



U.S. Department of the Interior
Bureau of Land Management
Elko Field Office
Elko, Nevada

April 2002



FINAL Environmental Impact Statement Newmont Mining Corporation's South Operations Area Project Amendment

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
Elko Field Office
3900 East Idaho Street
Elko, Nevada 89801-4611
<http://www.nv.blm.gov>

In Reply Refer To:
1793.4/3809
N16-81-009P

April 12, 2002

Dear Reader:

Enclosed for your review and comment is the Final Environmental Impact Statement (FEIS) for Newmont Mining Corporation's South Operations Area Project Amendment. The FEIS serves to analyze the effect of continuing mining and dewatering operations for ten years beyond the current permit. The South Operations Area Project consists of the Gold Quarry, Mac, and Tusc open pit gold mine, mill, and dewatering facilities, and is located approximately six miles northwest of Carlin, Nevada.

This FEIS addresses those concerns raised during the public comment period on the DEIS through October 31, 2000. This document provides the information presented in the DEIS as well as changes to the text which have been highlighted in bold type to aid in the reader's review. A second volume (Appendix E) contains all of the comment letters received on the DEIS and the BLM's responses to these comments. The BLM, in conjunction with all interested parties, has proposed mitigation measures to address incremental impacts which are over and above what was addressed in the 1993 South Operations Area Project EIS.

Following a 30 day public review period, a Record of Decision (ROD) will be published. The decision reached in the ROD is subject to appeal to the Interior Board of Land Appeals. The 30-day appeal period starts with the publication of the ROD, and implementation of the Plan of Operations will not begin until the ROD has been issued.

Your interest in the management of public lands is appreciated. If you have any questions, please contact Roger Congdon, EIS Coordinator, at the Bureau of Land Management, Elko Field Office, 3900 Idaho Street, Elko, NV 89801.

Sincerely,

Helen Hankins
Field Manager

**FINAL ENVIRONMENTAL IMPACT STATEMENT
NEWMONT MINING CORPORATION
SOUTH OPERATIONS AREA PROJECT AMENDMENT**

LEAD AGENCY

U.S. Department of the Interior
Bureau of Land Management
Elko Field Office
Elko, Nevada

PROJECT LOCATION

Elko and Eureka Counties, Nevada

**COMMENTS ON THIS FINAL ENVIRONMENTAL
IMPACT STATEMENT (EIS) SHOULD BE DIRECTED TO:**

Roger Congdon, Project Lead
Elko Field Office
Bureau of Land Management
3900 East Idaho Street
Elko, Nevada 89801

**DATE FEIS WAS MADE AVAILABLE
TO THE ENVIRONMENTAL PROTECTION
AGENCY AND THE PUBLIC**

April 26, 2002

**DATE BY WHICH COMMENTS SHOULD BE
RECEIVED BY THE BUREAU OF LAND MANAGEMENT**

May 28, 2002

ABSTRACT

The Final Environmental Impact Statement analyzes impacts associated with a proposal to continue and expand gold mining operations on the South Operations Area Project site in northeastern Nevada. Newmont has been mining at this location since 1981, and, in 1993 as a result of the South Operations Area Project EIS Record of Decision, has deepened the Gold Quarry open pit mine below the local water table, and included a dewatering operation, which has discharged up to 20,000 gpm to the Humboldt River. However, Newmont has implemented an extensive Mitigation Plan which has proven effective in mitigating potential impacts and in some cases, improving environmental conditions. The annual progress report for the Mitigation Plan is provided as an appendix to this document. The proposed Action includes: (1) additional mining to approximately 350 feet below the currently approved operating level of the Gold Quarry open pit mine with attendant 139 acre expansion aerially, (2) continuing to dewater the mine and discharge groundwater at a rate no greater than 25,000 gallons per minute directly into Maggie Creek six miles above the confluence with the Humboldt River, (3) expand waste rock disposal facilities and leach facilities, and (4) construct associated ancillary facilities. Two alternatives to the Proposed Action are analyzed in the document. The Agency Preferred Alternative consists of the Proposed Action. A considerable portion of the Final Environmental Impact Statement addresses and analyzes impacts associated with incremental dewatering issues and the resulting expansion of the cone of depression.

Responsible Official for FEIS:



Manager, Elko Field Office

| UNIT CONVERSION TABLE | | |
|------------------------------|-----------------------------|--------------------|
| From | To | Multiply By |
| Area | | |
| acres | square feet | 43,560 |
| square miles | acres | 640 |
| Volume | | |
| acre-feet | gallons | 325,829 |
| gallons | cubic feet | 7.48 |
| Flow | | |
| cubic feet per second (cfs) | gallons per minute (gpm) | 449 |
| gpm | acre-feet per year | 1.61 |
| cfs | acre-feet per year | 724 |
| Concentration | | |
| parts per million (ppm) | milligrams per liter (mg/L) | 1 |
| mg/L | micrograms per liter (Fg/L) | 1,000 |
| Loads | | |
| tons per day (tpd) | tons per year (tpy) | 365 |
| tpy | pounds per day | 5.48 |

Cover photographs, clockwise from top, left: Maggie Creek; Coyote Creek; oblique aerial view of Gold Quarry site; and Bighorn sheep on the Ivanhoe mine site. (Bighorn sheep do not occur at the Gold Quarry site.)

SUMMARY

SUMMARY

Newmont Mining Corporation (Newmont) submitted a Plan of Operations describing proposed activities for the South Operations Area Project Amendment (SOAPA) in March 1997. The proposal would amend the existing Plan of Operations N16-81-009P. The Bureau of Land Management (BLM) reviewed the Amendment and determined that the Proposed Action had the potential to result in significant environmental impacts and that preparation of an Environmental Impact Statement (EIS) would be necessary.

Newmont proposes activities that would support continued operation and expansion of existing gold mining and processing at its South Operations Area Project in Eureka and Elko Counties, Nevada; six miles northwest of Carlin. The South Operations Area Project is located on both private lands owned or controlled by Newmont and on public lands administered by the BLM.

This EIS describes components of, reasonable alternatives to, and environmental consequences of implementing the SOAPA. Direct, indirect, and cumulative impacts on the affected environment have been analyzed for the Proposed Action and alternatives. The impacts described in this document will be the basis for a decision regarding the Proposed Action or alternatives and selection of appropriate mitigation. No distinction has been made between impacts occurring on public versus privately owned land that would result from the possible federal authorization. The SOAPA would not cause any new kinds of impacts (with certain exceptions) but would extend the time period during which existing impacts would continue.

Newmont began mining at the Gold Quarry Mine in 1981 under a Plan of Operations (as amended). In 1992, Newmont filed a Plan of Operations Amendment with the BLM Elko Resource Area Office proposing to expand mining at the site (Plan of Operations N16-81-009P). Newmont also changed the name of the operation to South Operations Area Project.

Existing operations at the Gold Quarry site were analyzed by the BLM in 1993 (BLM, 1993). Subsequently, the BLM issued a Record of Decision approving the project and requiring the implementation of an extensive mitigation plan developed by Newmont and the BLM (BLM, 1993). That mitigation plan contained numerous, specific actions to be taken to mitigate potential impacts to riparian and wetland areas, springs and seeps, streams and rivers, aquatic habitat and fisheries, threatened, endangered and candidate species, livestock grazing, terrestrial wildlife, soils, vegetation, visual resources, and recreation and wilderness. A major element of the mitigation plan was the Maggie Creek Watershed Restoration Project and its extensive requirements for monitoring, which are described in this document. Another major element of the mitigation plan was the reclamation and revegetation plan, which is described in Chapter 2.

The BLM recently prepared a Cumulative Impact Analysis report (BLM, 2000b) to address potential cumulative dewatering and discharge impacts associated with Barrick's Betze Project and Newmont's proposed South Operations Area Project Amendment and Leeville Project. The results of this analysis

are summarized in Chapter 5 of this EIS. The analysis may result in the implementation of mitigation measures to address the cumulative impacts of the groundwater pumping and water management operations of these three mines. The BLM will identify monitoring programs and mitigation measures in conjunction with the affected parties; monitoring and mitigation measures will be specified in the Final EISs for the three projects.

SUMMARY OF THE PROPOSED ACTION

The Proposed Action would provide for the expansion of mining at the Gold Quarry Mine. Total incremental disturbance in the South Operations Area associated with the Proposed Action would be 1,392 acres, of which 553 acres are private lands and 839 acres are public lands. The disturbed area would include the mine pit, leach pads, waste rock disposal facilities, haul roads, and ancillary mine facilities associated with the Proposed Action. These areas compare with the South Operations Area Project analysis of 2,047 acres of public land, 5,913 acres of private land, and a total surface disturbance of 7,960 acres.

Mining and processing operations would result in recovery of oxide and sulfide ores by deepening the existing Gold Quarry pit approximately 350 feet. Incremental disturbance area associated with development of the open pit would be 139 acres. Mining for the SOAPA would continue through the year 2011 and ore processing would continue through 2016.

Deepening of the Gold Quarry pit would result in further mining below the regional groundwater table and would require

installation of additional dewatering wells to keep groundwater out of the mine pit. Dewatering would result in pumping and discharging water in excess of Newmont's water needs at the South Operations Area. Newmont proposes to pump water at rates of less than 30,000 gallons per minute (gpm), treat the water to State of Nevada standards, and discharge the water to Maggie Creek near the mine site. Dewatering activities would cease at the conclusion of open pit mining in the year 2011.

Waste rock generated during mining would be disposed at the existing Gold Quarry North Waste Rock Disposal Facility, the Gold Quarry South Waste Rock Disposal Facility and the James Creek Waste Rock Disposal Facility. Waste rock disposal at the South Waste Rock Disposal Facility would require an expansion of approximately 235 acres. Waste rock placed on the North Waste Rock Disposal Facility would disturb approximately 439 acres. The James Creek Waste Rock Disposal Facility would disturb approximately 255 acres. The total waste rock production for the amendment would be 408 million tons. These acreages represent an approximate 50 percent increase in the area of existing waste rock disposal facilities.

Combined ore production for the expanded pit is expected to be about 118 million tons. Of this amount, approximately 57 million tons would be oxide and mill-grade sulfide ore. The remaining 61 million tons would be low-grade sulfide ore.

The proposed open pit expansion would require relocating 30 million tons of tailing from the James Creek tailing facility to the Mill 5/6 tailing facility. The tailing would be moved by dredging and surface mining techniques. This represents the removal of 186 surface acres of old tailing.

The existing oxide leach facilities in the South Operations Area would be expanded to accommodate the low grade oxide and biooxidized sulfidic refractory ore from the proposed Gold Quarry pit expansion. The South Area Leach facility expansion would consist of a southern extension of the existing Non-Property Leach Pad and construction of the Property Leach Pad 2. The leach pads would continue to be stacked in lifts to a maximum height of 300 feet. Process and stormwater ponds would be constructed down gradient of the proposed leach pads. The proposed leach pads would share the same process and stormwater ponds. All ponds would be fenced in compliance with Nevada Division of Wildlife (NDOW) specifications. Changes to leaching operations would involve the addition of approximately 487 acres, or about 40 percent more leaching area.

The Non-Property Leach Pad would be expanded along its existing southern edge and would disturb 182 acres of public lands. The expansion would buttress against the existing Non-Property Leach Pad and would ultimately contain approximately 245 million tons. The Property Leach Pad 2 would be operated independently from the existing Property Leach Pad. The proposed Property Leach Pad 2 including process and stormwater ponds would disturb 163 acres of public lands and would contain approximately 46 million tons.

Newmont proposes to construct an expansion to the Refractory Leach Facility to provide an ammonium thiosulfate leach pad for heap leaching the carbonaceous sulfidic refractory ore in lifts without removing it from the pad. This proposed Refractory Leach Facility expansion would disturb an additional 108 acres of public land and 219 acres of private land.

Tailing generated by the ore processing would continue to be disposed at the existing Mill 5/6 tailing facility. No additional acreage would be disturbed for expansion of the tailing storage facility.

Proposed reclamation activities at the South Operations Area would include neutralization of process solutions, regrading of disturbance areas, replacement of topsoil, and seeding, fertilizing, and mulching. The mine pit would not be reclaimed; however, the pit would be fenced or bermed.

PROJECT ALTERNATIVES

Alternatives identified in this EIS were developed in response to issues raised during public scoping and BLM review of the Proposed Action. Alternatives selected for detailed review in the EIS were based on one primary issue related to potential impacts resulting from the Proposed Action. This issue is feasibility of backfilling open mine pits to be consistent with Nevada Administrative Code (519A.250) concerning solid minerals reclamation standards and policy statements outlined in the Federal Land Policy Management Act (PL 94-579, 43 USC 1701).

Two alternatives were developed to address this issue. In addition, the No Action Alternative was also carried through analysis. The alternatives are as follows.

Alternative 1 - Backfilling the Mac Pit

This alternative includes backfilling of the Mac open pit with waste rock generated from the Gold Quarry pit expansion. Backfilling the Mac pit would reduce the size of the waste

rock disposal facilities by six acres. Total disturbance for this alternative would be 1,386 acres with 1,247 acres reclaimed.

Alternative 2 - Modified Waste Rock Disposal Facility Design

This alternative would modify the Gold Quarry South Waste Rock Disposal Facility by substituting some of the horizontal hauling distance for additional elevation in an attempt to have a smaller “footprint” for the facility (50 acres less). A smaller footprint would reduce the disturbance associated with a new diversion channel west of the disposal facility by three acres. Total disturbance for this alternative would be 1,339 acres with 1,200 acres reclaimed.

No Action Alternative

Expansion of the SOAPA mining facilities would not be approved. The Gold Quarry Mine would not expand beyond the currently approved Plan of Operations.

SUMMARY OF IMPACTS

Detailed analysis of potential impacts and mitigation measures are presented in Chapters 4 and 5, Consequences of the Proposed Action and Alternatives and Cumulative Effects Analysis, respectively. The following is a summary of potential impacts, by resource, resulting from implementation of the Proposed Action and alternatives. Impacts in this EIS address only the incremental effects of the proposed expansion and do not repeat the impacts analyzed in the original EIS (BLM, 1993).

PROPOSED ACTION

Geology and Minerals

Newmont’s proposed amendment would move 526 million tons of waste rock and ore from the Gold Quarry pit to waste rock disposal facilities, leach processing facilities, and a tailing storage facility. Relocation of these rock materials would modify landscape and topography of the South Operations Area. Several million ounces of gold would be extracted from the geologic resource.

One sinkhole has been documented to-date in the area affected by dewatering at the Gold Quarry mine. A sinkhole was discovered in July 1996 along Maggie Creek that temporarily captured the Maggie Creek flow. Although development of the sinkhole is likely related to mine-induced drawdown, the mechanism for development of this sinkhole is not completely understood. Available information on the geology in the region and prediction of groundwater drawdown were used to identify areas that potentially could be susceptible to sinkhole development. These areas include the large area underlain by carbonate rock located north of the Gold Quarry Pit. The development of sinkholes can pose a hazard to livestock, humans, and wildlife. If a sinkhole develops in an area containing buildings, roads, or other structures, damage to these structures may result.

Water Resources

The Proposed Action would require the expansion of pit dewatering operations. Approximately 459,000 acre-feet of groundwater would be removed through

dewatering concurrent with mining activities. As a result, groundwater levels in the mine area would decline farther, causing incremental reduced flows or loss of springs, seeps, and streamflow in the project area. Based on the extent of groundwater drawdown predicted by a numeric model, approximately five spring and seep sites would be impacted. To date, none of the 25 springs predicted by these models for impact in the 1993 EIS have been affected. During the dewatering period, discharge of mine water would continue to increase flow in lower Maggie Creek and the Humboldt River. Reductions or possible elimination of baseflow would be expected to occur in portions of two streams due to the incrementally expanded cone of depression. These streams would also experience declines in, or elimination of baseflow after cessation of dewatering. To date, most of the eight streams predicted for dewatering impacts in 1993 have not been noticeably affected, but two locations in the narrows area of Maggie Creek may have experienced reduced flows during low flow seasons (BLM, 1993).

Flows in springs, seeps and streams would eventually return to pre-mining conditions after pumping has ceased and the groundwater cone of depression has recovered sufficiently. Recovery of the water table to near original levels may take over 100 years; however, results of the model indicate that 95 percent of groundwater recovery would occur within 60 years after dewatering ceases. Evaporation from the pit lake would prevent complete recovery of the water table. Three adjudicated surface water rights would potentially be affected by lost or reduced flows. To date, none of the seven water rights predicted for impact in 1993 have been affected.

The Gold Quarry pit would fill with groundwater to an ultimate depth of about **1,370 feet**. Most of the pit lake would form during the first 10 to 20 years after mining ceases. As a result of several factors, including carbonate rock in the pit walls, the ultimate pit lake chemistry is expected to be similar to that of existing groundwater. **During the first years of pit refilling, 75 percent of the inflowing groundwater would pass through the limestone in the base of the pit which has a large buffering capacity to neutralize possible acidic inflows from the siltstone (DEIS at 4-51). Predicted concentrations of cadmium and selenium may exceed the 96-hour average aquatic life standard, but not the 1-hour average, and only molybdenum may exceed both standards. In the mature lake (after 250 years), manganese may marginally exceed secondary drinking water standards (Geomega, 2001).**

Floodplains

The Proposed Action would have no additional effects on floodplains in the study area beyond those identified in the original EIS (BLM, 1993). That document indicated that Maggie Creek could have increased flows during mining which might increase the width of the floodplain. After mining, the baseflow in Maggie Creek might be reduced, which would serve to reduce the floodplain and make it more upland in nature. No detectable effect would be expected on the Humboldt River floodplains.

Soils

Soils located on approximately 1,392 acres would be disturbed by the Proposed Action. Implementation of the proposed reclamation plan would result in soils being redistributed

on approximately 1,253 acres which includes all proposed disturbance areas except the mine pit. Soil losses are expected to be minimal as a result of establishing vegetation cover on stockpiles to reduce wind and water erosion.

Vegetation

Mine expansion would disturb approximately 1,392 acres of vegetation. With the exception of the 139 acres of the mine pit, reclamation would restore vegetation cover on all proposed disturbance areas.

Noxious Weeds

The amendment would disturb 1,392 acres during construction that would provide invasion sites for noxious weeds. The expansion would remove 45 acres of scotch thistle and several hundred saltcedar plants from the area used for facility construction. Newmont's weed control program would be continued.

Riparian Areas and Wetlands

It was determined that no wetlands would be disturbed in the amendment area and a total of 0.89 acres of Waters of the U.S. would be disturbed in Section 18, T33N R52E.

A limited amount of riparian vegetation may be affected by the proposed dewatering program. Potentially affected wetland/riparian areas are associated with the two streams discussed in the Water Resources section. In addition, a reduction or loss of flow in five spring and seep sites would cause an additional 2.5 acres of riparian/wetlands to be affected. No additional effects on riparian areas along the Humboldt River would occur,

beyond those described in the original EIS (BLM, 1993).

Terrestrial Wildlife

Impacts on terrestrial wildlife would include loss of habitat and loss and displacement of wildlife from the affected habitat. Reductions or elimination of flows in springs, seeps, and streams due to dewatering would impact wildlife species dependent on these sites (e.g., amphibians and certain birds) and may affect distribution of other species (e.g., bats, mule deer, and pronghorn antelope) that use these sites as part of a larger habitat complex. Reclamation would restore habitat on 1,253 of the 1,392 acres disturbed.

Aquatic Habitat and Fisheries

Potential incremental reductions or elimination of baseflow associated with dewatering could decrease habitat quality for fish and other aquatic organisms in **the lower Fish, middle and lower Marys Creek (primarily the Carlin "Cold" Spring), lower Maggie Creek, and upper Lynn Creek.** These flow changes would occur primarily during low-flow periods for up to 60 years after dewatering. Intermittent streamflows would eliminate or restrict fish and many aquatic insects in dewatered portions of streams.

Threatened, Endangered, Candidate, and Sensitive Species

Lahontan cutthroat trout (LCT), a federally listed threatened species, is not expected to be affected by SOAPA. Projected impacts to LCT streams are less

than what was identified in the Environmental Impact Statement (EIS) for the South Operations Area Project (SOAP) completed in 1993. In 1993, impact projections were based discharge rates of 42,000 gallons per minute (gpm) while under the proposed action, discharge rates would be less than 25,000 gpm. Approximately 4.5 fewer miles of LCT stream habitat in Maggie Creek would be potentially impacted in the form of reduced baseflows. In addition, habitat conditions for LCT have been dramatically improved as a result of the Maggie Creek Watershed Restoration Project (MCWRP) implemented mitigation for the 1993 SOAP EIS.

SOAPA could impact some sensitive species of wildlife through incremental loss of some seeps, springs, and stream reaches. California floaters (a freshwater mussel) and springsnails are not expected to be impacted by SOAPA since occupied habitats occur outside the predicted ten foot drawdown contour.

Livestock Grazing

The Proposed Action would affect three grazing allotments and permittees. Five spring and seep sites and two streams within the study area would be affected by the incremental expansion of the cone of depression, reducing availability of stockwater. Stocking rates would likely be reduced on some grazing allotments throughout the period of drawdown and recovery of the cone of depression. A total of 71 animal unit months on public land could be suspended due to the expansion of the SOAPA perimeter fences.

Some areas, such as the mine pit, would be permanently lost to livestock grazing. Steep slopes on reclaimed waste rock disposal areas or leach pads may result in limited use by livestock. Permanent losses in grazing areas associated with the mining pit, coupled with uncertainty regarding stockwater availability, may result in permanent reductions in stocking rates on some allotments.

Recreation

The Proposed Action would result in 1,392 fewer acres being available for recreational use during and after mining. Visitation pressures on the current recreational facilities within Elko and Eureka Counties would continue but not be increased.

Visual Resources

The primary impact on visual resources from the Proposed Action would be additional modification of landforms. There would be little additional visual contrast in areas where existing facilities are visible.

Noise

There would not be any change in existing noise levels. Mining disturbance would continue for an additional 10 years.

Cultural Resources and Native American Religious Concerns

There would be no direct impacts on cultural resources. Based on information about potential dewatering of certain springs, there is potential for indirect impacts to Western Shoshone traditional values, practices, and properties.

Social and Economic Impacts

No temporary socioeconomic impacts from the proposed amendment would occur during the construction period within local communities.

Property taxes and net proceeds of mining taxes would continue to be paid to Eureka County, whereas most sales tax revenues would accrue in Elko County. Wages spent by miners and workers in mining related occupations would continue to contribute to local revenues through sales and use taxes.

Wastes - Solid or Hazardous

There would be no significant change in waste generation or handling under the Proposed Action.

Environmental Justice

No impacts on environmental justice would occur.

ALTERNATIVES

Where specific impacts, by resource, are not presented under each alternative, it is to be assumed that those impacts would be the same as that of the Proposed Action.

Alternative 1

Geology and Minerals

The alternative would eliminate access to ore reserves remaining in the Mac pit. Waste rock disposal facilities would be approximately 6 acres smaller.

Air Resources

An increase in diesel and fugitive dust emissions would occur as a result of increased haul distance for waste rock disposal in the Mac pit.

Soils

The alternative would spread topsoil over an additional 40 acres of the backfilled Mac pit and disturb six fewer acres for waste rock disposal.

Vegetation

The alternative would revegetate an additional 40 acres of the backfilled Mac pit and disturb six fewer acres of vegetation.

Terrestrial Wildlife

An additional 40 acres would be available for wildlife habitat and use under this alternative.

Alternative 2

Geology and Minerals

This alternative is similar to the Proposed Action but would result in the South Waste Rock Disposal Facility being smaller in area by 53 acres but taller than the Proposed Action by approximately 100 feet.

Soils

Soils would be disturbed on 53 fewer acres, but topsoil spreading would be the same as for the Proposed Action.

Vegetation

Approximately 53 fewer acres would be disturbed, but the revegetation area would be the same as the Proposed Action.

Visual Resources

The South Waste Rock Disposal Facility would be approximately 100 feet taller which would allow the facility to be more dominant on the landscape as seen from observation points. The difference in height would not have a significant effect on the viewshed.

NO ACTION ALTERNATIVE

Under this alternative, the proposed Plan of Operations Amendment would not be approved and further disturbance of public land would not occur. Mining would continue until 2001, dewatering and ore processing until 2006.

AGENCY PREFERRED ALTERNATIVE

As a result of the analysis in this EIS, the BLM has selected as the Preferred Alternative, the Proposed Action.

TABLE OF CONTENTS

TABLE OF CONTENTS

| | |
|--|-----|
| SUMMARY | S-1 |
| SUMMARY OF THE PROPOSED ACTION | S-2 |
| PROJECT ALTERNATIVES | S-3 |
| Alternative 1 - Backfilling the Mac Pit | S-3 |
| Alternative 2 - Modified Waste Rock Disposal Facility Design | S-4 |
| No Action Alternative | S-4 |
| SUMMARY OF IMPACTS | S-4 |
| PROPOSED ACTION | S-4 |
| Geology and Minerals | S-4 |
| Water Resources | S-4 |
| Floodplains | S-5 |
| Soils | S-5 |
| Vegetation | S-6 |
| Noxious Weeds | S-6 |
| Riparian Areas and Wetlands | S-6 |
| Terrestrial Wildlife | S-6 |
| Aquatic Habitat and Fisheries | S-6 |
| Threatened, Endangered, Candidate, and Sensitive Species | S-6 |
| Livestock Grazing | S-7 |
| Recreation | S-7 |
| Visual Resources | S-7 |
| Noise | S-7 |
| Cultural Resources and Native American Religious Concerns | S-7 |
| Social and Economic Impacts | S-8 |
| Wastes - Solid or Hazardous | S-8 |
| Environmental Justice | S-8 |
| ALTERNATIVES | S-8 |
| Alternative 1 | S-8 |
| Geology and Minerals | S-8 |
| Air Resources | S-8 |
| Soils | S-8 |
| Vegetation | S-8 |
| Terrestrial Wildlife | S-8 |
| Alternative 2 | S-8 |
| Geology and Minerals | S-8 |
| Soils | S-8 |
| Vegetation | S-9 |
| Visual Resources | S-9 |
| NO ACTION ALTERNATIVE | S-9 |
| AGENCY PREFERRED ALTERNATIVE | S-9 |

TABLE OF CONTENTS (continued)

| | |
|---|------|
| CHAPTER 1 PURPOSE AND NEED | 1-1 |
| PURPOSE AND NEED | 1-1 |
| AUTHORIZING ACTIONS | 1-3 |
| RELATIONSHIP TO BLM AND NON-BLM POLICIES, PLANS, AND PROGRAMS . | 1-3 |
| ISSUES | 1-5 |
| | |
| CHAPTER 2 PROPOSED ACTION, INCLUDING ALTERNATIVES | 2-1 |
| EXISTING OPERATIONS | 2-2 |
| Location and Land Ownership | 2-2 |
| South Operations Area Open Pit Mines | 2-5 |
| Gold Quarry Mine | 2-5 |
| Tusc Mine | 2-7 |
| Mac Mine | 2-7 |
| South Operations Area Waste Rock Disposal Facilities | 2-7 |
| South Operations Area Ore Processing Operations | 2-7 |
| Mill 5 - Oxide Ore Treatment Plant | 2-7 |
| Mill 6 - Refractory Ore Treatment Plant | 2-8 |
| Mill 5/6 Tailing Facility | 2-8 |
| South Area Leach Facility | 2-8 |
| Refractory Leach Facility | 2-9 |
| South Operations Area Ancillary Facilities | 2-9 |
| Existing Resource Monitoring | 2-9 |
| Air Quality | 2-9 |
| Water Resources | 2-10 |
| Potentially Acid-Producing Rock | 2-10 |
| Hazardous Substances | 2-12 |
| Hazardous Waste | 2-13 |
| Toxics Release Inventory (TRI) | 2-14 |
| Tailing Composition | 2-16 |
| Human Health and Safety | 2-16 |
| Employment | 2-16 |
| Reclamation | 2-16 |
| PROPOSED ACTION | 2-16 |
| General Project Overview | 2-16 |
| Status of Lands Affected by Proposed Activities | 2-18 |
| Gold Quarry Mine | 2-22 |
| South Operations Area Waste Rock Disposal Facilities | 2-23 |
| Gold Quarry North Waste Rock Disposal Facility | 2-24 |
| Gold Quarry South Waste Rock Disposal Facility. | 2-24 |
| James Creek Waste Rock Disposal Facility | 2-25 |

TABLE OF CONTENTS (continued)

| | |
|--|------|
| South Area Leach Facilities | 2-25 |
| Refractory Leach Facility | 2-25 |
| Ancillary Facilities | 2-26 |
| Water Treatment Facility | 2-26 |
| Water Control Ditches | 2-26 |
| Resource Monitoring | 2-26 |
| Air Quality | 2-26 |
| Water Resources | 2-27 |
| Potentially Acid-Producing Rock | 2-27 |
| Wastes - Solid or Hazardous | 2-28 |
| Hazardous Substances | 2-28 |
| Tailing Composition | 2-28 |
| Human Health and Safety | 2-29 |
| Closure and Reclamation | 2-29 |
| Soil Salvage | 2-29 |
| Revegetation | 2-30 |
| Noxious Weed Control | 2-30 |
| Mine Pit | 2-30 |
| Waste Rock Disposal Areas | 2-32 |
| Tailing Storage Facility | 2-32 |
| Leach Pads | 2-33 |
| Haul Roads | 2-35 |
| Ancillary Facilities | 2-35 |
| Monitoring/Evaluation of Reclamation Success | 2-36 |
| PROJECT ALTERNATIVES | 2-36 |
| Alternatives Considered in Detail | 2-37 |
| Features Common to All Action Alternatives | 2-37 |
| Proposed Action with Backfilling of the Mac Pit | 2-37 |
| Proposed Action with Modified Waste Rock Disposal Facilities | 2-40 |
| No Action Alternative | 2-41 |
| AGENCY PREFERRED ALTERNATIVE | 2-41 |
| ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS | 2-41 |
| Underground Mining | 2-41 |
| Water Disposal Alternatives | 2-41 |
| Backfilling the Tusc Pit | 2-42 |
| Backfilling the Gold Quarry Pit | 2-42 |

TABLE OF CONTENTS (continued)

CHAPTER 3 AFFECTED ENVIRONMENT FOR PROPOSED ACTION

| | |
|--|------|
| AND ALTERNATIVES | 3-1 |
| CRITICAL ELEMENTS OF THE HUMAN ENVIRONMENT | 3-1 |
| GEOLOGY AND MINERALS | 3-1 |
| Geologic Setting | 3-1 |
| Geologic Hazards | 3-2 |
| Mineral Resources | 3-3 |
| Acid Rock Drainage | 3-3 |
| PALEONTOLOGICAL RESOURCES | 3-5 |
| AIR RESOURCES | 3-6 |
| Climate | 3-6 |
| Air Quality | 3-7 |
| Regulatory Status | 3-10 |
| WATER RESOURCES | 3-10 |
| Surface Water Hydrology | 3-12 |
| Surface Water Quantity | 3-13 |
| Surface Water Quality | 3-25 |
| Water Quality Standards | 3-30 |
| Spring and Seep Surveys | 3-30 |
| Surface Water Use | 3-40 |
| Groundwater Hydrology | 3-40 |
| Groundwater Quantity | 3-44 |
| Groundwater Quality | 3-47 |
| Groundwater Use | 3-53 |
| Hydrologic Monitoring Program | 3-53 |
| FLOODPLAINS | 3-54 |
| SOILS | 3-54 |
| VEGETATION | 3-60 |
| NOXIOUS WEEDS | 3-62 |
| RIPARIAN AREAS, WETLANDS AND WATERS OF THE U.S. AREAS | 3-63 |
| Riparian Areas | 3-63 |
| Spring/Seep Wetlands | 3-64 |
| SOAPA Wetlands | 3-65 |
| TERRESTRIAL WILDLIFE | 3-65 |
| AQUATIC HABITAT AND FISHERIES | 3-70 |
| THREATENED, ENDANGERED, CANDIDATE AND SENSITIVE SPECIES | 3-73 |
| Bald Eagle (Threatened) | 3-73 |
| Lahontan Cutthroat Trout (Threatened) | 3-73 |
| Columbia Spotted Frog (Candidate) | 3-76 |
| Spotted Bat | 3-76 |

TABLE OF CONTENTS (continued)

| | |
|--|-------|
| Small-footed Myotis | 3-76 |
| Long-eared Myotis | 3-76 |
| Fringed Myotis | 3-77 |
| Long-legged Myotis | 3-77 |
| Townsend's Big-Eared Bat (Pale & Pacific) | 3-77 |
| Preble's Shrew | 3-78 |
| Northern Goshawk | 3-78 |
| Ferruginous Hawk | 3-78 |
| Burrowing Owl | 3-79 |
| White-Faced Ibis | 3-79 |
| Golden Eagle | 3-79 |
| Swainson's Hawk | 3-79 |
| Osprey | 3-79 |
| Western Sage Grouse | 3-80 |
| California Floater | 3-80 |
| Springsnails | 3-80 |
| Nevada Viceroy | 3-81 |
| Lewis Buckwheat | 3-81 |
| LIVESTOCK GRAZING | 3-82 |
| RECREATION | 3-82 |
| State Recreation Areas | 3-82 |
| Nevada Statewide Comprehensive Outdoor Recreation Plan | 3-86 |
| Project Area Recreation | 3-86 |
| VISUAL RESOURCES | 3-86 |
| NOISE | 3-92 |
| LAND USE AND ACCESS | 3-93 |
| Land Ownership | 3-93 |
| Land Use | 3-93 |
| Access | 3-95 |
| Land Use Planning and Management | 3-95 |
| BLM Land and Resource Management Plan | 3-95 |
| County Land Use Planning | 3-95 |
| CULTURAL RESOURCES | 3-96 |
| NATIVE AMERICAN RELIGIOUS CONCERNS | 3-100 |
| SOCIAL AND ECONOMIC RESOURCES | 3-106 |
| Population | 3-106 |
| Labor and Employment | 3-107 |
| Civilian Labor Force | 3-107 |
| Unemployment | 3-110 |
| Newmont Employment | 3-110 |

TABLE OF CONTENTS (continued)

| | |
|--|-------|
| Housing | 3-110 |
| Public Utilities and Services | 3-113 |
| Schools | 3-113 |
| Law Enforcement | 3-115 |
| Fire Protection | 3-115 |
| Ambulance | 3-116 |
| Health Care | 3-116 |
| Social Services | 3-116 |
| Water and Wastewater | 3-117 |
| Water | 3-117 |
| Wastewater | 3-117 |
| Parks and Recreation | 3-117 |
| Libraries | 3-118 |
| Public Finance | 3-118 |
| Energy Generation and Distribution | 3-121 |
| ENVIRONMENTAL JUSTICE | 3-121 |

CHAPTER 4 CONSEQUENCES OF THE PROPOSED ACTION

| | |
|--|-----|
| AND ALTERNATIVES | 4-1 |
| GEOLOGY AND MINERALS | 4-1 |
| Direct and Indirect Impacts | 4-2 |
| Proposed Action | 4-2 |
| Alternatives | 4-4 |
| No Action Alternative | 4-4 |
| Potential Mitigation and Monitoring | 4-4 |
| Irreversible and Irretrievable Commitment of Resources | 4-4 |
| Residual Effects | 4-5 |
| PALEONTOLOGICAL RESOURCES | 4-5 |
| Direct and Indirect Impacts | 4-5 |
| Proposed Action | 4-5 |
| Alternatives | 4-5 |
| No Action Alternative | 4-5 |
| Potential Mitigation and Monitoring | 4-5 |
| Irreversible and Irretrievable Commitment of Resources | 4-5 |
| Residual Effects | 4-6 |
| AIR RESOURCES | 4-6 |
| Direct and Indirect Impacts | 4-6 |
| Proposed Action | 4-6 |
| Alternatives | 4-7 |
| No Action Alternative | 4-7 |

TABLE OF CONTENTS (continued)

| | |
|--|-------------|
| Potential Mitigation and Monitoring | 4-7 |
| Irreversible and Irretrievable Commitment of Resources | 4-8 |
| Residual Effects | 4-8 |
| WATER RESOURCES | 4-8 |
| Direct and Indirect Impacts | 4-11 |
| Proposed Action | 4-12 |
| Dewatering System | 4-12 |
| Water Treatment System | 4-12 |
| Water Storage Reservoir | 4-12 |
| Groundwater Flow Model | 4-14 |
| Impacts on Groundwater Levels | 4-15 |
| Impacts on Wells | 4-16 |
| Impacts on Springs and Seeps | 4-21 |
| Impacts on Baseflow | 4-29 |
| Surface Water Rights | 4-40 |
| Stream and River Channel Stability | 4-40 |
| Impacts on Water Temperature | 4-42 |
| Impacts on Surface Water Quality | 4-45 |
| Impacts from Mine Pit Water Recovery | 4-45 |
| Surface Erosion and Sedimentation | 4-50 |
| Mine Processing Impacts | 4-54 |
| Cyanide Fate | 4-54 |
| Ammonium Thiosulfate Fate | 4-55 |
| Alternatives | 4-55 |
| No Action Alternative | 4-55 |
| Potential Mitigation and Monitoring | 4-56 |
| Irreversible and Irretrievable Commitment of Resources | 4-56 |
| Residual Effects | 4-57 |
| FLOODPLAINS | 4-57 |
| Direct and Indirect Impacts | 4-57 |
| Proposed Action | 4-57 |
| Alternatives | 4-57 |
| No Action Alternative | 4-57 |
| Potential Mitigation and Monitoring | 4-57 |
| Irreversible and Irretrievable Commitment of Resources | 4-58 |
| Residual Effects | 4-58 |
| SOILS | 4-58 |
| Direct and Indirect Impacts | 4-58 |
| Proposed Action | 4-58 |
| Alternatives | 4-58 |

TABLE OF CONTENTS (continued)

| | |
|--|------|
| No Action Alternative | 4-60 |
| Potential Mitigation and Monitoring | 4-60 |
| Irreversible and Irretrievable Commitment of Resources | 4-61 |
| Residual Effects | 4-61 |
| VEGETATION | 4-61 |
| Direct and Indirect Impacts | 4-61 |
| Proposed Action | 4-61 |
| Alternatives | 4-62 |
| No Action Alternative | 4-62 |
| Potential Mitigation and Monitoring | 4-62 |
| Irreversible and Irretrievable Commitment of Resources | 4-63 |
| Residual Effects | 4-63 |
| NOXIOUS WEEDS | 4-63 |
| Direct and Indirect Impacts | 4-63 |
| Proposed Action | 4-63 |
| Alternatives | 4-64 |
| No Action Alternative | 4-64 |
| Potential Mitigation and Monitoring | 4-64 |
| Irreversible and Irretrievable Commitment of Resources | 4-64 |
| Residual Effects | 4-64 |
| RIPARIAN, WETLANDS, AND WATERS OF THE U.S. AREAS | 4-65 |
| Direct and Indirect Impacts | 4-65 |
| Proposed Action | 4-65 |
| Alternatives | 4-66 |
| No Action Alternative | 4-66 |
| Potential Mitigation and Monitoring | 4-69 |
| Irreversible and Irretrievable Commitment of Resources | 4-69 |
| Residual Effects | 4-69 |
| TERRESTRIAL WILDLIFE | 4-69 |
| Direct and Indirect Impacts | 4-70 |
| Proposed Action | 4-70 |
| Alternatives | 4-72 |
| Backfilling of the Mac Pit | 4-72 |
| Modified Waste Rock Disposal Facilities | 4-72 |
| No Action Alternative | 4-72 |
| Potential Mitigation and Monitoring | 4-72 |
| Irreversible and Irretrievable Commitment of Resources | 4-74 |
| Residual Effects | 4-74 |
| AQUATIC HABITAT AND FISHERIES | 4-74 |
| Direct and Indirect Impacts | 4-75 |

TABLE OF CONTENTS (continued)

| | |
|---|------|
| Proposed Action | 4-75 |
| Dewatering Impacts | 4-75 |
| Discharge Impacts to Maggie Creek and Humboldt River | 4-76 |
| Alternatives | 4-76 |
| No Action Alternative | 4-76 |
| Potential Mitigation and Monitoring | 4-76 |
| Irreversible and Irretrievable Commitment of Resources | 4-77 |
| Residual Effects | 4-77 |
| THREATENED, ENDANGERED, CANDIDATE AND SENSITIVE SPECIES | 4-77 |
| Direct and Indirect Impacts | 4-77 |
| Proposed Action | 4-77 |
| Bald Eagle | 4-77 |
| Lahontan Cutthroat Trout | 4-78 |
| Columbia Spotted Frog | 4-78 |
| Other Species of Concern | 4-81 |
| Alternatives | 4-82 |
| Backfilling of the Mac Pit | 4-82 |
| Modified Waste Rock Disposal Facilities | 4-82 |
| No Action Alternative | 4-82 |
| Potential Mitigation and Monitoring | 4-82 |
| Irreversible and Irretrievable Commitment of Resources | 4-84 |
| Residual Effects | 4-84 |
| LIVESTOCK GRAZING | 4-84 |
| Direct and Indirect Impacts | 4-85 |
| Proposed Action | 4-85 |
| Alternatives | 4-86 |
| No Action Alternative | 4-86 |
| Potential Mitigation and Monitoring | 4-86 |
| Irreversible and Irretrievable Commitment of Resources | 4-89 |
| Residual Effects | 4-89 |
| RECREATION | 4-89 |
| Direct and Indirect Impacts | 4-89 |
| Proposed Action | 4-89 |
| Alternatives | 4-90 |
| No Action Alternative | 4-90 |
| Potential Mitigation and Monitoring | 4-90 |
| Irreversible and Irretrievable Commitment of Resources | 4-90 |
| Residual Effects | 4-90 |
| VISUAL RESOURCES | 4-91 |
| Direct and Indirect Impacts | 4-91 |

TABLE OF CONTENTS (continued)

| | |
|--|-------|
| Proposed Action | 4-91 |
| Alternatives | 4-103 |
| Backfilling of the Mac Pit | 4-103 |
| Modified Waste Rock Disposal Facilities | 4-104 |
| No Action Alternative | 4-104 |
| Potential Mitigation and Monitoring | 4-104 |
| Irreversible and Irretrievable Commitment of Resources | 4-105 |
| Residual Effects | 4-105 |
| NOISE | 4-105 |
| Direct and Indirect Impacts | 4-105 |
| Proposed Action | 4-105 |
| Alternatives | 4-105 |
| No Action Alternative | 4-105 |
| Potential Mitigation and Monitoring | 4-106 |
| Irreversible and Irretrievable Commitment of Resources | 4-106 |
| Residual Effects | 4-106 |
| LAND USE AND ACCESS | 4-106 |
| Direct and Indirect Impacts | 4-106 |
| Proposed Action | 4-106 |
| Land Status | 4-106 |
| Land Use | 4-106 |
| Public Access | 4-107 |
| Land Use Planning and Management | 4-107 |
| Alternatives | 4-107 |
| Backfilling of the Mac Pit | 4-108 |
| Modified Waste Rock Disposal Facilities | 4-108 |
| No Action Alternative | 4-108 |
| Potential Mitigation and Monitoring | 4-108 |
| Irreversible and Irretrievable Commitment of Resources | 4-108 |
| Residual Effects | 4-108 |
| CULTURAL RESOURCES | 4-109 |
| Direct and Indirect Impacts | 4-109 |
| Proposed Action | 4-109 |
| Alternatives | 4-109 |
| Backfilling of the Mac Pit | 4-109 |
| Modified Waste Rock Disposal Facilities | 4-109 |
| No Action Alternative | 4-109 |
| Potential Mitigation and Monitoring | 4-109 |
| Irreversible and Irretrievable Commitment of Resources | 4-110 |
| Residual Effects | 4-110 |

TABLE OF CONTENTS (continued)

| | |
|--|------------|
| NATIVE AMERICAN RELIGIOUS CONCERNS | 4-110 |
| Potential Mitigation and Monitoring | 4-111 |
| Irreversible and Irretrievable Commitment of Resources | 4-111 |
| Residual Effects | 4-111 |
| SOCIAL AND ECONOMIC RESOURCES | 4-112 |
| Direct and Indirect Impacts | 4-112 |
| Proposed Action | 4-113 |
| Employment | 4-113 |
| Housing | 4-113 |
| Community Service Providers | 4-113 |
| Government and Public Finance | 4-114 |
| Alternatives | 4-114 |
| No Action Alternative | 4-114 |
| Potential Mitigation and Monitoring | 4-115 |
| Irreversible and Irretrievable Commitment of Resources | 4-115 |
| Residual Effects | 4-115 |
| WASTES - SOLID OR HAZARDOUS | 4-115 |
| Direct and Indirect Impacts | 4-115 |
| Proposed Action | 4-115 |
| Alternatives | 4-116 |
| No Action Alternative | 4-116 |
| Potential Mitigation and Monitoring | 4-116 |
| Irreversible and Irretrievable Commitment of Resources | 4-116 |
| Residual Effects | 4-116 |
| ENVIRONMENTAL JUSTICE | 4-116 |
| COMPARISON OF IMPACTS | 4-116 |
| | |
| CHAPTER 5 CUMULATIVE EFFECTS ANALYSIS | 5-1 |
| EXISTING AND FORESEEABLE PROJECTS | 5-1 |
| IMPACTS SUMMARY | 5-1 |
| Geology | 5-1 |
| Karst Development in the Region | 5-1 |
| Areas Susceptible to Future Sinkhole Development | 5-2 |
| Impacts to the Humboldt River | 5-2 |
| Paleontological Resources | 5-2 |
| Air Resources | 5-2 |
| Water Resources and Geochemistry | 5-8 |
| Impacts from Mine Dewatering and Localized Water Management Activities | 5-8 |
| Impacts to Date | 5-8 |
| Predicted Impacts to Springs and Seeps and Stream Baseflow | 5-8 |

TABLE OF CONTENTS (continued)

| | |
|--|------------|
| Predicted Baseflow Reductions | 5-11 |
| Impacts to the Humboldt River | 5-11 |
| Floodplains | 5-12 |
| Predicted Dewatering Effects | 5-12 |
| Impacts to the Humboldt River | 5-13 |
| Soils | 5-13 |
| Vegetation | 5-13 |
| Noxious Weeds | 5-13 |
| Wetlands and Riparian Areas | 5-13 |
| Predicted Dewatering Effects | 5-13 |
| Impacts on the Humboldt River | 5-14 |
| Terrestrial Wildlife | 5-14 |
| Predicted Dewatering Effects | 5-14 |
| Impacts on the Humboldt River | 5-15 |
| Impacts on the Humboldt Sink | 5-15 |
| Aquatic Habitat and Fisheries | 5-16 |
| Predicted Dewatering Effects | 5-16 |
| Impacts on the Humboldt River | 5-16 |
| Threatened, Endangered, Candidate, and Sensitive Species | 5-16 |
| Predicted Dewatering Effects | 5-16 |
| Impacts to the Humboldt River | 5-17 |
| Livestock Grazing | 5-17 |
| Predicted Dewatering Effects | 5-17 |
| Impacts to the Humboldt River | 5-18 |
| Recreation | 5-18 |
| Visual Resources | 5-18 |
| Noise | 5-19 |
| Land Use and Access | 5-19 |
| Cultural Resources | 5-19 |
| Native American Religious Concerns | 5-20 |
| Social and Economic Resources | 5-20 |
| Predicted Dewatering Effects | 5-20 |
| Impacts to the Humboldt River | 5-21 |
| Wastes - Solid or Hazardous | 5-21 |
| Environmental Justice | 5-22 |
| | |
| CHAPTER 6 CONSULTATION, COORDINATION, AND PREPARATION | 6-1 |
| PUBLIC PARTICIPATION SUMMARY | 6-1 |
| IMPLEMENTATION | 6-1 |
| CRITERIA AND METHODS BY WHICH PUBLIC INPUT IS EVALUATED | 6-3 |

TABLE OF CONTENTS (continued)

| | |
|--|-----|
| CONSULTATION WITH OTHERS | 6-3 |
| LIST OF PREPARERS AND REVIEWERS | 6-3 |
| LIST OF AGENCIES, ORGANIZATION, AND PERSONS TO WHOM THE FEIS WAS SENT | 6-4 |

| | |
|---|------------|
| CHAPTER 7 REFERENCES, GLOSSARY, LIST OF ABBREVIATIONS, AND INDEX | 7-1 |
| REFERENCES | 7-1 |
| GLOSSARY | 7-15 |
| ABBREVIATIONS | 7-26 |
| INDEX | 7-27 |

Figures

| | | |
|-------------|---|------|
| Figure 1-1 | General Location | 1-2 |
| Figure 2-1 | Surface Ownership and Utilities | 2-3 |
| Figure 2-2 | Existing and Approved Operations | 2-6 |
| Figure 2-3 | Proposed Operations | 2-21 |
| Figure 2-4 | Alternatives Action | 2-39 |
| Figure 3-0 | Areas Potentially Susceptible to Sinkhole Development | 3-4 |
| Figure 3-1 | 1998 Quarterly Wind Rose | 3-9 |
| Figure 3-2 | Surface Water Monitoring Locations | 3-14 |
| Figure 3-3 | Flood Frequency Curves | 3-22 |
| Figure 3-4 | Spring and Seep Locations (11x17) | 3-35 |
| Figure 3-5 | Gold Quarry Pit Area Groundwater Monitoring Locations and Collar Elevations | 3-43 |
| Figure 3-6 | Maggie Creek Basin Region Groundwater Monitoring Locations and Collar Elevations | 3-45 |
| Figure 3-7 | Maggie Creek Basin Bedrock Change from Pre-Dewatering Elevation | 3-48 |
| Figure 3-8 | Maggie Creek Basin Potentiometric Surface - December 1998 Elevation ... | 3-49 |
| Figure 3-9 | Soil Mapping Units | 3-55 |
| Figure 3-10 | Wetlands and Waters of the U.S. in the SOAPA Area | 3-67 |
| Figure 3-11 | Crucial Winter Range for Wildlife | 3-69 |
| Figure 3-12 | Aquatic Habitat Areas | 3-71 |
| Figure 3-13 | Grazing Allotments and Selected Range Improvements | 3-83 |
| Figure 3-14 | Project Viewshed | 3-89 |
| Figure 3-15 | VRM | 3-91 |
| Figure 3-16 | Estimated Existing Noise Levels | 3-94 |

TABLE OF CONTENTS (continued)

| | | |
|--------------|---|-------|
| Figure 3-17 | Cultural Resources and Native American Religious Concerns | 3-97 |
| Figure 3-18 | Population Trend | 3-109 |
| Figure 3-19 | Labor Force Distribution by Industry | 3-111 |
| Figure 4-0 | Areas of Potential Sinkhole Development in Relation to Predicted Drawdown Contours | 4-3 |
| Figure 4-1 | Predicted Impacted Stream Reaches | 4-9 |
| Figure 4-2 | Past (Actual) and Predicted Dewatering Rates for the Gold Quarry Mine . . . | 4-13 |
| Figure 4-3 | Maximum Extent of 10-foot Drawdown Contour Predicted by 1993 EIS Model, 1999 SOAPA Model, and Current Monitoring | 4-17 |
| Figure 4-4 | Carlin Formation Water Elevation Change | 4-19 |
| Figure 4-5 | Predicted Impacted Water Wells and Applications | 4-23 |
| Figure 4-6 | Predicted Impacted Springs and Seeps | 4-27 |
| Figure 4-7 | Predicted Baseflow in Upper Maggie Creek | 4-31 |
| Figure 4-8 | Predicted Baseflow in Lower Maggie Creek | 4-32 |
| Figure 4-9 | Predicted Baseflow in Lower Susie Creek Near Confluence with Humboldt River | 4-34 |
| Figure 4-10 | Predicted Baseflow in Marys Creek (Carlin Spring) | 4-36 |
| Figure 4-11 | Predicted Baseflow in the Humboldt River at Dunphy | 4-37 |
| Figure 4-12 | Humboldt River Flow Natural Gains and Losses Between Gaging Stations . . | 4-38 |
| Figure 4-13 | Humboldt River Cross-Section | 4-39 |
| Figure 4-14 | Predicted Impacted Surface Water Rights | 4-43 |
| Figure 4-15 | Predicted Water Levels in Gold Quarry Pit | 4-46 |
| Figure 4-16 | Schematic Hydrologic Cross Section through Pit | 4-47 |
| Figure 4-17 | Ultimate Gold Quarry Pit Surface Lithology | 4-51 |
| Figure 4-18 | Predicted Impacted Riparian Areas | 4-67 |
| Figure 4-19 | Areas of Lahontan Cutthroat Trout Habitat | 4-79 |
| Figure 4-20 | Predicted Effects on Grazing Allotments | 4-87 |
| Figure 4-21a | Visual Simulations | 4-93 |
| Figure 4-21b | Visual Simulations | 4-93 |
| Figure 4-21c | Visual Simulations | 4-93 |
| Figure 4-22a | Visual Simulations | 4-95 |
| Figure 4-22b | Visual Simulations | 4-95 |
| Figure 4-22c | Visual Simulations | 4-97 |
| Figure 4-23a | Visual Simulations | 4-99 |
| Figure 4-23b | Visual Simulations | 4-99 |
| Figure 4-23c | Visual Simulations | 4-101 |
| Figure 5-1 | Mining Activity in the Carlin Trend | 5-3 |
| Figure 5-2 | Predicted Maximum Extent of 10-foot Drawdown | 5-9 |

TABLE OF CONTENTS (continued)

Tables

| | | |
|-------------------|---|-------------|
| Table 1-1 | Regulatory Responsibilities | 1-4 |
| Table 1-2 | Issues and Concerns Identified in Scoping | 1-6 |
| Table 2-1 | Existing and Approved Surface Disturbance | 2-4 |
| Table 2-1a | Summary of Discharge Water Quality | 2-11 |
| Table 2-2 | Hazardous Substances Management | 2-13 |
| Table 2-3 | Hazardous Waste Streams ¹ | 2-13 |
| Table 2-3a | Revised 1998 Toxics Release Inventory - Carlin South Area Mine Site .. | 2-15 |
| Table 2-4 | Concentrations ¹ of Trace Elements in Mill Tailing | 2-17 |
| Table 2-5 | Production Rates (Tons) | 2-18 |
| Table 2-6 | Proposed Surface Disturbance | 2-19 |
| Table 2-7 | Total Surface Disturbance | 2-20 |
| Table 2-8 | Acreage, Dimensions, and Capacities for SOAPA Facilities at End of Mining | 2-23 |
| Table 2-9 | Seed List | 2-31 |
| Table 2-10 | Incremental Surface Disturbance by Alternative | 2-38 |
| Table 3-1 | Seismic Characterization for the Soapa | 3-5 |
| Table 3-2 | SOAPA Climatology | 3-8 |
| Table 3-3 | PM ₁₀ Measurements in the Project Area | 3-11 |
| Table 3-4 | Predicted Ambient Air Concentrations of Criteria Pollutants Associated with Ore Processing | 3-11 |
| Table 3-4a | Hazardous Air Pollutant Defined by the Clean Air Act | 3-12 |
| Table 3-5 | Humboldt River Flows at Carlin Tunnels and Palisade Gaging Stations for 1983-1998 | 3-16 |
| Table 3-6 | Average Monthly Flow for the Humboldt River at Palisade and Carlin Gaging Station and Lower Maggie Creek | 3-18 |
| Table 3-7 | Summary of Flows in Small Creeks in SOAPA Study Area Through December 1998 | 3-20 |
| Table 3-8 | Summary of Water Quality for Maggie Creek and Humboldt River | 3-26 |
| Table 3-9 | Summary of Water Quality for Jack Creek, Simon Creek, Mary's Creek and Susie Creek | 3-28 |
| Table 3-10 | Water Temperatures in Maggie Creek and Humboldt River | 3-29 |
| Table 3-11 | Class A, B & C Water Quality Standards for Nevada | 3-31 |
| Table 3-12 | Water Quality Criteria and Standards for Nevada | 3-32 |
| Table 3-13 | Water Quality Standards for Humboldt River at Palisade Gage Control Point | 3-34 |
| Table 3-14 | Summary of Water Quality for Selected Springs in the SOAPA Study Area | 3-38 |
| Table 3-15 | Major Hydrostratigraphic Units in SOAPA Study Area | 3-42 |

TABLE OF CONTENTS (continued)

| | | |
|-------------|--|-------|
| Table 3-16 | Summary of Aquifer Pumping Tests Conducted at the SOAPA Study Area | 3-42 |
| Table 3-17 | Summary of Groundwater Levels in Selected Wells in the South Operations Study Area ¹ | 3-50 |
| Table 3-18 | Water Production and Use 1994 - 1998 | 3-50 |
| Table 3-19 | Summary of Groundwater Quality in the SOAPA Study Area | 3-51 |
| Table 3-20 | SOAPA Study Area Monitor Wells ¹ | 3-57 |
| Table 3-21 | Soil Mapping Units Within the SOAPA Area | 3-61 |
| Table 3-22 | Range Sites Within the SOAPA Study Area | 3-61 |
| Table 3-23 | Acres* Proposed for Disturbance by Range Sites in the SOAPA Study Area | 3-62 |
| Table 3-24 | Noxious Weeds in the SOAPA Study Area | 3-62 |
| Table 3-25 | Wetlands and Other Waters of U.s. in Sections 10 and 18 | 3-66 |
| Table 3-26 | Threatened, Endangered, Candidate, and Sensitive Species of Plants and Animals Potentially Occurring in the SOAPA Study Area | 3-74 |
| Table 3-27 | Livestock Grazing Allotments in the Study Area | 3-85 |
| Table 3-28 | Annual Visits to State Recreation Areas, 1987 - 1997 | 3-86 |
| Table 3-29 | Noise Levels of Mining Equipment and Operations | 3-94 |
| Table 3-30 | Cultural Resource Investigations Completed in the SOAPA Study Area, Project Area, and Amendment Area | 3-99 |
| Table 3-31 | Eligible and Unevaluated Cultural Resource Sites in the SOAPA Area, Project Area, and Amendment Area | 3-101 |
| Table 3-31a | Summary of BLM's Consultation Efforts and Information Exchange Related to SOAPA | 3-102 |
| Table 3-32 | Population Census Data and Population Estimates | 3-108 |
| Table 3-33 | Labor Force Distribution by Industry, 1997 Annual Average Nevada, Elko County and Eureka County | 3-108 |
| Table 3-34 | Employment and Unemployment Information, 1997 | 3-110 |
| Table 3-35 | Elko County, Total Housing Units, July 1, 1997 | 3-113 |
| Table 3-36 | Elko County School District Enrollment Statistics | 3-114 |
| Table 3-37 | Governmental Revenues and Expenditures, Year Ending June 30, 1996 ... | 3-119 |
| Table 3-38 | Assessed Valuation of Property and Net Proceeds of Mines (Dollars) | 3-120 |
| Table 3-39 | Newmont Taxable Property Value and Taxes Paid | 3-122 |
| Table 4-1 | Groundwater Wells Potentially Impacted by Soapa Dewatering | 4-22 |
| Table 4-2 | Springs and Seeps Within the Incremental 10-foot Drawdown Contour of Gold Quarry Mine Dewatering | 4-30 |
| Table 4-3 | Possibly Impacted Surface Water Rights | 4-41 |
| Table 4-4 | Comparison of Groundwater and Pit Lake Water Quality | 4-53 |
| Table 4-5 | Disturbance Acreage, Depth of Available Soil, and Total Available Soil Volume | 4-59 |

TABLE OF CONTENTS (continued)

| | | |
|-----------|---|-------|
| Table 4-6 | Soil Loss to Water Erosion by Disturbance Area | 4-60 |
| Table 4-7 | Comparison of Impacts Between the Proposed Action and Alternatives . . . | 4-117 |
| Table 5-1 | Existing and Reasonably Foreseeable Mining Disturbance in the Carlin Trend | 5-5 |
| Table 5-2 | Existing and Reasonably Foreseeable Mining Disturbance in the Carlin Trend from Open-pits Only | 5-7 |

Appendices

| | |
|-------------|--|
| Appendix A1 | 1999 Progress Report for the Soap Mitigation Plan Implementation and Mitigation of Potentially Impacted Springs and Seeps |
| Appendix A2 | Riparian Monitoring Analysis SOAP Mitigation Plan Maggie Creek Watershed Restoration Project 1997 and 1999 |
| Appendix A3 | Stream Restoration Photographs |
| Appendix B | Visual Contrast Rating Worksheets |
| Appendix C | SOAPA New Mitigation Measures |
| Appendix D | SOAP 1993 Mitigation Plan Revisions |
| Appendix E | Response to Public Comments |

Technical Reports

Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project. Report available at Bureau of Land Management, Elko Field Office, 3900 East Idaho Street, Elko, Nevada, 89801. (775) 753-0200. Email address: <http://www.nv.blm.gov/elko>.