000 feet thick and underlain by volcanics. The exact thickness of alluvial sediments in Newark Valley is uncertain due to a lack of deep test holes. Paleozoic carbonate rocks underlie the alluvial sediments and are separated from them by an unknown thickness of volcanics. Precipitation is similar to Long Valley.

Precipitation recharge to groundwater has been estimated to be 18,000 acre-feet per year (Eakin 1960). Discharge through plant evapotranspiration has been estimated at 16,000 acre-feet per year, leaving approximately 2,000 acre-feet per year for water lost by evaporation from the playa lake. Water levels are 0 to 5 feet deep near the playa lake and increase to 35 to 100 feet below surface along the margins of the valley. Water storage in the valley has been estimated at 15,000 acre-feet per foot of saturated thickness (Eakin 1960). The perennial yield of the alluvial sediments is estimated to be in the range of 2,000 to 16,000 acre-feet per year. Eakin (1960) estimated the average transmissivity of the valley sediments at around 100,000 gallons per day per foot (gpd/ft). Simonson Warm Springs has a flow rate between 1,000 to 1,800 gpm and a temperature in the range of 70° to 75°F. Water use is for irrigation and stockwater.

Southern Ruby Valley: Southern Ruby Valley is a closed basin containing Franklin Lake at the north end and Ruby Lake at the southern end. North of Franklin Lake and north of the ridge separating southern Ruby Valley from the northern two-thirds of Ruby Valley, the Franklin River flows northward and drains the central axial zone of Ruby Valley. Alluvial sediments in southern Ruby Valley are up to 200 to 600 feet thick. These gravels and sands with interbedded volcanics and lacustrine clays overlie nearly 6,000 feet of Miocene volcanics. Paleozoic carbonate rocks are found below the Miocene volcanics.

Precipitation along the valley floor of Ruby Valley ranges from 10 to 12 inches per year (Eakin and Maxey 1951), while evaporation plus evapotranspiration has been estimated at 48 inches per year for the Ruby Lake area. Recharge to the groundwater in Ruby Valley from precipitation, spring inflow, and subsurface flow in the alluvium has been estimated at 68,000 acre-feet per year (Eakin and Maxey 1951). Groundwater discharge from Franklin Lake is 37,000 acre-feet per year, and the total discharge for southern Ruby Valley is 68,000 acre-feet per year from evaporation and evapotranspiration. The water table in southern Ruby Valley ranges from 10 to 20 feet deep near the valley axis to 100 to 150 feet deep near the eastern slope of the southern Ruby Mountains.

Ruby Lake represents an area where the unconfined alluvial water table in the southern

Ruby Valley breaches the surface. The lake is fed principally by spring flow along the eastern front of the southern Ruby Mountains, but also by subsurface flow in the alluvium that is generated along the northwestern front of the Maverick Springs Range. According to Eakin and Maxey (1951), withdrawal of less than 50 percent of the annual recharge to the valley at distances at least 10 miles from Ruby Lake or Franklin Lake should not impact water levels in the lakes. Thus, withdrawal of less than 15,000 acre-feet per year at distances of at least 10 miles from Ruby Lake should not impact the water level in the lakes.

Currently, the main use for water in the southern Ruby Valley is for irrigation and stockwater. Water use for mining at the White Pine Mine and the Casino/Winrock Mine does not exceed 400 to 500 gpm (800 acre-feet per year) per mine. These two mines are situated 6 to 10 miles from the southern end of Ruby Lake.

Southern Huntington Valley: Huntington Valley forms an elongate north-south trending valley approximately 8 to 10 miles wide at its southern end that drains northward into the South Fork of the Humboldt River, and thus ultimately to the Humboldt River. Southern Huntington Valley (the Huntington Creek subarea of Rush and Everett 1966) encompasses the area from north of the low ridge that separates Newark and Huntington Valleys to the northern boundary of Township 27 North.

Valley alluvium in southern Huntington Valley is in excess of 1,600 feet thick (Simon Hydro-Search 1994a and 1994b). Younger alluvial sands and gravels overlie the lacustrine clays of the Humboldt Formation lake beds. Water-bearing sand units are frequently 10 to 35 feet thick, but can be up to 270 feet thick (Rush and Everett 1966). Alluvium is generally saturated with water, so recharge equals the estimated discharge due to stream outflow, evaporation, and evapotranspiration. Precipitation along the valley floor is approximately 10 inches per year.

Total discharge from Huntington Valley consists of 21,000 acre-feet per year of loss due to evapotranspiration and 9,000 acre-feet per year by surface flow and subsurface outflow northward. Total recharge thus equals the total discharge of 30,000 acre-feet per year because the alluvium is essentially saturated (Rush and Everett 1966). Southern Huntington Valley accounts for 14,000 acre-feet of groundwater loss per year. The average transmissivity of the alluvial gravels was estimated at 50,00 gpd/ft by Rush and Everett (1966). However, Simon Hydro-Search (1994a) measured a transmissivity of 6,000 gpd/ft for the deeper alluvial sands with abundant clay. Storage of water in the valley was estimated at 32,000 acre-feet per foot of saturated thickness by Rush and Everett (1966). The perennial yield for southern Huntington Valley would be approximately equal to the estimated annual recharge value of 14,000 acre-feet per year.

Water use in Huntington Valley is for crop irrigation and stockwater. Groundwater withdrawal for irrigation amounted to 38,000 acre-feet per year in 1966 (Rush and Everett 1966). Approximately 20,000 acre-feet per year came from southern Huntington Valley and was used to irrigate meadow grasses. Evapotranspiration losses due to greasewood, rabbitbrush, and sage account for 4,000 acre-feet per year. Withdrawal of groundwater for mining is currently approximately 500 to 600 gpm. Bald Mountain Mine Properties plans to withdraw up to 1,200 gpm (1,935 acre-feet per year) for its expanded processing facilities. The Western States Bellview Mine, to be located in the western foothills of the southern Ruby Mountains, may withdraw up to 300 to 400 gpm (480 to 645 acre-feet per year). Groundwater withdrawal for mining is expected to be considerably less than that for agriculture and have no impact on Huntington Valley or the Humboldt River drainage, of which Huntington Valley is a part.

Perched Groundwater and Springs

Perched groundwater is found in the mountainous areas above 6,000 to 6,200 feet (mean sea level), primarily at Buck Mountain, Bald Mountain, and in the southern Ruby Mountains. Perched groundwater is evident in springs and seeps that flow primarily in the late spring due to snowmelt infiltration. These springs are sources of water for wildlife, wild horses, and livestock, but provide little water for domestic or agricultural use.

Perched groundwater and springs are quite evident in the Buck Mountain area. Eight major springs are mapped in this area, with Beck and Rock springs occurring at the southern end of Buck Mountain and a grouping of springs occurring just south of Buck Pass in Township 21-22 North, Range 57 East. These springs include Moore Springs, Cottonwood Spring, Mud Spring, Willow Spring, and Woodchuck Spring. Maximum flow rates for most springs range from 2 to 4 gpm, but are usually less than 1 gpm most of the year.

Springs in the Buck Mountain area are due to perched water within Paleozoic carbonate rocks. This perched water is controlled by bedding planes within the carbonate rocks, vertical faults, and lithologic discontinuities. Concentration of the springs into two main areas (see Map B-7) suggests structural control on the perched water and thus the springs.

Springs are not found in the Alligator Ridge - southern Mooney Basin area, but are common again in the Bald Mountain area (Little Bald Mountain and Big Bald Mountain) and in the Maverick Springs Range. Four major springs, Bourne Tunnel Spring, Mill Spring, North Water Canyon Spring, and Cherry Spring, are mapped in the Bald Mountain area. The Maverick Springs Range contains springs scattered along its northeast-trending axis.

The Bald Mountain area is noted for intrusive rocks, contact metamorphic skarns, veins, and both volcanic rocks and Paleozoic carbonate rocks. Perched groundwater and thus springs are both structurally and lithologically controlled in this area. Springs follow faults and fault intersections. Springs in the Maverick Springs Range are similarly controlled by faults and lithologic contacts.

Springs are very common in the southern Ruby Mountains on both the east and west flanks of the range. Springs on the western slope of the range occur at the head of practically every major valley between the elevations of 6,500 feet and 7,500 feet (mean sea level). On the eastern side of the range, they occur along the range-front fault at the base of the range and provide water for Ruby Lake. Springs in the southern Ruby Mountains are the result of infiltrated precipitation that moves along faults and lithologic contacts. Flow rates for springs along the eastern front of the southern Ruby Mountains are quite high and are often in the 100 to 200 gpm range. Springs on the western slope have lower flow rates in the range of 1 to 4 gpm up to 30 to 50 gpm.

The quality of groundwater in springs was discussed under surface water quality and is presented in Table B-9. Spring water is usually well within Nevada drinking water standards, and thus suitable for wildlife use and human use (if properly treated for bacteria).

Groundwater Quality

Groundwater quality in the cumulative effects area is based on water quality analyses from springs and from production water wells at the Bald Mountain Mine, Casino/Winrock Mine, Alligator Ridge Mine, and Yankee Mine. Table B-9 presents currently available surface water and groundwater quality data. The few analyses available suggest that groundwater quality from wells is similar to spring water quality. Groundwater is thus within Nevada drinking water standards and either calcium or calcium/magnesium bicarbonate dominated, or sodium bicarbonate dominated.

Groundwater from the production wells at the Alligator Ridge Mine, Yankee Mine, and Casino/Winrock Mine is calcium bicarbonate dominated and within Nevada water standards (Simon Hydro-Search 1994a). Three production wells at the Alligator Ridge Mine tap deep regional flow, as evidenced by its high temperature of 109°F. The Yankee Mine production well taps local groundwater from fractured volcanics, and the Casino/Winrock well taps local groundwater in fractured sediments beneath volcanics at a depth of 720 feet below ground level (Simon Hydro-Search 1994a). Thus, groundwater quality in the Alligator Ridge area does not vary in quality. Deep regional groundwater has a chemistry similar to local groundwater derived by infiltration recharge.

Summary

There are three main types of groundwater in the Buck and Bald Mountain cumulative effects area: 1) regional groundwater that is part of interbasin flow in northeastern Nevada, 2) local groundwater that consists of subsurface flow from mountainous areas to nearby valleys and basins, and 3) perched groundwater controlled by lithologic units and faults that provides water for springs. Local groundwater and perched groundwater provide water for the springs in the southern Ruby Mountains. Perched groundwater provides water for the springs in Buck Mountain and Bald Mountain. Regional groundwater provides water for basin-margin springs like the Simonson Warm Springs. Regional groundwater and local groundwater have been tapped by production wells at the Alligator Ridge, Bald Mountain, Yankee, Casino/Winrock, and White Pine Mines. The four major basins of the cumulative effects area are supplied with water by precipitation, local groundwater flow, and to some extent regional groundwater flow. Huntington, Ruby, and Long Valleys also loose water by regional interbasin flow. Newark Valley appears to be a closed basin that may be not lose any water to interbasin regional flow.

Water quality is within Nevada drinking water standards for perched water in springs, local groundwater tapped by wells, and for regional groundwater tapped by wells and springs. Groundwater is generally calcium or calcium/magnesium bicarbonate dominated. Sulfate and chloride are low. Locally, groundwater can be sodium bicarbonate dominated. The total dissolved solids is generally below 500 mg/l. The pH values range from 7.0 to 9.0, with most values between 7.3 and 8.5. Iron, manganese, and metal values are low. The water is suitable for wildlife, wild horse, livestock, and human consumption (with proper treatment for bacteria).

Available data suggest that the various groundwater aquifers are in hydrodynamic equilibrium. The potentiometric surface for unconfined alluvial groundwater is comparable to that for confined alluvial groundwater. Regional groundwater tapped by wells and springs has a potentiometric surface comparable to the local groundwater potentiometric surface found in valleys, basins, and fractured volcanics in the Buck and Bald Mountain area. Perched water may not be in hydrodynamic equilibrium with local and regional groundwater.

4.4.2 Cumulative Impacts

There are four general potential sources of impacts to water resources potentially caused by open-pit mining in arid to semi-arid regions, such as the Great Basin of Nevada. These potential sources are: 1) withdrawal of groundwater during mining operations, 2) open pits left after mining, 3) waste rock dumps left after mine closure, and 4) leach ponds and tailings facilities that exist during mining and are reclaimed at the cessation of mining.

Withdrawal of groundwater can impact springs and nearby private wells. Open pits that penetrate the permanent water table may contain permanent pit lakes, while open pits that are above the water table may contain pit ponds in the late spring that would evaporate or infiltrate by early to mid-summer. Waste rock dumps may generate seeps that are acidic and laden with metals, while leach ponds and tailings facilities may leak effluent to surface and/or groundwater.

Data for hydrogeology and water chemistry in the cumulative effects area was often obtained from regional reports by State and Federal agencies, whose report objectives did not include the evaluation of potential environmental impacts. The lack of site-specific data for the cumulative effects area frequently required extrapolation of data from surrounding regions into the study area. Assumptions involved in this extrapolation and interpretation of regional data include:

- That hydrologic patterns present in valleys apply between the valleys.
- That hydrologic patterns evident in parts of the central and southern Ruby Mountains apply to the cumulative effects area.
- That regional groundwater flow patterns delineated in basins adjacent to the cumulative effects area apply to the study area.
- That alluvium within the southern Ruby Mountains is generally dry most of the year, based on a few areas within that part of the Ruby Mountains that have had alluvial water evaluated.
- That springs are fed by local perched aquifers throughout the southcentral and southern Ruby Mountains, based on a few local studies reported by Simon Hydro-Search.
- That baseline water quantity and quality studies by private firms and State and Federal agencies have been conducted in a manner that allows direct comparison of data, even though the studies were conducted at different times and for different purposes.
- That the use of temperature as a guide to separating groundwater flow regimes in Nevada is applicable to the cumulative effects area.
- That the limited hydrogeologic data on aquifers in the cumulative effects area can be applied uniformly throughout the study area for calculating the potential impacts to groundwater.

4.4.2.1 Surface Water

There are no current impacts to surface water in the cumulative effects area. Most drainages are ephemeral. Only Huntington Creek flows year round. Mine pits and/or waste rock dumps that have been placed in drainages have storm water drains to divert water away from pits and waste rock. This practice would continue for planned future mining. Thus, neither the quantity nor the quality of surface water has been impacted by mining. No existing waste rock dumps are known to have seeps.

No springs have been affected by current mining practices. The proposed East Sage waste rock dump would partially cover the upper part of the potential recharge area to Cherry Spring. This may affect the flow and quality of water in Cherry Spring. Because the extent of the recharge area for Cherry Spring is not known, the extent of this impact is not possible to estimate. However, it is likely that Cherry Spring is fed by perched water and thus would show a drop in flow rate when the waste rock dump is completed because 235 acres of its recharge area would have been covered by the waste rock dump. Infiltration and seepage modeling through the East Sage waste rock dump using the Hydrologic Evaluation of Landfill Performance (HELP) modeling has shown that seepage should be negligible. Thus, although the East Sage waste rock pile could have seeps at its base that may exceed Nevada drinking water standards (but not Nevada stock water standards) for arsenic, mercury, and selenium, the occurrence of such seeps is considered unlikely.

The proposed Bellview Mine along the western slope of the southern Ruby Mountains may impact springs near the proposed pit area. The production well would be downgradient from most springs and tap deep water at depths of 200 to 600 feet. Thus, this well should not impact springs in the area. The formation of a pit and the presence of waste rock dumps, a leach pad, and mine roads may decrease the flow of springs near the mine area temporarily. However, after mine closure it is expected that spring flow would return to present levels. Springs in this area, such as Buck Spring, supply free water at a few gallons per minute. Western States Mining plans to provide supplemental water during mining.

Ruby Lake is not currently impacted by mining at the White Pine Mine. Withdrawal of water for this mining operation and withdrawal of water for the Casino/Winrock Mine when active did not impact Ruby Lake. Future planned mining in the area of southern Ruby Valley is minimal and not expected to affect water quantity or quality for Ruby Lake.

4.4.2.2 Groundwater

There are six production wells or well fields currently installed or drilled for processing water within the cumulative effects area: 1) Yankee Mine and processing facility, 2) Alligator Ridge Mine and processing facility, 3) Casino/Winrock processing facility, 4) White Pine Mine and processing facility, 5) Bald Mountain Mine processing facility, and 6) the production well drilled but not in use for the planned Bellview Mine. These wells are designed to produce up to 400 to 700 gpm to supply leach pads and mill/recovery facilities.

The Yankee Mine well obtains water at a rate of 300 gpm from fractured volcanics at a depth of 560 to 700 feet (Simon Hydro-Search 1994a). This is confined water that is part of the local flow regime. Thus, the water is cold and recharged by precipitation on the volcanics in the Buck Mountain area. The estimated drawdown on the potentiometric surface for this confined volcanic aquifer at the Yankee Mine is 8 to 10 feet at a radius of 2 miles from the well after 10 years of pumping at 300 gpm (Shepherd Miller 1994). This would not impact springs, which are fed by perched aquifers that lie above this deep volcanic aquifer, and would not impact shallow stock wells, which are screened in near-surface alluvial water.

The Alligator Ridge Mine has three production wells that obtain water from fractured Guilmette Limestone at depths of 480 to 560 feet. This is confined, warm water with a maximum temperature of 109°F that is undoubtedly part of regional flow between basins (Simon Hydro-Search 1994a). This water is probably recharged in mountains to the east of Long Valley. Pumping of these wells at a total of 500 gpm for 10 years would result in a drawdown of 3 to 5 feet in the potentiometric surface of this confined, deep aquifer at a distance of 1 mile from the wells (Shepherd Miller 1994). This would not impact springs, for there are none in this part of the cumulative effects area, and would not impact shallow stock wells in Long Valley, because these are screened in alluvial valley water and also are more than 1 mile away.

The Casino/Winrock processing facility obtains water from fractured Diamond Peak Formation (830 to 995 feet) and from fractured Tertiary sediments beneath volcanics at a depth of 700 to 725 feet. This is confined, local flow water recharged probably in the Maverick Springs Range. Pumping of this well at 500 gpm for 10 years would result in a drawdown of the potentiometric surface of these two confined aquifers of 5 to 10 feet at a distance of 5 miles from the well (Shepherd Miller 1994). This would not impact springs in the area, because they are fed from perched water in the Maverick Springs Range. This would not impact shallow stock wells screened in valley alluvium, and this would not impact the Ruby Lake because water in the lake comes from shallow alluvial water in Ruby Valley and from springs along the eastern edge of the southern Ruby Mountains.

The White Pine Mine, a few miles to the north of the Casino/Winrock Mine, obtains water from the fractured Chainman Shale at depths of 468 to 800 feet (Simon Hydro-Search 1994a). This also is confined water recharged locally. Pumping of this well at 500 gpm for 10 years would result in a drawdown of this potentiometric surface of 5 to 10 feet at a distance of 5 miles from the mine (Shepherd Miller 1994). This would not impact springs in the area because the water is derived from a deep aquifer. This would not impact shallow stock wells or Ruby Lake for the same reasons listed above for the nearby Casino/Winrock well.

The Bald Mountain Mine obtains water from two wells in southern Huntington Valley. This water is unconfined alluvial water obtained from gravels at depths of 1,000 to 1,600 feet. The proposed Bellview Mine, 10 miles to the north along the western slope of the southern Ruby Mountains, also would obtain water from an unconfined alluvial aquifer just south of Willow Creek on National Forest Service land in Section 32, Township 26 North, Range 56 East. This water would come from depths of 200 to 600 feet. Pumping of the Bald Mountain Mine wells at a total of 1,200 gpm for 10 years would result in a drawdown of the unconfined water table in Southern Huntington Valley of 6 to 10 feet at a distance of 2 miles from the well field (Shepherd Miller 1994). This would not impact springs in the area because they are fed by perched water that lies well above the alluvial water. This may impact shallow stock wells within a 1- to 2-mile radius of this well field after 8 to 10 years of pumping. Stock wells at a radial distance of 2 to 3 miles or more from the well field should not be impacted. Groundwater withdrawal would not affect Huntington Creek since the main drainage of the creek is over 2 miles from the well field. Also, groundwater withdrawal at the Bald Mountain Mine well field is not expected to impact the waters of the Humboldt River system because the perennial use would be less than the estimated annual recharge of groundwater to Huntington Valley. Groundwater is expected to recover to 70 percent of its original level within 20 years after cessation of pumping.

4.4.2.3 Potential Impacts of Open Pits

All of the open pits currently being mined and those reasonably foreseeable in the cumulative effects area are above the permanent water table. Storm water diversion drains have been or would be installed around all pits. Temporary accumulations of water in depressions within the pits may occur in the spring and last for a few days to a few weeks. Possible recharge to groundwater by snowmelt and rainfall falling on the pits would total approximately 25 acre-feet per year (see Table B-10). Geochemical tests presented in Table B-11 indicate that water infiltrating through pit bottoms may exceed Nevada drinking water standards for arsenic, mercury, selenium sulfate, total dissolved solids, nitrate, and iron. Different pits would have different potential exceedences. Natural mitigation of infiltrating water through reaction with bedrock, adsorption to oxides, diffusion, dispersion, and dilution are expected to reduce the potential exceedences to background groundwater concentrations. Thus, no impacts are expected to groundwater from water that may infiltrate through pits.

4.4.2.4 Potential Impact of Waste Rock Dumps

There are 28 waste rock dumps in the cumulative effects area, for a total of 534 acres (see Table B-7). Geochemical tests presented in Table B-11 indicate that snowmelt and rainfall infiltrating through these waste rock dumps may exceed Nevada drinking water standards for total dissolved solids, sulfate, nitrate, arsenic, mercury, selenium, and iron. The Bald Mountain Mine area has potential exceedences mainly for arsenic and iron, but also for total dissolved solids, sulfate, and iron. The Casino/Winrock area has potential exceedences for total dissolved solids and arsenic. The Yankee Mine area has potential exceedences for total dissolved solids, arsenic, and iron. The Vantage waste rock dumps in the Alligator Ridge Mine area have potential exceedences for total dissolved solids, sulfate, and nitrate. Except for the Vantage area, most of these exceedences are minor and within twice the drinking water standard. Thus, the exceedences probably would not occur. The exceedences in the Vantage waste rock dumps are substantial and probably would occur if water were to seep from the base of the waste rock piles.

Infiltration and seepage modeling using the Hydrologic Evaluation of Landfill Performance model suggests that seepage is unlikely. Thus, although geochemical tests suggest possible exceedences of Nevada drinking water standards for some constituents in some of the waste rock piles in the cumulative effects area, it is considered unlikely that seepage would occur from the waste rock dumps and thus impacts to surface and groundwater are not expected.

4.4.2.5 Potential Impact of Leach Ponds

Leach ponds are designed to hold dilute cyanide solutions that emanate from the leaching of gold ore on the leach pads. The solution is held temporarily in the leach pond before it is passed through a gold-recovery process. As discussed for the tailings impoundments below, these leach ponds are lined with a synthetic liner, but can leak if the liners are not properly installed. Leach ponds have leak detection systems, as required by the State of Nevada, and these detection

Table B-10

Estimated Recharge to Groundwater from Open Pits

Pit Name	Existing Area (Acres)	Existing Recharge (Acre-ft/yr)	Proposed/Permitted Area (Acres)	Proposed Recharge (Acre-ft/yr)	Recharge Increase (Acre-ft/yr)	Percentage Increase in Recharge
Proposed Action Mining Areas						
Horseshoe/East Bida	0	0.00	13	0.57	0.57	
Galaxy	0	0.00	3	0.13	0.13	
Saga Pits	0	0.00	23	1.01	1.01	
Top Expansion	41	1.79	99	4.33	2.54	141%
Mahoney	0	0.00	18	0.79	0.79	
Sage Flat	0	0.00	91	3.98	3.98	
Subtotal	**41**	**1.79**	**247**	**10.81**	**9.02**	**503%**
Permitted Mining Areas						
2/3	43	1.88	43	1.88	0.00	0.00%
One	25	1.09	25	1.09	0.00	0.00%
Five	4	0.18	4	0.18	0.00	0.00%
RBM	21	0.92	21	0.92	0.00	
Rat	50	2.19	50	2.19	0.00	0.00%
Little Bald Mtn.	2	0.09	2	0.09	0.00	
Casino/Winrock Pits	20	0.87	20	0.87	0.00	
Alligator Ridge Pits	58	2.54	58	2.54	0.00	
Yankee Pits	75	3.28	75	3.28	0.00	0.00%
Subtotal	**298**	**13.04**	**298**	**13.04**	**0.00**	**0%**
TOTAL	**339**	**14.83**	**545**	**23.84**	**9.02**	**61%**
RECHARGE (GPM)		**9.27**		**14.90**		

Note:

1 Precipitation = 10"/yr

2 Recharge = 7.5% of precipitation

3 Equation: (annual precipitation in inches/12)*(% precipitation falling when recharge possible)*
(area of pit)*(recharge rate for Nevada)

4 Example: (10" per year/12" per foot)*(70%)*(area of pit)*(.075)

5 1 gpm = 1.6 ac-ft/yr

6 Approximately 70% of precipitation falls November through April and is available for infiltration.

Table B-11

Results of Static and Meteoric Water Mobility Procedure Testing for Selected Samples

Sample		Lithology	Static Acid-Base Accounting (ABA)					
			Sulfur Species		Acid-Base Accounting			
			Total S (%)	Pyritic S (%)	ANP(1) (tons CaCO3/kt)	AGP(2) (tons CaCO3/kt)	NNP=ANP-AGP(3,4) (tons CaCO3/kt)	ANP/AGP(4) (tons CaCO3/kt)
Nevada Drinking Water Standards								>=1.2
Stock Water Standards								
Proposed Action Area								
Top Area	Top Waste Dump			0	25.3	0.5	24.8	49.6
	Top TDC-2 (10-20)	Altered Quartz Monzonite	0.02		12.9	0.6	12.3	20.5
	Top TDC-2 (90-100)	Altered Quartz Monzonite	0.02		18.3	0.6	17.7	29.0
	Top TDC-2 (110-120)	Altered Quartz Monzonite	0.04		9.8	0.9	8.8	10.4
	Top TDC-2 (120-130)	Altered Quartz Monzonite	0.03		9.8	1.3	8.5	7.8
	Top MDC-1 (190-199)	Limestone	0.02		817	0.6	816.4	1296.8
	Top MDC-2 (180-190)	Limestone	0.02		792	0.9	791.1	842.6
	Top TDC-2 (320-330)	Limestone	0.02		860	0.6	859.4	1365.1
	Top TDC-2 (310-320)	Limestone	< 0.02		970	0.6	969.4	1539.7
	Top TDC-4 (140-150)	Altered Limestone	< 0.02		10.4	0.0	10.4	
	Top TDC-4 (270-280)	Altered Limestone	0.02		788	0.6	787.4	1250.8
Sage Flat	RSF-113 (420)	OFP-Sage	0.05		5.4	1.6	3.9	3.5
	RSF-113 (440-450)	OFP-Sage	0.06		2.2	3.1	-0.9	0.7
	RSF-115 (440-450)	OFP-Sage		0.10	18.3	3.1	15.2	5.8
	RSF-107 (410-480)	LS-Sage		0.06	946	1.9	944.1	503.2
	RSF-101 (520-530)	LS-Sage		0.07	27	2.2	24.8	12.3
	RSF-119 (50-80)	Quartzite-Sage						
	RSF-102 (780-810)	Hornfels						
Horseshoe	Waste Rock	Composite	0.01	0.01	402	0.3	401.7	1340.0
Galaxy	Waste Rock	Composite	0.12	0.01	48.4	3.8	44.6	12.7
Saga	Waste Rock	Argillized Pilot	0.57	< 0.03	6.23	< 0.96	5.8	13.0
	Waste Rock	Jasperoid	1.06	0.18	99.05	5.76	93.3	17.2
	Waste Rock	Limestone	0.05	< 0.03	928.6	< 0.96	928.1	1934.6
	Waste Rock	Overburden	0.15	< 0.03	790.7	< 0.96	790.2	1647.3
	Waste Rock	Oxidized Pilot	0.55	< 0.03	15.3	< 0.96	14.8	31.9
	Waste Rock	QFP Dike	0.67	0.07	18.72	2.24	16.5	8.4
	Waste Rock	Silicified Pilot	0.68	0.07	106.7	2.24	104.5	47.6
Interrelated Projects								
Bald Mtn.	One Waste Dump	Composite		0	242	0.5	241.5	465.4
	One Dump/Pit	Composite			321	3.1	317.9	102.9
	One Dump/Pit	Composite			373	5.0	368.0	74.6
	Three Dump	Composite			470	1.3	468.7	370.1
	3 Pit SE 1/4 Composite	Composite	0.06	0.06	39	1.9	37.1	20.5
	3 Pit SE 1/4 Composite	Composite	0.2	0.2	102	6.2	95.8	16.5
	2/3 4th 1/4 91	Composite			117	2.2	114.8	53.4
	2/3 1st 1/4 92	Composite			200	3.8	196.3	53.3
	2/3 2nd 1/4 92	Composite			190	9.4	180.6	20.3
	RBM Waste Dump	Composite		0.53	10.4	77.2	-66.8	0.1
	S. RBM (20-40)	Composite	0.1	0.02	16.9	3.1	13.8	5.5
	S. RBM (40-60)	Composite	0.45	0.02	9.5	14.1	-4.7	0.7
	Rat OH Baseline-5807	Composite			938	1	937.0	938.0
	Rat OH Baseline-5808	Composite			544	1	543.0	544.0
	Rat 4th 1/4 92	Composite			703	0.9	702.1	747.9
	S. Rat 2ND 1/4 93	Composite			470	0.9	469.1	500.0
	S. Rat 3RD 1/4 93	Composite			537	0.6	536.4	895.0

< Indicates sample concentration is less than given detection limit

(1) Acid Neutralizing Potential / Gross Neutralizing Potential

(2) Acid Generating Potential / Maximum Potential Acidity

(3) Net Neutralizing Potential

Table B-11 (Continued)

Sample		Lithology	Static Acid-Base Accounting (ABA)					
			Sulfur Specie		Acid-Base Accounting			
			Total S (%)	Pyritic S (%)	ANP(1) (tons CaCO3/kt)	AGP(2) (tons CaCO3/kt)	NNP=ANP-AGP(3,4) (tons CaCO3/kt)	ANP/AGP(4) (tons CaCO3/kt)
Nevada Drinking Water Standards								>=1.2
Stock Water Standards								
Interrelated Projects								
Bald Mtn.	S. Rat 4TH 1/4 93	Composite			563	0.9	562.1	598.9
	S. Rat 1ST 1/4 94	Composite			399	< 3.5	397.3	230.0
	S. Rat 2ND 1/4 94	Composite			318	1.9	316.1	169.1
	S. Rat 3RD 1/4 94	Composite			677	5.0	672.0	135.4
	S. Rat 4TH 1/4 94	Composite			406	2.8	403.2	144.5
	Stage Rat 1ST 1/4 93	Composite			305	3.1	301.9	97.4
	Stage Rat 2ND 1/4 93	Composite			521	1.9	519.1	277.1
	Stage Rat 3RD 1/4 93	Composite			539	0.3	538.7	1796.7
	Stage Rat 4th 1/4 93	Composite			663	2.5	660.5	265.2
	N. Rat 1ST 1/4 93	Composite			633	< 0.6	632.7	2110.0
	N. Rat 2nd 1/4 93	Composite			401	0.6	400.4	646.8
Winrock	Blowout	Composite	0.54		43	16.9	26.1	2.5
	Hilltop	Composite	0.62		< 2	19.4	-18.4	0.1
	Deer Camp	Composite	0.59		11	18.4	-7.4	0.6
	Winrock Composite	Composite			29	17.6	11.7	1.7
Casino	Waste Rock	Composite			103	< 1.0	102.5	206.0
	Waste Rock	Composite			3.3	< 1.0	2.8	6.6
Yankee	Yankee	Alluvium			233	< 1.0	232.5	466.0
	Yankee	Pilot Siltstone			229	< 1.0	228.5	458.0
	Yankee	Silicified Pilot Siltstone			40	< 1.0	39.5	80.0
	Yankee	Clay Alt. Pilot Siltstone			439	1.0	438.0	439.0
	Yankee	Jasperoid			327	2.0	325.0	163.5
	Yankee	Devil's Gate Limestone			597	2.0	595.0	298.5
	Monitor	Silicified Siltstone	0.27	< 0.03	18	8.4	9.4	2.1
	Monitor	Pilot Siltstone	0.08	< 0.03	512	2.5	509.8	204.9
	Monitor	Lower Pilot Siltstone	0.05	< 0.03	711	1.6	709.0	455.5
	Saddle	Devils Gate Limestone	0.05	< 0.03	967	1.6	965.5	619.9
	Saddle	Jasperoid	0.37	< 0.03	30	11.6	18.6	2.6
	Monitor	Alluvium	0.19	< 0.03	270	5.9	264.2	45.5
Vantage	Lux B Backfill	Composite	0.79	< 0.03	52	24.7	26.8	2.1
	Lux Dump	Composite	0.61	0.03	56	19.1	36.8	2.9
	Lux Saddle Dump 1	Composite	0.19	0.03	313	5.9	306.7	52.6
	Lux Saddle Dump 2	Composite	0.14	< 0.03	122	4.4	117.3	27.8
	ARM Backfill	Composite	0.46	0.03	97	14.4	82.4	6.7
	VO Dump	Composite	0.14	< 0.03	235	4.4	231.0	53.7
	North Dump	Composite	0.27	< 0.03	262	8.4	253.6	31.0
	VI Backfill	Composite	0.78	< 0.03	290	24.4	266.0	11.9
	VII & VIII Backfill	Composite	0.55	0.07	203	17.2	185.7	11.8
	South Dump A	Composite	1.43	0.43	253	44.7	207.8	5.7
	South Dump B	Composite	0.98	0.15	199	30.6	167.9	6.5
	South Dump C	Composite	0.32	0.04	185	10.0	174.9	18.5
	South Dump D	Composite	0.27	< 0.03	253	8.4	244.8	30.0
Bellview	Bellview	Composite	< 0.01		46	0.3	45.7	148.4
White Pine	Waste Rock	Composite			388	5.0	383.0	77.6
	Waste Rock	Composite	0.38		91	11.9	78.7	7.6

< Indicates sample concentration is less than given detection limit
(1) Acid Neutralizing Potential / Gross Neutralizing Potential
(2) Acid Generating Potential / Maximum Potential Acidity
(3) Net Neutralizing Potential
(4) For calculation purposes, 1/2 of the detection limit was used

Table B-11 (Continued)

		Meteoric Water Mobility Procedure (MWMP)						
Sample		pH (Standard Units)	TDS (mg/l)	SO4 (mg/l)	Cl (mg/l)	Total Alkalinity (mg/l)	NO3 as N (mg/l)	F (mg/l)
Nevada Drinking Water Standards		6.5-8.5	500	250	250	----	10	1.4-2.4
Stock Water Standards		5.0-9.0	3,000	----	1,500	----	100	2.0
<u>Proposed Action Area</u>								
Top Area	Top Waste Dump	7.8	117	1.4	<0.01	58	2.17	0.833
	Top TDC-2 (10-20)	8.02	106	4.21	18.5	39.9	0.887	0.196
	Top TDC-2 (90-100)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top TDC-2 (110-120)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top TDC-2 (120-130)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top MDC-1 (190-199)	8.44	123	3.06	23.3	51.1	0.379	0.089
	Top MDC-2 (180-190)	8.44	123	3.06	23.3	51.1	0.379	0.089
	Top TDC-2 (320-330)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top TDC-2 (310-320)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top TDC-4 (140-150)	8.14	122	3.52	31.5	47.1	0.151	0.055
	Top TDC-4 (270-280)	8.14	122	3.52	31.5	47.1	0.151	0.055
Sage Flat	RSF-113 (420)	7.12	63	12.4	8.19	18.2	0.666	0.295
	RSF-113 (440-450)	7.12	63	12.4	8.19	18.2	0.666	0.295
	RSF-115 (440-450)	7.12	63	12.4	8.19	18.2	0.666	0.295
	RSF-107 (410-480)	8.39	120	9.51	10.6	86.5	<0.01	0.135
	RSF-101 (520-530)	8.39	120	9.51	10.6	86.5	<0.01	0.135
	RSF-119 (50-80)	7.54		1.29	<1.5		0.359	0.076
	RSF-102 (780-810)	8.12	118	33.3	3.78	62.6	0.632	0.206
Horseshoe	Waste Rock		206	44	21.27	92	<0.5	0.58
Galaxy	Waste Rock		262	29	10.6	130	0.45	0.88
Saga	Waste Rock		183	24.7	<5	80.50	1.08	1.15
	Waste Rock		229	24.83	46	60.97	0.28	1.70
	Waste Rock		113	17.16	20	52.09	1.08	0.25
	Waste Rock		185	23.22	20	71.39	0.18	0.99
	Waste Rock		228	37.28	15	78.53	1.02	1.29
	Waste Rock		178	31.62	20	60.77	1.02	0.62
	Waste Rock		191	29.16	26	83.19	1.61	1.25
<u>Interrelated Projects</u>								
Bald Mtn.	One Waste Dump	6.3	172	2.8	<0.01	51	10.8	0.762
	One Dump/Pit	8.26	115	8.23	2.42	59.1		0.367
	One Dump/Pit	8.35	135	16.4	6.27	60.1		0.391
	Three Dump	8	84	8.6	<0.01	55	1.42	0.496
	3 Pit SE 1/4 Composite							
	3 Pit SE 1/4 Composite							
	2/3 4th 1/4 91	7.4	108	10	<6.31	47.2		0.224
	2/3 1st 1/4 92	6.8	392	4.9	2.05	47		0.2
	2/3 2nd 1/4 92	7.5	64	15.36	3.57	42.2		0.59
	RBM Waste Dump	7.3	935	568	<0.01	170	0.497	0.851
	S. RBM (20-40)	7.3	93	9.1	58.8	40	1.72	0.713
	S. RBM (40-60)	7.3	93	9.1	58.8	40	1.72	0.713
	Rat OH Baseline-5807	7.2	119	3.3	<0.25	54.1		<0.1
	Rat OH Baseline-5808	6.8	64	3.82	0.61	35.9		<0.1
	Rat 4th 1/4 92	8.38	137	7.72	1.11	46.2		0.198
	S. Rat 2ND 1/4 93	8.34	112	11.2	1.26	326		0.35
	S. Rat 3RD 1/4 93	8.2	166	15	1	64		0.4

< Indicates sample concentration is less than given detection limit

Table B-11 (Continued)

Sample		pH (Standard Units)	TDS (mg/l)	SO4 (mg/l)	Cl (mg/l)	Total Alkalinity (mg/l)	NO3 as N (mg/l)	F (mg/l)
		Meteoric Water Mobility Procedure (MWMP)						
Nevada Drinking Water Standards		6.5-8.5	500	250	250	----	10	1.4-2.4
Stock Water Standards		5.0-9.0	3,000	----	1,500	----	100	2.0
Interrelated Projects								
Bald Mtn.	S. Rat 4TH 1/4 93	8.41	206	4.6	0.37	59.2		0.201
	S. Rat 1ST 1/4 94	8.07	151	16.4	<0.01	53.1		0.286
	S. Rat 2ND 1/4 94	8.27	130	11	1.66	54.9		3.23
	S. Rat 3RD 1/4 94	8.04	216	15.5	2.52	57		0.362
	S. Rat 4TH 1/4 94	8.32	128	7.74	1.35	67.1		0.357
	Stage Rat 1ST 1/4 93	8.15	208	4.93	7.5	72.9		0.327
	Stage Rat 2ND 1/4 93	8.33	168	12.5	2.23	24		0.37
	Stage Rat 3RD 1/4 93	8.47	182	<18	2	92		0.4
	Stage Rat 4th 1/4 93	8.25	117	7.98	2.23	53.2		0.287
	N. Rat 1ST 1/4 93	8.06	504	5.92	4	76.4		0.165
	N. Rat 2nd 1/4 93	8.44	172	15.1	3.45	167		0.47
Winrock	Blowout	8.22	283	18.2	<5	70	<0.05	0.7
	Hilltop	7.63	275	16.2	5	38	<0.05	0.53
	Deer Camp	8.08	305	17.2	5	52.8	<0.05	0.61
	Winrock Composite							
Casino	Waste Rock	5.9	2210	390	21	42	6.3	0.9
	Waste Rock	7.5	501	5.3	1.4	180	8.3	0.11
Yankee	Yankee	6.89	388	118	19	70	<1	0.6
	Yankee	7.47	734	16	2.7	77	<1	0.62
	Yankee	7.37	264	14	1.7	58	<1	0.64
	Yankee	6.27	230	38	12	30	<1	0.87
	Yankee	7.37	108	19	<1	58	<1	0.28
	Yankee	6.9	134	45	2.6	37	<1	0.52
	Monitor		193	22.6	9.78	73	0.58	0.35
	Monitor		398	144.8	74.99	80.89	0.7	1.11
	Monitor		830	13.87	16.3	831.2	0.37	0.3
	Saddle		47	4.00	<0.02	55.24	0.58	<0.02
	Saddle		37	5.4	<0.02	23.68	0.45	<0.02
	Monitor		334	0.2	96.2	92.73	1.97	0.38
Vantage	Lux B Backfill		323	45.2	5.4	43.4	18.03	0.5
	Lux Dump		350	51.33	22.8	87.1	6.93	1.08
	Lux Saddle Dump 1		672	118.68	187.5	71.03	7.35	0.67
	Lux Saddle Dump 2		573	74.05	141.3	57.2	26.01	0.58
	ARM Backfill		1067	680	62.5	39.46	11.13	0.52
	VO Dump		818	362	122.3	127.7	214	0.87
	North Dump		1177	672	96.19	49.33	239	0.56
	VI Backfill		3339	2310	22.2	49.33	210	0.72
	VII & VIII Backfill		2155	733.5	13.04	39.46	286	1.14
	South Dump A		2344	1203	298.9	41.43	434	0.31
	South Dump B		3448	2650	15.6	52.61	14.10	0.49
	South Dump C		1655	990	40.5	39.46	11.91	0.64
	South Dump D		748	252	76.6	63.14	39.92	0.81
Bellview	Bellview							
White Pine	Waste Rock	8.69	350	70.6	28.1	49.1	2.15	0.458
	Waste Rock	7.81	242	36.6	22.5	52.5	1.8	0.741

< Indicates sample concentration is less than given detection limit

Table B-11 (Continued)

Sample		pH (Standard Units)	As (mg/l)	Ba (mg/l)	Cr (mg/l)	Cu (mg/l)	Fe (mg/l)	Pb (mg/l)	Mn (mg/l)	Hg (mg/l)	Se (mg/l)	Ag (mg/l)	Zn (mg/l)
		Meteoric Water Mobility Procedure (MWMP) cont.											
Nevada Drinking Water Standards		6.5-8.5	0.05	1.0	0.05	1.0	0.3	0.05	0.05	0.002	0.01	0.05	5.0
Stock Water Standards		5.0-9.0	0.2	----	1.0	0.5	----	0.1	----	0.01	0.05	----	25
Proposed Action Area													
Top Area	Top Waste Dump		0.047	0.269	<0.01	<0.007	0.011	0.086	<0.003	<0.015	<0.13	<0.02	0.021
	Top TDC-2 (10-20)		<0.1	0.104	<0.01	0.023	2.25	<0.03	0.029	0.005	<0.05	<0.01	0.015
	Top TDC-2 (90-100)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top TDC-2 (110-120)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top TDC-2 (120-130)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top MDC-1 (190-199)		<0.05	0.091	<0.01	<0.005	<0.05	<0.03	<0.005	0.0103	<0.05	0.026	<0.005
	Top MDC-2 (180-190)		<0.05	0.091	<0.01	<0.005	<0.05	<0.03	<0.005	0.0103	<0.05	0.026	<0.005
	Top TDC-2 (320-330)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top TDC-2 (310-320)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top TDC-4 (140-150)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
	Top TDC-4 (270-280)		<0.1	0.074	<0.01	<0.005	0.163	<0.03	0.008	0.0001	<0.05	<0.01	<0.005
Sage Flat	RSF-113 (420)		<0.1	0.167	<0.01	<0.005	0.114	<0.03	<0.005	<0.0002	<0.1	<0.01	0.021
	RSF-113 (440-450)		<0.1	0.167	<0.01	<0.005	0.114	<0.03	<0.005	<0.0002	<0.1	<0.01	0.021
	RSF-115 (440-450)		<0.1	0.167	<0.01	<0.005	0.114	<0.03	<0.005	<0.0002	<0.1	<0.01	0.021
	RSF-107 (410-480)		<0.1	0.185	<0.01	<0.005	0.071	<0.03	0.007	<0.0002	<0.1	<0.01	0.012
	RSF-101 (520-530)		<0.1	0.185	<0.01	<0.005	0.071	<0.03	0.007	<0.0002	<0.1	<0.01	0.012
	RSF-119 (50-80)		<0.1	0.196	<0.01	<0.005	<0.25	<0.03	0.008	0.0005	<0.1	<0.01	0.015
	RSF-102 (780-810)		<0.1	0.208	<0.01	<0.005	0.119	<0.03	0.027	<0.0002	<0.1	<0.01	0.026
Horseshoe	Waste Rock		<0.01	0.133	<0.01	<0.01	<0.005	<0.01	0.012	0.0117	<0.002	0.017	<0.015
Galaxy	Waste Rock		<0.065	0.206	<0.01	<0.01	0.046	<0.01	0.025	0.0039	<0.002	0.04	<0.015
Saga	Waste Rock	7.86	<0.025	0.154	<0.005	<0.010	<0.005	<0.015	<0.005	0.0052	<0.002	<0.025	0.016
	Waste Rock	7.93	<0.025	0.111	<0.005	<0.010	<0.005	<0.015	<0.005	0.0004	<0.002	<0.025	<0.015
	Waste Rock	8.87	<0.025	0.129	<0.005	<0.010	<0.005	<0.015	<0.005	0.0024	<0.002	<0.025	0.017
	Waste Rock	7.88	<0.025	0.090	<0.005	<0.010	<0.005	<0.015	<0.005	0.0007	<0.002	<0.025	<0.015
	Waste Rock	8.19	<0.025	0.124	<0.005	<0.010	0.430	0.048	<0.005	0.0007	<0.002	<0.025	<0.015
	Waste Rock	7.94	<0.025	0.110	<0.005	<0.010	<0.005	<0.015	<0.005	0.0005	<0.002	<0.025	<0.015
	Waste Rock	8.05	<0.025	0.084	<0.005	<0.010	<0.005	<0.015	<0.005	0.0002	<0.002	<0.025	0.017
Interrelated Projects													
Bald Mtn.	One Waste Dump		0.06	0.304	<0.01	0.012	0.058	<0.05	0.004	<0.015	<0.13	<0.02	0.008
	One Dump/Pit		<0.1	0.149	<0.01	<0.005	0.52	<0.03	<0.005	<0.002	<0.1	<0.01	0.01
	One Dump/Pit		<0.01	0.120	<0.01	<0.005	0.05	<0.03	<0.005	<0.002	<0.1	<0.01	0.01
	Three Dump		<0.01	0.158	<0.01	0.013	0.068	<0.05	<0.003	<0.015	<0.13	<0.02	0.042
	3 Pit SE 1/4 Composite												
	3 Pit SE 1/4 Composite												
	2/3 4th 1/4 91		0.06	0.031	<0.01	<0.007	0.007	<0.05	0.01	0.0005	<0.005	<0.02	0.027
	2/3 1st 1/4 92		0.038	0.15	<0.01	<0.007	<0.008	<0.05	0.012	<0.5	<0.13	0.072	<0.005
	2/3 2nd 1/4 92		0.136	0.048	1.95	0.023	8.66	<0.05	0.209	<0.0005	<0.13	<0.02	0.009
	RBM Waste Dump		0.017	0.284	<0.01	0.009	0.056	0.053	0.848	<0.015	<0.13	<0.02	0.042
	S. RBM (20-40)		0.166	0.092	<0.01	<0.007	0.015	<0.05	0.003	0.00106	<0.13	<0.02	<0.005
	S. RBM (40-60)		0.166	0.092	<0.01	<0.007	0.015	<0.05	0.003	0.00106	<0.13	<0.02	<0.005
	Rat OH Baseline-5807		<0.01	0.128	<0.01	<0.007	0.02	<0.05	0.007	0.0007	<0.005	<0.02	0.008
	Rat OH Baseline-5808		<0.01	0.06	<0.01	<0.007	0.054	<0.05	0.008	0.0007	<0.005	<0.02	<0.005
	Rat 4th 1/4 92		0.022	0.136	<0.01	0.007	0.276	<0.005	0.008	<0.0005	<0.005	<0.01	<0.005
	S. Rat 2ND 1/4 93		0.085	0.158	<0.01	<0.005	1.96	<0.03	0.068	<0.0003	<0.05	<0.01	0.013
	S. Rat 3RD 1/4 93		<0.000	3.51	<0.01	<0.01	<0.02	<0.001	0.06	<0.0002	<0.02	<0.01	0.005

< Indicates sample concentration is less than given detection limit

Table B-11 (Continued)

Sample		pH (Standard Units)	As (mg/l)	Ba (mg/l)	Cr (mg/l)	Cu (mg/l)	Fe (mg/l)	Pb (mg/l)	Mn (mg/l)	Hg (mg/l)	Se (mg/l)	Ag (mg/l)	Zn (mg/l)
		Meteoric Water Mobility Procedure (MWMP) cont.											
Nevada Drinking Water Standards		6.5-8.5	0.05	1.0	0.05	1.0	0.3	0.05	0.05	0.002	0.01	0.05	5.0
Stock Water Standards		5.0-9.0	0.2	----	1.0	0.5	----	0.1	----	0.01	0.05	----	25
Interrelated Projects													
Bald Mtn.	S. Rat 4TH 1/4 93		0.134	0.226	<0.01	0.009	3.15	<0.03	0.058	0.0005	<0.05	<0.01	0.031
	S. Rat 1ST 1/4 94		<0.05	0.366	<0.01	<0.005	<0.05	<0.03	<0.005	<0.0002	<0.05	<0.01	<0.013
	S. Rat 2ND 1/4 94		0.16	0.249	<0.01	<0.005	<0.383	<0.03	0.005	<0.0002	<0.05	<0.01	0.013
	S. Rat 3RD 1/4 94		<0.2	0.305	<0.01	<0.005	0.054	<0.03	0.006	<0.0002	<0.1	<0.01	<0.009
	S. Rat 4TH 1/4 94		<0.1	0.253	<0.01	<0.005	0.055	<0.03	<0.005	<0.0002	<0.1	<0.01	<0.01
	Stage Rat 1ST 1/4 93		0.047	0.269	<0.01	<0.007	0.011	0.086	<0.003	<0.015	<0.13	<0.02	0.021
	Stage Rat 2ND 1/4 93		0.099	0.081	<0.01	<0.005	3.44	<0.03	0.043	<0.0003	<0.005	<0.01	0.023
	Stage Rat 3RD 1/4 93		0.019	3.52	<0.01	<0.01	<0.02	<0.001	0.16	<0.0002	0.004	<0.01	0.006
	Stage Rat 4th 1/4 93		0.143	0.233	<0.01	0.008	3.74	<0.03	0.078	<0.0002	<0.05	<0.01	0.033
	N. Rat 1ST 1/4 93		0.019	0.435	<0.01	<0.005	0.24	<0.005	0.014	<0.0002	<0.005	<0.01	<0.005
	N. Rat 2nd 1/4 93		0.17	0.186	0.13	0.016	2.04	<0.03	0.079	<0.0003	<0.005	<0.01	0.023
Winrock	Blowout		0.064	0.046	<0.05	0.014	<0.005	<0.1	0.024	0.009	<0.05	<0.005	<0.008
	Hilltop		0.096	0.145	0.004	0.012	<0.001	0.005	0.006	0.01	<0.08	0.001	0.003
	Deer Camp		0.043	0.564	<0.025	0.007	0.007	0.005	0.012	<0.001	<0.08	0.001	0.001
	Winrock Composite												
Casino	Waste Rock		0.004	<0.5	<0.025	<0.05	<0.05	<0.025	<0.5	0.0017	<0.005	<0.025	<0.05
	Waste Rock		0.0069	0.59	<0.025	<0.05	0.79	<0.025	<0.5	0.002	0.065	<0.025	<0.05
Yankee	Yankee		0.054	0.32	<0.025	<0.05	1.1	<0.005	<0.5	<0.001	<0.005	<0.025	0.061
	Yankee		0.18	0.84	0.048	<0.05	11	0.019	<0.5	0.0028	<0.005	<0.025	0.2
	Yankee		0.063	0.46	<0.025	<0.05	1.1	0.0056	<0.5	0.0046	<0.005	<0.025	0.05
	Yankee		0.3	0.17	<0.025	<0.05	0.66	<0.005	<0.5	0.001	<0.005	<0.025	<0.05
	Yankee		0.018	0.23	<0.025	<0.05	<0.05	<0.005	<0.5	<0.001	<0.005	<0.025	<0.05
	Yankee		0.0027	0.16	<0.025	<0.05	<0.05	<0.005	<0.5	<0.001	0.0069	<0.025	<0.05
	Monitor	8.92	<0.025	0.862	0.062	<0.01	0.247	<0.015	<0.005	<0.0002	<0.002	<0.025	0.068
	Monitor	8.50	<0.025	0.046	<0.01	0.016	0.050	<0.015	0.006	<0.0002	<0.002	<0.025	<0.015
	Monitor	8.56	<0.025	0.206	<0.01	<0.01	0.170	<0.015	<0.005	0.014	<0.002	0.125	0.020
	Saddle	9.07	<0.025	0.334	<0.01	<0.01	<0.005	<0.015	<0.005	<0.0002	<0.002	<0.025	<0.015
	Saddle	8.08	<0.025	0.600	<0.01	0.011	<0.005	<0.015	<0.005	0.0002	<0.002	<0.025	<0.015
	Monitor	7.90	<0.025	0.357	<0.01	<0.01	0.152	<0.015	<0.005	0.0002	<0.002	<0.025	<0.015
Vantage	Lux B Backfill	8.10	<0.025	0.773	<0.01	0.089	<0.005	<0.015	0.191	0.0059	<0.002	<0.025	0.400
	Lux Dump	8.34	<0.025	0.808	<0.01	<0.01	0.178	<0.015	<0.005	<0.0002	<0.002	<0.025	0.015
	Lux Saddle Dump 1	8.34	<0.025	0.210	<0.01	0.022	0.240	<0.015	0.029	<0.0002	<0.002	<0.025	<0.015
	Lux Saddle Dump 2	8.20	<0.025	0.275	<0.01	0.012	0.857	<0.015	0.023	0.0009	<0.002	<0.025	0.024
	ARM Backfill	7.66	<0.025	0.058	0.013	0.018	0.110	<0.015	<0.005	<0.0002	<0.002	<0.025	<0.015
	VO Dump	8.32	<0.025	0.062	<0.01	<0.01	0.508	<0.015	<0.005	0.0002	<0.002	<0.025	0.022
	North Dump	7.78	<0.025	0.101	<0.01	<0.01	<0.005	<0.015	0.041	<0.0002	<0.002	<0.025	<0.015
	VI Backfill	7.61	<0.025	0.097	<0.01	0.014	<0.005	<0.015	0.029	0.0002	<0.002	<0.025	0.025
	VII & VIII Backfill	7.73	<0.025	0.130	<0.01	<0.01	<0.005	<0.015	0.017	<0.0002	<0.002	<0.025	<0.015
	South Dump A	7.69	<0.025	0.082	0.013	0.018	<0.005	<0.015	0.108	<0.0002	<0.002	<0.025	<0.015
	South Dump B	7.70	<0.025	0.051	<0.01	<0.01	<0.005	<0.015	0.0121	<0.0002	<0.002	<0.025	<0.015
	South Dump C	7.53	<0.025	0.082	<0.01	<0.01	<0.005	<0.015	<0.005	<0.0002	<0.002	<0.025	<0.015
	South Dump D	7.93	<0.025	0.086	<0.01	<0.01	0.158	<0.015	0.013	0.001	<0.002	<0.025	<0.015
Bellview	Bellview		0.131	0.041	<0.025	<0.005	<0.15	<0.025	<0.025	<0.001	<0.005	<0.025	<2.5
White Pine	Waste Rock		0.104	0.130	<0.01	0.013	0.362	<0.03	0.028	0.0076	<0.05	0.222	0.032
	Waste Rock		0.043	0.242	<0.01	<0.007	0.246	<0.05	0.0009	<0.5	0.008	<0.02	<0.005

< Indicates sample concentration is less than given detection limit

systems would allow detection of a leak in time for remediation.

The old leach pond at the Alligator Ridge Mine was found to be leaking in 1988. A study completed by Montgomery (1990) showed that a mound of water originating from the old leach pond had formed downgradient (to the east) of the pond in the valley alluvium. Cyanide levels in the water mound ranged up to 0.5 mg/l and were accompanied by elevated levels of chloride, sulfate, nitrate, and total dissolved solids. The valley alluvium in the area of the pond is 20 to 35 feet thick and generally dry. The nearest permanent water table is 550 feet down in fractured limestone. A volcanic tuff that underlies the alluvium near the Alligator Ridge Mine confined the mound of water to alluvium. Thus, no surface or groundwater was affected or in danger of being affected by the leakage from the old leach pond (Montgomery 1990).

There are active leach ponds at the Yankee processing facility, the Alligator Ridge Mine, the Bald Mountain Mine, and the White Pine Mine. The ponds at the Casino/Winrock facility are in the process of closure. Additional leach ponds are planned for the Bald Mountain Mine and the proposed new processing facility in south Mooney Basin. The proposed Bellview Mine also would have a leach pond when it goes into production. All leach ponds must be lined and equipped with leak detection systems to receive a permit from the State of Nevada.

The potential impact of leach ponds to the cumulative effects area's surface water and groundwater is considered to be minimal. The existing and planned leach ponds are situated near the mines and built on top of unsaturated alluvium. The permanent water table is generally well below the bottom of the lined ponds. Thus, any leakage from the ponds should be detected in time to be remediated before groundwater is threatened. Surface water flow is ephemeral, so drainages are generally dry near the ponds. Therefore, the leakage discovered and remediated at the old leach pond associated with the Alligator Ridge Mine is considered to be representative of potential leakage from other ponds in the cumulative effects area. No surface water or groundwater was threatened by the leakage from the old leach pond.

4.4.2.6 Potential Impact of Tailings Impoundments

Currently there is one existing and one proposed tailings facility in the cumulative effects area. A small tailings facility that has completely drained is located at the Alligator Ridge Mine. A second facility is proposed at the Bald Mountain Mine process area and would cover 138 acres. The proposed facility would be composite-lined with a synthetic liner and would contain a drain system to capture leakage.

The potential impact of the active tailings facility at the Bald Mountain Mine to surface or groundwater in southern Huntington Valley is considered to be minimal. The tailings facility is designed to capture and return any surface seepage. Any leakage that may bypass the drain system would have to pass through at least 400 to 500 feet of alluvium before encountering the water table. This alluvium should attenuate the small leakage before it could reach the water table. Because of the presence of a considerable zone of unsaturated alluvium beneath the facility, mounding of effluent water beneath the tailings facility would not be expected.

4.4.2.7 Mine Closure and Reclamation

The potential impact of mine closure and associated reclamation should be beneficial in the cumulative effects area. Reclamation and revegetation of roads, drill pads, waste rock dumps, leach pads and ponds, and eventually tailings facilities should decrease surface erosion during major storms. Open pits would remain unreclaimed, but their impact would be no different than discussed previously. Groundwater in the vicinity of the production wells or well fields would recover within 20 years from the local drawdown caused by pumping. Waste rock dumps would be reclaimed and revegetated to minimize infiltration from snowmelt and rainfall. Any seepage that may escape from the base of these dumps should not exceed the Nevada Division of Environmental Protection's discharge standards for waste rock.

4.5 WETLANDS AND WATERS OF THE UNITED STATES

4.5.1 Cumulative Effects Area and Characteristics

The wetlands and riparian areas occupy less than 3 percent of the cumulative effects area and are generally limited in size, with the exception of Ruby Lake. Ruby Lake is the largest wetland within the cumulative effects area and supports a variety of plant species within the water body as emergents (e.g., cattails, bulrush, rush, sedges), along the banks, and within the dry lakebed margins that support low plant cover and diversity. In addition to Ruby Lake, the larger wetland/riparian areas are located along the Newark Valley drainage. Small isolated wetlands/riparian areas are located at or near Buck Mountain, Buck Pass, Long Valley Slough, Water Canyon, Cherry Canyon, Twin Springs, Blue Jay Ranch (southeast of Ruby Valley), and Willow Creek and springs.

In addition to these wetlands and riparian areas, other waters of the United States occur within the cumulative effects area. Other waters of the United States include perennial creeks and intermittent drainages. Perennial creeks and intermittent drainages located in the cumulative effects area include Woodward's Creek, Big Wash, Sestanovich Creek, Walker Canyon, Cherry Spring Canyon, Huntington Creek, Conners Creek, Bourne Canyon, Martin Canyon, Cherry Canyon, Mahoney Canyon, Burn Canyon, North Water Canyon, and Rattlesnake Canyon. The cumulative effects area contains numerous intermittent drainages within the major watersheds that include Mooney Basin, and Newark, Ruby, Huntington, and Long Valleys. Intermittent drainages typically support upland vegetation such as big sagebrush, mixed shrub, and greasewood.

4.5.2 Cumulative Impacts

4.5.2.1 Impacts of the Proposed Action

Construction within the Proposed Action area would not directly impact wetlands. However, approximately 0.04 acre of other waters of the United States (i.e., intermittent drainages) would be directly impacted by the placement of culverts during construction of the proposed haul roads near the proposed Horseshoe/Galaxy process and leach area. Riparian areas would not be impacted by the Proposed Action.

4.5.2.2 Impacts of the Interrelated Projects

No impacts to wetlands or riparian areas are anticipated to occur as a result of interrelated activities. Based on the abundance of intermittent drainages within the cumulative effects area, it is anticipated that some of the projected disturbances would occur within other waters of the United States.

4.5.2.3 Combined Impacts

No impacts to wetlands or riparian areas are expected to occur. Impacts to other waters of the United States would occur during construction of the proposed Horseshoe/Galaxy process and leach area. Additionally, it is anticipated that other waters would be impacted in association with interrelated project activities.

4.6 WILDLIFE AND FISHERIES RESOURCES

4.6.1 Cumulative Effects Area and Characteristics

Regional Characteristics. The wildlife communities of northeastern Nevada are typical of the intermountain habitats within the Great Basin. The range of habitat types occurring in these areas supports a wide variety of wildlife resources correlated to the differences in elevation and climatic zones. The arid climate, sparse vegetation, and restricted water availability common to the region limit many wildlife populations. Even with wildlife species that are adapted to the arid environment, populations fluctuate considerably from both annual and seasonal climatic variations. Competition is high for limited resources, such as forage, cover, and available water.

The cumulative effects area analyzed for wildlife resources encompasses a large region surrounding the proposed Bald Mountain Mine Expansion Project. This area varies, depending on the resource, its associated habitat type, the sensitivity of the issue, and the animals' mobility. As each resource is discussed, the associated cumulative effects area will be described.

Important wildlife habitats occurring within these cumulative effects areas include big sagebrush, piñon-juniper woodland, mountain mahogany, mixed shrub (e.g., bitterbrush, serviceberry, snowberry), and riparian. Big sagebrush provides a base plant community for a number and diversity of wildlife species dependent on sagebrush habitats. The piñon-juniper and shrub communities provide structural diversity for wildlife species as both thermal cover and food sources, particularly during the winter season.

The arid upland and mesic areas are typically characterized by a diversity of wildlife species rather than high population density. Due to the arid nature of the region, available water for wildlife consumption and riparian vegetation are the limiting factors. Therefore, riparian habitats, particularly with a multi-story canopy and free water, support a greater diversity and population density of wildlife species than any other habitat type occurring within the region of northeastern Nevada. Water resources are prominent within the cumulative effects area, particularly in Ruby Valley. Naturally-occurring seeps and springs are numerous and both perennial and intermittent drainages flow out of the mountain ranges into the valley bottoms.

The following information attempts to identify important issues associated with species potentially affected by cumulative activities. These issues may be applicable to a single species (e.g., mule deer) or they may encompass a group of species that have a common factor potentially affecting their survival (e.g., upland game birds).

Mule deer. The cumulative impacts analysis for mule deer encompasses a large area, extending from Secret Pass in the northern Ruby Mountains south to Little Antelope Summit along Highway 50. This large area of analysis was chosen because of the importance of the Ruby Deer Herd within the State of Nevada, relative to ongoing activities within the Ruby Mountains (including the Buck and Bald Mountain area) and its surrounding valleys.

Mule deer are the principal big game species in the cumulative effects area. The Ruby Deer Herd is the largest mule deer herd in Nevada. Favorable climatic and vegetative conditions during the 1984 to 1988 period allowed deer populations in the Ruby Deer Herd to increase to a recent high of 40,000 animals in 1988. Current numbers are estimated at 30,000 deer. During heavy snow accumulations in the Ruby Mountains, 20,000 to 24,000 deer may migrate from their summer range in the Ruby Mountains south to the Buck, Bald, and Butte Mountains, continuing south past Little Antelope Summit into the White Pine Range (Bureau of Land Management 1989; Foree 1994). The Nevada Division of Wildlife has designated crucial deer winter range for this herd. Map B-8 depicts the designated winter range and migration routes associated with the cumulative effects area. The number of deer that move along these routes during the migrational periods typically depends on the severity of the weather and associated snow depth.

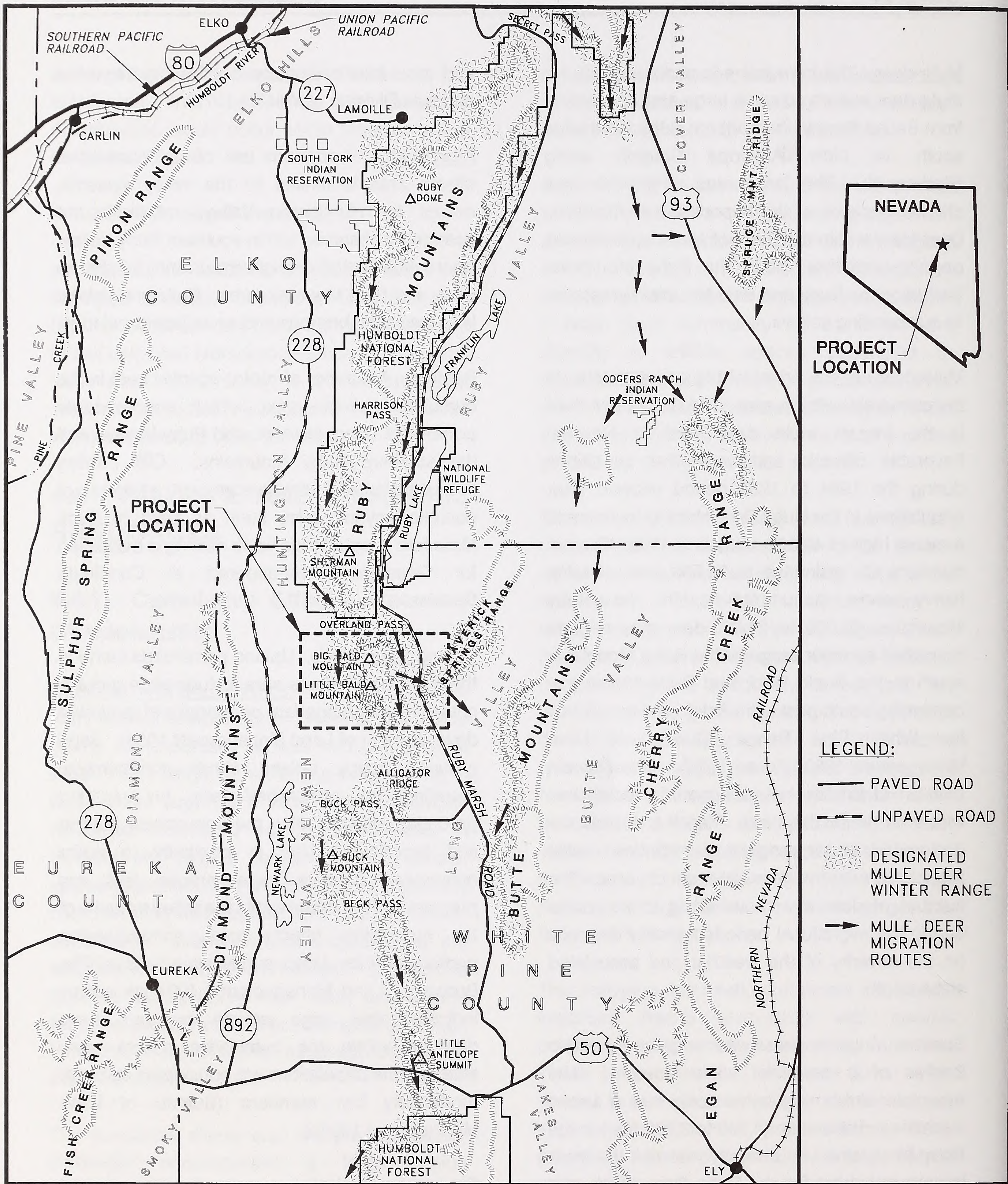
Summer range for these deer is generally within 2 miles of a perennial water source. The mountain shrub vegetative zone has a broad elevational distribution (7,500 to 9,500 feet) in the Ruby Mountains. Its diversity makes it the most important habitat for the Ruby Deer Herd, with sagebrush, bitterbrush, snowberry, serviceberry, and mountain mahogany dominating this zone (Nevada Division of Wildlife 1976).

Pronghorn. Pronghorn use of the cumulative effects area is limited to the valley systems, except for Huntington Valley. Animals are commonly observed within southern Ruby Valley. Approximately 100 pronghorn currently inhabit the Buck and Bald Mountain area. Preferred habitat is in the valley bottoms and on adjacent bajadas.

Raptors. A number of raptor species nest in the cumulative effects area, which encompasses portions of Long, Newark, and Ruby Valleys and the southern Ruby Mountains. Cliff nesting habitat is limited, but where present, a number of occupied eyries exist, such as west of Buck Mountain. Ferruginous hawk nesting is discussed for Threatened, Endangered, or Candidate Species.

Upland Game Birds. Upland game birds found in the cumulative effects area include sage grouse, chukar, gray (Hungarian) partridge, and mourning dove (Bureau of Land Management 1989). Sage grouse occupy upland shrub communities, breeding on established leks (or strutting grounds) and inhabiting the appropriate nesting and brooding habitat in proximity to water resources. Active sage grouse leks are predominantly located within the valley systems of the cumulative effects area, encompassing portions of Ruby, Long, and Newark Valleys. The Bureau of Land Managements' 1994 lek survey indicated that sage grouse numbers have declined within the cumulative effects area, although the populations are considered stable at moderately low numbers (Bureau of Land Management 1994b).

Chukar are typically associated with perennial water sources, mesic areas, and rugged slopes or rock outcrops. Gray partridges, also referred to



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-8
MULE DEER WINTER RANGE
AND MIGRATION ROUTES

as Hungarian partridges, often occupy riparian drainages and the adjacent terraces. This species is also commonly associated with agricultural areas in the valleys of the cumulative effects area (Bureau of Land Management 1989). Mourning doves are common throughout the cumulative effects area, occupying a variety of habitat types. Important habitat for this species is riparian zones, particularly drainages that support trees or shrubs large enough for nesting.

Neotropical Migrants. Another issue that is becoming more prominent within the United States is the cumulative impacts to breeding birds, including neotropical migrants. This issue is often emphasized, relative to passerines, as annual bird surveys continue to record declining songbird populations. A number of breeding birds return to northeastern Nevada to breed. These birds are typically present within the respective Great Basin habitats from spring through fall, migrating to the subtropics and tropics before winter. Although many of the neotropical migrants that occur within the cumulative effects area also occupy other habitat types found elsewhere within the species' range, the mature mountain mahogany and piñon-juniper woodlands provide valuable nesting habitat for a number of species that would otherwise be more restricted in distribution within the Great Basin.

Other Wildlife. Upland game, nongame, and fisheries are addressed within the cumulative effects area, although a cumulative analysis area for less mobile species may be smaller than that associated with a far-ranging species. General wildlife species occupying the cumulative effects area encompass a number of vertebrate and invertebrate species. Although the species diversity is typically greater than the population density, certain habitats (e.g., riparian) support a greater number of these species. Many of the nongame species, particularly small mammals and birds, are widely distributed, occupying a variety of habitat types.

Specifically, a number of bat species occupy the cumulative effects area, although little information is available for certain species, particularly those that are sensitive or rare. Bats may reside year-long or seasonally in the cumulative effects area, occupying a number of habitat types, including abandoned mine shafts, adits, and other underground openings, in addition to natural habitats, such as caves. Hibernacula, nursery colonies, or bachelor roosts may be used by area bats, depending on the species' preference and available habitat.

Ruby Lake National Wildlife Refuge. The cumulative effects area for wildlife and fisheries encompasses the Ruby Lake National Wildlife Refuge located to the north of the Proposed Action area (see Map B-1). The expanse of sloughs, wetlands, and islands provides critical habitat for both resident and migratory animals. The refuge is a important stopover or staging area for migratory waterfowl and shorebirds; it also provides important nesting and wintering habitat for a number of avian species.

Over 150 springs flow into the marsh along the western margin. Wet meadows transition into grasslands and sagebrush/rabbitbrush habitat, resulting in a mosaic of valuable nesting habitat, foraging areas, and cover for area wildlife. Nesting habitat typically fluctuates annually with available water. Several species that use the refuge are either Federally listed or Federal candidate species, and are discussed for Threatened, Endangered, or Candidate Species.

The refuge conducts an annual winter bird count. The survey results have indicated a consistent population decline in bird numbers (Mackay 1995). Two active sage grouse leks have been documented near the refuge. The northern lek occurs within 400 yards and the southern lek is located within 0.5 mile of water.

As discussed in Section 3.2 of this Appendix, the recreational use of the refuge has declined substantially over the last decade. This decline is due primarily to the decreased fisheries and in part to the drought. Section 3.2 lists the six stocked fish species. In addition to these sport fish, two dace species inhabit Ruby Lake. The relict dace is a Federal candidate-category 2 and is discussed for Threatened, Endangered, or Candidate Species. The second dace is the Lahontan speckled dace, which was introduced in 1950. This dace species appear to be increasing within the lake system (Mackay 1994).

Regional Wetlands. The perennial and intermittent wetlands and playas associated with Ruby Lake, Franklin Lake, Newark Lake, as well as the naturally occurring seeps and springs in the overall region provide critical habitat for migratory birds within the Great Basin (Bureau of Land Management 1987). Isolated wetlands and open water sources that occur throughout the area, such as Long Valley Slough, provide not only water bird nesting, foraging, and resting habitat, they also support nesting and brooding habitat for upland game birds and provide valuable riparian habitat for a number of other birds, amphibians, reptiles, and mammals.

4.6.2 Cumulative Impacts

The cumulative impact analysis for wildlife resources emphasizes the components of the related ecosystems and how they may be susceptible to cumulative impacts. The basic approach to assessing cumulative impacts to fish and wildlife resources follows that outlined by the United States Fish and Wildlife Service in their "Methodological Guidance for Assessing Cumulative Effects on Fish and Wildlife" (1983). Applicable criteria were developed, relative to the resource issues, taking into account the interaction between resources, incremental impacts relative to the collective impacts, functional and structural aspects of the plant and animal communities, and the anticipated time frame. An important point for the cumulative impact assessment of fish and wildlife resources is the adaptability or flexibility to modify management actions, based on system monitoring.

Basic assumptions used in the impact analysis for wildlife resources include the following:

- Human use of the cumulative effects area will continue to increase with or without the Proposed Action.
- Wildlife habitats are potentially at their carrying capacities, particularly for more valuable habitat types, such as riparian zones and mountain mahogany woodlands.
- Increased human uses would result in increased habitat fragmentation and disturbance.
- Livestock and wild horse use of riparian areas has resulted in degradation of the water source and riparian zones.
- Vegetation conversion and woodland harvesting would result in an improvement of habitat for mule deer for the long-term.

The primary impacts to wildlife resources from regional development is the incremental habitat loss and fragmentation, animal displacement, impacts to the associated carrying capacities of native habitats, increased harassment, and impacts to critical habitats (e.g., riparian).

4.6.2.1 Impacts of the Proposed Action

The Proposed Action would result in both direct and indirect impacts to wildlife resources and their associated habitats. The degree of impact would depend on the relative sensitivity of the species, the resource issue, the duration of the activity, and the period of disturbance. The Proposed Action would result in the short-term habitat loss and long-term habitat changes to 1,450 acres of native habitat, with 1,316 acres reclaimed and 134 acres not reclaimed for post-mining use. Approximately 595 acres of woody vegetation (i.e., piñon-juniper, mixed shrub, and mountain mahogany) would be disturbed, affecting breeding birds. Direct and indirect impacts would result in loss or disturbance to forage, breeding areas, and thermal cover; animal displacement; habitat fragmentation; increased disturbances; and possible mortalities.

A total of 1,450 acres within a 295,000-acre crucial mule deer winter range would be affected, including the short-term loss of winter forage and thermal cover, displacement, and habitat fragmentation. Some impacts to deer migration may result, although movements should be relatively undisturbed. The potential for vehicle-related mortalities would increase slightly. The primary impacts to resident mule deer would be the short-term loss of summer range, potential impacts to available water access, and indirect impacts from increased human presence.

Indirect impacts to upland game bird brooding and nesting habitats would occur near Cherry Spring, particularly the available forage and cover for sage grouse during the spring and summer seasons. Existing adits in the Proposed Action area would be affected; however, bat surveys would be conducted prior to disturbance. Wildlife mortalities from cyanide ingestion could occur if barriers were compromised.

No impacts to wildlife from degradation of existing water quality is anticipated from the Proposed Action. Potential reduction in water flow has been identified for Cherry Spring, due to the placement of the East Sage waste rock dump. Cherry Spring's flow could be seasonally reduced from the waste dump covering a portion of the spring's recharge area.

Hazardous waste materials transported within Huntington Valley could result in a low probability for a release into a riparian area, possibly affecting aquatic and terrestrial species. The probability of a hazardous materials release of sodium cyanide, hydrochloric acid, or diesel fuel was calculated for a sensitive resource or receptor (i.e., riparian drainage) along the identified transportation routes. Although a number of variables would determine the severity of the impact from a spill or release, the potential impacts to wildlife resources were determined to be low, based on the spill probability, percentage of sensitive resources crossed by the transportation corridors, and established emergency response plan.

4.6.2.2 Impacts of Interrelated Projects

Within the cumulative effects area, an estimate of the total vegetation types affected by interrelated projects (past, present, and reasonably foreseeable future actions) was calculated. The affected acreage was 24,985 acres. Of this total, 16,834 acres of big sagebrush, 7,637 acres of piñon-juniper woodland, 470 acres of mixed shrub, and 44 acres of low sagebrush were impacted by all interrelated projects (see Vegetation Resources).

Mining. Historic mining in the Buck and Bald Mountain area between 1869 and 1956 resulted in a loss of discrete areas of native habitats, resulting in a relatively small amount of disturbance with increased habitat fragmentation. Past and present mining activities (permitted disturbance) will ultimately affect a total of 3,372 acres (including the permitted 69-kV transmission line), with 2,951 acres reclaimed. Therefore, these projects would permanently remove 421 acres of native habitat for wildlife. Within the cumulative effects area, seven future mining-related projects (including the Top Area Conveyor) could proceed with development over the next 9 years (excluding reclamation). The estimated habitat disturbance from these projects would total approximately 633 acres with 495 acres being reclaimed and the remaining 138 acres not reclaimed. Overall impacts to wildlife resources from these seven projects would parallel those described for the Proposed Action. The potential Top Area Conveyor could result in additional impacts, particularly to mule deer, due to its linear configuration that is 3 miles in length.

Habitat fragmentation is applicable to the same vegetation communities identified for the Proposed Action, extending from the existing White Pine Mine south to the Yankee Mine. Fragmentation tends to increase animal displacement, which may result in exceeding the adjacent habitat carrying capacity. Other impacts to fisheries and wildlife from these activities have paralleled those described for the Proposed Action (e.g., increased human presence, harassment, noise).

Oil and Gas. Past and present oil and gas exploration has affected a total of 140 acres of habitat. Impacts to wildlife from this activity are similar to those experienced from mining exploration, being more dispersed than mining operational effects. Primary impacts are from further habitat fragmentation, increased human presence, and animal displacement. Potential future oil and gas exploration would disturb an estimated 338 acres, which would all be reclaimed. The potential for drilling activities is higher in Newark and Long Valleys than it is within the surrounding mountain ranges. Impacts to wildlife would likely be short-term, based on the habitat types and areas likely to be disturbed. However, certain sensitive resources are located throughout these valleys, such as raptor nests, waterfowl use areas, sensitive springs, and active sage grouse leks. Location, duration, and associated human presence in and near these areas could affect these sensitive resources. Additional discussion on this issue is presented for Threatened, Endangered, or Candidate Species.

Land Management. Bureau of Land Management land management practices within the Buck and Bald Mountain area include range improvement, vegetation conversion, and harvesting of woodland products. These activities have affected a total of 20,502 acres, and may alter habitat types, but typically do not remove them from potential use. The 19,500 acres that are reclaimed (i.e., improved and converted) do not generally support the vegetation types originally disturbed, since the primary objectives of the management and enhancement activities are to modify the existing environment. Therefore, these areas are generally still available for wildlife use, but the species diversity and composition changes.

Ruby Lake. The ongoing activities at the Ruby Lake National Wildlife Refuge manage a number of aquatic and terrestrial species.

Summary. In summary, of the 24,985 acres of permitted disturbance for interrelated projects within the cumulative effects area, 24,312 acres would be ultimately reclaimed and 673 acres would not be reclaimed. This 673 acres would be considered a long-term resource loss for wildlife.

The remaining 24,312 acres would be considered a short-term loss or habitat disturbance and a long-term change in vegetation communities. Effects from the removal of piñon-juniper or mountain mahogany woodlands would be considered a long-term impact.

4.6.2.3 Combined Effects

The total acreage potentially affected by both the Proposed Action and interrelated projects would be 26,435 acres. Of those 26,435 acres affected, 15,556 acres would be reseeded and improved, 3,944 acres would be converted to enhance forage availability, and 1,002 acres would be harvested for piñon-juniper (i.e., woodland products). Therefore, the remaining 5,933 acres would be disturbed by mining activities, oil and gas exploration, and proposed transmission line construction within the cumulative effects area. Of these 5,933 acres, 807 acres would not be reclaimed, resulting in a long-term loss of wildlife habitat, equalling approximately 0.2 percent of available acreage within the cumulative effects area. The 20,502 acres of habitat disturbed by either reseeding, converting, or harvesting, equals 6 percent of the available habitat within the cumulative effects area. This acreage is still capable of supporting wildlife use, but species composition and densities would change.

The amount of surface disturbances from the past, present, proposed, and future projects would affect area wildlife and their associated habitats. Many of the cumulative effects anticipated from these activities would parallel those described for the Proposed Action. The following discussion outlines a more detailed analysis, relative to specific issues pertinent to cumulative effects.

Mule Deer. The overall range condition within portions of the cumulative effects area has degraded as a result of high levels of grazing, in addition to current drought conditions, resulting in increased competition and poor forage availability. This resource deterioration has primarily been caused by heavy grazing pressure from livestock and wild horses, damaging the ecological status of the major plant communities and reducing associated carrying capacities for wildlife resources. In addition, the drought conditions occurring within the western United States during the last decade have compounded the problem of plant regeneration. These conditions vary between allotment and between the United States Forest Service and Bureau of Land Management lands, but the trend has limited available forage for mule deer, particularly affecting browse species on both the summer and winter ranges. Lack of available browse is believed to correlate with higher fawn mortalities recorded for the population (Bureau of Land Management 1989).

The population trend for the Ruby Deer Herd over the last 10 years showed an increase in deer numbers in the late 1980s followed by a downward trend. Winter fawn loss in the Ruby population in 1993 was 70 percent, increasing from a previous 5-year average mortality rate of 38 percent. These losses were attributed by the Nevada Division of Wildlife to 6 years of drought and overgrazing by livestock and wild horses. In addition, heavy snows forced the complete migration of the herd into the designated crucial winter range. While weather plays an important role in the annual population fluctuations, quality and quantity of habitat are key to the long-term stability of the herd (Nevada Division of Wildlife 1984-1994).

While present mining levels have not eliminated substantial areas of mule deer seasonal ranges, the increased activity and habitat fragmentation have displaced domestic livestock and wild horses into adjacent areas. This displacement concentrates all large herbivores into already marginal range affected by drought and overuse to compete for a decreasing forage base. With degraded seasonal ranges, spring and summer forage may not provide the succulent grasses and forbs essential for lactating does, resulting in a lowered fawn survival rate. Also, forcing mule deer into marginal winter range with inadequate browse would result in increased deer mortalities, particularly for overwintering fawns. These effects would be magnified during both drought periods and heavy snow accumulations.

Key browse species, especially bitterbrush, have been exhibiting the results of prolonged drought conditions. Browse production and vigor has been poor within the cumulative effects area. Because of the severity of the resource damage, the Bureau of Land Management issued a Notice of Full Force and Effect Final Multiple Use Decision for a grazing allotment in the cumulative effects area in an attempt to improve range condition and forage availability by decreasing the number of livestock and wild horses within the allotment.

Although deer mortalities have not been an issue along existing haul roads, hazards to deer moving across the South Water Canyon haul road have been recorded. An increase in roads and vehicles from cumulative activities would increase the risk of vehicle-related mortalities of mule deer and other area wildlife. Increased roads and human-related activities would contribute to animal displacement and habitat fragmentation. Poaching of wildlife also could increase, possibly indirectly affecting hunting opportunities. Poaching already occurs within the cumulative effects area, and although construction and operation workers are not necessarily predisposed to poaching, it may increase over present levels because: 1) construction transients may have little attachment or concern for the resources in the cumulative effects area; 2) there ***are three*** wildlife law enforcement agents assigned to ***portions of*** White Pine County; and 3) improved access into the cumulative effects area to relatively large populations of big game would attract other people to the area. Although anticipated impacts from poaching cannot be quantified, the current issue is expected to be compounded.

The crucial winter range designated for the Ruby Deer Herd totals 295,000 acres. The estimated cumulative impacts to vegetation types for the Proposed Action and interrelated projects totals 26,435 acres. However, the 3,944 acres that would be converted would improve habitat for deer, and the 1,002 acres harvested for piñon-juniper would remain available for deer use. Therefore, the remaining 21,489 acres of crucial winter range would be disturbed, equaling 8 percent of available winter range.

In summary, regional development, livestock and wild horse use, and increased human presence have cumulatively affected the availability of crucial winter range for the Ruby Deer Herd. Displacement, habitat fragmentation and increased disturbances to resident herds have resulted in loss of seasonal ranges, increased pressures on carrying capacities of adjacent habitat types, and effects to traditional migration routes and corridors between seasonal ranges. Summer range is limiting for resident mule deer, primarily because of the lack of available water. Therefore, the loss of summer range from expanded activities in the cumulative effects area could impact resident deer to a greater extent than the impacts to wintering deer.

The cumulative activities could restrict seasonal movement, limit transitional habitat, reduce crucial habitat, and increase the potential for direct effects to individuals, such as vehicle collisions, poaching, and harassment. Continued development of mining activities along an east-west orientation near Big Bald Mountain could impede mule deer migrational movements between their summer range in the Ruby Mountains and the crucial winter range located to the south, if future actions created a greater amount of disturbances surrounding Bald Mountain, forcing animals to circumnavigate around these activities. Finally, the Bureau of Land Management's Final Multiple Use Decisions for specific allotments within the cumulative effects area would improve range conditions, resulting in a beneficial effect to mule deer.

Pronghorn. Cumulative activities within the preferred habitat of pronghorn is minimal, based on available habitat. Loss of forage and thermal cover would be limited; effects would include a small increase in the potential for vehicle-related mortalities and poaching.

Upland Game. Increased mining activities, road development, and human presence could adversely affect resident game birds, such as sage grouse, chukar, gray partridge, and mourning dove. Direct loss of nesting and brooding habitat in close proximity to water resources would be the most important impact to these species.

Neotropical Migrants. The estimated acreage of piñon-juniper woodland, mixed shrub, and mountain mahogany affected by the Proposed Action and interrelated projects would total 8,702 acres within the cumulative effects area. This loss of the woodland habitat would reduce the amount of nesting habitat for a number of bird species, including neotropical migrants. The amount of these three habitat types available equals 139,392 acres. Therefore, the estimated disturbance of 8,702 acres would remove approximately 6 percent of available woodland habitat within the cumulative effects area.

The Bureau of Land Management also proposes additional vegetation conversions to increase the diversity of plant species, increasing forage availability for certain wildlife species. The estimated amount of converted and cleared piñon-juniper ultimately to be removed by the Proposed Action and the interrelated projects totals 5,186 acres, which would affect an additional 4 percent of available woodland habitat.

Specifically, the Bureau of Land Management implemented a project in Mooney Basin, removing piñon-juniper woodland for vegetation conversion. The Nevada Division of Wildlife conducted subsequent bird surveys in May 1992 to compare bird communities within both converted and unaffected habitats, establishing four permanent survey plots, using the variable circular plot method. Only species presence was recorded. Incidental observations of birds also were recorded. All species observed are listed in Table B-12.

Although the number of species observed was greater in the converted area than in the unaffected area, habitat associations were somewhat apparent, as a few species fell out of each community type. For example, the mountain chickadee, a forest-obligate, was observed in the unaffected habitat, but not in the converted habitat. Likewise, the Brewer's sparrow, a species that uses open, shrubby habitat, was observed in the converted area, but not in the unaffected piñon-juniper woodland.

As identified by the Nevada Division of Wildlife for these survey results, a complete survey of bird communities for comparing converted versus unaffected or natural habitats should be conducted in all seasons to assess year-round

Table B-12

Nevada Division of Wildlife Avian Presence/Absence Surveys
Mooney Basin Vegetation Conversion Project

	Converted Clearings	Piñon-Juniper Woodland
American kestrel	X	X
Broad-tailed hummingbird	X	
Common flicker	X	X
Pinyon jay		X
Western wood pewee	X	X
Gray flycatcher	X	
Raven	X	X
Rock wren	X	
Plain titmouse	X	X
Bushtit	X	
Mountain chickadee		X
Mountain bluebird	X	X
House finch		X
Green-tailed towhee	X	X
Chipping sparrow	X	
Brewer's sparrow	X	
Brown-headed cowbird	X	X
Number of Species Observed	14	11

species' compositional changes. In mid-May some species may have been migrants. For brief periods during migration, many species use a variety of habitats not typically used on breeding grounds. Broad-tailed hummingbirds, rock wrens, and western wood pewees fall into the category of such migrants, and all three species were observed in the converted but not in the unaffected areas. As discussed, these species would not typically nest in open shrubland.

Raptors. Potential impacts to breeding raptors (e.g., Cooper's hawk, red-tailed hawk, great-horned owl) from increased development could include habitat loss of piñon-juniper woodland and disturbance activities within close proximity to a nest site, possibly resulting in nest abandonment. Habitat losses also would affect foraging areas for some species. Potential impacts to the ferruginous hawk, bald eagle, and peregrine falcon are discussed for Threatened, Endangered, or Candidate Species.

Biodiversity. The cumulative analysis for wildlife resources for the Proposed Action relative to the interrelated projects emphasizes the overall effects to habitat availability and biological diversity within the region. Biological diversity or "biodiversity" has become a focus of land management agencies throughout the United States. However, it is a difficult concept to incorporate into management decisions and planning programs. In an effort to clarify biodiversity goals and objectives, the Council on Environmental Quality published a guide to incorporate biodiversity considerations into an environmental impact analysis (Council on Environmental Quality 1993).

Biodiversity is often misunderstood. In the past, it was often believed that increasing the diversity (i.e., numbers of species) within a certain area or habitat type would increase the biodiversity. However, the number of species is the "species richness," and this measurement does not consider the issues of ecosystems and genetic diversity, generally treating all species alike, whether native or introduced, common or rare. In fact, managing for maximum diversity may actually decrease the natural biodiversity. An example would be small, habitat disturbances that create increased "edge." This often increases the species' diversity or richness, but may attract opportunistic, "weedy" species that outcompete endemic species at risk, affecting the integrity of the system.

In certain cases, the alteration of habitats may mimic natural occurrences, such as fire, wind, and drought. If these occurrences are integrated naturally, then one can assume that the biodiversity of an area would not be jeopardized.

The loss of biodiversity is currently recognized as a primary concern that may have profound ecological and economic consequences. If effects on biodiversity are to adequately assessed, the analysis of effects to the biological system must be conducted on an ecosystem or regional scale, taking into account cumulative effects. General principles outlined by the Council on Environmental Quality (1993) emphasize: ecosystem management, minimization of habitat fragmentation, native species, unique or ecologically important species and environments, natural processes, genetic diversity, flexibility, and monitoring for effects.

Human Presence. Indirect effects to area wildlife from past, present, and future actions would result from increased human presence and activities in the cumulative effects area. Effects to high-profile species is proportional to the increase in human presence, land use and recreation demands, and other associated development and activities in the region. Therefore, direct and indirect effects to wildlife from increased human presence in the future would include vehicle-mortalities, off-road vehicle use, increased legal and illegal hunting, noise effects, and harassment. The most visible wildlife species would be the most prone to these types of effects.

The use of off-road vehicles during recreational activities could result in increased wildlife harassment and physiological stress, breeding disturbance, and habitat degradation for resident and migratory species, particularly for future actions. Additional hunting pressure would occur, and poaching or illegal shooting would increase in the cumulative effects area.

Water Quality and Quantity. The Ruby Lake National Wildlife Refuge located along the northern portion of the cumulative effects area is critical to a number of both resident and migratory wildlife species. No cumulative activities have been identified that may directly affect this resource, other than increased human use of the area. More importantly, cumulative activities could indirectly effect the birds dependent on the refuge. Accessibility to toxic solutions associated with mining or oil and gas activities could result in bird mortalities. However, State regulations protecting wildlife species from toxic solutions went into effect in 1990. In the event protection systems failed and cyanide waters become available for bird consumption, potential impact for future projects would be important during migration, as large numbers of birds move through the Great Basin and northeastern Nevada.

Riparian. Riparian loss is a critical issue throughout Nevada. Habitat components that would be primarily affected by riparian loss include breeding, foraging, and cover habitat; available water; and loss of both vertebrate and invertebrate species dependent on free water and riparian vegetation.

No effects to riparian or wetland areas have been identified for either the Proposed Action or the interrelated projects. However, impacts to water resources may result from the implementation of the reasonably foreseeable future actions. Direct or indirect effects to water quality or water quantity could affect these resources and the aquatic and terrestrial resource dependent on them.

4.7 THREATENED, ENDANGERED, OR CANDIDATE SPECIES

4.7.1 Cumulative Effects Area and Characteristics

The cumulative analysis for sensitive species includes Federally listed and Federal candidate species that occupy the appropriate cumulative effects areas, allowing for higher mobility of some species such as mammals and birds. Table B-13 lists the sensitive species that may occur within these cumulative effects areas.

Birds. A number of sensitive bird species use the Ruby Lake National Wildlife Refuge for nesting, foraging, and resting. Wintering bald eagles frequent the refuge, particularly before the water freezes near the end of November. One bald eagle consistently overwinters at the refuge, often occupying a historic eagle roost commonly used by wintering birds (Mackay 1995). Wintering eagles also occur throughout the cumulative effects area, particularly within the valleys. A historic eagle roost also is located west of Newark Lake.

Table B-13

Threatened, Endangered, or Candidate Wildlife Species Identified for the Cumulative Effects Area

Common Name	Scientific Name	Federal Status[1]	Regional Occurrence[2]
BIRDS			
American peregrine falcon	*Falco peregrinus anatum*	E[3]	R, M
Arctic peregrine falcon	*F. p. tundrius*	E[4]	M
Bald eagle	*Haliaeetus leucocephalus*	E[3]	W, M
Northern goshawk	*Accipiter gentilis*	C2	R
Ferruginous hawk	*Buteo regalis*	C2	R, M
Black tern	*Chlidonias niger*	C2	R, M
White-faced ibis	*Plegadis chihi*	C2	R, M
Western snowy plover	*Charadrius alexandrinus nivosus*	C3C	R, M
Least bittern	*Ixobrychus exilis hesperis*	C2	R, M
Trumpeter swan	*Cygnus buccinator*	C2	R, M
Western burrowing owl	*Athene cunicularia hypugea*	C2	R, M
MAMMALS			
Spotted bat	*Euderma maculatum*	C2	R
Small-footed myotis	*Myotis ciliolabrum*	C2	R
Long-eared myotis	*M. evotis*	C2	R
Fringed myotis	*M. thysanodes*	C2	R
Long-legged myotis	*M. volans*	C2	R
Townsend's big-eared bat	*Plecotus townsendii*	C2	R
Pygmy rabbit	*Branchylagus idahoensis*	C2	R
Sierra Nevada red fox	*Vulpes vulpes necator*	C2	R
North American wolverine	*Gulo gulo luscus*	C2	N
AMPHIBIANS			
Spotted frog	*Rana pretiosa*	C1	R
FISH			
Newark Valley tui chub	*Gila bicolor newarkensis*	C2	R
Relict dace	*Relictus solitarius*	C2	R

Table B-13 (Continued)

Common Name	Scientific Name	Federal Status[1]	Regional Occurrence[2]
PLANTS			
Nachlinger catchfly	*Silene nachlingerae*	C2	N/A[5]
Holmgren smelowskia	*Smelowskia holmgrenii*	3C	N/A

[1]E = Endangered: A species in danger of extinction throughout all or a significant portion of its range.

T = Threatened: A species likely to become endangered within the foreseeable future through all or a significant portion of its range.

C1 = Candidate - Category 1: A species that will likely be Federally listed as threatened or endangered, but has been precluded by other listing activity. Federal listing is anticipated.

C2 = Candidate - Category 2: A species that may be listed as Federally threatened or endangered, but conclusive biological data to support this listing are not currently available.

[2]Regional occurrence encompasses portions of Ruby, Newark, and Long Valleys:
R = resident
M = migrant
W = wintering

[3]Proposed to be downlisted to Federally threatened. Decision is pending.

[4]Proposed to be delisted. Decision is pending.

N/A = Not applicable.

The Nevada Division of Wildlife conducted a peregrine falcon hacking program near Ruby Lake National Wildlife Refuge that released 27 birds over a 4-year period (Mackay 1995; Bradley 1995). However, the last documented peregrine sighting at the refuge occurred in 1990 (Mackay 1995). Considering the nesting and foraging habitat available for peregrine falcons, it is unclear why breeding birds do not occupy this area of the southern Ruby Mountains.

Important water birds include the trumpeter swan, which nests and winters at the refuge. The black tern, least bittern, and white-faced ibis nest at the refuge and also occur at Newark Lake in southern Newark Valley. A sandhill crane pair has been documented nesting in northern Newark Valley. No nesting record for the western snowy plover has been documented at the refuge, although breeding birds occur at Franklin Lake to the north (Mackay 1995).

The Nevada Division of Wildlife has identified the Egan Resource Area as the most important resource area within the State for ferruginous hawks, with Newark Valley supporting the greatest number of breeding pairs. This species inhabits Great Basin foothills, desert, and submontane elevations and occupies a variety of ecosystems within these zones. Associated habitats include sagebrush/grass, piñon/juniper, saltbush/grass, blackbrush, grassland, barren, marsh, mesic meadow, and riparian communities (Dalton et al. 1990).

The ferruginous hawk nests on trees, promontory points, cut banks, or on the ground. Preferred breeding habitat is scattered juniper trees at the interface between the piñon-juniper and desert shrub communities that overlook broad valleys. Two prominent ferruginous hawk nesting areas occur west of Buck Mountain in Newark Valley and east of Alligator Ridge in Long Valley. Up to 4 and 5 nests can occur within a breeding territory within these areas.

The primary prey species of the ferruginous hawk in this area of Nevada is the Townsend's ground squirrel. Ferruginous hawk nestlings typically fledge by mid-July, as the ground squirrels enter aestivation. In response to the decreasing food supply, the birds typically migrate out of the cumulative effects area by August 1.

The ferruginous hawk has experienced a sharp population decline within the last decade in this area of Nevada. A nesting study conducted by the Bureau of Land Management in 1981 and 1982 identified 32 occupied ferruginous hawk nests in Ruby, Newark, and Long Valleys. In 1988, 14 occupied nests were documented in the same valleys, a 56 percent loss of breeding pairs from 1982. In 1994, 16 occupied nests were recorded.

The Northern goshawk may be observed in mountainous terrain near 9,000 feet during the warmer months and in the lower foothill and valley habitats during the winter. This species primarily nests within deciduous woodlands and would typically occur within piñon-juniper habitat only during migration. Although goshawks have been reported in the region, there are no known nesting sites in the cumulative effects area. Therefore, goshawk use of these areas would likely be limited to occasional occurrences.

Burrowing owls could occur within the low sagebrush and grassland habitats primarily within the valley systems. This species is dependent on mammal burrows for nesting.

Mammals. As shown in Table B-13, a number of sensitive mammal species have been identified for the cumulative effects area. The majority of these species are bats. Although limited information is available on some of these mammals, it is likely that many of them occur within the cumulative effects area. In addition to the species listed in Table B-13, the United States Fish and Wildlife Service identified one other mammal, the North American wolverine, which typically inhabits high elevation habitats. A nonfossilized skull was previously discovered near the Utah border in White Pine County, but this species has not been reported within the cumulative effects area.

Amphibians. The spotted frog has been documented in Green Mountain Creek, north of Harrison Pass (Ports 1995), and may occur in Willow Creek and Huntington Creek (United States Forest Service 1992). This species typically occupies open, perennial water, breeding in the surrounding ephemeral pools (Ports 1995).

Fish. Two sensitive fish species occur within the cumulative effects area. The relict dace is native to Ruby Lake. This species population is declining within the lake, possibly from predation from largemouth bass and hybridization with the non-native Lahontan speckled dace (Mackay 1994). The Newark Valley tui chub is known to occur in specific springs in Newark Valley.

Plants. Two sensitive plant species occur within the cumulative effects area. Based on the Nevada Natural Heritage Program data, known populations of the Federal candidates Holmgren smeloskia and Nachlinger catchfly occur within and immediately north of the cumulative effects area.

Documented populations of Holmgrem smeloskia occur in the northwestern corner of the cumulative effects area, near Sherman Mountain and Walker and Willow Creeks. This species is typically located on cliffs and talus of schist and crevices in calcareous rocks at elevations between 6,500 to 11,000 feet (Mozingo and Williams 1980). Potential habitat for the Nachlinger catchfly is present in the northwestern portion of the cumulative effects area, characterized by rocky limestone slopes or outcrops in association with piñon.

4.7.2 Cumulative Impacts

The assumptions used in the cumulative impact analysis are the same as those described for Wildlife and Fisheries Resources.

4.7.2.1 Impacts of the Proposed Action

No direct impacts were identified for the bald eagle, peregrine falcon, ferruginous hawk, Sierra Nevada red fox, or spotted frog. Potential impacts were discussed relative to the western burrowing owl, the sensitive bat species identified for the project, and the pygmy rabbit.

Potential short-term loss of foraging habitat for wintering bald eagles was discussed, relative to the risk associated with a hazardous materials release along the proposed transportation corridors. The risk of a potential diesel fuel, hydrochloric acid, or sodium cyanide release into a riparian area in Huntington Valley was calculated. The probability was determined to be low, based on the shipment frequency, extent of riparian areas crossed, and emergency spill response plan.

No documented populations of sensitive plant species are known to occur within the Proposed Action area. The nearest known population ***of the Nachlinger catchfly*** is located more than 15 miles north of the Proposed Action area. ***Although*** potential habitat for the Nachlinger catchfly may be affected ***in the Top Area, it is unlikely that the Nachlinger catchfly occurs in this area, based on elevational records.***

4.7.2.2 Impacts of Interrelated Projects

The potential effects that would result from interrelated projects would be specific to the sensitive species identified, its location, planned activities, and duration. Primary impacts relative to the cumulative effects area would be more likely to occur for the ferruginous hawk, a prominent raptor, and resident bat species that could occupy abandoned underground openings.

Effects to the Holmgren smeloskia or Nachlinger catchfly may occur if proposed disturbances are located within known populations or potential habitat.

4.7.2.3 Combined Impacts

Effects to breeding or migrating peregrine falcons would not be anticipated. If future projects were to affect riparian sources, such as North Water Canyon, potential foraging habitat for this species could decrease. Potential impacts to wintering bald eagles would parallel that for the peregrine falcon. Possible indirect effects to eagle roosts or riparian habitat could be affected by future oil and gas development or increased human uses of the cumulative effects area, depending on the resource location relative to the activities.

No nesting habitat for the northern goshawk occurs in the cumulative effects area. The limited use of piñon-juniper woodland during migration would not warrant concern.

The decline of the ferruginous hawk within the western United States has been attributed to increased human disturbances, affecting the species' reproductive success, and to habitat alteration, resulting in decreased prey base and nest site opportunities. The ferruginous hawk is particularly susceptible to disturbance during the courtship and incubation periods, which can cause nest abandonment. The population decline of the ferruginous hawk in the cumulative effects area can be attributed to increased human presence, including recreation activities, livestock grazing, oil and gas exploration, and mining development.

Potential impacts to the trumpeter swan, black tern, white-faced ibis, western snowy plover, and western least bittern would be relative to activities in and near nesting areas in Ruby and Newark Valleys. The potential for mortalities from cyanide poisoning would be the same as that described for Wildlife Resources.

The potential for effects to the relict dace and Newark Valley tui chub would be dependent on the activity and relative location.

Impacts to the western burrowing owl would depend on the location of proposed activities to a nest site. Oil and gas exploration and development in the valley bottoms would be the most likely activity to affect this species.

Impacts to sensitive bat species would likely be indirect rather than direct effects, based on the existing State policy to survey existing adits, shafts, or other underground openings prior to closure. Impacts to the pygmy rabbit and the Sierra Nevada red fox would depend on project location relative to potential habitats. Impacts may occur as a result of project development if the appropriate habitat types were disturbed by future actions.

The spotted frog will likely become Federally listed in the near future. It is known to occur in the cumulative effects area within the appropriate habitat types. If future projects were to affect perennial water sources that support this species, it would be directly affected.

Impacts to the two sensitive plant species would depend on the location of future projects relative to potential habitat for these species. Impacts may occur as a result of project development if the appropriate habitat types were disturbed by future actions.

4.8 WILD HORSES

4.8.1 Cumulative Effects Area and Characteristics

The cumulative effects area for wild horses is essentially the Buck and Bald Herd Management Area. However, animals typically move between the Buck and Bald, Butte, and Maverick-Medicine Herd Management Areas. Both the Buck and Bald and Butte Herd Management Areas are shown on Map B-9.

Based on past wild horse censuses, it is apparent that wild horses moved into the Butte Herd Management Area from the Buck and Bald Herd Management Area, exceeding the Appropriate Management Levels established by the Bureau of Land Management for both herd management areas. To achieve the Appropriate Management Level goals, 347 wild horses were removed from the Buck and Bald Herd Management Area in 1986, 338 in 1989, and 562 in 1994. An additional 70 wild horses were removed in 1994 off of the Butte Herd Management Area. Of the 11 grazing allotments associated with the Buck and Bald Herd Management Area, the Appropriate Management Levels have been determined for 7 of them, totaling 346 wild horses. Of the 6 grazing allotments associated with the Butte Herd Management Area, the Appropriate Management Levels have been determined for 3 of them, totaling 76 wild horses.

4.8.2 Cumulative Impacts

Basic assumptions used in the impact analysis for wild horses include the following:

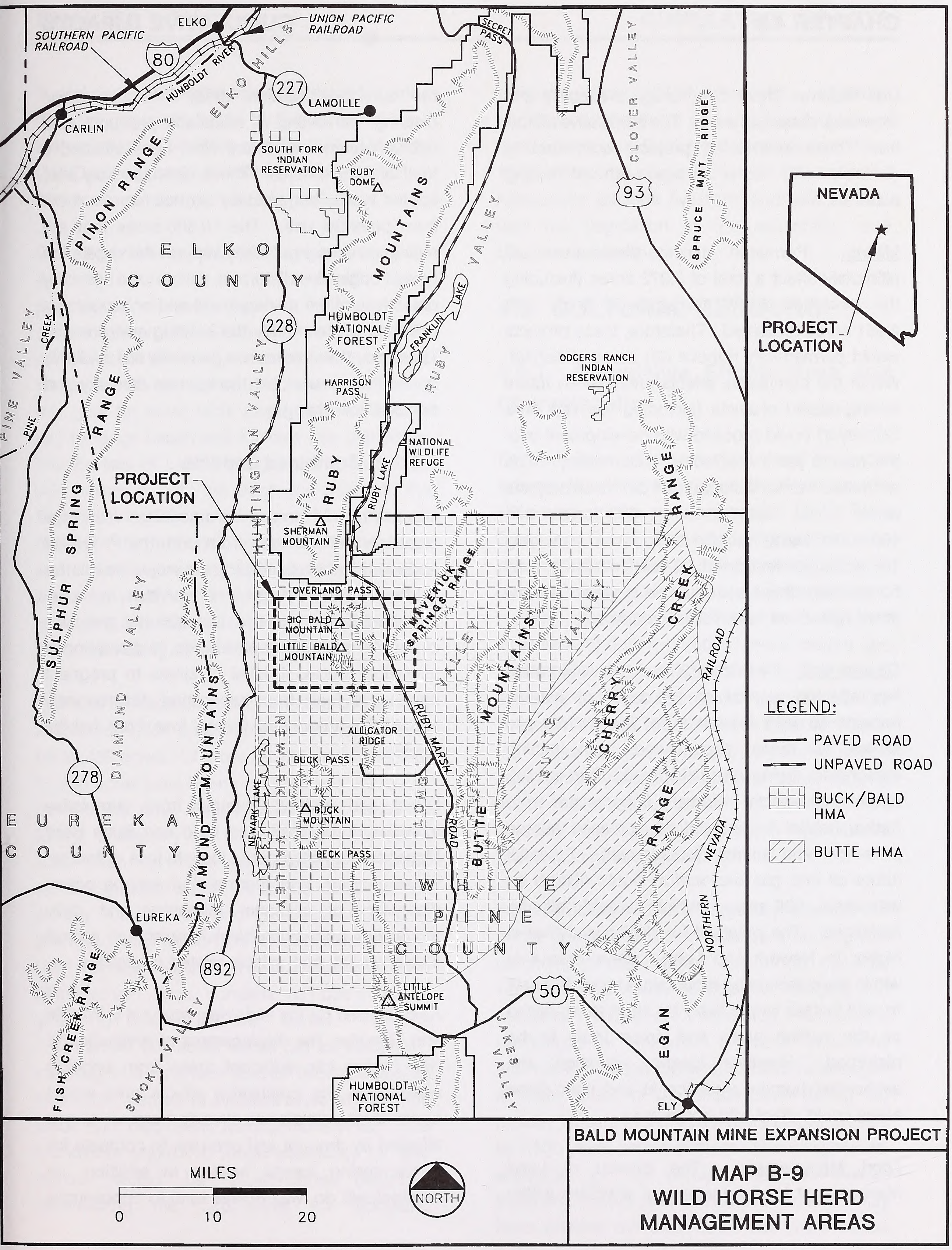
- Human use of the cumulative effects area will continue to increase with or without the Proposed Action.
- Increased human uses would result in increased habitat fragmentation and disturbance.
- Livestock and wild horse use of riparian areas has resulted in degradation of the water source and riparian zones.
- Vegetation conversion and woodland harvesting would result in an improvement of habitat for wild horses for the long-term.

4.8.2.1 Impacts of the Proposed Action

Impacts to wild horses from the Proposed Action are expected to be low. Short-term and long-term impacts encompassed disturbance, displacement, possible injuries, and a small amount of habitat loss. The competition among wild horses, livestock, and wildlife for available forage, water, and cover was evaluated, relative to the Bureau of Land Management's recent allotment decisions and range modifications (Bureau of Land Management 1994a). The estimated acreages potentially lost coincide with that described for Wildlife Resources.

4.8.2.2 Impacts of Interrelated Projects

The primary impacts to wild horses from interrelated projects would be the relative loss of habitat, forcing animals into a smaller range area. These habitat acreages would be the same as those described for Wildlife Resources. Habitat



BALD MOUNTAIN MINE EXPANSION PROJECT

MAP B-9
WILD HORSE HERD MANAGEMENT AREAS

loss includes impacts to forage availability and thermal and escape cover. The cumulative effects from these interrelated projects continued to diminish wild horse range with increasing activities.

Mining. Permitted mining disturbance will ultimately affect a total of 3,372 acres (including the permitted 69-kV transmission line), with 2,951 acres reclaimed. Therefore, these projects would permanently remove 421 acres of habitat. Within the cumulative effects area, seven future mining-related projects (including the Top Area Conveyor) could proceed with development over the next 9 years (excluding reclamation). The estimated habitat disturbance from these projects would total approximately 633 acres with 495 acres being reclaimed and the remaining 138 acres not reclaimed. Overall effects to wild horses from these seven projects would parallel those described for Wildlife Resources.

Oil and Gas. Permitted oil and gas exploration has affected a total of 140 acres of habitat. Impacts to wild horses from this activity are similar to those experienced from mining exploration, being more dispersed than mining operational effects. Primary impacts are from further habitat fragmentation, increased human presence, and animal displacement. Potential future oil and gas exploration would disturb an estimated 338 acres, which would all be reclaimed. The potential for drilling activities is higher in Newark and Long Valleys than it is within the surrounding mountain ranges. Impacts to wild horses would likely be short-term, based on the habitat types and areas likely to be disturbed. However, location, duration, and associated human presence in and near these areas could affect wild horse use.

Land Management. The Bureau of Land Management land management practices within the cumulative effects area, including range clearing, harvesting of woodland products, and habitat enhancement activities, have affected a total of 20,502 acres. These activities may alter habitat types, but typically do not remove them from potential use. The 19,500 acres that are reclaimed do not generally support the vegetation types originally disturbed, since the primary objectives of the management and enhancement activities are to modify the existing environment. Therefore, these areas are generally still available for wild horse use, but the species diversity and composition changes.

4.8.2.3 Combined Impacts

Impacts to wild horses from activities within the cumulative effects area from both the Proposed Action and interrelated projects would be relative to the: 1) level of project activities in areas occupied by wild horses, 2) additional presence of people and number of vehicles, 3) disruption of migration routes, 4) level of stress to pregnant mares and foals from associated disturbances, and 5) the amount of forage loss from habitat removal.

Direct and indirect impacts from cumulative activities in the Buck and Bald and Butte Herd Management Areas could include loss of forage, water sources, and thermal and escape cover; disruption of seasonal migratory and daily movement routes; physical harassment; animal displacement; and vehicle-related mortalities.

As discussed for the mule deer analysis in Wildlife and Fisheries, the displacement of livestock and wild horses into adjacent areas from ongoing activities in the cumulative effects area would concentrate animals into already marginal ranges affected by drought and overuse, to compete for a decreasing forage base. In addition, as livestock will do, wild horses tend to concentrate in and damage riparian areas, particularly during drought. However, based on the Bureau of Land Management's Full Force and Effect Final Multiple Use Decision, range conditions in the cumulative effects area are expected to improve.

One of the Bureau of Land Management's goals with wild horses is to maintain wild horse populations at levels that are balanced with natural resources. Since wild horses directly compete with livestock and wildlife for resources present in the cumulative effects area, achieving this goal for reasonable population numbers is key to range health and multiple use objectives. The Bureau of Land Management's removal of wild horses in both the Buck and Bald and the Butte Herd Management Areas in 1994 will decrease the amount of pressure on the range and riparian areas. With additional range available, wild horses would be able to avoid additional activities within the cumulative effects area, minimizing stress to individuals.

The total acreage potentially affected by both the Proposed Action and interrelated projects would be 26,435 acres. Of those 26,435 acres affected, 15,556 acres have been reseeded and improved, 3,944 acres have been converted to enhance forage availability for wildlife, and 1,002 acres have been harvested for piñon-juniper. The remaining 5,933 acres would be disturbed by mining activities, oil and gas exploration, and proposed transmission line construction within the herd management area. The Buck and Bald Herd Management Area contains 627,030 acres of year-long habitat for wild horses. Of the 5,933 acres, 807 acres would not be reclaimed, resulting in a long-term loss of habitat equalling less than 1 percent of available acreage within the Buck and Bald Herd Management Area. The cumulative impact to range availability for wild horses would be 21,489 acres disturbed (subtracting the 1,002 acres for woodland harvesting and 3,944 acres for vegetation conversion), affecting 3 percent of available range in the Buck and Bald Herd Management Area. The 3,944 acres converted would be fenced to temporarily exclude livestock and wild horses, until the vegetation in the conversion area becomes established.

4.9 CULTURAL RESOURCES

4.9.1 Cumulative Effects Area and Characteristics

The cumulative effects area for cultural resources extends from immediately south of the Yankee Mine north to the southern portion of the Ruby Range and Ruby Valley, east to the western edge of Long Valley, and west to the eastern portion of Newark Valley. This area has a long history of human occupation and was probably first inhabited 11,000 to 10,000 years before the present (Peterson and Stoner 1991). The earliest evidence of human occupation recorded to date in eastern Nevada is Smith Creek Cave, located in the Snake Range east of the cumulative effects area, which yielded radiocarbon dates ranging from 11,680 before present to 9,940 before present (Pre-Archaic period) in the lowest occupation level (Bryan 1979).

Archaeological evidence suggests prehistoric use of the cumulative effects area by a hunting and gathering or subsistence culture (or cultures) whose mobile lifeway of extensive foraging and seasonal migration remained essentially unchanged for thousands of years. Lacustrine and marsh-oriented subsistence patterns emerged in many areas of the Great Basin during the moister climate found 4,000 years before present to 1,500 years before present. Numic speakers, ancestors of the modern Northern Paiute, Southern Paiute, and Western Shoshone, may have entered the area about 900 years before present, bringing new projectile point forms, brownware ceramics, and distinctive basketry. An excavated cultural site located immediately south of the cumulative effects area at Buck Mountain in the Newark Valley contained brown ware ceramics, grinding stones, worked bone, basketry, and cordage. The site may have been occupied intermittently from 5,000 years before present to as late as 900 years before present (Young 1988).

At the time of Anglo entry into the area, the region was occupied by Numic-speaking Western Shoshone. The Shoshone migrated into the area approximately 700 to 800 years before present (Price 1983). The Western Shoshone were gatherers and hunters moving often to take advantage of seasonally available resources. Immediate family was generally the only residential and economic grouping present throughout the majority of the year. Larger groups, which usually included related families, would assemble during the fall and winter, often near the piñon-juniper zone where fuelwood for cooking and heating and food supplies were available (Young 1988). Major Shoshone villages were located around the edge of the Ruby Valley to the north (Price 1983).

The incursion of European and American explorers into the area is documented as early as 1827 when Jedediah Smith passed south of the Proposed Action area on his return from California (Young 1988). Captain James H. Simpson led a military exploration expedition through this area in 1859, following roughly what is now the route of United States Highway 50 (Young 1988).

Portions of the Pony Express Trail, which is designated as a National Historic Trail, are located along the southern edge of the Ruby Mountains in the Overland Pass area. The route the trail follows was pioneered by Major George Chorpenning Jr., in 1858, for use by both the Pony Express and the Overland Stage. Pony Express and stage stations were located along the trail approximately 8 to 12 miles apart. Stations located in the Bald Mountain area included Jacob's Well Station on the west side of the Huntington Valley and the Ruby Valley Station, which was located south of the National Historic Landmark of Fort Ruby in the Ruby Valley. Fort Ruby was established in 1862 to protect travelers on the Overland route from Indian raids. The Ruby Valley Treaty was signed at Fort Ruby in 1863 by Shoshone leaders, including Chief Te-Moak of Ruby Valley. The fort was abandoned in 1869. The Mountain Spring Station, located in the Maverick Springs Range east of Bald Mountain, was used towards the end of the Pony Express in 1861 and as an Overland stage stopover (Bureau of Land Management 1994d). Mormon settlers were some of the first to develop ranching and agriculture in the region; mining booms in the mid to late nineteenth century turned Elko into a regional transportation hub with routes to Ely, Austin, Eureka, and Hamilton. The Elko to Hamilton stage line road which, ran north to south along the eastern side of the Newark Valley and west of Bald Mountain, can still be observed in the area.

In 1869, claims were staked in the Big and Little Bald Mountain areas for silver, copper, and gold mining. A small community named Joy was established in 1876 on the saddle between Big and Little Bald Mountains, the location of several of the mines in the area (Young 1988). Apparently insufficient capital and high transportation costs to mills prevented further development of the community either after the 1869 discovery or during the peak of activity in 1905 (Henderson 1978). Bald City, a mining town/camp, was located east of Joy and appears to have been established in the 1880s. Bald City failed to prosper and Joy became the leading community in the District. In 1897 Joy became the first recognized post office in the District, and it remained open off and on until 1918 (Mehls et al. 1994a). Mining remained a major activity in the District through World War I and World War II and continues to be a major activity in the area today.

Several sites in the area are related to the "Carbonari", Italian-Swiss immigrants who produced charcoal during the late 1800s to early 1900s from local piñon and juniper forests to supply local smelters in Eureka, Nevada. One site is located near Buck Mountain. The Carbonari clearcut the forests in generally a 45-mile radius surrounding the town of Eureka for wood for charcoal (Bureau of Land Management 1993).

4.9.2 Cumulative Impacts

It has been assumed that the typical cultural site density in various biotic zones is representative of site density in the cumulative effects area. Site-specific cultural resource inventories have not been conducted for reasonably foreseeable future actions.

4.9.2.1 Impacts of the Proposed Action

Between 1983 and 1994, about 18 cultural resource inventories were conducted in the Proposed Action area by the Bureau of Land Management, Western Cultural Resource Management, JBR Environmental Consultants, Retrospect Research, and Archeological Research Services. These inventories identified 190 sites in the area, including 6 sites eligible to the National Register of Historic Places; 7 sites judged eligible to the Register pending concurrence by the State Historic Preservation Officer; 7 sites judged eligible pending further evaluation; 110 judged ineligible pending State Historic Preservation Officer concurrence; and 60 sites that have been found ineligible to the Register.

Ten known cultural sites eligible or potentially eligible to the Register would be directly affected by the Proposed Action. These include six sites (46-7545, 46-7546, 46-7549, 46-7556, and 46-7559) in the proposed Horseshoe/Galaxy Mine area that are eligible to the Register pending State Historic Preservation Officer concurrence; and four sites (6869, 26Wp1682/046-2733, 046-7172, and 046-7168) in the proposed Top Modification area for which eligibility is pending. Ten known eligible or potentially eligible sites could be indirectly impacted by the Proposed Action through illegal collecting or erosion.

Inventories of the entire Proposed Action area have not been completed, including portions of the proposed processing area, the South Water Canyon waste rock dump and haul road, and the Proposed Top pit. It is not known how many cultural resources exist in these areas where cultural inventories have not been conducted. Under the draft Programmatic Agreement guidelines, these areas would be inventoried and mitigated as necessary.

4.9.2.2 Impacts of the Interrelated Projects

Any mining and other ground-disturbing activities could impact prehistoric and historic National Register of Historic Places-eligible sites within the cumulative effects area. As directed by law, cultural resource inventories would be conducted for any projects involving public lands, and impacts would be avoided or mitigated as applicable.

Cultural inventories required for the reasonably foreseeable future actions would add to the information base for cultural resources within the cumulative effects area. Compliance with sections 106 and 110 of the National Historic Preservation Act of 1986 would result in evaluation and mitigation plans for any significant properties identified during the inventories in the reasonably foreseeable future actions and also would increase the overall knowledge of cultural resources in the cumulative effects area. Direct impacts to cultural resources would be reduced under the provisions of the National Historic Preservation Act, which requires that cultural resources be considered in any Federal undertaking. Even with mitigation through data recovery, physical destruction of sites would still occur in the reasonably foreseeable future actions, and there would be a permanent loss of some cultural sites. Permanent loss of sites has also occurred within the areas disturbed by past and present actions. Indirect impacts, such as vandalism and illegal collecting, have and could occur to cultural resources through increased access and increased human presence, as a result of the reasonably foreseeable future actions and past and present activities.

Disturbance to traditional lifeway values of Native Americans and other ethnic groups from developments associated with past projects, present projects, and reasonably foreseeable future actions could occur if they have not been previously identified. Loss of piñon woodland through ground-disturbing operations could affect traditional piñon nut collecting by Native Americans. No Native American religious use areas have been currently identified within the cumulative effects area; however, consultation with the appropriate Tribal councils would be required under the American Indian Religious Freedom Act of 1978 prior to any future action taking place within the cumulative effects area.

The majority of the cumulative effects area is located in a biotic zone referred to as piñon-juniper woodland or mid-elevation. The ratio of cultural sites in piñon-juniper/mid-elevation areas or moderate cultural resource potential areas, as identified through previous inventories is generally 1 site per 15 acres inventoried. The ratio of National Register of Historic Places-eligible sites recorded during archaeological inventories in mid-elevation areas have been identified as approximately 1 significant or National Register of Historic Places-eligible site per 75 acres inventoried. The Bald Mountain Mining District lies within a zone with moderate potential for prehistoric and historic properties. Mahoney Canyon contains the Mahoney Canyon Quarry with a moderate potential for prehistoric properties (Bureau of Land Management 1993).

The remainder of the cumulative effects area generally lies in low cultural resources potential zones in lower elevations or non-piñon-juniper areas. These zones generally contain cultural site densities of approximately 1 site for every 65 acres inventoried and 1 significant or National Register of Historic Places-eligible site for every 320 acres inventoried (Bureau of Land Management 1992).

Approximately 2,350 acres, of the 3,001 acres that would be disturbed in the reasonably foreseeable future actions by the year 2007 lie within the piñon-juniper/mid-elevation zone. This equates to the potential identification of an estimated 157 potential cultural sites within the reasonably foreseeable future action areas (2,350/15); of these, approximately 31 sites could be designated as potentially significant and eligible to the National Register of Historic Places (2,350/75). The potential future Poker Flats/Repeat Area could have direct impacts on the Mahoney Canyon Quarry site, which is a property eligible for the National Register of Historic Places.

About 650 acres of the 3,001 acres that would be disturbed by the reasonably foreseeable future actions lie within low cultural resources potential zones. An estimated 10 cultural sites could potentially be identified in these areas (650/65); approximately 2 of these sites could be significant or eligible to the National Register of Historic Places (650/320).

Past and present disturbances in piñon-juniper areas or mid-elevation areas total approximately 4,836 acres (22 percent of 21,984 acres of total permitted disturbance). About 17,148 acres have been previously disturbed in low elevation/low potential areas. Based upon the ratios of cultural sites per acres disturbed in mid-elevation/moderate potential areas and low elevation/low potential, approximately 586 cultural sites ([4,836/15] and [17,148/65]) may have been disturbed by past activities in the cumulative effects area with a potential number of 118 significant sites ([4,836/75] and [17,148/320]) having been disturbed. Site totals for past disturbances could be less than these numbers since clearing and range management activities, such as burning which account for a major portion of the past disturbance in the piñon-juniper areas, would only disturb or destroy sites containing ignitable surface features such as wickiups, corrals, and historic buildings. A total of approximately 151 potentially significant sites are expected to be or have been disturbed by past, present, and reasonably foreseeable future action activities.

4.9.2.3 Combined Impacts

A total of 150 potentially significant cultural sites are expected to be directly affected by past, present, reasonably foreseeable future actions, and the Proposed Action. The Egan Resource Area contains approximately 409,600 acres of undisturbed piñon-juniper which are expected to contain an estimated 5,461 significant National Register of Historic Places-eligible sites (409,600/75). The 150 potentially eligible sites which could be found in the cumulative effects area represent approximately 3 percent of the remaining significant cultural resources in the piñon-juniper area of the Egan Resource Area.

4.10 AIR QUALITY

4.10.1 Cumulative Effects Area and Characteristics

The cumulative effects area is located near the east-central portion of the Great Basin. The local surrounding terrain consists of alternating mountain ranges and sagebrush-covered valleys, at the southern end of the Ruby Mountains. The highest peaks in the Ruby Mountains extend to over 10,000 feet in elevation. Elevations in the cumulative effects area range from approximately 6,800 feet to 7,700 feet.

The climate in the region is classified as semi-arid to arid, with elevations below 6,500 feet receiving the least amount of precipitation while the mountainous areas are significantly wetter. A semi-arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges. Precipitation is monitored at Ruby Lake, the weather monitoring station nearest the cumulative effects area. Precipitation and temperature are both monitored in Ely, Nevada. The Ely station is situated within the Steptoe Valley, and is located about 50 miles southeast of the area and at a lower elevation. Average temperatures at the station range from the low 20s (°F) in January to the mid-60s in July. Temperatures are generally cooler in the cumulative effects area because it is at a higher elevation, but summers are typically hot and dry, except in the higher mountains ranges. Although precipitation is spread throughout the year, most of the annual precipitation falls as snow during the winter months. The average annual precipitation is about 13 inches at Ruby Lake. Average relative humidity ranges from a low of 17 percent in the summer during the day to a high of 77 percent in spring during the night (National Ocean and Atmospheric Administration 1990). Net evaporation exceeds precipitation in the cumulative effects area. Winds are predominantly from the southwest, but with secondary maximum of wind occurrences from the northeast. The mean annual morning mixing height is estimated to be about 300 feet, but during the winter months the mean morning mixing height is about 200 feet (Holzworth 1972). The mean annual afternoon mixing height exceeds 2,600 feet.

Air quality is defined by the concentration of various pollutants and their interactions in the atmosphere. Pollution impacts on receptors have been used to establish a definition of air quality. Air quality standards specify acceptable upper limits of pollutant concentrations and duration of exposure. Air pollutant concentrations within the standards are generally not considered to be detrimental to public health and welfare. The cumulative effects area lies in Hydrographic Basin 175, Long Valley. The existing air quality is typical of the largely undeveloped regions of the western United States. For the purposes of statewide regulatory planning, this area has been designated as unclassifiable for all pollutants that have an ambient air quality standard and is treated as being in attainment for regulatory purposes.

4.10.2 Cumulative Impacts

4.10.2.1 Impacts of the Proposed Action

Results from modeling various mine sources at the Yankee Mine show that maximum concentrations of particulate matter less than 10 μm in size (PM_{10}), oxides of nitrogen, carbon monoxide, and sulfur dioxide would not exceed State or Federal ambient air quality standards (Nevada Division of Environmental Protection 1994). Impacts from the proposed Horseshoe/Galaxy Mine and Process/Top Area Modifications are expected to be similar. Process emissions from the facilities would be less than 100 tons per year. ***Air quality standards are set to protect human health and welfare, and significant impacts are not expected if the standards are not exceeded. This includes toxic substances (e.g., metals and crystalline silica) that may make up a small component of the PM-10 emissions. Nevertheless,*** the State of Nevada would have to grant air quality operating permits for the proposed operations, and the project would have to comply with all air quality standards in Nevada.

4.10.2.2 Impacts of the Interrelated Projects

Air quality in the cumulative effects area would be affected by both construction and operation of reasonably foreseeable future actions. Activities associated with surface disturbance would cause an increase in fugitive and gaseous emissions in the local area. Gaseous pollutants include nitrous oxides, carbon monoxide, and sulfur dioxide from exhaust emissions from vehicles and other mobile equipment. Exhaust emissions would be small compared to fugitive emissions and would not affect regional air quality.

Particulate levels from interrelated projects would vary, and impacts would depend on the activity location and the daily wind and weather. Activities would require a surface disturbance permit from the Nevada Division of Environmental Protection, which would require that watering or other measures be taken to limit fugitive dust emissions. While measures such as watering would reduce the amount of emissions from interrelated projects some level of fugitive dust emissions would be unavoidable due to the nature of the work. Although some impacts on air quality would inevitably occur, they would be transitory and temporary, limited in duration, and would end at the completion of that particular phase of the work. Once reclamation was completed, pollutant concentrations would return to background levels.

4.10.2.3 Combined Impacts

Combined air quality impacts were assessed using the existing Bald Mountain Mine as an example of interacting emission sources within the cumulative effects area. The maximum annual concentration of particulates at the existing Bald Mountain Mine process facility was predicted using air quality modeling to be 0.53 $\mu g/m^3$. This concentration occurred about 0.7 mile from the facility, so sources would have to be relatively close in order to interact (Nevada Division of Environmental Protection 1994). Adding an assumed annual background of 9 $\mu g/m^3$, the total annual cumulative impact is predicted to be 9.53 $\mu g/m^3$. This is below Nevada's annual ambient air standard of 50 $\mu g/m^3$. Adding the predicted maximum 24-hour concentration of 18.66 $\mu g/m^3$ to the assumed background of 10.2 $\mu g/m^3$, the total cumulative 24-hour impact would be 23.75 $\mu g/m^3$, which does not exceed the Nevada 24-hour ambient air quality standard of 150 $\mu g/m^3$. Other permitted and non-permitted sources of air pollution are included in the background values. Cumulative air quality impacts in the vicinity of the Proposed Action and interrelated projects are predicted to be very slight, since the annual and 24-hour contributions from the sources in the example above would be considerably below the national or State standards.

As required by permit conditions, project operators would apply air pollution controls to reduce emissions during construction and operation. Fugitive dust from all disturbed areas would be controlled using watering, chemical stabilization, or other controls approved by the Nevada Bureau of Air Quality. Reclamation and revegetation would stabilize exposed soil and control fugitive dust emissions. As vegetation becomes established, particulate levels should return to what is typical for a dry desert environment.

4.11 SOCIAL AND ECONOMIC RESOURCES

4.11.1 Cumulative Effects Area and Characteristics

The cumulative effects area for social and economic resources includes White Pine County and Elko County. Historically, the economies of both White Pine County and Elko County have been directly influenced by the economic health of the mining industry. Since the 1800s, the counties' population and economies were subject to the "boom-bust" cycles that follow gold and silver strikes in the area. However, in the early 1900s that pattern changed in White Pine County. Copper mining and smelting dominated the economic activity in that county, providing for stable employment opportunities. By the 1970s, with world prices for metals decreasing significantly due to foreign competition, the mining industries in both counties decreased dramatically. Such decline led to adverse economic conditions in the region, including declining economic activity and population decreases. Both Elko and White Pine Counties have emerged from the economic decline of the 1970s and 1980s, and have weathered the recession of the early 1990s. Both counties now benefit from increasing tourism and gaming as well as renewed growth in the mining sectors.

Population in the region has been steadily growing and unemployment decreasing.

Recent efforts to diversify economic activity and the increased activity in the mining sector have resulted in substantial population growth in Elko County and a stable population in White Pine County. White Pine County population decreased approximately 1.5 percent from a population of 9,410 in 1990 to an estimated population of 9,280 in 1994. Approximately 50 percent of the county's population resides in the county seat at Ely which had a 1994 estimated population of 4,630. Elko County population grew approximately 22 percent from a population of 33,530 in 1990 to an estimated population of 41,050 in 1994. Approximately 42 percent of the county's population resides in the county seat of Elko, which had a 1994 estimated population of 17,110 (University of Nevada-Reno 1995).

The available statistics indicate that the 1994 labor force numbered 3,510 in White Pine County and 20,700 in Elko County. The 1994 average annual unemployment rate was 7.8 and 5.6 for White Pine and Elko Counties, respectively. The employment statistics indicate that government, service, and mining are the largest employing sectors in the region. The trade sector in Elko County is substantial due to the fact that the City of Elko is the major regional trade and retail center. Per capita income (1992) averages $16,980 in White Pine County and $19,385 in Elko County. Total personal income in 1992 was $163 million in White Pine County and $724 million in Elko County.

A large percentage of the State of Nevada's revenues is derived from the collection on gaming winnings. Nongaming tax revenues consist of sales tax, the statewide gas tax, cigarette and liquor tax, the drug manufacturers' tax, and the estate and lodging tax. Specific to mining, the State benefits, in part, from the sales and net proceeds taxes. The State also charges a Nevada Business Tax.

County revenue also is determined largely by tax collection. The Nevada counties generate operating revenue through imposition of property taxes and through a portion of sales and use tax and net proceeds tax (sales and use tax and net proceeds tax revenue is shared with the State).

4.11.2 Cumulative Impacts

4.11.2.1 Impacts of the Proposed Action

It is unlikely that the proposed increase of 25 new positions would have any noticeable impact on the current conditions with respect to population and demography, total employment, housing, water supply, wastewater treatment, schools, solid waste disposal, fire protection, health care, or social services. ***The existing impacts to the White Pine County Sheriff's office and law enforcement would continue at the current levels.*** Impacts associated with the Proposed Action would be the continuation of contributions to county and State tax revenues, income, and employment throughout the life of the operation.

4.11.2.2 Impacts of the Interrelated Projects

Impacts associated with the interrelated projects also would be the continuation of contributions to county and State tax revenues, income, and employment throughout the life of the projects.

4.11.2.3 Combined Impacts

The combined impacts of the Proposed Action and interrelated projects would be a beneficial impact by continuing the generation of tax revenues, income, and employment.

4.12 RECREATION

4.12.1 Cumulative Effects Area and Characteristics

The cumulative effects area for recreation covers a large geographic area and can be generally described as including Newark Valley (to United States 50); southern Huntington Valley; southern Ruby Valley (including the Ruby Mountains south of Harrison Pass); and Long Valley. It also includes Illipah Reservoir and Ruby Lake National Wildlife Refuge. Cumulative impacts on recreation resources were addressed using the Recreation Opportunity Spectrum.

The Recreation Opportunity Spectrum, a recreation planning and management tool, was used to map the impacts of existing projects, the Proposed Action, and interrelated projects within the cumulative effects area. The cumulative effects area was chosen as the Recreation Opportunity Spectrum mapping area since the probability of dispersed recreation occurring exclusively within the historic mining area of the Proposed Action is slight. Recreation Opportunity Spectrum identifies recreation opportunities and arranges them along a spectrum as they may occur in the physical environment. The spectrum helps to conceptualize the relationships among activities and settings that, in appropriate combinations, produce recreation experiences. The Recreation Opportunity Spectrum system defines recreation opportunities as primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban. Each Recreation Opportunity Spectrum class is composed of combinations of physical settings, social settings, managerial settings, and recreation experience opportunities.

4.12.1.1 Recreation Opportunity Spectrum Class Delineation

- Physical Setting

The first step of this mapping exercise is to document the physical setting of the Recreation Opportunity Spectrum study area. The physical setting combines the following three criteria: remoteness, size, and evidence of humans.

<u>Remoteness</u>. Remoteness from the sights and sounds of humans is used as an indicator of the opportunity to experience greater or lesser amounts of social interaction, and primitive to urban influences, as one moves across the spectrum. The first step in determining remoteness is to delineate the "primitive" and "better than primitive" roads within the Recreation Opportunity Spectrum mapping area. Better than primitive roads are constructed or maintained vehicle ways for the use of highway type vehicles having more than two wheels. Primitive roads are not constructed or maintained, and are used by vehicles not primarily intended for highway use. Trails with motorized use are included in the "primitive" road category. For purposes of this analysis, all the major roads (paved and unpaved) identified on the Bureau of Land Management's Transportation Plan were mapped as "better than primitive; all other roads and trails were mapped as "primitive."

The next step in determining remoteness is to map Recreation Opportunity Spectrum classes by using established distance criteria from the mapped roads and trails in the Recreation Opportunity Spectrum mapping area. For example, primitive areas are at least 3 miles from all roads, railroads, or trails with motorized use; roaded natural areas are within 0.5 mile from "better than primitive" roads and railroads.

The remoteness mapping exercise determined that there were no primitive, rural, or urban Recreation Opportunity Spectrum classes in the mapping area. The remaining areas were classified as semiprimitive nonmotorized, semiprimitive motorized, and roaded natural.

Size. Size of area is used as an indicator of the opportunity to experience self-sufficiency as related to the sense of vastness of a relatively undeveloped area. In some settings, the remoteness mapping assures the existence of these experience opportunities; in other settings, the remoteness criteria alone do not. Therefore, established size criteria are applied. For example, semiprimitive nonmotorized and semiprimitive motorized classes should be a minimum of 2,500 acres; roaded natural areas have no size criteria.

After the remoteness and size criteria were applied and areas were mapped, there were still three Recreation Opportunity Spectrum classes identified: semiprimitive nonmotorized, semiprimitive motorized, and roaded natural.

Evidence of Humans. Evidence of humans is used as an indicator of the opportunity to recreate in environmental settings having varying degrees of human influence or modification. The established evidence of humans criteria for each Recreation Opportunity Spectrum class is primarily based on the visual impact and effect of modifications on the recreation experience, as distinguished from only the physical existence of modifications. For example, the primitive setting is essentially an unmodified natural environment. Evidence of humans would be unnoticed by an observer wandering through the area. Evidence of trails is acceptable, but structures are extremely rare.

After the remoteness, size, and evidence of humans criteria were applied, and areas were mapped, there were still three Recreation Opportunity Spectrum classes identified: semiprimitive nonmotorized, semiprimitive motorized, and roaded natural.

- Social Setting

The social setting reflects the amount and type of contact between individuals or groups. It indicates opportunities for solitude, for interactions with a few selected individuals, or for large group interactions. Established "user density" criteria were applied. These criteria are used as a measure of user interaction. For example, in semiprimitive motorized areas, low to moderate contact frequency would be expected.

After the social setting criteria were applied to the physical setting map, there were still three Recreation Opportunity Spectrum classes identified: semiprimitive nonmotorized, semiprimitive motorized, and roaded natural.

- Managerial Setting

The managerial setting reflects the amount and kind of restrictions placed on people's actions by the administering agency or private landowner, which affect recreation opportunities. For example, in roaded natural areas, on-site regimentation and controls (physical or regulatory) are noticeable, but harmonize with the natural environment.

After the managerial setting criteria were applied to the physical and social setting map, there were still three Recreation Opportunity Spectrum classes identified: semiprimitive nonmotorized, semiprimitive motorized, and roaded natural.

- Recreation Opportunity Spectrum Classes and Recreation Experience Opportunities

The following acreages were calculated for the Recreation Opportunity Spectrum classes within the cumulative effects area. In addition, a description of the recreation experience is provided. These experiences are highly probable outcomes of participating in recreation activities in these Recreation Opportunity Spectrum classes.

Semiprimitive Nonmotorized - 249,374 acres. High, but not extremely high, probability of experiencing isolation from the sights and sounds of humans; independence; closeness to nature; tranquility; and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.

Semiprimitive Motorized - 363,008 acres. Moderate probability of experiencing isolation from the sights and sounds of humans; independence; closeness to nature; tranquility; and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunity to use motorized equipment while in the area.

Roaded Natural - 260,224 acres. About equal probability to experience affiliation with other user groups and for isolation from the sights and sounds of humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and nonmotorized forms of recreation are possible.

4.12.2 Cumulative Impacts

Cumulative impacts do not include those areas disturbed by past projects that have been reclaimed (17,591 acres).

4.12.2.1 Impacts of the Proposed Action

The Proposed Action would be located within the roaded natural and semiprimitive motorized Recreation Opportunity Spectrum classes and would not result in any changes to these two classifications. The types of recreation that occur in the area would not change.

4.12.2.2 Impacts of the Interrelated Projects

The interrelated projects also would be located within the roaded natural and semiprimitive motorized Recreation Opportunity Spectrum classes. The interrelated projects would be consistent with the physical, social, and managerial settings for these two Recreation Opportunity Spectrum classes, and would not result in any changes to the existing Recreation Opportunity Spectrum classifications.

4.12.2.3 Combined Impacts

The combined impacts of the Proposed Action and interrelated projects would have the same impacts as described above. Following reclamation, there would be no residual effects to Recreation Opportunity Spectrum classes.

4.13 VISUAL RESOURCES

4.13.1 Cumulative Effects Area and Characteristics

The cumulative effects area developed for consideration of cumulative visual impacts is generally bounded by the Overland Road on the north, the Elko-Hamilton stage route (east Newark Valley Road) on the west, the Beck Pass Road on the south, and the Ruby Marsh Road on the east up to Hobson Pass, then northeast along the summit of the Maverick Springs Range to the Overland Road (see Map B-1). These roads form a loop around a north-south trending mountain range made up of Big and Little Bald Mountains to the north, Alligator Ridge and other unnamed formations in the central region, and Buck Mountain to the south. The roads that surround this area, as well as the Buck Pass Road that transverses it from east to west, have been identified as key observation points because of their sensitivity and/or volume of use. As such, they serve as important points from which to assess potential visual impacts of the proposed Bald Mountain Mine expansion, as well as the cumulative impacts of reasonably foreseeable future actions within this area of influence. Other sensitive viewpoints in the region adjacent to the area just defined, include Highway 892 (west side Newark Valley Road), Ruby Lake National Wildlife Refuge and surrounding residential and recreation areas, Ruby Marsh Road north of the Overland Road, and State Highway 228 (Huntington Valley Road).

These lands associated with the cumulative effects area have varied scenic and visual interest, and are partially influenced by existing mining operations. Most of the lands within the cumulative effects area are under the management of Bureau of Land Management and have been assigned an interim visual resource management classification. Essentially all the valley lands are managed as visual resource management Class IV, while all mountainous lands are managed as interim visual resource management Class III (see Map B-10). All proposed facilities and interrelated projects are located in interim visual resource management Class III areas.

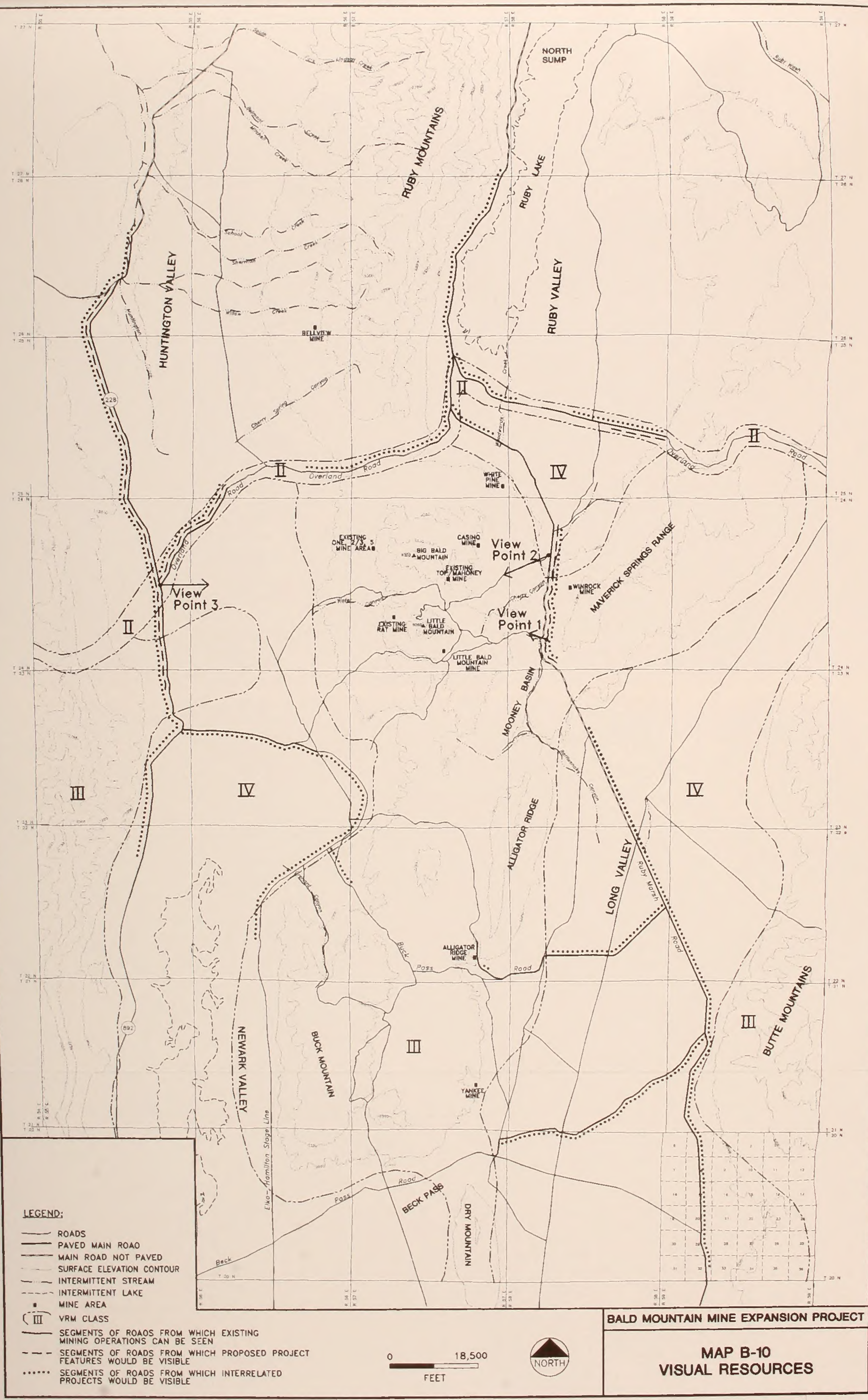
4.13.2 Cumulative Impacts

Visual impacts have been assessed in accordance with standard Bureau of Land Management visual resource management Contrast Rating principles. Briefly, the Visual Contrast rating process is used to systematically identify the nature and degree of visible modification to the landscape that would occur as a result of a Proposed Action. The degree of contrast is then compared to visual resource management guidelines for the area to determine its compatibility/level of impact.

4.13.2.1 Impacts of the Proposed Action

The Horseshoe/Galaxy mine would be visible from the Ruby Marsh Road from Hobson Pass to near Mahoney Canyon, a distance of just over 5 miles. Most prominent in this regard would be the Mooney Basin processing facility, which is immediately adjacent to the Ruby Marsh Road. Visual contrast of these proposed modifications would be high because of the natural condition of the lands in this area. These lands are managed as visual resource management Class III standards. High levels of visual contrast would exceed the management guidelines for visual resource management Class III lands, and as a result the proposed Horseshoe/Galaxy project would result in high, short-term visual impacts.

Following reclamation all structures would have been removed, some recontouring would have


NORTH SUMP
RUBY MOUNTAINS
RUBY LAKE
RUBY VALLEY
HUNTINGTON VALLEY
BELLVIEW MINE
WHITE PINE MINE
CASINO MINE
EXISTING ONE 2/3, 5 MINE AREA
BIG BALD MOUNTAIN
EXISTING TOP/MAHONEY MINE
WINROCK MINE
MAVERICK SPRINGS RANGE
EXISTING RAT MINE
LITTLE BALD MOUNTAIN
LITTLE BALD MOUNTAIN MINE
View Point 1
View Point 2
View Point 3
Overland Road
MOONEY BASIN
ALLIGATOR RIDGE
LONG VALLEY
Ruby Marsh Road
ALLIGATOR RIDGE MINE
Buck Pass Road
YANKEE MINE
BUTTE MOUNTAINS
NEWARK VALLEY
Elko-Hamilton Stage Line
BUCK MOUNTAIN
BECK PASS
Beck Pass Road
DRY MOUNTAIN
228
892
II
III
IV
LEGEND:
ROADS
PAVED MAIN ROAD
MAIN ROAD NOT PAVED
SURFACE ELEVATION CONTOUR
INTERMITTENT STREAM
INTERMITTENT LAKE
MINE AREA
VRM CLASS
SEGMENTS OF ROADS FROM WHICH EXISTING MINING OPERATIONS CAN BE SEEN
SEGMENTS OF ROADS FROM WHICH PROPOSED PROJECT FEATURES WOULD BE VISIBLE
SEGMENTS OF ROADS FROM WHICH INTERRELATED PROJECTS WOULD BE VISIBLE
0
18,500
FEET
NORTH
BALD MOUNTAIN MINE EXPANSION PROJECT
MAP B-10
VISUAL RESOURCES

taken place, and except for the pits, all areas would have been revegetated. Visual contrasts at this point in time would be primarily the result of remaining unnatural landform modifications. The long-term visual impacts of the overall Horseshoe/Galaxy operation would be substantially reduced over the active mining conditions, being reduced in both degree and extent, due to proposed reclamation efforts. However, because of the high level of visibility of this area, and the scale of the remaining, unnatural land forms, visual contrasts would remain high for the process area, resulting in long-term high visual impacts.

The proposed East Sage dump would be visible from a short segment (1+ mile) of the Ruby Marsh Road in the vicinity of Mahoney Canyon. The distance from the viewpoint (3+ miles) is the primary reason for contrast ratings being at a moderate level. This would result in a visual impact level of moderate.

Following reclamation visual contrasts would be largely the result of the unnatural form of the remaining landforms. The color contrasts would be largely eliminated, reducing overall noticeability and visual contrast to moderate-low when seen from this viewpoint. Long-term visual impacts would therefore be reduced to low.

The South Water Canyon dump and proposed process facilities would be visible from portions of the Newark and Huntington Valley Roads and adjacent portions of the Overland Road at distances of 5 to 9 miles. From these viewpoints, most of the existing Bald Mountain Mine operations also are visible. The large scale of the proposed modifications combined with the location of the South Water Canyon dump on the skyline would create a readily noticeable difference in the existing landscape. Within this context, visual contrast levels would be moderate to low. Visual impacts also would be moderate to low.

Following reclamation, all structures would have been removed, regrading of the rock dumps would have been accomplished and the entire area, except for the pits would have been revegetated. As with other areas, the remaining visual contrast would be the result of unnatural form (pit, dump and leach areas) and color (pit wall)contrasts. While noticeable contrast remains, the overall visual contrast would have been substantially reduced. At this distance, long-term visual impacts would be low.

4.13.2.2 Impacts of the Interrelated Projects

Interrelated projects include several reasonably foreseeable future actions that have been identified. Of most significance visually would be the L.J. Ridge project, which would involve mining the western corner of the top of Big Bald Mountain. Since Big Bald Mountain is visually prominent within the surrounding region, it is probable that mining in this particular area of the mountain would noticeably alter the configuration of its upper western profile. Such a disturbance would be readily evident from a number of viewpoints, some of which have no current visibility of mining operations. Of particular note in this regard would be approximately 10 miles of the Elko-Hamilton Stage Route (east side of Newark Valley road), and approximately 6 miles of the Overland Road. The Newark and Huntington Valley Roads and the western-most portion of the Overland Road are already influenced by the existing Bald Mountain mining and processing operations. Visual contrasts of the potential L.J. Ridge project, as seen from these various viewpoints, would be generally moderate (modified either by distance or the influence of existing mining). The only exception to this would be on views from the portion of the Overland Road between the Ruby Marsh Road and the historical route of the Elko-Hamilton Stage Line. Because of the relatively close distance, the probable scale and prominence of the possible modifications and the lack of existing visual disturbance, visual contrast would be high as seen from this viewpoint. As a result, short-term visual impacts would be high for this viewpoint and moderate for all other affected viewpoints. Visual impacts of the L.J. Ridge action would remain at these levels for the long-term as well because of the inability to successfully reclaim the visible pit high-wall that would remain. Over the long-term, this would likely be the most significant visual impact remaining in the Bald Mountain area, because of it's regional prominence and the potential to successfully revegetate much of the visible existing and proposed/potential Bald Mountain disturbance.

The Top Area Conveyor action would result in low short-term visual contrast and impacts because of its more restricted visibility, less prominent position, and low profile, providing that reasonable measures are taken to blend its color and eliminate reflectivity. Long-term visual impacts would be nonexistent because it would be removed following mining.

On the east side of Big Bald Mountain, the Poker Flats/Repeat projects also would have minimal visual impacts because of their restricted visibility. In fact, only a portion of the Poker Flats operation would be briefly visible from Ruby Marsh Road at a distance of approximately 2 miles. Visual contrast would be moderate to low (primarily as a result of color contrasts created by vegetative clearing). Short-term visual impacts also would be moderate to low. Over the long-term, revegetation of cleared areas would be possible, reducing contrasts to low as seen from this short segment of the Ruby Marsh Road. Long-term visual impacts of the Poker Flats/Repeat projects would therefore be low. The Poker Flats/Repeat processing area, however, would be adjacent to, and prominently visible from, approximately a 2-mile segment of the Ruby Marsh Road. At the time this facility would be developed, the existing Casino/Winrock processing facility, approximately 0.5 mile to the east, would be in it's fourth year of reclamation. Short-term visual contrasts and impacts would be high. Reclamation would eliminate structure contrasts and substantially reduce vegetative (color) contrast. The primary long-term visual contrast would result from the unnatural landform created by the leach heap. Its location, potentially so close to the Ruby Marsh Road, would result in continued high visibility and high visual impacts.

The potential Gator action would be located on the east side of Alligator Ridge. Landform and vegetative disturbances of approximately 100 acres on the side of this ridge would be visible to a large surrounding area, including approximately 22 miles of the Ruby Marsh Road, 9 miles of the Beck Pass Road, and 5 miles of the Buck Pass Road. Of this, approximately 4 miles of the 22 miles that would be visible from the Ruby Marsh Road is currently not affected by visibility of mining activities, and essentially all of the potentially affected section of the Buck Pass Road currently has little or no visibility of existing mining disturbances. Of the remaining segments of roads with visibility of existing operations, the Yankee heap leach facility (6 miles to the south) is the most prominent feature currently visible. Visual contrast of the Gator action is modified by its distance from the Ruby Marsh and Beck Pass Roads and would be moderate overall as a result. Visual impacts in this visual resource management Class III area also would be moderate. From the Buck Pass Road, visibility and visual contrast would both be high. Short-term visual impacts also would be high.

While there would be a noticeable reduction in both the extent and intensity of contrast following reclamation, long-term visual impacts of the Gator action would remain in the moderate and high range due to the outward facing orientation of the unreclaimed pit high-wall in this prominent and widely visible location.

By contrast, the Alligator Ridge Expansion action would result in both low visual contrast and low visual impacts. Unlike the Gator action, the Alligator Ridge Expansion would take place in a relatively concealed location in the midst of extensive existing mining operations. The only impacted viewpoint would be a very short segment of the Buck Pass Road, which is already strongly influenced by existing operations.

The same general pattern holds true of the Yankee Expansion action. It also would be located in a relatively concealed location in the midst of existing mining operations. The only affected viewpoint here would be an approximately 1-mile segment of the Beck Pass Road from which the existing Yankee operation is currently visible.

The proposed Bellview project would be located approximately 10 miles north-northwest of the Bald Mountain Mine. As a result, it would receive little modifying influence from the existing mining operations there. Visual contrasts could range from high to moderate, depending upon actual location and relationship to Highway 228. Visual impacts could also range from high to moderate, depending upon the classification of the specific National Forest lands involved. Because it is so far removed visually from existing and proposed or potential mining operations, this project would not contribute significantly to the primary regional mining influence.

Oil and gas exploration could have the potential to collectively result in significant visual impacts if located in portions of the cumulative effects area that are not currently impacted, or little impacted, by existing similar disturbance, if within reasonable visual proximity to sensitive viewpoints. The determination of reasonable visual proximity would be related to physical proximity as well as the character of the landscapes on which they were located. For example, visual contrast would be greater on steep, prominent hillsides where vegetation conditions are such that clearing would result in noticeable color and line contrasts (e.g., dense piñon-juniper vegetation). On the other hand, flat lands, particularly where vegetative screening can be used to advantage, would typically result in much less visual contrast. Visual impacts could therefore range from high to low depending upon the number, concentration, and location of the activity.

4.13.2.3 Combined Impacts

Two basic aspects of the visual impacts of the Proposed Action and interrelated projects need to be considered when describing their combined visual impacts: 1) the extent of visibility and 2) the degree of contrast/impact. Map B-10 illustrates the segments of sensitive road and highway viewpoints from which existing mining facilities are visible as well as those locations from which interrelated projects would be visible. From this illustration it can be seen that the visibility of mining operations would noticeably extend beyond current conditions. The greatest contributor in this regard would be the L.J. Ridge action, which would be visible from large areas of the Elko-Hamilton Stage Route (east side of Newark Valley Road), a portion of the west side Buck Pass Road, and a 6-mile segment of the Overland Road in the Overland Pass area, all of which currently have no visibility of mining operations. Also of note would be the Gator action that would extend visibility of landscape disturbance along 27 miles of the Ruby Marsh and Buck Pass Roads. Finally, the proposed Horseshoe/Galaxy Mine would increase visibility of mining along a portion of the Ruby Marsh Road, which is currently not affected by views of notable landscape modifications. Conversely, the only area now influenced by visual modifications that would not have visibility to proposed or interrelated projects is a segment of the Ruby Marsh Road at the southern end of Ruby Valley, which is adjacent to the White Pine Mine.

The second consideration involves the degree of visual contrast and impacts that would be associated with the combined modifications. High levels of visual impact would result in the following situations: 1) a 5-mile segment of the Ruby Marsh Road where it crosses the southern end of the Maverick Springs Range as a result of development of the proposed Horseshoe/Galaxy Mine, 2) a portion of this same segment of the Ruby Marsh Road as a result of development of the Poker Flats/Repeat process area, 3) approximately a 6-mile segment of the Overland Road centered on Overland Pass as a result of the development of the L.J. Ridge action, and 4) approximately a 5-mile segment of the Buck Pass Road in Long Valley as a result of the Gator action.

In addition, moderate visual contrast and impacts would result in the following situations: 1) a portion of the 5-mile segment of the Ruby Marsh Road across the southern end of the Maverick Springs Range identified above, as a result of the development of the proposed East Sage dump; 2) the west side Huntington and Newark Valley Roads, approximately 8 miles of the Overland Road in two roughly equal segments - one near its intersection with the Huntington Valley Road and the other east of its junction with the Ruby Marsh Road, the Ruby Marsh Road north of the Overland Road, the Ruby Lake National Wildlife Refuge and surrounding area, approximately the western-most 2 miles of the Buck Pass Road, and the Elko-Hamilton Stage Road (east side Newark Valley Road and its extension to the western Newark Valley Road (Highway 892), all as a result of the development of the L.J. Ridge action; and 3) approximately 22 miles of the Ruby Marsh Road in Long Valley and approximately 10 miles of the Beck Pass Road, also in Long Valley, as a result of the development of the Gator action.

Two conclusions can be drawn from these results. First that the area under influence of mining related landscape disturbance in the study area would increase noticeably over current levels, and secondly that, with two notable exceptions, the great majority of this change would be moderate in nature. The exceptions of note include the high impacts associated with the L.J. Ridge action as seen from the 6-mile segment of the Overland Road in the Overland Pass area, because of its historic significance; and the high visual impact that would result from proposed development of the Horseshoe/Galaxy Mine and Poker Flats/Repeat process area along the 5-mile segment of the Ruby Marsh Road at the southern end of the Maverick Springs Range, because of the scenic value of this area.

Over the long-term, visual impacts would be substantially reduced in both extent and degree through reclamation efforts now proposed. It is important to note, however, that widespread evidence of mining would remain within the region over the long-term as a result of the visual contrast of the numerous unreclaimed pit walls that are, and would be, visible from various key observation points.

4.14 PALEONTOLOGICAL RESOURCES

4.14.1 Cumulative Effects Area and Characteristics

The cumulative effects area ranges from immediately south of the Yankee Mine north to the southern portion of the Ruby Range and Ruby Valley, east to the western edge of Long Valley, and west to the eastern portion of Newark Valley. Although this portion of the southern Ruby Mountains is relatively rich in invertebrate fossils, none are considered rare or important (Taylor 1994). No macrofaunal fossils have been found in the cumulative effects area (Henry 1994; Silverling 1994).

4.14.2 Cumulative Impacts

4.14.2.1 Impacts of the Proposed Action

No impacts to invertebrate or macrofaunal fossils are anticipated under the Proposed Action.

4.14.2.2 Impacts of the Interrelated Projects

No impacts to invertebrate or macrofaunal fossils are anticipated from the interrelated projects.

4.14.2.3 Combined Impacts

The cumulative impacts of the Proposed Action and the interrelated projects are not expected to affect paleontological resources in the cumulative effects area.

4.15 RECLAMATION

4.15.1 Cumulative Effects Area and Characteristics

The cumulative effects area for reclamation consists of the areas of past, present, and estimated future mining disturbances, and disturbances from land management (i.e., vegetation conversion and habitat improvement) and woodland product harvest activities within the cumulative effects area identified for Vegetation. The areas of past and current disturbance were estimated from aerial photographs conducted as part of the vegetation mapping effort. The disturbance inventory (see Table B-1) indicates that approximately 21,984 acres or 6 percent of the natural vegetation within the Vegetation cumulative effects area has been disturbed by past and current human actions. Of this fraction, the majority (15,556 acres) has resulted from range improvement activities; 3,512 acres of disturbance resulted from mining activities, oil and gas exploration, and transmission line construction; 2,344 acres from vegetation conversion and habitat enhancement, and 572 acres from woodland products harvesting. The Vegetation discussion identifies the vegetation types that have been disturbed and the assumptions concerning past and ongoing reclamation efforts.

4.15.2 Cumulative Impacts

4.15.2.1 Impacts of the Proposed Action

Approximately 1,450 acres of vegetation would be removed by implementing the Proposed Action. Of those, 134 acres consisting of pit walls and extremely steep side slopes would not be reclaimed. The Bureau of Land Management has established revegetation cover and species composition goals for the Bald Mountain Mine Expansion disturbance areas. These goals are based on the productivity levels of the range sites that existed prior to disturbance. An assessment of the expected levels of reclamation success over time was conducted on the expansion area by collecting data on natural vegetation canopy cover and composition for comparison with revegetation success (as indicated by canopy cover and number of species) on test plots located on various types of reseeded mine areas (e.g., waste rock dumps and roads). Based on a limited field sampling effort (1994), average plant canopy cover values for the big sagebrush, low sagebrush, and mixed shrub types ranged from 35 to 68 percent. The big sagebrush type cover estimates ranged from 44 to 58 percent; mixed shrub type ranged from 59 to 68 percent; and the low sagebrush ranged from 35 to 45 percent. Species diversity ranged from 5 to 13 species, with low sagebrush having the lowest species diversity.

Four reclaimed project sites, including the Yankee and Casino Mines and exploration roads, were evaluated relative to species composition and canopy cover. Results from the evaluation indicated that average canopy cover values ranged from 17 to 40 percent depending on the reclamation period (1 to 3 years). In general, species composition was low (3 to 7 species). These areas generally support weedy species including Russian thistle, cheatgrass, and halogeton.

In conclusion, it is apparent that vegetation recovery rates would be slow, but the goal of 35 percent canopy cover is achievable in some areas within a 3 year period. Noxious range weeds such as halogeton represent a major fraction of the canopy cover measured. The persistence of these species would reduce the long term value of these reclaimed areas for pre-existing uses (livestock grazing and wildlife habitat).

4.15.2.2 Impacts of the Interrelated Projects

The disturbance and reclamation acreage estimates for the interrelated projects are presented for Vegetation. It is expected that the reclamation constraints identified for the Proposed Action (e.g., weed invasion, slow establishment) would also apply to other mining disturbances that would occur when all past, present, and future surface disturbance activities are considered.

4.15.2.3 Combined Impacts

The combined disturbance and reclamation for the Proposed Action and the interrelated projects are discussed for Vegetation. Approximately 807 acres of disturbance would not be revegetated. This total represents 0.2 percent of the 366,114 acres of vegetation present in the cumulative effects area. Approximately 24,626 acres would be reclaimed and 1,002 acres would be naturally revegetated (i.e., harvested piñon-juniper woodland). The diversity of native species within the reclaimed plant community and the amount of canopy cover within the plant community are important factors used to evaluate and determine reclamation success. Successfully reclaimed areas would include plant communities primarily consisting of native species with canopy cover values ranging from 30 to 40 percent. Reclaimed plant communities, approximately 5 years after reclamation, would be characterized by a dominant herbaceous layer largely consisting of weedy species. Approximately 5 to 15 years after reclamation, species and vegetative structural diversity within these plant communities would be greater than plant communities that are present in recently reclaimed areas (i.e., 0 to

5 years after reclamation). Canopy cover values for reclaimed plant communities approximately 5 to 15 years after reclamation would be approximately 30 to 40 percent, of which native grasses and forbs would contribute the greater percentage of total canopy cover. Therefore, these areas would be considered successfully reclaimed lands. Reclamation success should be achieved by the year 2011 for approximately 18,400 acres of previously disturbed land located within the cumulative effects area. The reclamation constraints identified under the Proposed Action and interrelated projects are applicable to all the ground-disturbing activities included in this analysis.

4.16 HAZARDOUS MATERIALS AND WASTES

4.16.1 Cumulative Effects Area and Characteristics

The cumulative effects area consists of the chemical transport routes, storage areas, and on-site disposal sites on the currently active Bald Mountain Mine Properties mines, and the reasonably foreseeable future actions described in Section 3.0. A records review and a site reconnaissance were conducted during 1994 at the Alligator Ridge, Bald Mountain, Casino/Winrock, and Yankee Mines to evaluate the locations and conditions of aboveground storage tanks, underground storage tanks, and Class III industrial landfills currently in use. A summary of this investigation is presented in Table B-14.

At present there are no underground storage tanks in use at any of the mine sites, although Bald Mountain Mine Properties provided notice to the Nevada Division of Environmental Protection that it was taking its underground storage tanks out of service at the Alligator Ridge Mine in 1993. One underground tank was excavated, and then placed in an aboveground location and surrounded with a containment berm. No evidence of soil contamination was found at the time of tank excavation.

All aboveground tanks are surrounded by containment berms. Evidence of surface soil contamination was minor, being confined to tank fill and transfer locations. No liners have been installed within the aboveground storage tank containment areas at the Alligator Ridge or Casino/Winrock Mines; liners have been installed in fuel tank containment areas at the Bald Mountain and Yankee Mines.

The Class III industrial landfills were investigated by the Bureau of Land Management at the various mines, and no environmental problems were identified (Bureau of Land Management, unpublished data). Bureau of Land Management and ENSR examined these landfills in 1994, and found no inappropriate waste placed in these sites (see Table B-15).

Bald Mountain Mine Properties is currently classified as a Conditionally Exempt Small Quantity Generator under the Resource Conservation and Recovery Act guidelines. Bald Mountain Mine Properties currently has hazardous wastes transported off-site to an approved recycler or disposal facility.

Two primary transportation routes to the mines in the cumulative effects area have been assumed. The first route is State Highway 228, which extends south from Elko, and then eastward along the existing haul road. This route currently serves the existing Bald Mountain Mine and Bellview Mine. This route would support the proposed Top Area expansion and ancillary

Table B-14

Underground and Aboveground Storage Tanks
Bald Mountain Mine Project

Time Frame	Mine	USTs[1]	ASTs[1]	Size (gal.)	Containment	Liner	Reference
Current	Alligator Ridge	None[2]	Waste Oil	10,000	Y	N	Dunlap to Woods 4/13/94; ENSR field trip report/photographs 08/94
			Fuel	10,000	Y	N	
			Fuel	30,000	Y	N	
			Fuel	30,000	Y	N	
			Not used	10,000	Y	N	
			Caustic		Y	Y	
	Bald Mountain	None	Fuel	10,000	Y	N	ENSR field trip report/photographs 08/94; NDEP[1] permit 11/30/92
			Fuel	10,000	Y	N	
			Fuel	3,000	Y	Y	
			Waste Oil	4,000	Y	?	
			Fuel (6 tanks at mine)	?	Y	?	
	Casino/Winrock[3]		Fuel	6,000	Y	N	
			Fuel	12,000	Y	N	
	Yankee	None	Fuel (tanks total)	300	Y	Y	ENSR field trip report/photographs 08/94
			Fuel	500	Y	Y	
			Cyanide	7,600			
			2 Fuel	12,000			
			Kerosene	500			
			Fuel	2,000			
			Oil	1,000			
			Oil	2,000			
			Oil	4,000			
			Oil	1,500			
			Antifreeze	3,000			
			Waste Oil	3,000			
			Methanol	4,000			
	Little Bald Mountain	None	None				
Proposed Action	Horseshoe/Galaxy		Fuel	10,000	Y	Y	Dunlap to Nielsen 12/20/94
	Process/Top Area Modifications		Fuel & existing tanks	10,000	Y	Y	Dunlap to Nielsen 12/20/94

[1]Underground Storage Tanks (USTs); Aboveground Storage Tanks (ASTs); Nevada Division of Environmental Protection.

[2]All but one of the USTs located at the Alligator Ridge Mine were excavated, removed, and taken out of service in 1993. The single exception was the waste oil tank, which was excavated and is currently in use as an AST. No leaks were apparent during excavation of these tanks.

[3]Several drums of oil were also observed during a site visit in August 1994.

Table B-15

Solid Waste Disposal
Bald Mountain Mine Project

Time Frame	Mine	Landfills	Waste Produced	Status	Reference
Current	Alligator Ridge	Trench	500 ft^3/mo.	Application for Class III submitted (SWMI-17-32); no environmental problems at time of BLM Inspection.	Undated memo from Ely BLM District Mgr. to NV St. Dir.; ENSR field trip report/ photographs 08/93
	Bald Mountain	Trench	500-1,000 lbs/day	Application for Class III submitted (SWMI-17-35); no environmental problems at time of BLM Inspection.	Dunlap to Nielsen 12/20/94
	Casino/Winrock	Trench	50 ft^3/mo.	Application for Class III submitted (SWMI-17-33); no environmental problems at time of BLM Inspection; Contains refrigerator and oil filters.	ENSR field trip report/photographs 08/94; BLM memo
	Yankee	Trench	200 ft^3/mo.	Application for Class III submitted (SWMI-17-34); no environmental problems at time of BLM Inspection; contains tires, drained oil filters, and primacord, drained oil filters are acceptable wastes.	ENSR field trip report/photographs 08/94; BLM memo
Proposed Action	Horseshoe/Galaxy	Trench	200 ft^3/month	New Landfill	Dunlap to Nielsen 12/20/94
	Process/Top Area Modifications	Trench	500-1,000 lbs/day	Existing Landfill	Dunlap to Nielsen 12/20/94

facilities, as well as the L.J. Ridge and Top Area Conveyor reasonably foreseeable future actions.

The second transportation route originates in Ely, follows United States Highway 50 west to the intersection with the Ruby Marsh Road, and then north to the intersection with various mine access roads. This route currently serves the Alligator Ridge, Casino/Winrock, Yankee, and White Pine Mines, and would serve the proposed Horseshoe/Galaxy Mine. This route also would support the Yankee Mine Expansion, Alligator Ridge Expansion, Gator Area, Poker Flats, and Repeat Area reasonably foreseeable future actions.

4.16.2 Cumulative Impacts

It has been assumed that two primary transportation routes to the Proposed Action area would be used to transport hazardous materials: State Highway 228 and United States Highway 50. Each route is approximately 75 miles long.

4.16.2.1 Impacts of the Proposed Action

The risk of chemical spills would continue as the result of hazardous process chemical and fuel hauling requirements. It is estimated that 624 diesel fuel, 288 hydrochloric acid, and 144 sodium cyanide deliveries would be made by truck along Highway 228 from Elko and along United States Highway 50 and Ruby Marsh Road from Ely over the 12-year project life. The Highway 228 route would parallel approximately 6 miles of sensitive resources (stream crossings and wetlands), and the United States 50/Ruby Marsh Road would parallel approximately 4 miles of similar resources. Each route would parallel approximately 1 mile of commercial or residential areas. Based on current transportation statistics, it is unlikely (approximately 2 chances in a 100) that a chemical or fuel release would occur during the lifetime of this project. If such a release did occur, it could cause local damage to vegetation, water quality, and aquatic life in wetlands or waterbodies adjacent to the haul route. Emergency response actions and spill containment and control plans would be applied to spill incidents to limit their extent. However, some short-term loss of vegetative production, and short-term reductions in water quality would occur, regardless of incident response actions taken. If a hydrochloric acid release occurred in a populated area, there would be an inhalation exposure risk to the nearby public.

Additional potential impacts from chemical and fuel storage releases are not expected because tank storage areas would be surrounded by impermeable structures that would contain 110 percent of the tank volumes.

Additional solid waste capacity would be required to accommodate non-hazardous waste at the rate of 500 to 1,000 lbs per day. The rate of hazardous waste generation would not change, and no procedural changes in recycling or off-site disposal would be required.

4.16.2.2 Impacts of the Interrelated Projects

Impacts of the interrelated Bald Mountain Mine Properties reasonably foreseeable future actions are not expected to interact cumulatively with the Proposed Action because each interrelated project would be developed sequentially (see overall schedule in Figure B-1). In other words, as the reserves were depleted at one mine, reserves at other mine pits would be opened up for extraction. As a consequence of this development plan, the rate of process chemical and fuel use is expected to remain relatively constant over the active mining and processing lives of all the elements of the reasonably foreseeable future actions.

The operations of the Bellview Mine could interact cumulatively with the Bald Mountain Mine Properties reasonably foreseeable future actions, assuming that this small heap-leach mine with an operational life of 1 year re-opens within the time frame of the Bald Mountain Mine Properties reasonably foreseeable future actions. The Bellview Mine proposes to move 0.75 million tons of ore in 1 year. This level of effort compares to 1.5 million tons per year at Horseshoe/Galaxy. Based on this comparison, the Bellview Mine would require approximately one-half of the fuel, blasting compounds, and leaching compounds used by the Horseshoe/Galaxy operations in 1 year. Solid wastes would likely be disposed on site, and would not interact cumulatively with the Bald Mountain Mine Properties projects. Like the Bald Mountain Mine operations, the Bellview Mine operation is likely to be classified as a small quantity hazardous waste generator. Hazardous wastes would be shipped off-site at the rate of 100 kilograms (220 pounds) or less per month.

4.16.2.3 Combined Impacts

The cumulative increase in mine-related liquid chemicals and fuel transported for the Bellview Mine would occur over a period of 1 year along Highway 228. These cumulative increases in transportation would represent less than a one percent increase in the overall likelihood of an accidental release along this route. Off-site shipment of hazardous wastes would increase over this period of 1 year at the rate of 100 kilograms (220 pounds) or less per month.

4.17 ACCESS AND LAND USE

4.17.1 Cumulative Effects Area and Characteristics

The cumulative effects area for land jurisdiction/ownership, land use plans, and access involves the immediate mines areas.

The cumulative effects area for livestock management includes the Warm Springs and Maverick Springs Allotments. The Warm Springs Allotment has one permittee and is in overall poor condition primarily from overuse of key forage species by cattle and wild horses. As a Final Multiple Use Decision dated March 14, 1994, the active preference for the Warm Spring Allotment has been identified as 7,744 animal unit months, with 16,799 animal unit months placed in suspended non-use (Bureau of Land Management 1994a). Because of the severity of the resource damage throughout portions of the allotment, the full final reduction is being implemented (Bureau of Land Management 1994a). The Maverick Springs Allotment has one permittee, is in fair to good condition, and has a total preference of 1,500 animal unit months. The Resource Management Plan classifies the Maverick Springs Allotment as an "I" category allotment or "improve." An "I" classification indicates the allotment has a high potential to increase forage production, current forage production is below maximum, current forage value is fair to poor, and the allotment has moderate to extreme resource conflicts. Livestock mortality data is not available for the cumulative effects area. No range improvements are scheduled for construction in the cumulative effects area.

The cumulative effects area for woodland products is the same study area as that described for Vegetation.

4.17.2 Cumulative Impacts

The following assumptions were used for the land use cumulative impact assessment:

- Cumulative changes in land use include mining, oil and gas exploration, and transportation line construction minus areas reclaimed.
- One-third of the piñon-juniper woodlands disturbed by the interrelated projects (7,637 acres) would be considered manageable woodlands (2,520 acres) due to limitations in road access (greater than 1 mile), slope (greater than 30 percent), or vegetation density or maturity.
- Fuelwood productivity = 8 cubic feet per acre per year.
- Christmas tree productivity - There is an ingrowth of Christmas trees every 5 to 7 years equal to the number removed. For example, if 100 Christmas trees were removed in 1995, there would be an ingrowth of 100 trees by the years 2000 to 2002.
- The average age of a 6-foot Christmas tree is 35 years.
- Piñon nut productivity - There is an average of 118 piñon trees per acre with an average production rate of 5 pounds of piñon nuts per tree, and a rotation rate of 5 to 7 years. This represents approximately 84 to 118 pounds of piñon nuts per acre on an annual basis (118 trees per acre x 5 pounds of nuts per tree/5 to 7 years).
- Successful regeneration of piñon-juniper woodland to achieve the assumed productivity levels is estimated at 60 to 80 years.

4.17.2.1 Impacts of the Proposed Action

The Proposed Action would be consistent with existing land use plans. The Proposed Action would change 1,450 acres of public lands administered by the Bureau of Land Management from existing land uses, such as livestock grazing, wildlife and wild horse habitat, woodland products harvesting, and dispersed recreation to mining development. The Proposed Action would result in the short-term displacement of an average of 347 animal unit months (for both livestock and wild horses). Following reclamation, approximately 345 animal unit months would be recovered; therefore, the long-term loss would be approximately 2 animal unit months.

The Proposed Action would result in the long-term loss of productivity on approximately 242 acres of manageable woodlands, which are currently used by the public for harvesting of fuelwood, Christmas trees, and piñon nuts. This loss represents less than 1 percent of the piñon-juniper woodlands in the cumulative effects area. Construction of the Proposed Action would remove a total of 1,260 to 2,000 cords of wood, with an annual growth loss of between 21 and 25 cords of fuelwood per year; between 2,380 and 3,332 Christmas trees; and from 19,992 to 28,084 pounds of piñon nuts per year, or 1.2 to 1.7 million pounds of piñon nuts over an average 60-year regeneration time frame. Following reclamation of the Proposed Action, approximately 134 acres of public lands would be left unreclaimed.

4.17.2.2 Impacts of the Interrelated Projects

The interrelated projects would be consistent with existing land use plans. The interrelated projects would change an additional 4,483 acres of public lands administered by the Bureau of Land

Management and Forest Service from existing land uses, such as livestock grazing, wildlife and wild horse habitat, woodland products harvesting, and dispersed recreation to other uses, such as oil and gas exploration and mining development. The completion of the interrelated projects would result in the short-term displacement of 4,742 animal unit months (for both livestock and wild horses). Following revegetation, approximately 6,377 animal unit months would be recovered; therefore, the long-term gain would be approximately 1,635 animal unit months. This large increase would be due in part to the conversion of 7,637 acres of piñon-juniper woodland to grass/forb-dominated types.

The interrelated projects would result in the long-term loss of productivity on approximately 2,520 acres of manageable woodlands, which are currently lightly used by the public for harvesting of fuelwood, Christmas trees, and piñon nuts. This loss represents approximately 2 percent of the piñon-juniper woodlands in the cumulative effects area. Construction of the interrelated projects would remove approximately 13,360 to 21,540 cords of wood, with an annual growth loss of between 223 and 269 cords of fuelwood per year; between 25,200 and 35,280 Christmas trees; and from 211,680 to 297,360 pounds of piñon nuts per year, or 12.7 to 17.8 million pounds of piñon nuts over an average 60-year regeneration time frame. Following reclamation of the interrelated projects, approximately 673 acres of public lands would be left unreclaimed.

4.17.2.3 Combined Impacts

The combination of the Proposed Action and interrelated projects would change an additional 5,933 acres of public lands administered by the Bureau of Land Management and United States Forest Service from existing land uses, such as livestock grazing, wildlife and wild horse habitat, woodland products harvesting, and dispersed recreation to other uses, such as oil and gas exploration and mining development. The Proposed Action and interrelated projects would temporarily displace about 5,089 animal unit months from livestock grazing. Following reclamation, approximately 6,722 animal unit months would be recovered; therefore, the long-term gain would be approximately 1,633 animal unit months. This long-term gain represents approximately 17.7 percent of the active preference animal unit months in the cumulative effects area.

The Proposed Action and interrelated projects would result in the long-term loss of productivity on approximately 2,762 acres of manageable woodlands, which are currently used by the public for harvesting of fuelwood, Christmas trees, and piñon nuts. This loss represents approximately 2.2 percent of the piñon-juniper woodlands in the cumulative effects area. Construction of the Proposed Action and interrelated projects would remove a total of 14,620 to 23,540 cords of wood, with an annual growth loss of between 244 and 294 cords of fuelwood per year; between 27,580 and 38,612 Christmas trees; and from 231,672 to 325,444 pounds of piñon nuts per year, or 13.9 to 19.5 million pounds of piñon nuts over an average 60-year reclamation time frame. Following reclamation of the interrelated projects, approximately 807 acres of public lands would be left unreclaimed. The recovery of manageable woodlands and harvestable woodland products would occur over an average 60- to 80-year reclamation time frame.

5.0 POTENTIAL MITIGATION AND MONITORING MEASURES FOR FUTURE ACTIONS

Mitigation measures for cumulative impacts are presented below by resource area. The measures are being suggested by the Bureau of Land Management, but no commitments have been made to require these measures. All measures are recommended mitigation for the reasonably foreseeable future actions as detailed in Table B-3. If an agency other than the Bureau of Land Management would be responsible for enforcing a measure, this has been noted.

5.1 MITIGATION MEASURES

Wildlife and Fisheries Resources

Issue: Loss of migratory birds, nests, and/or nestlings.

Measure 1: Removal of piñon-juniper, mixed shrub, and mountain mahogany vegetation on previously undisturbed lands would be prohibited between May 1 and July 31 to protect nesting birds, particularly neotropical migrants. As an option to this construction constraint period, breeding bird surveys could be conducted during the breeding season and prior to site disturbance to identify if any occupied territories or active nest sites occur within the areas to be disturbed.

Effectiveness: Constraint periods for removal of these vegetation types would minimize loss of resident and migratory birds. Breeding bird surveys would identify any sensitive breeding areas prior to site disturbances.

Issue: Disturbance of breeding raptors.

Measure 2: Raptor nest surveys would be conducted ***between May 1 and July 15*** within the appropriate habitat types (e.g., cliff nesting) prior to development or construction. If an occupied nest is located, restrictions would be applied to all disturbance activities during the breeding season (March 1 through June 30). Applicable protection procedures would be identified by the Bureau of Land Management biologist to protect the breeding birds.

Effectiveness: Surveys would determine the potential for impacting breeding raptors during nesting, and construction restrictions would prevent disturbances of breeding birds.

Issue: Potential disturbance of breeding sage grouse.

Measure 3: Sage grouse lek surveys would be conducted between March 1 and May 15. No construction activities would be allowed from 2 hours before dawn to 10:00 a.m. within 2 miles of an active sage grouse lek.

Effectiveness: Surveys would determine the potential for impacting breeding sage grouse during strutting, and construction restrictions would prevent disturbances of breeding birds.

Threatened, Endangered, or Candidate Species

Issue: Potential impacts to nesting raptors.

Measure 4: Nest surveys for listed or candidate raptor species would be conducted ***between May 1 and July 15*** within the appropriate habitat types (e.g., cliff nesting) prior to development or construction. If an occupied nest is located, restrictions would be applied to all disturbance activities during the breeding season (March 1 through June 30). Applicable protection procedures would be identified by the Bureau of

Land Management biologist to protect the breeding birds.

Effectiveness: Surveys would determine the potential for impacting breeding raptors during nesting, and construction restrictions would prevent disturbances of breeding birds.

Issue: Potential impacts to sensitive plant species.

Measure 5: Sensitive plant species surveys would be completed in potential habitat areas prior to disturbances.

Effectiveness: Sensitive plant surveys would identify the locations of populations within the proposed disturbance areas. Mitigation options typically include avoiding or minimizing disturbances to the populations and habitat, transplanting, or collection of specimens for educational purposes (e.g., herbariums, schools).

Cultural Resources

Issue: Potential disturbance of cultural resources.

Measure 6: A Programmatic Agreement, developed with input from the Bureau of Land Management, State Historic Preservation Officer, Advisory Council on Historic Preservation, and the applicants should be developed either for each reasonably foreseeable future action or the Bald Mountain Mining District as a whole. Employee education programs directed towards recognizing the sensitive nature of cultural resources and strict management policies regarding casual collection of artifacts from public lands should be implemented for all reasonably foreseeable future actions.

Effectiveness: Implementation of a Programmatic Agreement, particularly a district-wide Programmatic Agreement, would reduce the direct impacts to cultural resources by coordinating and stipulating cultural resources identification, evaluation, data collection, and mitigation methods in the reasonably foreseeable future actions pursuant to Section 106 of the National Historic Preservation Act of 1986, aiding the Bureau of Land Management and the State Historic Preservation Officer in determining impacts on cultural resources in the cumulative effects area, and streamlining the evaluation process. Available data from directly affected sites would be collected. Sites would still be physically altered by construction activities and site integrity would be permanently lost. Implementation of education programs and artifact collect policies would reduce but not eliminate indirect impacts to cultural resources on project lands.

Visual Resources

Issue: Impacts to visual resources.

Measure 7: All metal structures would be painted with a neutral, nonreflective paint that would blend as much as possible with the surrounding landscape setting. This would be particularly important for mine processing facilities because of their scale and concentration.

Effectiveness: This measure would be effective in reducing the visual contrast of project-related structures.

Issue: Visual impact of Poker Flat/Repeat site.

Measure 8: Substantial room exists at the Poker Flats/Repeat site. Careful siting should be employed to move this facility as far as possible from the Ruby Marsh Road and place it against the far hillsides.

Effectiveness: This consideration during facility siting would substantially reduce the scale, contrast, and dominance of these facilities.

5.2 MONITORING MEASURES

Water Resources

Issue: Potential impacts to water quantity or quality.

Measure *A*: Copies of annual reports provided to the Nevada Division of Environmental Protection by February 28 of each year would be sent to the Bureau of Land Management, Ely District for information and review purposes.

Effectiveness: Copies of annual reports would provide the Ely District with current information on compliance status and environmental problems associated with projects located on public land. This report would include activities/problems that could affect water resources, test plot programs, and yearly activity reports, livestock, wildlife, and/or wild horses.

Wildlife and Fisheries Resources

Issue: Increase deer mortalities due to traffic.

Measure *B*: Road-kill deer along proposed and existing travel routes would be reported to Nevada Division of Wildlife. If deer mortalities increase substantially from previous levels during project operation, both the Bureau of Land Management and the Nevada Division of Wildlife would be consulted and the appropriate mitigation measures (e.g., additional signage, restrictive speed limits, modified road design) would be developed to reduce or eliminate the problem.

Effectiveness: Monitoring of deer killed or injured by increased traffic would identify whether road location and design impeded mule deer movements, resulting in increased mortalities. Consultation with the Bureau of Land Management and the Nevada Division of Wildlife would facilitate the development of appropriate supplemental mitigation, if necessary.

Issue: Shortage of available water sources for wildlife.

Measure *C*: A monitoring program would be implemented to identify if supplemental water sources were required. If supplemental water were needed, both the Bureau of Land Management and Nevada Division of Wildlife would be consulted and the appropriate locations for these sources would be determined in order to reduce or eliminate the problem.

Effectiveness: Monitoring would identify if project development or operation activities restricted wildlife access to water sources. Consultation with the Bureau of Land Management and Nevada Division of Wildlife would facilitate the development of this supplemental source, if necessary.

Wild Horses

Issue: Increased wild horse mortalities due to traffic.

Measure *D*: A monitoring program would be implemented to record road-killed wild horses along roads. If horse mortalities increase substantially during project operation, the Bureau of Land Management would be consulted and the appropriate mitigation measures (e.g., escape ramps, signage, speed limits, modified road design) would be developed to reduce or eliminate the problem.

Effectiveness: Monitoring of wild horses killed or injured by increased road traffic would identify if road location and design impeded horse movements, resulting in increased mortalities. Consultation with the Bureau of Land Management would facilitate the development of appropriate supplemental mitigation, if necessary.

Issue: Shortage of water sources for wild horses.

Measure *E*: A monitoring program would be implemented to identify if supplemental water sources were required. If supplemental water were needed, both the Bureau of Land Management and the Nevada Division of Wildlife would be consulted and the appropriate locations for these sources would be determined in order to reduce or eliminate the problem.

Effectiveness: Monitoring would identify if project development or operation activities restricted wild horse access to water sources. Consultation with the Bureau of Land Management and the Nevada Division of Wildlife would facilitate the development of this supplemental source, if necessary.

6.0 RESIDUAL IMPACTS

All projects in this cumulative impact analysis will be subject to some form of reclamation, mitigation, or natural revegetation. By 2011, a total of about 26,435 acres in the cumulative effects area would have been affected; however, a total of about 24,626 would have been reclaimed. Of the 1,809 acres not reclaimed, 1,002 acres affected by woodland product harvesting would revegetate naturally, leaving about 807 acres of mining disturbance (primarily in pits) and oil and gas disturbance not revegetated. This represents 0.2 percent of the 366,114 acres mapped for vegetation type in the cumulative effects area.

A summary of residual cumulative impacts by resource is presented in Table B-16. The importance of these residual impacts to the resources after 2011 (following completion of reclamation) also is noted.

Table B-16

Residual Impacts

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
SOILS					
Native soils disturbed.	1,450 acres	24,985 acres	26,435 acres	807 acres	The soils salvaged from the pit locations (693 acres) would be utilized for reclamation purposes.
VEGETATION					
Native vegetation removed.	1,450 acres	24,985 acres	26,435 acres	807 acres	The 1,002 acres disturbed by woodland product harvesting would revegetate naturally over 50 to 100 years. The 693 acres lost to pits would not represent an important residual impact.
GEOLOGY					
Mineral resources recovered.	Permitted gold resources would be recovered by 2005.	Known gold resources would be recovered by 2005.	Known gold resources in the Buck and Bald Mountain area would be recovered by 2005.	Reclamation would be completed by 2011.	No known residual impacts.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
WATER RESOURCES					
Mining disturbance potentially affecting water resources.	Pits No.: 9 Acreage: 189 Dumps No.: 5 Acreage: 508	Pits No.: 42 Acreage: 639 Dumps No.: 36 Acreage: 1071	Pits No.: 51 Acreage: 828 Dumps No.: 41 Acreage: 1579	After cessation of mining, all 41 waste rock dumps would be reclaimed, 8 pits would be backfilled, and 43 pits would be left open.	Following reclamation, the importance of residual impacts on Water Resources is related to waste rock dumps and open pits. Waste rock may impact spring flow by covering portions of recharge areas. Future waste rock dumps may cause temporary impacts to surface water quality from the introduction of sulfate, total dissolved solids, and metals. Precipitation into future pits would be a seasonal source of groundwater recharge.
WETLANDS AND WATERS OF THE UNITED STATES					
Wetlands or waters of the United States disturbed.	No wetland or riparian areas would be directly impacted. One intermittent drainage totaling 0.04 acre would be impacted.	Interrelated projects would be expected to have low impacts to wetlands and riparian areas. Some long-term impacts to intermittent drainages (waters of the U.S.) would occur during material excavation and deposition.	Potential cumulative impacts to wetlands and intermittent drainages would depend upon project designs (e.g., the location of material excavation and deposition).	Federally-mandated mitigation as well as project design modifications and reclamation would reduce short- and long-term impacts.	Residual impacts to wetlands following design modifications, mitigation, and reclamation are expected to be low. Impacts to intermittent drainages would depend on project designs and on the potential for mitigation.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
WILDLIFE AND FISHERIES RESOURCES					
Habitat removed or changed.	1,450 acres	24,985 acres	26,435 acres	807 acres	After 2011, habitats would revert to native vegetation species over a long period of time. The permanent loss of 807 acres of habitat would not be important to area wildlife species.
Displacement/ fragmentation.	Yes	Yes	Yes	No	Following reclamation, vegetation would re-establish, roads would be reclaimed, and animals would reinhabit the areas previously disturbed, thereby decreasing the effects from habitat fragmentation.
Disturbance.	Yes	Yes	Yes	No	After closure of mines and cessation of other cumulative activities, the levels of disturbance would decrease, and no residual impacts would result.
Crucial mule deer winter range disturbed.	1,450 acres	20,039 acres	21,489 acres	807 acres	After 2011, habitats would begin to revert to native vegetation species. Mule deer would begin to reinhabit the areas previously disturbed, as native plant species re-established. The permanent loss of 807 acres of habitat would not be important to mule deer.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
Piñon-juniper, mountain mahogany, and mixed shrub habitat removed (potential nesting habitat).	595 acres	8,107 acres	8,702 acres	8,702 acres	After 2011, piñon-juniper, mountain mahogany, and mixed shrub habitat would have been reclaimed, but the dominant woody species would not be present and the habitat would be lost for the long term, reducing the amount of potential nesting habitat for birds by approximately 6 percent of the total available habitat.
<u>THREATENED, ENDANGERED, OR CANDIDATE SPECIES</u>					
Habitat removed or changed.	1,450 acres	24,985 acres	26,435 acres	807 acres	After 2011, habitats would revert to native vegetation species over a long period of time. The permanent loss of 807 acres of habitat would not be important to area threatened or endangered species.
Displacement/ fragmentation.	No	Yes	No	No	Following reclamation, vegetation would re-establish, roads would be reclaimed, and animals would reinhabit the areas previously disturbed, thereby decreasing the effects from habitat fragmentation.
Disturbance.	No	Yes	No	No	After closure of mines and cessation of other cumulative activities, the levels of disturbance would decrease, and no residual impacts would result.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
WILD HORSES					
Habitat disturbed.	1,450 acres	20,039 acres	21,489 acres	807 acres	Following reclamation, vegetation would begin to re-establish in areas previously disturbed by cumulative activities. The permanent loss of 807 acres of habitat would not be important to wild horses.
Displacement.	Yes	Yes	Yes	No	Following reclamation, vegetation would re-establish, roads would be reclaimed, and animals would reinhabit the areas previously disturbed, thereby decreasing the effects from habitat fragmentation.
Disturbance.	Yes	Yes	Yes	No	Following reclamation, human activity would be reduced to a low level as mining operations cease. Residual impacts of disturbance to wild horses would be minimal.
CULTURAL RESOURCES					
Sites disturbed.	20 known sites; completion of inventories may yield more.	151 potential sites; completion of inventories may yield more.	171 known and potential sites; completion of inventories may yield more.	171 known and potential sites may be disturbed permanently; site integrities would be lost permanently.	Once a site is disturbed, it cannot be restored; however, impacts to significant sites would be mitigated prior to disturbances. Also, illegal collecting and vandalism would still occur at sites that would not be impacted directly.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
AIR QUALITY					
Degraded air quality.	Air quality effects from construction, operation, and reclamation activities would result in short-term increases in fugitive dust emissions, as well as oxides of nitrogen, carbon monoxide, and sulfur dioxide concentrations.	Air quality effects from interrelated projects are expected to be short-term and similar in scope to those of the Proposed Action. Construction of an electrical transmission line to replace diesel generators as a source of power would reduce emissions at Bald Mountain Mine.	Impacts are not expected to act in a cumulative fashion, since the majority of these projects are either distant from each other or would be sequential to and not simultaneous with the Proposed Action.	Mitigation measures such as dust and other air pollutant controls would reduce impacts to air quality.	The majority of air emissions would cease with the completion of mining or other activities. No residual impacts to air quality are expected.
SOCIAL AND ECONOMIC RESOURCES					
Tax revenue generation.	Yes	Yes	Yes	No	Tax revenue would no longer be generated. White Pine and Elko Counties, and the State of Nevada would experience a decrease in revenues available unless other industries start up at that time to compensate. Employees would have to find other jobs, relocate, or collect unemployment. There could be underutilized infrastructure if the population were to experience a net loss.
Employment opportunities.	Yes	Yes	Yes	No	

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
RECREATION					
Public land available for dispersed recreational activities converted to other uses.	1,450 acres	6,822 acres	8,272 acres	807 acres	The residual impact on total acres available for dispersed recreation within the Egan Response Area would be minimal.
VISUAL RESOURCES					
Consistency with Visual Resource Management (VRM) objectives.	Visual contrasts allowed for VRM Class III lands would be exceeded, resulting in high visual impacts at the Mooney Basin process area.	Visual contrasts allowed for VRM Class III lands would be exceeded, resulting in high visual impacts due to interrelated projects.	Cumulative visual impacts would high.	Adoption of mitigation and reclamation measures would reduce cumulative visual impacts to moderate levels in most areas, but impacts would remain high along Overland Road and Ruby Marsh Road.	After 2011, most visual impacts would be expected to be moderate to low. However, widespread evidence of past mining activity would remain visible.
PALEONTOLOGICAL RESOURCES					
Loss of important fossil resources.	No impacts to paleontological resources are expected.	No impacts from interrelated projects are expected.	No cumulative impacts are expected.	No mitigation is proposed.	After 2011, residual impacts are not expected. The quality of paleontological resources would remain at pre-mining levels.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
RECLAMATION					
Areas not reclaimed.	134 acres	673 acres	807 acres	807 acres	The 1,002 acres disturbed by woodland products harvesting would revegetate naturally over 50 to 100 years. The 693 acres associated with unreclaimed pits and 114 acres associated with oil and gas development would not represent an important residual impact. Forage production on reclaimed lands would gradually increase after 3 to 5 years.
HAZARDOUS MATERIALS AND WASTE					
Possibility of a chemical release.	624 diesel fuel, 288 hydrochloric acid, and 144 sodium cyanide truck deliveries over the project life. The probability of an accident resulting in a release would be about 0.02 (2 in 100). Additional 500 to 1,000 lbs/day of solid, nonhazardous waste would be generated by project activities.	Rates of chemical use and waste generation with interrelated projects are not expected to increase beyond levels of the Proposed Action, since most interrelated projects would be sequential and not simultaneous with the Proposed Action.	Rates of chemical use and waste generation are not expected to act in a cumulative fashion.	Mitigation measures including emergency response, containment, and remediation would be expected to reduce the impacts of a chemical or waste release to the environment.	Residual impacts associated with chemical use and waste generation following the implementation of mitigation measures would consist of residual contamination associated with releases to the environment. Contaminant concentrations following remediation would be expected to be low and to decrease over time.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
ACCESS AND LAND USE					
Animal unit months (AUMs) displaced.	Short-term displacement of 347 AUMs. Following reclamation, approximately 345 AUMs would be recovered; therefore, the long-term loss would be approximately 2 AUMs.	Short-term displacement of 4,742 AUMs. Following reclamation, approximately 6,377 AUMs would be recovered; therefore, the long-term gain would be approximately 1,635 AUMs.	Short-term displacement of 5,089 AUMs. Following reclamation, approximately 6,722 AUMs would be recovered; therefore, the long-term gain would be approximately 1,633 AUMs.	Long-term gain of 1,633 AUMs.	Represents approximately 17.7 percent of the active preference AUMs in the cumulative effects area.
Public land converted to mining or other land uses.	1,450 acres	4,483 acres	5,933 acres	807 acres	The residual impact on total acres available within the Egan Resource Area would be minimal.
Manageable woodlands removed.	242 acres	2,520 acres	2,762 acres	2,762 acres	Represents approximately 2.2 percent of the piñon-juniper woodlands in the cumulative effects area.
Cords of wood removed.	1,260 to 2,000 cords	13,360 to 21,540 cords	14,620 to 23,540 cords	Loss of productivity would be long-term, beyond the year 2011.	Recovery of manageable woodlands and harvestable woodland products would occur over an average 60 to 80-year reclamation time frame. The acreage affected represents only 2.2 percent of the piñon-juniper woodlands in the cumulative effects area.

Table B-16 (Continued)

Resource	Proposed Action	Interrelated Projects	Cumulative Impact	Impact Following Reclamation/Mitigation	Importance After 2011
Christmas trees removed.	2,380 to 3,332 trees	25,200 to 35,280 trees	27,580 to 38,612 trees	Loss of productivity would be long-term, beyond the year 2011.	Recovery of manageable woodlands and harvestable woodland products would occur over an average 60 to 80-year reclamation time frame. The acreage affected represents only 2.2 percent of the piñon-juniper woodlands in the cumulative effects area.
Pounds of piñon pine nuts removed.	1.2 to 1.7 million pounds	12.7 to 17.8 million pounds	13.9 to 19.5 million pounds	Loss of productivity would be long-term, beyond the year 2011.	Recovery of manageable woodlands and harvestable woodland products would occur over an average 60 to 80-year reclamation time frame. The acreage affected represents only 2.2 percent of the piñon-juniper woodlands in the cumulative effects area.

APPENDIX C

CULTURAL RESOURCES SURVEY RESULTS

APPENDIX C
Cultural Resources Survey Results

Specific cultural resource information pertaining to the Bald Mountain Mine Expansion Project is presented in this appendix. Survey and site information is summarized on Table C-1.

Five previous surveys were identified in the vicinity of the proposed Horseshoe/Galaxy Mine. One of the inventories included a Bureau of Land Management survey in September 1983 along a proposed division fenceline, which located a large prehistoric village complex in the Willow Springs area (Site 046-2726). With the State Historic Preservation Officer's concurrence, the site was determined eligible, pending further evaluation (Price 1983; Becker 1984). Mitigation was conducted by the Bureau of Land Management in 1984. This mitigation allowed placement of the proposed division fence; however, no additional determination of the site's eligibility to the National Register of Historic Places appears to have been made beyond a recommendation that further research be conducted at the site (Amme and McFarlin 1984). Testing conducted at the site was inconclusive and a final eligibility determination has not been made to date. Ceramics, multi-component diagnostics, biface reduction areas, and rock rings have been identified at the site, which may have been a regional base camp. The site is still considered eligible to the National Register of Historic Places.

A survey of a proposed haul road between the Top Area and Alligator Ridge, which would have replaced the existing road, was conducted in 1988. Portions of the proposed haul road would have traversed sections of the proposed Horseshoe/Galaxy Mine. No sites eligible to the National Register of Historic Places were located during this survey in the Horseshoe/Galaxy area (Green 1988).

Between June and August 1992, Western Cultural Resource Management, Inc. conducted a survey in the Horseshoe/Galaxy area. A total of 70 sites (46-07191 to 46-07260) and 51 isolated artifacts (isolates) were recorded. Of these, 57 were prehistoric, 1 was historic, and 12 contained both prehistoric and historic components. Only one site, a quarry/lithic workshop (46-07240), was recommended as eligible to the National Register of Historic Places (Stoner and Johnson 1992). Probing has not been conducted at these sites and a final report was not issued, since the inventory was conducted prior to the Placer buy-out from USMX, Inc. and was not continued after USMX, Inc. sold the claims to Placer.

JBR Environmental Consultants conducted a survey of portions of the northern and the southern sections of the proposed Horseshoe/Galaxy Mine in 1994. Two previously recorded sites (7191 and 7492) were recorded in the northern portion. Seventeen new sites (46-7544 to 46-7560) were identified in the southern portion of the proposed mine area located in the Mooney Basin. Of these 19 sites, 7 sites (46-7545, 7546, 7549, 7554 through 7556, and 7559) were recommended eligible to the National Register of Historic Places (Crosland et al. 1995). The State Historic Preservation Officer's concurrence is pending.

Within the vicinity of the proposed Process Area Modifications, six previous cultural resource surveys were identified. These surveys included: 1) an August 1983 survey of a proposed pipeline extension that intersected portions of the proposed process area; a March 1983 survey for the proposed Placer-Amex gold mining operation, which lies northeast of the proposed process area modifications; and a July 1986 survey along the main road into the Bald Mountain Mine (Podborny 1986); 2) two surveys along portions of the Rat Pit haul road immediately east of the proposed process area (Moore et al. 1991; Mehls et al. 1994b); and a 1994 survey conducted by JBR

Environmental Consultants in portions of the proposed process area (Crosland et al. 1995).

The March 1983 survey conducted by the Bureau of Land Management included surveys of the proposed processing areas, one silt source, and new and existing roads. One small prehistoric isolated find (046-2637) was identified. The site was not identified as to its eligibility to the National Register of Historic Places and no mitigation, beyond recordation of the site, was suggested (Johnston and Lindsey 1983). The 1982 and 1986 surveys did not identify any cultural resources (Lindsey 1982; Podborny 1986).

The two surveys conducted along the Rat Haul road identified one site (46-7070) that was initially considered eligible to the National Register of Historic Places (Moore et al. 1991). Further evaluation of the site determined that it was not eligible (Mehls et al. 1994b). The State Historic Preservation Officer concurred with the findings in 1994 (Baldrica 1994).

The 1994 JBR Environmental Consultants survey identified only one site (36-7573) in the proposed Process Modifications area. It was judged ineligible for the National Register of Historic Places pending State Historic Preservation Officer concurrence (Crosland et al. 1995).

The majority of previous surveys in the Proposed Action area were conducted in the proposed Top Area and were related mainly to evaluations of Bald City. The Top Area has been identified as sensitive with regard to prehistoric and historic cultural resources. High sensitivity has been displayed along the edges of the Top Area and is primarily associated with stands of old growth mountain mahogany (Amme 1984). Twelve previous cultural surveys were identified for the Top Area with four surveys specifically identified within the Bald City area. These surveys included a July 1984 field examination by the Bureau of Land Management in response to proposed trenching activity by Amselco Exploration. The survey determined that a portion of the trenching operations would impact an extensive lithic tool scatter (Site 046-2733) in the Top Area and that mitigation would be required prior to construction. Impacts to the site were reduced by rerouting the trench. National Register of Historic Places eligibility of the site was not identified during this survey (Amme 1984).

Archaeological Research Services conducted an evaluation in August 1992 of site 046-2733 (26Wp1682) to determine the site's eligibility for the National Register of Historic Places. Subsequent surveys in the immediate vicinity of 26Wp1682 indicated that the entire area consists of extensive lithic scatters. Archaeological Research Service's investigation identified both prehistoric and historic components in the area, including bifaces, projectile points, cans, bottle fragments, and an ore car. The investigation identified that the site was probably used as a prehistoric field camp with associated toolstone procurement from the Mahoney Canyon Quarry, located east of the proposed Top area expansion. The Mahoney Canyon site is an extensive quarry/toolsite processing area that is eligible to the National Register of Historic Places. The historic component of Site 26Wp1682 indicated that the site's historic assemblage was related to occupation of nearby Bald City. The site was recommended as eligible to the National Register of Historic Places based upon its integrity and significant data. No further work on the site was recommended (Moore and Young 1992). The State Historic Preservation Officer recommended that eligibility of the site be deferred, pending creation of a historic context and determination of eligibility for Bald City. Bald City has been determined ineligible, as was the historic component for site 26WP1682.

In September 1984, the Bureau of Land Management surveyed approximately 45 acres in a ravine east of Bald Mountain and recorded the previously unrecorded historic mining complex of Bald City (046-3467/26Wp3362) (Bureau of Land Management Report No. CR-NV-04-688P). The site was described as a large multi-component mining complex and a variety of residential debris and artifacts associated with ore extraction and assaying were recorded (Johnston 1984; Moore and Young 1992). Additional work at the Bald City site was performed by Western Cultural Resource Management, Inc. between September and October 1992. Forty-three features were identified; none of the features was found, after surface examination and probing, to be eligible to the National Register of Historic Places (Mehls et al. 1994a). The State Historic Preservation Officer concurred with the findings in 1994 (Baldrica 1994).

The August 1988 survey of a proposed haul road from the Top Area to the Amselco Alligator Ridge Mine identified one site (513-9/CR-46-5621), which is in the vicinity of the proposed Top Area modification considered eligible for inclusion in the National Register of Historic Places (Green 1988). The State Historic Preservation Officer concurred with these findings in July 1989 (James 1989).

Another survey, conducted by the Bureau of Land Management (Johnston 1986) in the Top/Rat area, identified one isolated find (046-4749) on Placer's Amex Rat Claims. The site was not eligible to the National Register of Historic Places and the site was mitigated through recordation (Johnston 1986). A second survey in the area occurred in August 1986. Exploration drilling operations were surveyed in the Bourne Canyon and Rat Claim areas; four lithic scatters (046-4790 through 4793) and two rock rings (046-4794, 046-4795) were identified. None of the sites was recommended as eligible to the National Register of Historic Places (Amme 1986).

An additional survey associated with the Top/Rat Area included a survey conducted by Archaeological Research Services in June 1988 in Placer Domes' West Rat Claims; 28 sites were recorded, including 23 predominately prehistoric sites and five historic sites. Twenty-four sites were recommended as not eligible to the National Register of Historic Places. Four sites were recommended as eligible (46-5338, 5361, 5353, 5356); the State Historic Preservation Officer subsequently determined that 5353 and 5356 were not eligible (Young 1988; James 1992). In September 1988, Archaeological Research Services evaluated the remaining two sites (5338 and 5361) for significance and eligibility. The site numbers were rerecorded to 26Wp1920 and 26Wp1921, respectively. Site 26wp1920 was determined ineligible. Site 26Wp1921 was found eligible for the National Register of Historic Places, and the State Historic Preservation Officer concurred (Young and Clay 1988; James 1989). The remaining 24 sites were not considered eligible with concurrence from the State Historic Preservation Officer.

In November 1991, Archaeological Research Services surveyed a parcel located directly north of the 1988 Archaeological Research Services survey (Young 1988) in the Rat Haul Road area. Twenty-three previously unrecorded sites were recorded; of these 19 were identified as ineligible to the register (046-7072 to 046-7076, 046-7078, 046-7097 to 7101, and 678-1 to 678-8). Nineteen sites have predominantly prehistoric components, four sites are predominantly historic. Four sites were recommended as eligible to the Register (046-7070, 046-7071, 046-7077, and 046-7102) (Moore et al. 1991). The State Historic Preservation Officer concurred with these findings in 1992 (James 1992).

Additional surveys associated with the proposed Top Area modification include an August 1991 inventory of three parcels completed by Archaeological Research Services (CRR-04-1031). A total of 11 sites (46-6966 to 6976) and 5 isolates were recorded. Site 46-6968 was probed and data was recovered that indicated potential eligibility of the site for the National Register of Historic Places. The remaining sites were recommended ineligible with no additional work suggested (Moore 1991). The State Historic Preservation Officer concurred with the findings and deferred evaluation of site 6968 pending further study (Baldrica 1993).

Archaeological Research Services completed an inventory of 350 acres in the Sage Flats area in June 1992. Eight previously unrecorded sites (46-7165 to 7172) and 19 isolates were recorded during the inventory. Two previously recorded sites (Bald City 26Wp3362 and Mahoney archaeological site 046-2733) also were observed but not rerecorded. Of the eight site locations, two (7168 and 7172) were probed to determine the nature of the deposits. Site 7172 is recommended for further evaluation to determine eligibility. All of the other sites and isolates were determined by Archaeological Research Services as not eligible to the National Register of Historic Places (Young 1992). The State Historic Preservation Officer recommended that eligibility of sites 46-7166, 7167, 7168, and 7172 be deferred pending creation of a historic context and determination of eligibility for Bald City and be treated as potentially eligible properties. The Division concurred that sites 7165, 7169, 7170, and 7171 were not eligible to the Register (Baldrica 1993). These sites are no longer eligible to the National Register of Historic Places, since Bald City has been determined to be ineligible to the Register.

Class III archaeological surveys of the proposed Top Area modification were completed by JBR Environmental Consultants in November 1994, identifying 13 sites within the survey area (Crosland et al. 1995). The eligibility of the sites to the National Register of Historic Places is pending, based on the letter requesting concurrence from the State Historic Preservation Officer, which was submitted January 19, 1995.

Table C-1

Summary of Noneligible, Potentially Eligible, or Eligible Cultural Sites Located, Relocated, or Evaluated for the Placer Project[1]

Agency Site Number or Smithsonian Number	Brief Site Description	Project Association	National Register of Historic Places Potential[2]	Project Disturbance
Placer-Amex Mine Expansion (CRR 04-567P) (Johnston 1983)				
046-2637	Isolated find	Top Area	JI	—
Archaeological Survey of the Proposed Maverick-Warm Springs Division Fence (CRR-NV-04-606P)(Price 1983; Becker 1984; Amme and McFarlin 1984)				
CR-NV-046-2726 (Willow Spring)	Prehistoric village and historic camp	Horseshoe/ Galaxy Willow Springs	NEV	Indirect
AmSelco Trenching Operation Exploration (BLM CRR-04-673P, 46-1031C) (Amme 1984; Moore and Young 1992)				
26Wp1682 (BLM # 046-2733)	Large multi-loci lithic tool scatter/camp/ historic site related to Bald City	Top Area/Bald City	NEL	Direct
Bald City Site (BLM Report Nos. 93-04-1031D CRR-04-688P) (Johnston 1984; Mehls et al. 1994a; Baldrica 1994)				
Bald City Site (BLM#046-3467/26wp3362)	Historic townsite; 43 features; trash scatters, privy pits, adit, roads, prospect pits, house pits, platforms	Top Area/Bald City	NEL	—
Proposed drill hole exploration, Placer U.S., Bourne Canyon Claims (CRR-NV-04-820P addendum) (Amme 1986)				
4 sites (046-4790 to 4793)	Lithic scatters	Top Area	JI	—
2 sites (046-4794 to 4795)	Rock rings	Top Area	JI	—
ARS Inventory of Placer Dome West Rat Claims (Report 502) (Young 1988; Young and Clay 1988; James 1989; James 1992).				
27 sites (046 - 5334 to 5360)	Debitage scatters, historic structures and debris, prospect pit, rock cairn, lithic scatters.	Top Area	NEL	—
CRNV-046-5361/26Wp1921	Debitage; points; biface fragments; lithic tools; flakes	Top Area	E	Indirect

Table C-1 (Continued)

Agency Site Number or Smithsonian Number	Brief Site Description	Project Association	National Register of Historic Places Potential[2]	Project Disturbance
ARS Inventory of a Proposed Haul Road for Amselco Alligator Ridge Mine (BLM Report No. CRR-04-930P) (Green 1988; James 1989)				
10 sites (5613 to 5620, 5622, 5623)	Lithic scatters	Horseshoe/ Galaxy, Top Area (Haul road from Top Area to Alligator Ridge)	NEL	—
CR-46-5621 (513-9)	Lithic scatter, projectile points	Top Area	E	Indirect
B P Minerals Drillsite and Access Road Inventory (BLM Report No. CRR-04-957P) (Price 1989)				
46-5791 46-5792 46-5793 46-5794	(unavailable)	Top/Horseshoe/ Galaxy	NEL	—
ARS Addendum to Cultural Resource Inventory of the Placer Dome U.S., Inc., Bald Mountain Mine West Rat Claims: 427 Additional Acres (ARS Report No. 678, BLM Report No. CRR-04-924(d) Addendum) (Moore et al. 1991), and Rat Haul Road survey (CRR-92-04-024C)(Mehls et al. 1994b; Baldrica 1994)				
46-7070	Unidentified series; lithic scatter; historic artifacts	Top Area	NEL	—
46-7071	Biface; gatecliff; historic artifacts	Top Area	E	—
46-7077	Rock rings; biface; historic artifacts	Top Area	E	Indirect
46-7102	Historic artifacts	Top Area	E	—
8 isolates	Flakes, historic debris, stone tools	Top Area	NEL	—
11 sites	Historic artifacts, lithic scatters, several artifact features	Top Area	NEL	—

Table C-1 (Continued)

Agency Site Number or Smithsonian Number	Brief Site Description	Project Association	National Register of Historic Places Potential[2]	Project Disturbance
ARS Three Parcel Survey in Top Area (BLM Report No. CCR-04-1031) (Moore 1991; Baldrica 1993)				
10 Sites (46-6966 to 6967, 6969 to 6976)	Lithic scatters	Top Area	JI	—
5 Isolates	Flakes	Top Area	JI	—
46-6968	Extensive lithic scatter, toolstone production	Top Area	NEV	Direct
RMI Horseshoe/Galaxy Project Survey (BLM CRR-92-04-1060P) (Stoner and Johnson 1992)				
69 sites (46-07191 to 07239, 46-07241 to 07260)	Lithic scatters, can scatters, quarry/lithic workshop	Horseshoe/Galaxy	JI	—
51 isolates	Lithic tools, flakes, historic debris	Horseshoe/Galaxy	JI	—
46-07240	Quarry/lithic Workshop Site; Paleo/Indian Materials	Horseshoe/Galaxy	JE	Indirect
ARS Inventory of USMX Block A/B Claims; Addendum to report CRR-04-1031 (Young 1992; Baldrica 1993)				
19 Isolates	Flakes, projectile points, cans	Top Area/Sage Flat/Rat	NEL	—
4 sites (7165, 7169, 7170, 7171)	Lithic tool and debitage scatters	Top Area/Sage Flat/Rat	NEL	—
CrNV 46-7166	Historic adit and tailings	Top Area/Sage Flat/Rat	NEL	Indirect
CrNV 46-7167	Historic prospect and can scatter	Top Area/Sage Flat/Rat	NEL	Indirect
CrNv 46-7168	Prospects, historic debris, prehistoric lithic tool and debitage scatter	Top Area/Sage Flat/Rat	NEL	Direct

Table C-1 (Continued)

Agency Site Number or Smithsonian Number	Brief Site Description	Project Association	National Register of Historic Places Potential[2]	Project Disturbance
CrNV 46-7172	Lithic tool and debitage scatter with a historic component, prospects and debris	Top Area/Sage Flat/Rat	NEL	Direct
Preliminary Summary of the Placer Dome Cultural Resource Class III Inventory Results - Proposed Bald Mountain Mine Expansion Project (Crosland et al. 1995)				
21 sites (46-7544, 7547, 7458, 7551-7553, 7557, 7558, 7560-7562, 7564, 7565, 7567-7572)	Lithic scatters; caches; campsites; cairns; mine and ore dumps; sheep camp	Bald Mountain Mine Expansion areas on and east of Bald Mountain	JI	—
46-7545	Lithic scatter	Horseshoe/Galaxy	JE	Direct
46-7546	Campsite	Horseshoe/Galaxy	JE	Direct
46-7549	Quarry and lithic scatter	Horseshoe/Galaxy	JE	Direct
46-7550	Lithic scatter	Horseshoe/Galaxy	JI	—
46-7554	Stone circle	Horseshoe/Galaxy	JE	Indirect
46-7555	Stone circle and lithic scatter	Horseshoe/Galaxy	JE	Direct
46-7556	Lithic scatter	Horseshoe/Galaxy	JE	Direct
46-7559	Quarry and lithic scatter	Horseshoe/Galaxy	JE	Direct
46-7563	Campsite	Top Area/Sage Flat	JE	Indirect
46-7566	Campsite	Top Area/Sage Flat	JE	Indirect
3 previously recorded sites (46-6966, 46-7191-7192)	Lithic scatters	Bald Mountain Mine Expansion areas on and east of Bald Mountain	NEL	—

Table C-1 (Continued)

FOOTNOTES:

[1]Other surveys have been conducted in the area; if no sites were identified during these surveys or if the National Register of Historic Placer eligibility of sites were not identified, the surveys were not outlined in this table.

2

E = Eligible (State Historic Preservation Officer concurrence)
JE = Judged eligible (pending State Historic Preservation Officer concurrence)
JI = Judged ineligible (pending State Historic Preservation Officer concurrence)
NEL = Not eligible (State Historic Preservation Officer concurrence)
NEV = Eligible pending further evaluation (State Historic Preservation Officer concurrence)
AV = Avoid
ME = Mitigative Excavations
NA = No Action

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