United States Department of the Interior
Bureau of Land Management

Battle Mountain District
Battle Mountain, Nevada

January 1997

Ruby Hill Project
Final Environmental Impact Statement

COOPERATING AGENCIES:

Eureka County
Nevada Department of Conservation and Natural Resources,
Division of Wildlife
Nevada State Historic Preservation Office
U.S. Army Corps of Engineers

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.

BLM/BM/PL-97/008+1793

Cover: Post-reclamation topography at the proposed Ruby Hill Mine based on a digital elevation computer model. ***View is from the northwest looking southeast.***

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Battle Mountain Field Office
50 Bastian Road, P O Box 1420
Battle Mountain, Nevada 89820

IN REPLY REFER TO:

(NV-060)
1793/3809
N64-95-001P

December 11, 1996

Dear Reader:

Enclosed for your information is the Final Environmental Impact Statement for the Ruby Hill Project prepared by the Bureau of Land Management (BLM), Battle Mountain District. This Final Environmental Impact Statement analyzes the direct, indirect, and cumulative impacts associated with an open pit mining operation involving a crushing, grinding and agglomeration facility; heap leaching facilities; waste rock disposal sites; and ancillary facilities. Four project alternatives (including the no action alternative) are analyzed.

The Final Environmental Impact Statement contains the analyses originally published in the Draft Environmental Impact Statement as well as responses to public comments received during the public review period. The comments received include 45 letters and 2 public meeting transcripts, which are reproduced in this Final Environmental Impact Statement. These comments have been responded to by clarifying or updating the analyses, making factual revisions, or explaining why a comment does not warrant further response. Modified text appears in bold italic to facilitate review of this document.

A 30-day availability period will begin when the United States Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*, followed by the issuance of a Record of Decision. Questions or comments during the 30-day availability period should be directed to: Lynn Ricci or Christopher Stubbs, Project Managers, Ruby Hill Project Environmental Impact Statement, BLM, Battle Mountain Field Office, P.O. Box 1420, Battle Mountain, Nevada 89820, (702) 635-4000.

Sincerely,

acting
Gerald M. Smith
District Manager

Enclosure as stated

FINAL
ENVIRONMENTAL IMPACT STATEMENT
RUBY HILL PROJECT

Lead Agency:	U.S. Department of the Interior Bureau of Land Management Battle Mountain District
Project Location:	Eureka County, Nevada
Correspondence on this EIS Should be Directed to:	Christopher Stubbs Lynn Ricci Project Managers Bureau of Land Management Battle Mountain District P.O. Box 1420 Battle Mountain, NV 89820 (702) 635-4000
Date Draft EIS Filed with U.S. Environmental Protection Agency:	August 8, 1996
Date Final EIS Filed with U.S. Environmental Protection Agency:	January 3, 1997

ABSTRACT

Homestake Mining Company proposes to initiate gold mining operations within the historic Eureka Mining District in Eureka County, 0.7 mile northwest of Eureka, Nevada. The Ruby Hill Project (Proposed Action) would include development of an open pit, waste rock disposal sites, an ore processing facility, heap leach facilities, power line and water line corridors, and other ancillary facilities. The Proposed Action would require surface disturbance of 696 acres, 689 of which is public land managed by the Bureau of Land Management. Mining operation is expected to occur 7 days per week, 24 hours per day, with an anticipated mine life of 7.5 years.

This Final Environmental Impact Statement analyzes the environmental effects of the Ruby Hill Project, plus the No Action Alternative, and action alternatives including the East Waste Rock Dump Alternative, West Waste Rock Dump Alternative, and Partial Backfilling the Pit Alternative.

Responsible Official for EIS:

Acting

Gerald M. Smith
District Manager
Battle Mountain District

SUMMARY

SUMMARY

PROPOSED ACTION

The Homestake Mining Company (Homestake) proposes to initiate gold mining operations within the historic Eureka Mining District in Eureka County 0.7 mile northwest of Eureka, Nevada (see Chapter 1.0, Map 1-1). The Proposed Action would include mine development and surface disturbance on a total of 696 acres, of which 689 acres is public land administered by the Bureau of Land Management (BLM) and 7 acres is private land. ***Approximately*** 60 million tons of waste rock and ***approximately*** 8 million tons of ore would be removed during mine operations.

The proposed Ruby Hill Project includes an open pit; two waste rock disposal sites; a crushing, grinding, and agglomeration facility; heap leaching facilities; and ancillary facilities including the office building and parking lot, warehouse/shop, access and haul roads, growth media stockpiles, a soil borrow source, diversion ditches, and powerline and water pipeline corridors. ***The dimensions for the East Waste Rock Dump would be 7,000 feet long and 1,200 feet wide and the dimensions for the West Waste Rock Dump would be 2,500 feet long and 2,100 feet wide.*** If the Proposed Action were developed, the anticipated mine life would be 7.5 years. Final reclamation is anticipated to be completed by 2010. Homestake estimates that approximately 8 million tons of ore would be removed and processed over the project's 7.5-year life.

ALTERNATIVES

The Environmental Impact Statement (EIS) analyzes the direct, indirect, cumulative, and residual environmental impacts of the Proposed Action and four alternative scenarios: 1) the East Waste Rock Dump Alternative; 2) the West Waste Rock Dump Alternative; 3) the Partial Backfilling Alternative; and 4) the No Action Alternative. The alternatives are described in the following sections.

East Waste Rock Dump Alternative

The East Waste Rock Dump Alternative would involve placing all waste rock in one dump with a capacity of 60 million tons. The dump would be located on the east side of the mine complex (see Chapter 2.0, Map 2-4; Table 2-6). The waste rock dump would cover 360 acres and the approximate dimensions of the dump would be 5,300 feet long by 3,000 feet wide. Surface disturbance associated with other project components would be the same as those listed for the Proposed Action, except surface disturbance associated with haul road construction is not associated with this Alternative. Total surface disturbance would be 715 acres.

West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative also would involve placing all waste rock in one dump with a capacity of 60 million tons. The dump would be located on the west side of the mine complex (see Chapter 2.0 Map 2-6; Table 2-7). The waste rock dump would cover 214 acres and the approximate dimensions of the dump would be 4,300 feet long by 2,000 feet wide. Surface disturbance associated with other project components would be the same as those listed for the Proposed Action, except construction of the solid waste landfill would disturb an additional 4 acres. A total of 577 acres would be disturbed.

Partial Backfilling Alternative

Partial backfilling of the mine pit would occur in an area where potential mineral resources would not be affected and backfilling offers cost advantages. Homestake's current design for this alternative includes one potential backfilling area located in the northwest portion of the mine pit. Approximately 3 million tons of waste rock material would be removed from the eastern portion of the mine pit and placed in the northwestern portion of the pit without affecting the potential future development of additional mineral resources. This alternative would have a reclaimable surface of approximately 6 acres, which would be revegetated after mine development and operation. Total surface disturbance (696 acres) would be the same as the Proposed Action. However, this alternative would result in the revegetation of approximately 6 acres more than the Proposed Action.

No Action Alternative

Under the No Action Alternative, gold mining at the Ruby Hill Project would not occur. Mineral resources in the deposit areas would remain undeveloped, and no construction of the new pit, waste rock dumps, leach pad, or gold recovery facilities would occur.

IMPORTANT ISSUES AND IMPACT CONCLUSIONS

A number of important issues were raised during scoping for this EIS. 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 3.0 of this EIS for each affected resource.

Air Quality

Issue: Mining operations would degrade air quality in the Eureka area below applicable air quality standards.

Conclusion: Modeling results indicate that maximum concentrations of PM_{10}, NO_2, CO, and SO_2 would not exceed Nevada or National Ambient Air Quality Standards. Homestake plans to follow ***common*** construction practices to minimize fugitive dust emissions and impacts to air quality. ***During mining operations, dust (PM_{10}) levels in the vicinity of the mine and to a much lesser degree in the Eureka townsite would be higher than existing levels. However,*** the project would comply with all existing air quality standards in Nevada.

Geology and Minerals

Issue: Construction in an area where the facility could potentially be affected by, or induce, geologic hazards.

Conclusion: The activities at the proposed site are not expected to generate any geologic hazards, nor should the proposed facility be affected by such hazards, if properly designed. ***Although the region has a history of seismic activity, the project site has been seismicly inactive for recorded history based on*** records available at the National Earthquake Center, located in Golden, Colorado.

Issue: Interference with the present or future development of other known mineral resources.

Conclusion: Using condemnation drilling data, the proposed mine components are to be situated in such a manner as to minimize the possibility of covering any future economic ore deposits. The only known potential geologic or mineral resource to be affected is the covering of the alluvium, which is economically insignificant.

Paleontology

Issue: Impacts to significant paleontological resources

Conclusion: No significant paleontological resources have been identified in the area and no impacts to significant paleontology resources are anticipated.

Water Quality and Quantity

Issue: Degradation of surface water quality based on Nevada or Environmental Protection Agency water quality standards for appropriate or designated beneficial uses.

Conclusion: Perennial streams and springs do not exist within the project area so no impacts are expected to perennial streams or springs. Ephemeral drainages exist within the project area and carry water only during seasonal snowmelt or heavy precipitation events.

Issue: Degradation of groundwater quality based on Nevada drinking water standards.

Conclusion: Geochemical testing indicates that arsenic and aluminum could leach from the alluvium and oxidized limestone. Analytical transport modeling indicates that if arsenic reaches the groundwater, concentrations would be below Nevada Primary Drinking Water Standards within 1,000 feet downgradient of the proposed pit. Due to geochemical conditions, aluminum should not reach the groundwater. At present, no wells exist within 1,000 feet downgradient of the proposed pit.

Issue: Reduction of static water levels (10 feet or greater) in existing municipal and private wells because of groundwater withdrawal from the Homestake production wells.

Conclusion: A model run projecting drawdown for a 10-year period indicates that drawdown from the maximum anticipated pumping rate of 300 gpm is 5.44 feet at the pumping well. Modeling indicates that 1 foot of drawdown will occur at approximately 1 mile from the pumping well.

Issue: Measurable reduction in flow of perennial streams or springs.

Conclusion: No perennial streams exist within the project area so no impacts would occur to perennial streams. No seeps or springs occur within the project area. The nearest seep or spring occurs approximately 2.5 miles to the southeast of the project area. The seep and springs that occur to the southeast and upgradient of the project area are not expected to be impacted by proposed operations.

Issue: Formation of a pit lake as a result of mine development and impacts to wildlife from degraded water quality.

Conclusion: Groundwater levels below the pit area range from approximately 5,900 to 5,918 feet above mean sea level. The proposed pit bottom elevation is 5,940 feet above mean sea level, which is 22 to 40 feet above the groundwater surface elevation. Therefore, a pit lake is not expected to form ***and is not analyzed in the EIS.***

Soils

Issue: Loss of suitable soils or other growth media during salvage, stockpiling, or reclamation activities.

Conclusion: A total of 538 acres of growth media would be salvaged, and stockpiled, and would be available for reclamation on 608 acres of disturbed land after mine operation. Growth media stockpiles would be revegetated as soon as salvaging operations were completed. The successful revegetation of these stockpiles, in addition to erosion control structures (e.g., ditches) located around the base of growth media stockpiles, would limit the erosion of growth media by water and wind. Successful revegetation of the growth media stockpiles and disturbed areas is anticipated to occur approximately 3 to 5 years after reseeding and would limit the loss of growth media via water and wind erosion.

Issue: Erosion of disturbed or reclaimed sites thereby filling sediment control structures and natural drainages.

Conclusion: See conclusion for previous issue.

Vegetation Resources

Issue: Removal or disturbance of unique plant communities (e.g., wetlands and riparian areas) that provide outstanding habitat value for wildlife.

Conclusion: Wetlands and riparian areas are not present on the mine site and would not be removed or disturbed as a result of mine development and operation.

Woodland Products

Issue: Reduction in the harvestable base of woodland products (fuel wood, fence posts, Christmas trees, and pine nuts) in the Eureka area.

Conclusion: The long-term loss of woodland product productivity within the mine area would not be significant because abundant piñon-juniper woodlands exist on public lands accessible for woodland harvest.

Range Resources

Issue: Excessive grazing pressures on local plant communities or areas (greater than 100 acres) that would lead to irreparable degradation to the range resource in terms of plant community composition or productivity.

Conclusion: The movement of grazing livestock within the Ruby Hill grazing allotment would not be obstructed by the development of the Proposed Action. Livestock would be able to freely move within the allotment outside of the project area. Therefore, intense grazing pressure on local plant communities is not anticipated.

Issue: Loss of forage or grazing area leading to a permanent reduction of 10 percent or greater in the allowable animal unit months for the permittee within the affected allotment.

Conclusion: Mine development, operation, and reclamation would result in the permanent loss of 20 animal unit months or less than 2 percent of the active grazing preference.

Issue: Increased operational costs for any current grazing permittee exceeding 100 percent of the grazing lease cost.

Conclusion: Mine development and operation would not remove existing range improvements (e.g., water sources, fences) within the grazing allotment. Therefore, the construction of additional range improvements, which would be paid for by the permittee, are not anticipated as a result of mine development and operation.

Wildlife and Fisheries Resources

Issue: Habitat loss and degradation for upland and riparian vegetation.

Conclusion: No riparian habitat would be affected. Loss of upland habitat would total 694 acres of native vegetation and 2 acres of altered grazing land. All but 88 acres would be reclaimed. The value of habitat lost would be low to moderate, due to the proximity of the project to past and present disturbances and activities.

Issue: Loss of crucial big game seasonal ranges.

Conclusion: No big game seasonal ranges designated as crucial would be impacted by the project. A total of 375 acres of mule deer yearlong range and 321 acres of deer low-density range would be removed for the life of the project.

Issue: Impacts to mule deer migration corridors.

Conclusion: No direct or indirect effects to mule deer movement patterns or migration corridors would occur from the Proposed Action.

Issue: Direct mortalities, habitat fragmentation, and animal displacement.

Conclusion: Direct mortalities would be limited to smaller, less mobile species. Habitats would be fragmented and terrestrial wildlife would be displaced for the life of the project. Displaced animals may be lost from the population, depending on the carrying capacity of adjacent habitats. Incremental fragmentation would not be significant, due to the proximity to Eureka and past mining activities.

Issue: Impacts to resident and migratory birds.

Conclusion: Effects to breeding birds (e.g., passerines, raptors) could occur from direct habitat removal, disturbance to nest sites, and increased noise and human presence. Adverse impacts to specific breeding raptor species, such as the ferruginous hawk, would be significant. Effects to upland game birds would be minor. Regarding the electric distribution line, electrocution hazards have been eliminated by design, and line strikes are expected to be minimal.

Issue: Impacts to area fisheries from dewatering activities.

Conclusion: No dewatering activities would occur. Therefore, no surface water resources would be affected, and no aquatic organisms would be impacted.

Issue: Acute or chronic toxic effects to resident and migratory wildlife.

Conclusion: Potential impacts from cyanide ingestion would be low, due to committed protection measures. No interception of groundwater would be expected; therefore, no long-term water quality effects associated with a pit lake would occur.

Issue: Impacts to wildlife from transporting hazardous chemicals to the mine.

Conclusion: The probability of a hazardous materials spill into a perennial drainage along the transportation corridor is very low. If a spill were to occur, direct and indirect mortalities and habitat loss would occur in a perennial stream from a spill of sodium cyanide, sodium hydroxide, or diesel fuel.

Special Status Species

Issue: Loss of or disturbance to roosting bat concentrations (e.g., hibernacula, maternity roosts, bachelor colonies).

Conclusion: No direct impacts to roosting bats would occur. Noise and vibrations from blasting could indirectly disturb roosting bats, interrupt critical air flow for hibernacula, or affect shaft integrity, possibly resulting in roost abandonment or mortalities. Both hibernacula and nursery colonies for the small-footed myotis and hibernacula for the Townsend's big-eared bat could be adversely affected, resulting in significant impacts to the local populations.

Issue: Impacts to nesting ferruginous hawks.

Conclusion: Significant impacts would result from the loss of three ferruginous hawk breeding territories (six nest sites). Two additional established territories could be indirectly affected by increased human presence.

Issue: Impacts to other Federal candidate species (e.g., pygmy rabbit, loggerhead shrike).

Conclusion: A total of approximately 283 acres of potential habitat for the burrowing owl would be removed for the life of the project. Loggerhead shrikes could be affected by habitat loss. A total of approximately 11 acres of habitat exhibiting high relative abundance of pygmy rabbits would be removed, and approximately 50 acres of habitat of low to moderate relative abundance would be lost for the life of the project. Loss of individual rabbits would be considered a low impact.

Issue: Impacts to Federally listed species (e.g., peregrine falcon, bald eagle) resulting in a "take" of the species.

Conclusion: No impacts to Federally listed species were identified that would result in a "take." Although the probability is very low, a hazardous materials spill into a perennial stream along the transportation corridor during the winter period could remove potential prey items for wintering bald eagles, if eagles are present.

Land Use Authorizations and Access

Issue: Loss of public lands identified as suitable for disposal for public purposes.

Conclusion: This loss would not adversely affect future growth of the Eureka ***townsite***, as approximately 2,230 acres of public land identified as suitable for disposal exist adjacent to the current town boundary.

Recreation *and* Wilderness

Issue: Mine-related increases in population that could generate additional demand for urban-type developed recreational facilities within the town of Eureka.

Conclusion: Existing recreational facilities located within Eureka would be able to absorb the extra demand placed on them as a result of the anticipated number of new residents to the area.

Visual Resources

Issue: Visual contrasts with elements of the characteristic landscape in exceedence of BLM Visual Resource Management objectives.

Conclusion: Natural screening would shield views of mine elements from the Eureka townsite. The Proposed ***Action and*** East Waste Rock Dump ***Alternative*** would result in strong color contrast with the colors of the predominant vegetation; these contrasts would exceed Visual Resource Management objectives. After successful reclamation, these contrasts would diminish over time.

Cultural Heritage

Issue: Direct physical disturbance of cultural resources or traditional use sites that are listed on or are eligible to the National Register of Historic Places or are protected under state or other Federal statues.

Conclusion: Based on a programmatic agreement between Homestake 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 during construction or operation 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. Seven National Register of Historic Places-eligible or potentially eligible sites could be directly impacted. Homestake ***has prepared*** a treatment plan for those significant cultural sites potentially affected by the project. ***This plan has been approved by the BLM and field work has been completed.***

Issue: Indirect impacts (e.g., casual collecting) from development.

Conclusion: Indirect impacts would be controlled by limiting 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.

Issue: Adverse effects to the Eureka Historic District, which is listed on the National Register of Historic Places, from development of the Proposed Action.

Conclusion: Visual elements created by implementation of mine activities should not be visible from the Eureka Historic District. Implementation of the Proposed Action would introduce ***sounds*** that do not currently exist near the District, ***but mining-related sounds are*** not expected to alter the setting or character of the Historic District or diminish the integrity of the District. Studies conducted in the District indicate that vibrations produced by blasting at the mine should not affect historic structures in the area.

Development that could be stimulated in Eureka due to mine activities could either threaten or enhance historic resources. Potential threats could include possible demolition or renovation that compromises historic resources. Benefits could include renovation of deteriorating structures that is currently infeasible due to a weak economy. The likelihood of either type of impact or assessment of the effects on specific buildings and on private property is speculative and beyond the scope of this assessment.

Social and Economic Values

Issue: Adequacy of public infrastructure and services, particularly the Eureka County School District, to accommodate growth.

Conclusion: The population influx associated with the Proposed Action would result in substantial increases in demand on existing facilities and service providers in the town of Eureka. As a result of past and on-going capital improvement programs, virtually all key public facilities and utility systems have excess capacity available to accommodate growth. A new elementary school ***was recently completed in Eureka, providing adequate capacity to accommodate projected elementary-aged enrollment growth. Larger class sizes, the use of*** more modular classrooms, ***or scheduling changes could occur*** at the Eureka Junior/Senior High School ***as a result of higher secondary-aged enrollments***. The school district and the Eureka County Sheriff's Department would need to recruit and hire additional staff, but additional tax revenue generated by the Proposed Action would offset most of the school district's added costs and yield surplus revenue to the county.

Issue: Impacts to local housing markets from temporary and long-term population growth.

Conclusion: The local housing market is very tight and supply is inadequate to meet the demands associated with the project. Temporary housing needs during construction and initial operations could fully occupy existing motels and recreational vehicle accommodations and result in one or more informal parking areas for recreational vehicles/travel trailers being established. During this period, travellers may find it difficult to secure overnight accommodations in Eureka and nightly rates would increase. Once construction is complete, conditions for temporary lodging would ease. ***However, long***-term housing needs also surpass available supply. Completion of company-sponsored housing projects would ***make available 29*** new ***housing*** units ***and 30 modular/mobile home lots in the local market*** and some private development is expected. Nevertheless, shortages could be expected for about a year until more units are completed. These conditions would generate inflationary pressures on housing costs, particularly for rental housing, could impede the ability of the school district and county to recruit additional staff, and could induce workers to commute from other, more distant communities.

Issue: Possible effect of mining on the local tourism economy.

Conclusion: The local economy in the town of Eureka is limited in size and diversity. The Eureka Opera House and other historic buildings and a museum offer visitors rare insights into the region's past. Sales to tourists passing through Eureka and hunters from outside the area are critical for local motels, recreational vehicle/trailer parks, cafes, and other local businesses.

These demands are very seasonal in nature, with many businesses struggling the remainder of the year. The Proposed Action would generate substantial increases in sales for local businesses, with the higher demand evident on a year-round basis. During project construction, motels and recreational vehicle parks may have to turn away tourists and hunters due to the lack of vacancies. However, these impacts would be temporary in nature, easing with the completion of construction, and represent an economic boom to the business owners. Over the long-term, the increased local income and spending associated with the project would help existing businesses prosper and some new businesses would likely start. These changes would expand the number and variety of businesses to support both residents and visitors to the community. No long-term adverse impacts on the tourism economy are anticipated.

Issue: Disproportionate impacts of Federal actions on minority communities and low-income groups (Environmental Justice).

Conclusion: The EIS considered social, cultural, economic, and human health effects and whether BLM's decision would result in any inequity in the distribution of benefits or risks. The Ruby Hill Project was evaluated and no disproportionately high or adverse human health or environmental effects were identified for minority or low-income populations.

Noise and Blasting Vibrations

Issue: Mine operations generating noise in excess of commonly accepted community noise standards.

Conclusion: Combined noise levels from operations at the mine site would be perceptible ***outdoors at*** nearby sensitive receptors (e.g., the Eureka County Fairgrounds, Eureka High School, and the northern portion of the Eureka townsite), but would remain below levels identified to negatively impact public health and welfare for residential areas ***under almost all conditions***. ***Only during three, 3-month periods over the life of the Proposed Action when winds from the northwest exceed 10-meters/second would noise levels at these locations approach levels that could irritate some people. However, the occurrence of 10-meter/second or greater winds from the northwest is extremely rare and of limited duration and, consequently, would not adversely impact public health and welfare.***

Peak noise levels from blasting within the open pit would not exceed established thresholds for irritation from impulse-type noise ***at sensitive receptors***.

Issue: Blasting would cause ground vibration that could initiate or extend observable cosmetic cracking of historic structures located within the Eureka townsite.

Conclusion: Based upon extensive computer modeling analysis and measurement of test blasts at the location of the proposed open pit, the probability of damage to any structures in the Eureka area as a result of mine blasting was determined to be indistinguishable from zero.

Hazardous Materials and Wastes

Issue: Impacts of mining on human health.

Conclusion: None of the process chemicals or fuels expected to be utilized in large quantities are carcinogenic. Emergency response and spill response plans would mitigate any spills or releases of hazardous chemicals immediately. The only possibility of endangerment of human health would be due to a release during transport. The number of releases over the 7.5-year life of the processing facility has been estimated at about 0.03. However, the probability of such a release affecting human health would be even less because the transport routes intersect only about 2 miles of urban area ***in Carlin*** along the 90-mile route.

Issue: Impacts on sensitive resources due to transportation of hazardous materials.

Conclusion: The chances of a process chemical or diesel fuel release have been estimated at about 0.03 over the 7.5-year life of the processing facility. All material carriers would comply with Federal and state regulations. In addition, Homestake has prepared an emergency response plan to deal with potential releases. If a truck spill occurred in a sensitive area, impacts to soil, water, biological resources, and people would be expected. However, the probability of such a spill would be very low because less than 10 percent of the 90-mile transportation route would cross these sensitive areas.

AGENCY-PREFERRED ALTERNATIVE

The agency-preferred alternative is the Proposed Action plus the Partial Backfilling Alternative, as described in the EIS, with all appropriate mitigation. 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 Draft EIS, if a preference has been identified, and in the Final EIS 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 alternatives identified above are the BLM's preferred alternative at the Final EIS stage in the environmental review process. Homestake, Eureka County, and the BLM have reached consensus that the BLM's preferred alternatives would be acceptable provided that the new mitigation measures (listed below) for visual resources, air quality, and noise are implemented. The BLM's preference at this time considers all information that has been received and reviewed relevant to the proposed project.

Rationale

- *The Proposed Action would allow maximum operational flexibility by providing Homestake with two locations for the disposal of waste rock.*
- *The Partial Backfilling Alternative would reduce the amount of waste rock placed in dumps by 3 million tons and would increase the surface area to be revegetated by 6 acres.*
- *A new mitigation measure (Measure 3) for visual resources would limit the capacity of the East Waste Rock Dump to 25 million tons, 10 million tons less than the Proposed Action. This measure would not reduce the area disturbed by the dump (footprint) but*

would reduce the overall height of the dump, thereby reducing visual impacts.

- *New mitigation measures for air quality, visual resources, and noise and blasting vibrations (see Mitigation and Monitoring sections in Chapter 3.0) would establish an advisory group in Eureka County to address public concerns throughout the project life. Homestake would facilitate this group and the group would identify areas where monitoring for dust, noise, or blasting vibrations is needed and would develop additional mitigation that would address impacts that may not be fully identifiable until mining activities begin.*

- *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.*

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CONTENTS

LIST OF TABLES

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LIST OF FIGURES

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LIST OF MAPS

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1.0 INTRODUCTION

1.0 INTRODUCTION

1.1 Proposed Action

The Homestake Mining Company (Homestake) proposes to initiate gold mining operations within the historic Eureka Mining District in Eureka County 0.7 mile northwest of Eureka, Nevada (see Map 1-1). The Proposed Action would include mine development and surface disturbance on a total of 696 acres, of which 689 acres is public land administered by the Bureau of Land Management (BLM) and 7 acres of private land.

The proposed Ruby Hill Project includes an open pit; waste rock disposal sites; a crushing, grinding, and agglomeration facility; heap leaching facilities; and ancillary facilities including the office building and parking lot, warehouse/shop, access and haul roads, growth media stockpiles, a soil borrow source, diversion ditches, and powerline and water pipeline corridors. If the Proposed Action were developed, the anticipated mine life would be 7.5 years.

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

1.2 Relevant History of the Eureka Mining District

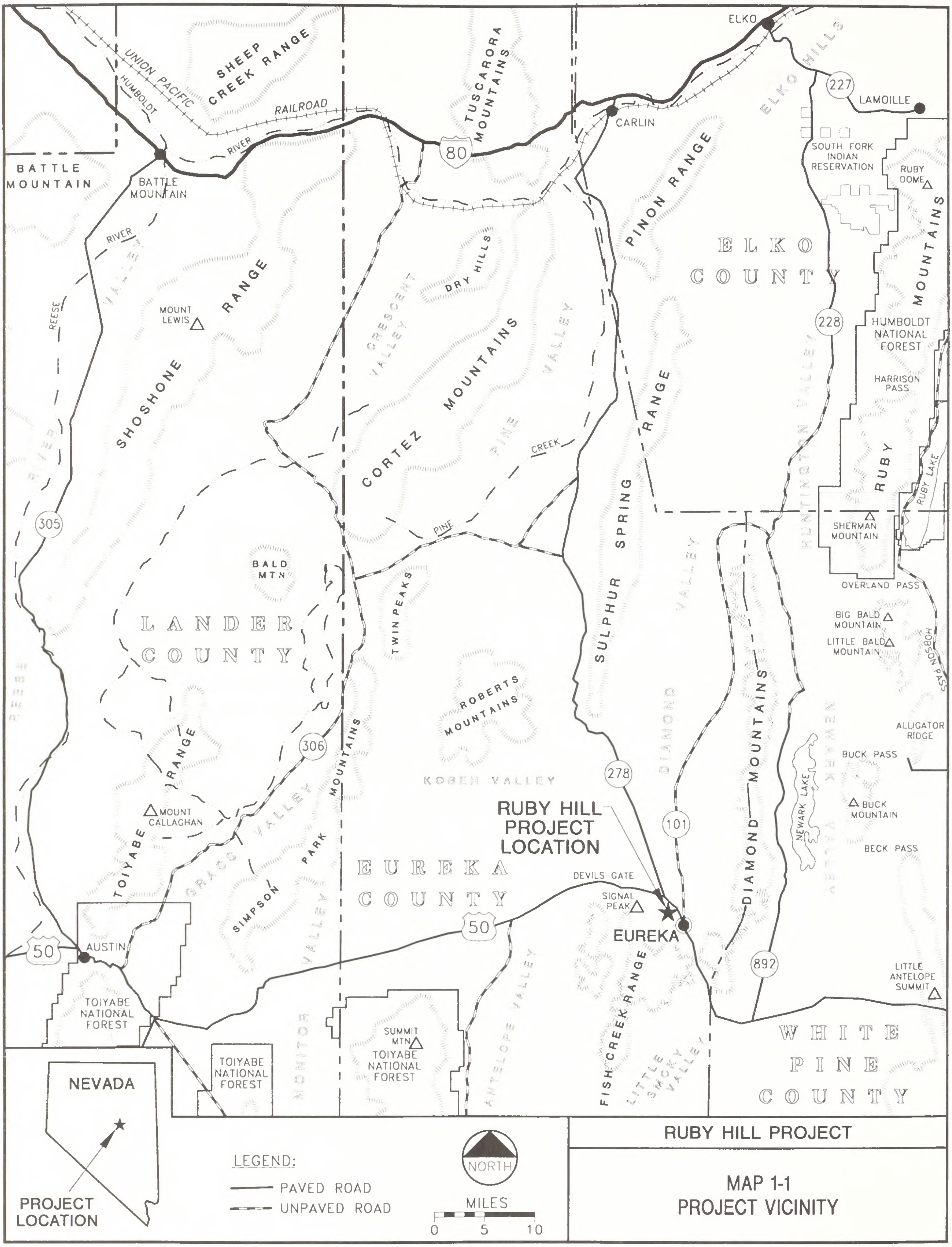
The Eureka Mining District is known mainly for the production of lead, silver, and gold during the late 1800s. The district produced approximately $60 million in gold and silver and approximately 225 thousand tons of lead between 1869 and 1883. The district also is considered to be the birthplace of American silver and lead smelting technology. Sixteen lead furnaces were operating in the town of Eureka by 1879 with a smelting capacity of 925 tons per day. Eureka was known as the "Pittsburgh of the West" because of the numerous smelters that were located in the area (Molinelli 1879). The Ruby Hill Mining Company acquired the mining claims in the project area in 1960. Homestake purchased the mining claims previously owned by the Ruby Hill Mining Company in 1994.

1.3 Purpose of and Need for the Proposed Action

1.3.1 Homestake Mining Company's Objectives

Homestake has economically driven project objectives, which are as follows:

- Develop gold mining facilities in the Ruby Hill Project area.
- Extract economically recoverable gold and other minerals determined to exist in the area.
- Operate and reclaim the project area in an efficient, environmentally conscientious, and safe manner.
- Maintain the high standards set 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.



RUBY HILL PROJECT

MAP 1-1
PROJECT VICINITY

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

The BLM has the responsibility and authority to manage the surface and subsurface resources on public lands within its charge. Homestake's use of public land in the Battle Mountain District requires conformance with BLM's surface management regulations (43 Code of Federal Regulations 3809), as well as various statutes, including the Federal Land Policy and Management Act (as amended). The BLM must review Homestake's plans for 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 BLM-Battle Mountain District is the Federal lead agency for this EIS. The U.S. Army Corps of Engineers, Nevada Division of Wildlife, State Historic Preservation Office, and Eureka County are cooperating agencies with the BLM. These agencies are responsible for providing information within their areas of expertise.

The BLM's Shoshone-Eureka Resource Management Plan contains no constraints that conflict with the Proposed Action, with the exception that parts of the proposed mine would be on lands identified as suitable for disposal, based on needs for recreation or other public purposes, community expansion, economic development, agriculture, and the creation of blocked-ownership patterns. Management activities for the Proposed Action area are identified as livestock grazing, wildlife habitat, and recreation. Mineral resource development is in conformance with the Resource Management Plan, *which states that "all public lands in the planning areas will be open for mining and prospecting unless withdrawn or restricted from mineral entry."*

1.4 Environmental Review Process

A Notice of Intent to prepare the EIS was published in the Federal Register on July 13, 1995. The Notice of Intent invited scoping comments to be sent to the BLM through September 5, 1995. On July 24, 1995, copies of the news release, *Public Invited to Comment on the Ruby Hill Project*, were issued statewide to newspapers, radio and television stations, and major interest groups. Public meetings were held in Eureka and Reno. Forty-eight members of the public attended the Eureka meeting on August 7, and 14 members of the public attended the Reno meeting on August 9. Comments recorded during these meetings are available in the BLM's Battle Mountain District office. As a result of the public scoping process, six comment letters were received by the BLM from the following:

U.S. Bureau of Mines
Eric J. Pastorino
Eureka County Director of Public Works
Plumbers and Pipefitters Union, Local #350
Legal and Safety Employer Research, Inc.
Board of Eureka County Commissioners

Following issuance of the Draft EIS *in August 1996*, public meetings *were* held in Eureka and Reno, *in September 1996. Comments received* during the formal 60-day public comment period *are presented in Section 4.5 of this Final EIS*.

The BLM is required to assess impacts to *a number of critical elements of the human environment, as discussed in Chapter 3.0. Those elements that do not occur in the Ruby Hill Project area and would not be affected, are not discussed further in the EIS.* 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. Homestake is responsible for applying for and acquiring these permits.

1.6 Organization of the Environmental Impact Statement

This EIS follows the Council on Environmental Quality recommended organization (40 Code of Federal Regulations 1508.9): Chapter 1.0 provides descriptions of the Proposed Action, relevant history of the project vicinity, purpose of and need for the Proposed Action, the environmental review process, applicable regulatory requirements and coordination, and organization of the EIS; Chapter 2.0 describes the Proposed Action and Alternatives; Chapter 3.0 describes the affected environment, environmental consequences, and mitigation; and Chapter 4.0 summarizes consultation and coordination for preparation of the EIS***, including comments and responses on the Draft EIS***; Chapter 5.0 presents the list of preparers; and Chapter 6.0 is a list of references. Copies of supporting documents are on file in the BLM's office in Battle Mountain.

Table 1-1

Major Permits and Approvals Required for the Ruby Hill Project

Permit/Approval	Granting Agency
Approval of Plan of Operations	Bureau of Land Management
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
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 (Storm Water)	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

As illustrated on Map 1-1, the Ruby Hill Project is located 0.7 mile northwest of the town of Eureka, in Eureka County, Nevada. The project area is located in the BLM's Battle Mountain District at elevations ranging between 6,200 and 6,500 feet above mean sea level.

Several groups of patented lode mining claims, most of which show evidence of historic prospecting and surface pitting, are included within the project area. The land ownership within the project area is illustrated on Map 2-1. The Ruby Hill Mining Company acquired the claims in the project area in 1960. Homestake signed a lease/purchase agreement with the Ruby Hill Mining Company in 1992 to facilitate a drilling program. Homestake executed its option to purchase the mining claims in 1994.

The land that would be directly affected by the Proposed Action includes approximately 696 acres. The project involves a single ore deposit (the West Archimedes deposit) that would be mined by open pit methods. Other facilities include waste rock disposal sites; a crushing, grinding, and agglomeration facility; heap leaching facilities; and ancillary facilities including the office building and parking lot, warehouse/shop, access and haul roads, growth media stockpiles, a soil borrow source, diversion ditches, and powerline and water pipeline corridors. These project components would be interconnected by haul roads, service roads, and the main access road.

The specific project area consists of all the mine components listed above and can be described as the area within the proposed perimeter fence plus the proposed access roads, growth media stockpiles, soil borrow source, fresh water pipeline, overhead powerline, and diversion channels to be located outside the perimeter fence. Map 2-2 presents the general facilities arrangement, while Table 2-1 presents a summary of the estimated surface disturbance for the proposed project. Table 2-2 provides the legal description for the Proposed Action and Alternatives.

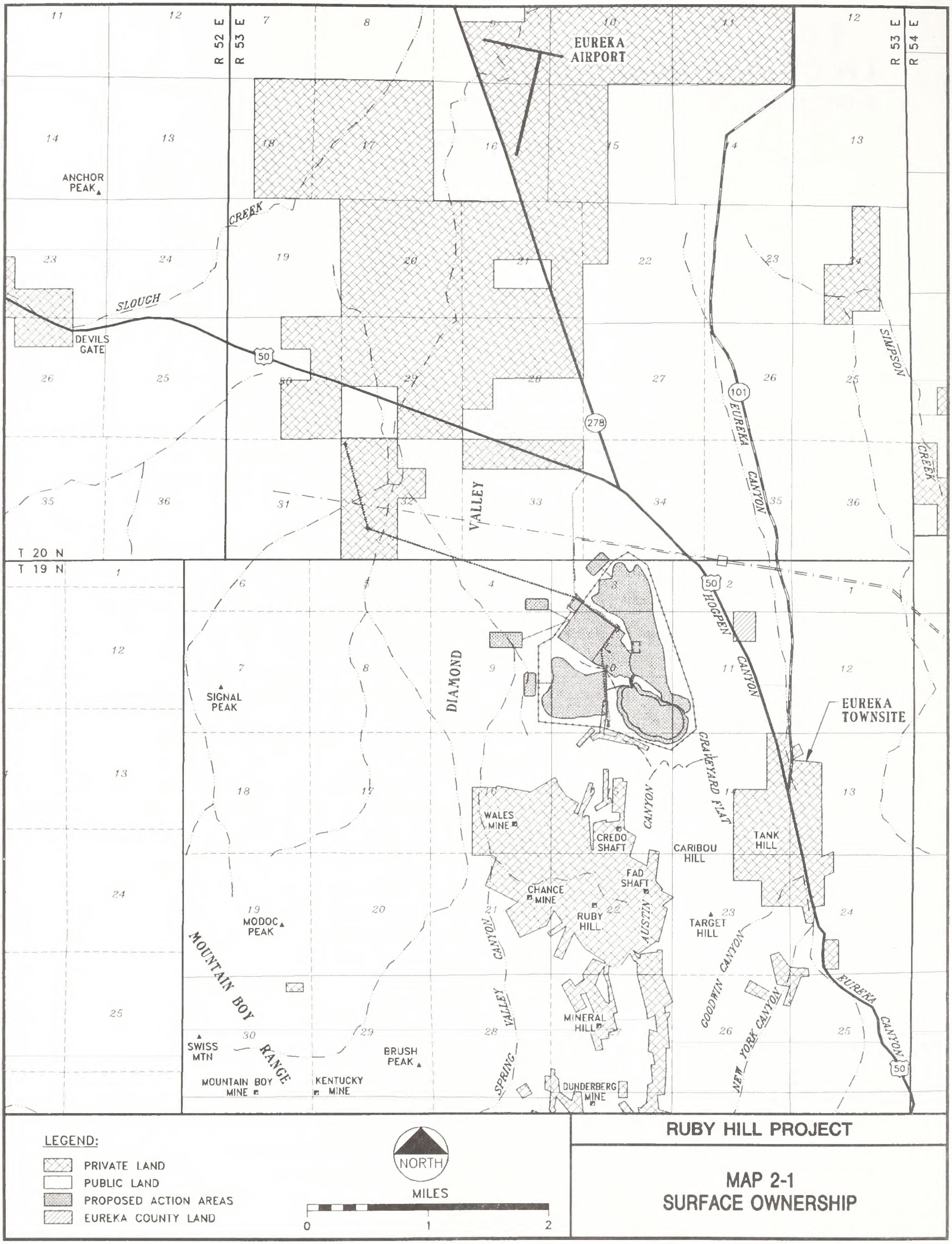
2.1.1 Work Force and Schedule

Project construction and pre-stripping would be conducted over a 15-month period. During the 9-month construction period, an approximate maximum of 126 non-Homestake employees and 99 Homestake employees would be on site (Figure 2-1). During a 6-month transition period between construction and operation, an approximate maximum of 70 non-Homestake employees and 121 Homestake employees would be on site. Once through these initial start-up periods, Homestake's operational employment would remain approximately 121 for the remainder of the project life. The construction sequence and schedule are subject to optimization during final engineering. It is anticipated that the majority of the work force would be hired from the Eureka area and the surrounding counties. The total annual payroll is estimated to be approximately $5.2 million. Homestake would work with Eureka County to minimize potential impacts associated with employee housing and transportation issues, including assisting in the development of up to ***29 new housing units and 30 modular/mobile home lots.*** A conceptual schedule showing possible sequencing of principal pre-development, construction, and operation activities is presented on Figure 2-2.

2.1.2 Mining Operations

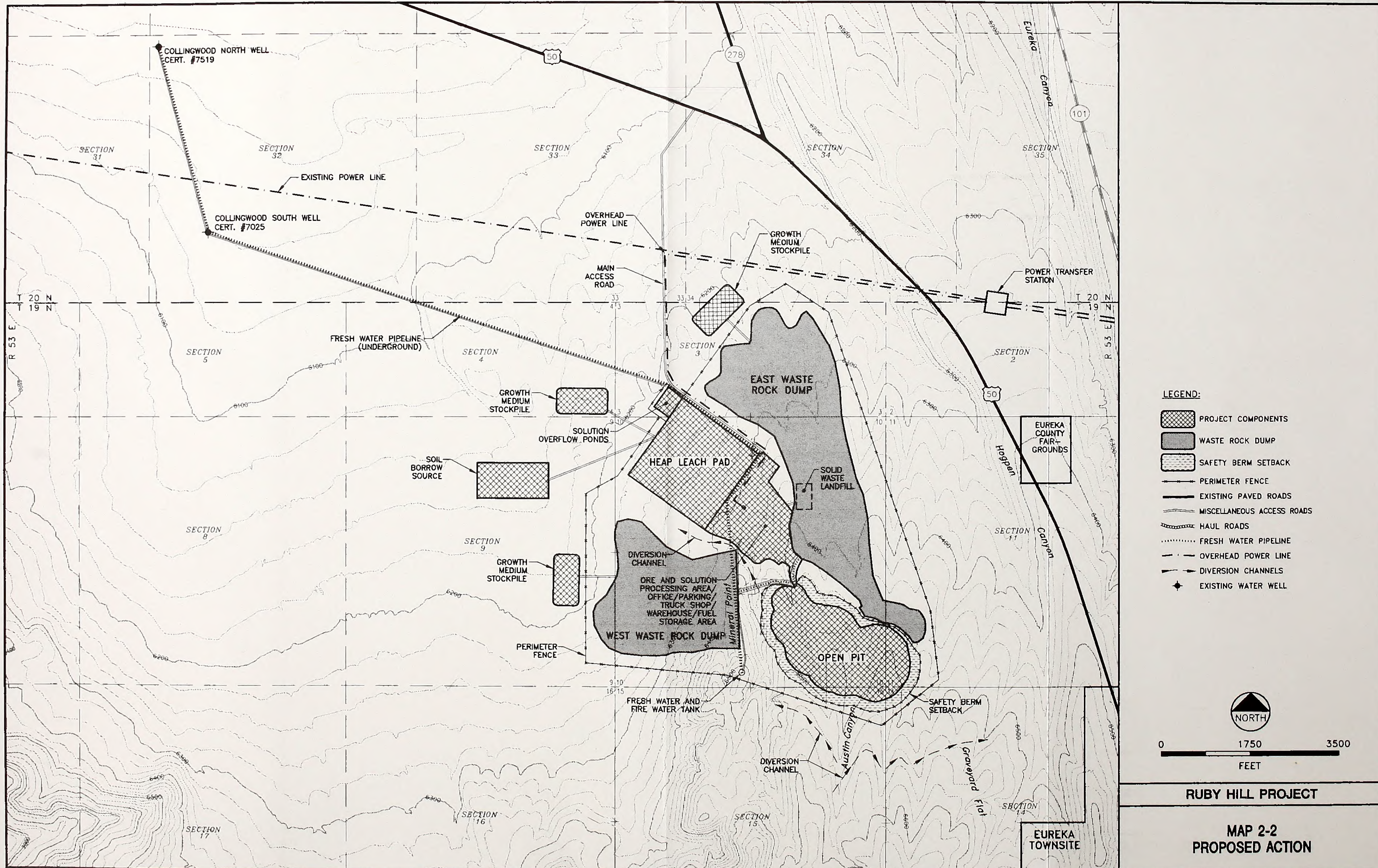
Mine production is based on year-round operations and delivering approximately 1.2 million tons of ore per year to the process facility. The average life-of-mine strip ratio of waste rock to ore is expected to be approximately 7 to 1. Approximately 16 million tons of waste rock would be removed during the first year of operation to access the ore body. Mining would consist of ore and waste removal by conventional open-pit mining methods. A list of initial equipment requirements for the project is presented in Table 2-3.

A 200-foot wide safety berm setback area would surround the pit except for an approximate 250-foot wide area needed for haul road access into and out of the pit. The safety berm would be 30 feet wide and 12 to 14 feet in height and would be built around the outer edge of the setback



RUBY HILL PROJECT

MAP 2-1
SURFACE OWNERSHIP



RUBY HILL PROJECT

**MAP 2-2
PROPOSED ACTION**

Table 2-1

Proposed Action
Estimated Surface Disturbance Acreage by Facility and Land Status

Facility	Public Land	Private Land	Subtotal
Open Pit	88	0	88
Safety Berm Setback Area	34	0	34
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	57	0	57
Waste Rock Dumps	334	3	337
Heap Leach Pad/Solution Overflow Ponds	84	0	84
Fresh Water Pipeline[1]	5	3	8
Overhead Power Line	--[2]	--[2]	--[2]
Haul Roads	4	0	4
Main Access Road	9	0	9
Miscellaneous Access Roads	3	0	3
Growth Medium Stockpiles	45	0	45
Diversion Channels	3	1	4
Soil Borrow Source	23	0	23
Total	689	7	696

[1]Width = *20 feet.*

[2]Disturbance would be minimal since an existing road within the power line corridor would be used during construction and the remainder of the power line would be constructed within the main access road disturbance area.

Table 2-2

Legal Descriptions for the Proposed Action and Alternatives

Proposed Action or Alternative	Legal Description
Proposed Action	**T 20N, R 53E:** NW 1/4, SW 1/4, and SE 1/4 of Sec. 32; E 1/2 of Sec. 33; NW 1/4, SW 1/4, and SE 1/4 of Sec. 34; and SW 1/4 of Sec. 35 **T 19N, R 53E:** All of Sec. 3; NW 1/4, NE 1/4, and SE 1/4 of Sec. 4; NW 1/4, NE 1/4, and SE 1/4 of Sec. 9; All of Sec. 10; W 1/2 of Sec. 11; NW 1/4 of Sec. 14; and NE 1/4 of Sec. 15
East Waste Rock Dump Alternative	**T 20N, R 53E:** NW 1/4, SW 1/4, and SE 1/4 of Sec. 32; E 1/2 of Sec. 33; NW 1/4, SW 1/4, and SE 1/4 of Sec. 34; and SW 1/4 of Sec. 35 **T 19N, R 53E:** SW 1/4 of Sec. 2; W 1/2 of Sec. 3; NW 1/4, NE 1/4, and SE 1/4 of Sec. 4; N 1/2 of Sec. 9; All of Sec. 10; W 1/2 of Sec. 11; NW 1/4 of Sec. 14; and NE 1/4 of Sec. 15
West Waste Rock Dump Alternative	**T 20N, R 53E:** NW 1/4, SW 1/4, and SE 1/4 of Sec. 32; E 1/2 of Sec. 33; NW 1/4, SW 1/4, and SE 1/4 of Sec. 34; and SW 1/4 of Sec. 35 **T 19N, R 53E:** NW 1/4, NE 1/4, and SE 1/4 of Sec. 4; All of Sec. 9; All of Sec. 10; SW 1/4 of Sec. 11; NW 1/4 of Sec. 14; and NE 1/4 of Sec. 15
Partial Backfilling Alternative	(Legal description is the same as the Proposed Action)

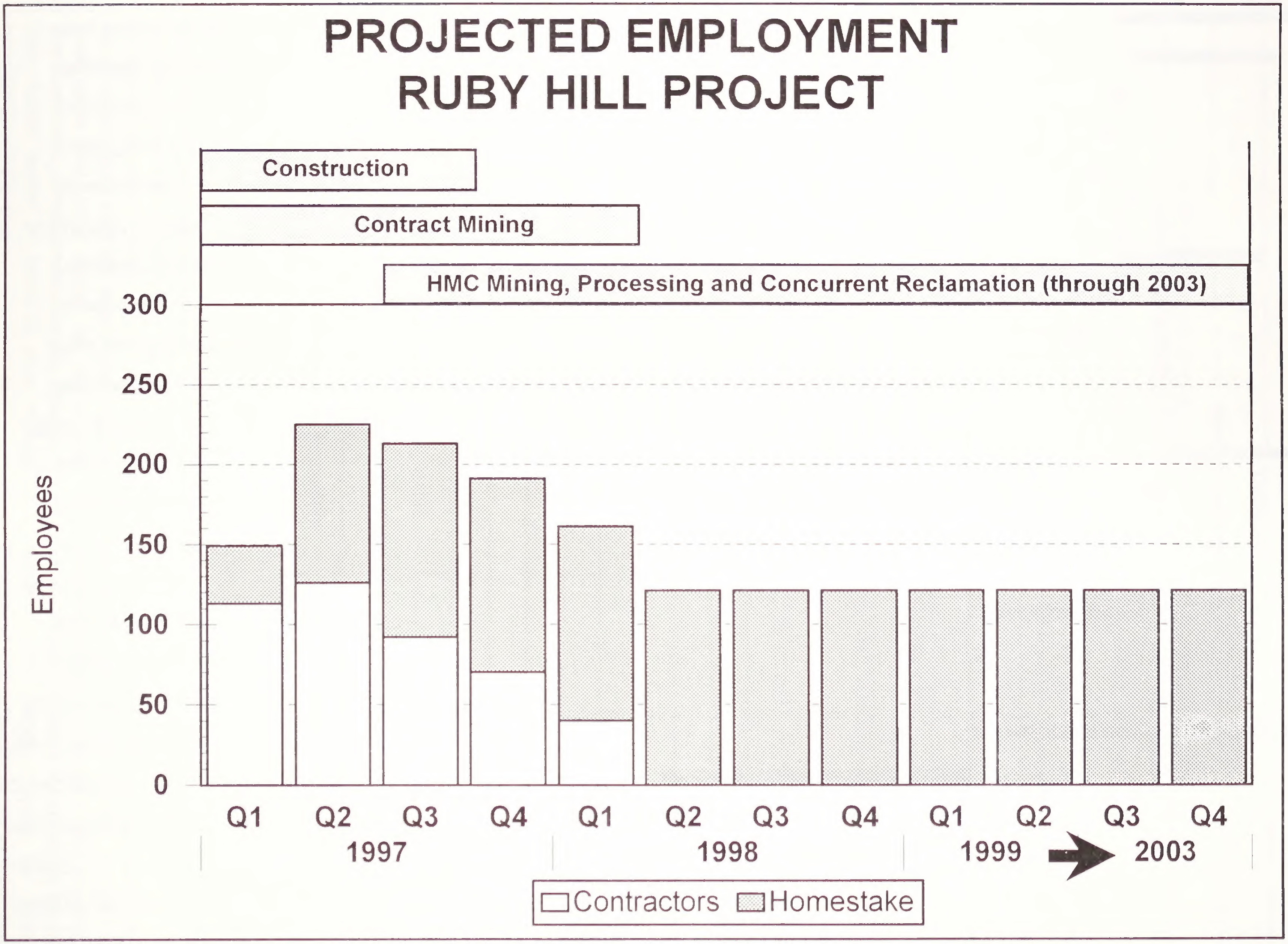


Figure 2-1. Projected Employment - Ruby Hill Project

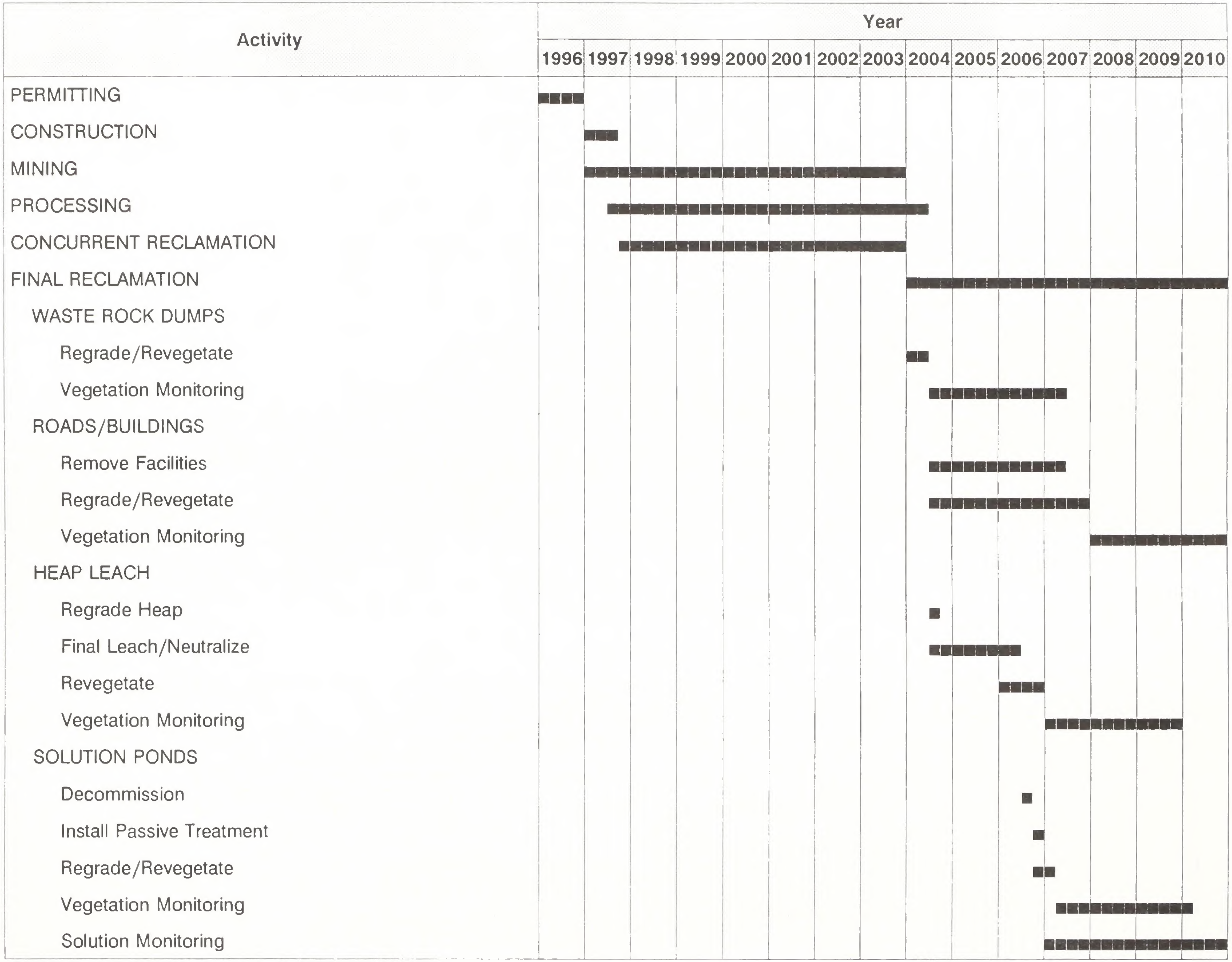


FIGURE 2-2. PROPOSED RUBY HILL PROJECT SCHEDULE

Table 2-3

Initial Equipment List

Type of Equipment	Number of Units
Rotary Drill	3
Front End Loader	4
Mechanical Shovel	1
Haul Truck	12
Motor Grader	2
Track Bulldozer	5
Wheel Bulldozer	2
Blasting Truck	2
Blasting Agent Loading Truck	2
Backhoe Excavator	1
Water Truck	2
Hole Stemmer	2
Maintenance Truck	2
Welding Truck	2
Tire Truck	2
Service Truck	2
Crane Flatbed	2
Personnel Carrier	4
Pickup Truck	8
Pump	2
Lighting Plant	6
Emergency Vehicle	1
Other Temporary Support Equipment and Vehicles[1]	30

[1]To include: Sheepfoot Compactors.

area. The remaining 170-foot width of the setback area between the safety berm and pit would consist of rangeland buffer. No growth media would be salvaged from the safety berm setback area since the area would be temporarily disturbed during mine construction and operation. Soils would remain in place to allow natural revegetation of the area.

2.1.2.1 Pit Slope Design

The preliminary pit design was based on pit slope angles ranging from 37° to 45°. The pit location is shown on Map 2-2. Geotechnical investigations would continue to assist in optimizing the final pit design. Pit stability would be monitored throughout the project life to ensure safe and uninterrupted operations. Prior to the start of operations, extensive testing on drill core and soils would be used to determine the optimum slope angles of the pit walls. When operations are underway, the routine monitoring would consist of:

- Visual inspections at the beginning of each operating shift;
- Documentation and investigations of major failures;
- Mapping and analysis of pit geological features;
- Additional core drilling designed specifically for stability studies, if necessary; and
- The installation of permanent survey stations or devices to monitor areas of the pit walls, if necessary.

2.1.2.2 Surface Water Diversions

Runoff would be directed around the open pit and the general mine site by diversion ditches constructed upgradient of the general mine site. The location of these ditches is illustrated on Map 2-2. The ditches would be designed and constructed to meet the requirements of Nevada Administrative Code 445A.2436(1)(a), which state the diversion system be sized to pass the 100-year/24-hour storm event. A typical diversion ditch cross-section is illustrated on Figure 2-3. The diversion ditches would be evaluated at project closure to determine if they should be removed or left ***in place***. If the ditches are ***removed***, the associated surface disturbance would be regraded and reclaimed. ***If the ditches are left in place, their condition would be reviewed to ensure that they would be maintenance-free after site reclamation is complete.***

2.1.2.3 Drilling and Blasting

The majority of the waste rock and all of the ore would require drilling and blasting. Material would be mined on 20-foot to 25-foot benches. Diesel-powered rotary hammer drills would be used to drill blast holes on a regular spacing. Blast holes would be charged with an ammonium nitrate/fuel oil mixture by means of a truck-mounted mixing/dispensing unit. Where practical, the ore and waste would be blasted separately in order to reduce the amount of ore loss and waste dilution. Unconsolidated gravels and ***growth media*** that do not require drilling and blasting would be ripped with a dozer, as required, for removal.

Several blasts would occur each day. Blasting would be scheduled to minimize disturbance to community activities and would likely occur around mid-day and late afternoon. Blasting would occur only during daylight hours. Blasting would be designed to control the scattering of rocks (flyrock) that could be a safety hazard for workers. Adequate "stand-off" distances and good blasting practices would be incorporated into the blasting design. Given the design parameters for the Ruby Hill pit, it would be unusual for individual rocks to travel more than 100 feet.

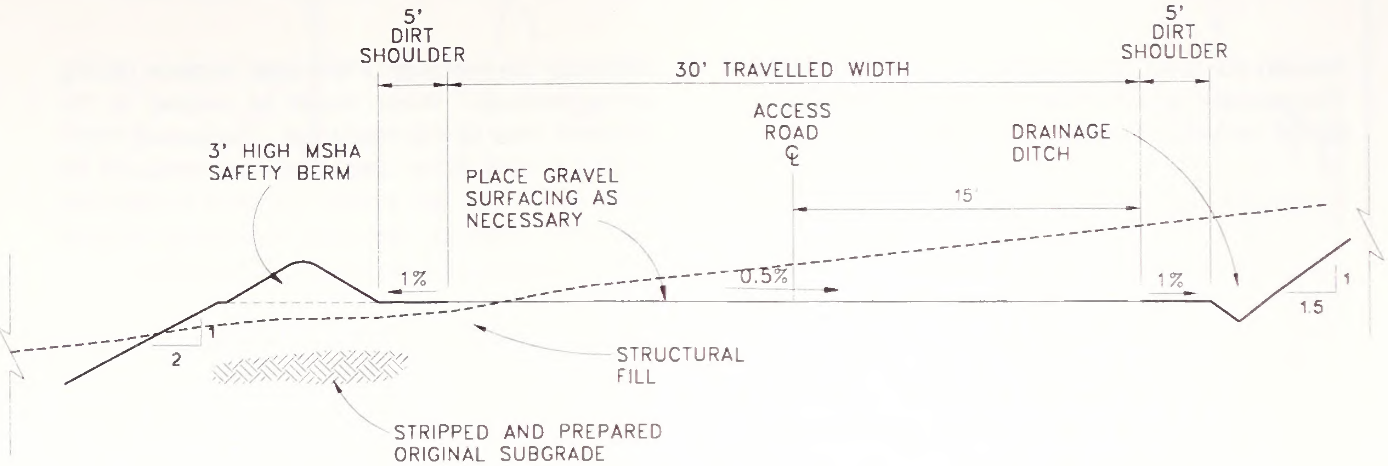
2.1.2.4 Loading and Hauling

Blasted ore and waste rock would be loaded with conventional mechanical shovels and/or front-end loaders. The ore and waste rock would be hauled by conventional off-highway mine trucks.

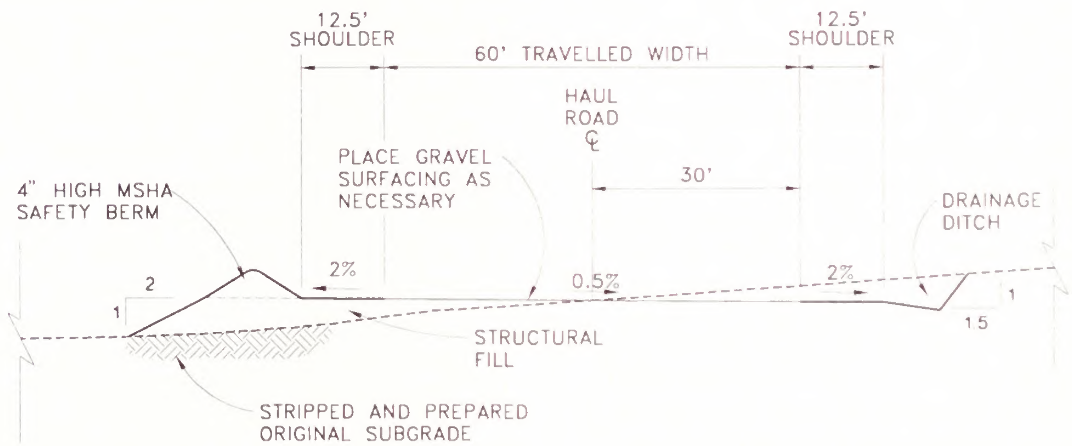
2.1.3 Roads

2.1.3.1 Main Access Road

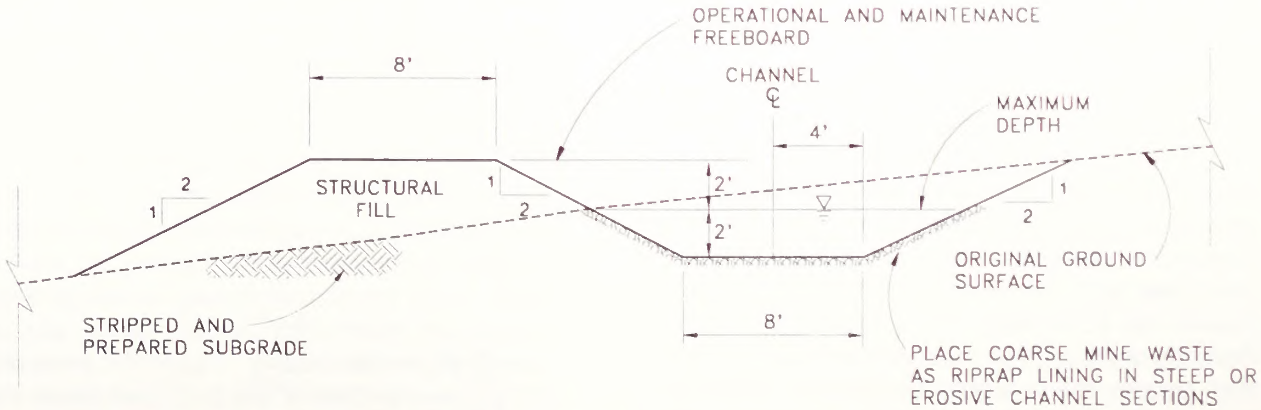
The proposed location of the main access road from U.S. Highway 50 to the project site is illustrated on Map 2-2. The proposed road would be constructed to BLM and Eureka County standards. A preliminary driving surface of 30 feet, which would allow two-way traffic, has been selected. To allow for proper construction, the total disturbance width is estimated at 50 feet. The road would be constructed to facilitate drainage. Culverts would be installed under the roadway at required locations. Silt fences, hay bales, or other sediment control devices would be installed to maintain sediment control as needed. Figure 2-3 illustrates a typical access road cross-section. The final road design would be determined during detailed engineering. Mine waste rock would be used to produce gravel



TYPICAL ACCESS ROAD SECTION



TYPICAL HAUL ROAD SECTION



TYPICAL STORM DIVERSION CHANNEL

(NOT TO SCALE)

RUBY HILL PROJECT

FIGURE 2-3
CONCEPTUAL ROAD AND DIVERSION SECTIONS

needed for road construction and maintenance. This material would either be mined directly from the pit or recovered from a waste rock dump.

2.1.3.2 Haul Roads

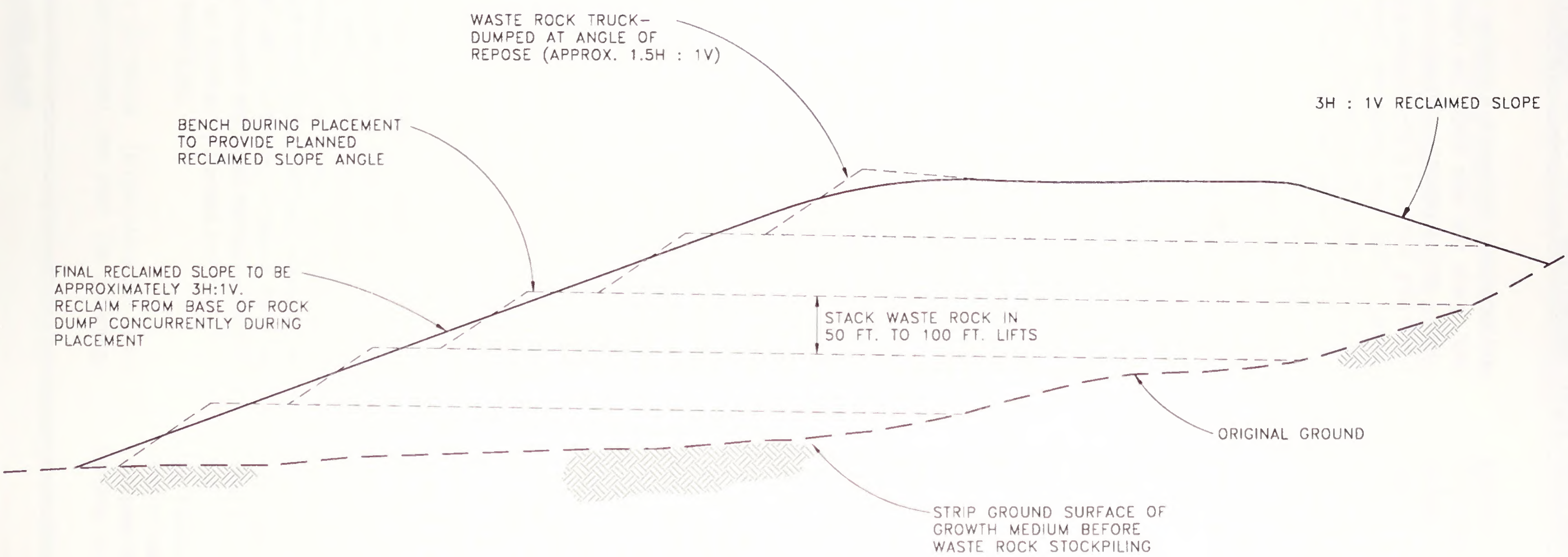
The proposed locations of the haul roads from the pit to the processing area, growth media stockpile areas, and waste rock dumps are shown on Map 2-2. The haul roads would be designed to accommodate appropriate mine equipment, including large mine haul trucks, and to meet United States Mine Safety and Health Administration requirements. The haul roads would be sloped into the hillside, and drainage would be provided by ditches along the roadway on the uphill side, with culverts under the roadway at required locations. A safety berm would be constructed on the downhill side. Silt fences, hay or straw bales, or other sediment control devices would be installed along the road to maintain sediment control as needed. Figure 2-3 illustrates a typical haul road cross-section. Haul roads would be enclosed within the fenced mine site, and would not be accessible to the general public. Mine waste rock would be used to produce gravel needed for road construction and maintenance. ***Homestake's engineer would specify the road surfacing material, taking into account the durability and environmental compatibility of the potential aggregates. Sufficient non-acid-generating waste rock would be available to satisfy all road construction and maintenance needs. If satisfactory pit-run waste rock material is not available, waste rock would be processed on-site through the crushing and screening plant to produce an aggregate that meets the engineer's specifications.***

2.1.3.3 Snow Removal and Management

Snow removal and management within the operations area are required to ensure safe winter operation. Drifting snow is expected in some areas and snow fences may be constructed as a means of controlling the pattern of drifting. Portions of the primary inner-project service roads and access roads would be cleared utilizing a grader. Proper road maintenance would include the placement of gravel or sand to maintain driving surfaces. Care would be taken to minimize the removal of the road surface during snow removal. Snow would be moved to the downhill side of the roadways. Excessive snow from the work areas also would be removed by front-end loader and trucks. In order to maintain roadway surfaces, dry road surfacing material would occasionally be placed and graded.

2.1.4 Waste Rock Dumps

The project would create two waste rock dumps that would disturb approximately 337 acres; ***approximate dimensions of the East Waste Rock Dump would be 7,000 feet long by 1,200 feet wide and the approximate dimensions of the West Waste Rock Dump would be 2,500 feet long and 2,100 feet wide***. Total production of waste rock is currently estimated at approximately 60 million tons, of which 35 million tons would be placed in the East Waste Rock Dump and 25 million tons would be placed in the West Waste Rock Dump. The locations of these waste rock dumps are illustrated on Map 2-2. The dumps would be constructed and reclaimed in a manner that would reduce overall visual impact. Mine waste would be hauled from the open pit to one of the two proposed waste rock dumps and dumped in approximate 50-foot lifts. Two slightly different construction methods would be used depending on the visual sensitivity of the particular dump face. Visually sensitive areas are expected to occur on the north and east sides of the waste rock dumps. Reclamation in these areas would be completed as soon as possible after ***sections of the*** waste dump faces have been constructed. The waste dump faces would be re-graded to an approximate 3H:1V slope once enough material has been placed to safely operate equipment. This simultaneous re-grading would produce a minimal dump face, usually less than several hundred feet. Less visually sensitive areas are expected to occur on the south and west sides of the proposed mine waste rock dumps. Waste rock dump faces located in these areas would be reclaimed concurrently, though not as soon as dump faces located in visually sensitive areas. Concurrent reclamation would occur annually instead of simultaneously. Figure 2-4 presents a typical cross-section of the proposed waste rock dumps. The size of the materials that would be placed in the waste rock dumps would be controlled by the blasting practices and the



TYPICAL ROCK DUMP SECTION

(NOT TO SCALE)

RUBY HILL PROJECT

FIGURE 2-4
WASTE ROCK DUMP
CROSS-SECTION

material handling characteristics. As removed from the pit, the waste rock would consist of approximately 80 percent alluvial material composed of cobble, gravel, and sand-sized fragments and 20 percent unmineralized limestone. Some breakdown of material is anticipated during removal from the pit and transport and placement in the waste rock disposal facilities. The material is not anticipated to degrade considerably upon removal and transport and should exhibit "rock fill" properties when the dumps are constructed.

The waste rock dumps would be engineered and constructed in a manner to ensure long-term stability, to provide for practical and effective concurrent reclamation, and reduce the overall visual impact. Construction of these facilities would be visually monitored during operations by mine personnel. This would ensure that proper construction techniques are being utilized. In addition, the waste rock dumps would be monitored following spring snowmelt and intense rain events to ensure that drainage and sediment control measures are effective. Additional discussion on reclamation of the waste rock dumps is described in Section 2.1.15, Reclamation Plan.

Due to low overall heights and the strength of the waste rock materials, Homestake does not anticipate stability problems with waste rock dumps, even with the operational slopes between benches constructed at angle of repose. With final overall slope configurations of 3H:1V or shallower, mass movement of material downgradient from the designated disposal location is not anticipated.

2.1.5 Crushing, Grinding, Agglomeration Facility

Prior to placement on the pad, all the leach ore would be processed in the crushing facility, and then the grinding and agglomeration facility located within the process building. Components in the facility would include a three-stage crushing system (primary jaw crusher, and secondary and tertiary cone crushers), a ball mill, a thickener, a disk or belt filters, and an agglomeration drum. Low grade ore would be crushed in the primary and secondary crushers to a nominal 1-inch size. High grade ore also would be crushed in the primary and secondary crushers to a nominal 1-inch size, then to a 0.25-inch size in the tertiary crusher. The high grade ore would then be ground in a ball mill to nominal -100 mesh size (0.005 inch). Barren cyanide solution would be added to the ore in the ball mill. The high grade ore slurry discharge from the ball mill would report to the thickener, where it would be thickened and filtered to remove excess water.

The resulting leached high grade ore filter residue, or pulp, would be transferred to the agglomeration drum, where it would be combined with the low grade ore material at a ratio of 3 to 4 tons of low grade ore to 1 ton of high grade ore. Cement at a rate of 10 pounds per ton of ore would be added to bind (agglomerate) finely ground high grade ore particles to coarser low grade ore pieces. Barren cyanide solution would be added to the ore mixture in the agglomerating drum to control the moisture content of the final ore product. The grinding and agglomeration components that utilize cyanide solutions would be designed with containment structures that meet the requirements of Nevada Administrative Code 445A.24366.

The agglomerated ore would be delivered from the crushing, grinding, agglomeration circuit to the leach pad via a series of portable bridge conveyors. All conveyors transporting material containing cyanide would be placed on a liner. A radial arm stacker would be used to place the conveyed ore on the pad in lifts that range in height from 20 feet to 25 feet.

2.1.6 Heap Leach Facility

As shown on Map 2-2, the proposed heap leach facility would be sited immediately west of the proposed processing facility. The heap leach facility would be sited on an alluvial fan that slopes down relatively uniformly to the west at a grade of about 5 percent. The heap leach facilities would consist of the following elements:

- A conveyor stacking system;
- A geomembrane/composite-lined, dedicated heap leach pad;
- Geomembrane/composite-lined, process ponds;
- A solution application system;
- A solution collection system placed above the liner system;
- Leak detection/collection systems; and
- High density polyethylene barren and pregnant solution pipelines and associated containment ditches.

2.1.6.1 Heap Leach Design and Construction

The heap leach facility is designed to contain a total of 11 million tons of ore, although only 8 million tons of ore would be processed. The facility would be developed in two phases. Phase 1 leach pad construction would disturb an estimated 34 acres and Phase 2 construction would add 50 acres of additional disturbance. The total leach pad disturbance is estimated at 84 acres. A cross-section of the heap leach facility showing phased construction is presented as Figure 2-5.

The heap leach facility would be designed to be a zero-discharge facility with the capacity to contain all process fluids and meteoric waters generated by the 25-year/24-hour storm event (Nevada Administrative Code 445A.2436[1][d]). In addition, the system would be designed to contain a 24-hour draindown resulting from power losses or unscheduled shutdown. Storm flows from upgradient catchment areas would be routed around the facility into natural drainages below the facility by perimeter berms and the planned diversion ditches. The diversion system would be designed to safely pass the 100-year/24-hour storm event as required by Nevada Administrative Code 445A.2436(1)(c).

Both run-of-mine (uncrushed) and crushed/agglomerated ore from the crushing, grinding, agglomeration circuit would be processed on the leach pad. Run-of-mine ore would be hauled from the mine to the leach pad and stacked directly on the pad with conventional haul trucks. Agglomerated ore from the crushing, grinding, agglomeration circuit would be transferred and stacked on the leach pad with conveyors.

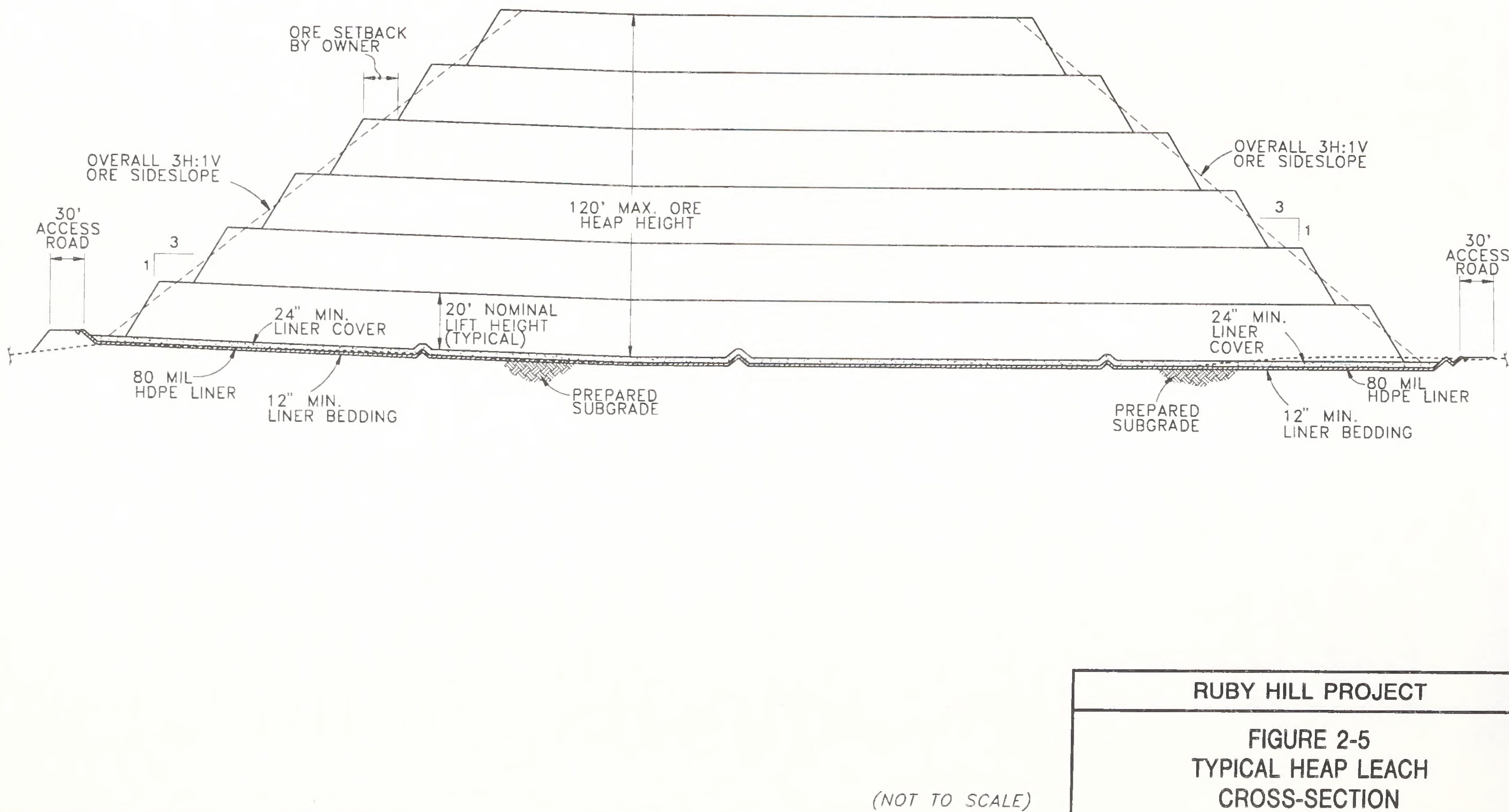
All ore would be stacked in lifts about 20 to 25 feet in thickness to an approximate height of 120 feet. The stacked heap ore would have overall sideslopes of 3H:1V. The 3H:1V heap slopes would be constructed by either providing a benched setback at each lift or by regrading the exterior slope during operation. The toe of each successive lift would be set back from the crest of the previous lift to provide a bench for stability considerations during operation of the facility.

Ore would be placed on the heap at an approximate rate of 100,000 tons per month. Once a lift of ore has been loaded, the solution application system would be installed and leaching would commence. Ore would be leached in a single 30-day cycle (no rest period) at average and maximum application rates of 0.0025 to 0.005 gallon per minute (gpm) per square foot (ft^2).

2.1.6.2 Heap Leach Pad Foundation and Liner

The leach pad would be constructed in compliance with Nevada Administrative Code 445A.24362, and would utilize a composite-lined system with leak detection. The primary liner would be an 80-mil high density polyethylene geomembrane. The liner would be bedded on a minimum thickness of 12 inches of fine-grained soil that would be compacted in place to provide a permeability of less than 1×10^{-5} centimeters per second (cm/sec). The liner bedding would be placed on a compacted subgrade in two 6-inch lifts. Leak detection/collection pipes would be placed beneath the primary liner under areas of concentrated flow.

The leach pad area would be cleared of brush, stripped of ***growth media***, site graded, and prepared for liner placement. Leach pad site leveling and grading would be performed to



RUBY HILL PROJECT

FIGURE 2-5
TYPICAL HEAP LEACH
CROSS-SECTION

control solution flows and establish a stable downhill toe area for the ore heap.

Both phases of the leach pad have been subdivided into modules or cells of roughly 400,000 square feet to separate flows, should the leach pad system be expanded for concurrent leach cycles. The cells would be separated with 24-inch high geomembrane lined berms.

A minimum of 24 inches of crushed sand and gravel would be placed over the synthetic liner to protect it from the heap stacking operation. This material would be free draining to allow solution to pass to the collection pipe system. The liner cover fill would have a maximum particle size of 1-inch. The liner cover fill would likely be crushed mine overburden or ore from the Ruby Hill Project pit.

2.1.6.3 Solution Collection System

The leach solution would be collected on top of the liner by a system of 4-inch perforated collection pipes placed in the liner cover fill. The 4-inch pipes placed in each cell of the leach pad would discharge into an 8-inch perforated collection pipe placed against the northeast berm of each cell. The 8-inch pipe would in turn discharge into a 10-inch perforated pipe 200 feet from the northwest berm. Flow not collected by the 4-inch pipes would discharge into a 10-inch collection pipe placed against the northwest berm of each cell of the leach pad. The two 10-inch collection pipes from each cell of the leach pad would discharge into a 12-inch non-perforated solution pipe placed in a lined ditch, which would be constructed along the northwest side of the leach pad.

The leachate collection system is designed to minimize the fluid head on the liner, resulting in a ***50-foot spacing of 4-inch perforated solution pipes.*** For pipe sizing and spacing calculations, the maximum normal solution application rate of 1,000 gpm was used.

2.1.6.4 Leach Pad Leak Detection/Collection System

The leach pad is designed with a leak detection/collection system placed under the primary liner beneath the 10-inch solution collection pipes in each cell of the leach pad. These pipes are located in areas that would experience the highest solution flows on the leach pad. Leak detection for the leach pad would include separate monitoring systems, one for each cell of the leach pad. In addition, each cell would be separated into three individual leak detection zones to more precisely monitor the facilities.

The leak detection/collection system would consist of 2-inch diameter perforated polyvinyl chloride pipes placed under the geomembrane liner adjacent to the northern cell berms and sub-cell division locations. The perforated polyvinyl chloride pipes would transition to 2-inch diameter non-perforated polyvinyl chloride leak detection pipes at the lowest point of their respective sub-cells. The 2-inch diameter non-perforated polyvinyl chloride leak detection pipes (three total) would drain by gravity to the lowest point of each cell, where they would enter the solution collection channel by booting through the liner in the channel so they can be visually monitored. This would be the only location where the pad leak detection/collection system passes through the geomembrane liner.

2.1.7 Adsorption, Desorption, and Recovery Plant

The adsorption, desorption, and recovery plant is housed in the same building as the grinding and agglomeration facility as illustrated on Map 2-2. The plant would consist of a precious metals recovery and refining circuit.

The following sections discuss plant operations.

2.1.7.1 Solution Processing

The adsorption, desorption, and recovery plant would process gold-bearing pregnant solution at a rate of 1,000 gpm from the grinding circuit and 1,000 gpm from the heap leach circuit.

Pregnant solution from the grinding, thickening, and filtering process would be pumped to a set of five carbon columns, located in the process building, where gold would be extracted from solution. Grinding circuit column barren solution would report to the mill water tank for re-use in the grinding circuit. Pregnant heap leach solution would gravity drain from the leach pad to a 500,000-gallon pregnant tank. This pregnant solution would be pumped to a separate set of five carbon columns, also located in the process building, where gold would be extracted from solution. Heap leach circuit column barren solution would gravity drain to a 500,000-gallon barren tank for re-use in the heap leach circuit.

The heap leach solution tanks and the process plant would be constructed with secondary containment that would drain by gravity to the process solution overflow pond through a pipe contained within the lined solution channel on the northern edge of the heap leach pad. The solution pond was sized to have a minimum operating depth of 4 feet (675,000 gallons), and a volume equal to 24 hours of draindown from the tanks or plant at 1,000 gpm (1,460,000 gallons). In addition, the solution pond would be no more than 12 feet deep, which would include 2 feet of freeboard (623,000 gallons). The pond would be netted and a pump would be used to remove solution from the pond. An event pond would be constructed adjacent to the solution pond that would contain 110 percent of the largest process tank (550,000 gallons) and flow from a 25-year/24-hour storm event falling on the pad, lined ditches, process pad, and ponds (3,890,000 gallons). The event pond would not have a normal or minimum operating depth and would have 2 feet of lined freeboard (1,200,000 gallons).

Cyanide solution from the heap leach barren solution tank would be pumped to a leach pad header pipe that would have both carbon steel and high density polyethylene sections. Branch lines from the main header would distribute the solution to emitters located on top of the heap on approximate 2-foot centers. Barren solution also may be applied to the heap by conventional sprinkler heads. Emitters or sprinklers would be assembled and operated to distribute solution at application rates from 0.0025 gpm/ft^2 to 0.005 gpm/ft^2.

The entire fluid management system would have a negative water balance. Evaporation and permanent moisture storage in the ore would exceed precipitation falling on the facility. As such, fresh make-up water would be added to the system in the mill water tank and the heap leach barren tank. Sodium cyanide would be added to the heap leach barren tank solution and the grinding circuit.

2.1.7.2 Acid Wash Circuit

The loaded carbon would be pumped into a 3-ton carbon capacity acid wash tank located in the process building. The loaded carbon would then be washed to remove scale by pumping a weak hydrochloric acid solution through the loaded carbon bed. The pH would be monitored and controlled during the acid wash. After several hours of acid wash, the acid solution would be neutralized with caustic solution, and the neutralized solution would be pumped to the heap leach barren tank. The acid-washed carbon would be pumped to the strip vessel.

2.1.7.3 Carbon Stripping

The strip vessel, located in the process building, would hold 3 tons of loaded carbon. Once excess water has been drained from the vessel, barren strip solution heated under pressure, containing sodium hydroxide and sodium cyanide, would be pumped up through the vessel. The pregnant solution leaving the strip vessel would flow to the pregnant solution tank. The barren strip solution tank would receive sodium hydroxide, sodium cyanide, and softened water additions to maintain proper strip solution composition.

2.1.7.4 Electrowinning

The hot pregnant strip solution would be pumped to two electrowinning cells, located in the process building, where gold would be plated onto stainless steel cathodes using an electric current. The electrowinning barren solution would be recycled to the barren strip solution tank. Periodically, the loaded stainless steel cathodes would be cleaned in a high pressure fresh water wash circuit to remove the precious metals. The resulting gold sludge would be recovered in a plate and frame filter press. Periodically, the sludge filter press would be cleaned and the sludge refined to produce doré bullion.

2.1.7.5 Carbon Reactivation

The stripped carbon would be pumped from the strip vessel to a dewatering screen located above the reactivation furnace hopper in the process building. The carbon would be thermally reactivated at 1,200°F in a horizontal carbon reactivation kiln. Emissions from the kiln would be assessed through the Nevada Bureau of Air Quality Operating Permit process. The reactivated carbon would be water quenched and pumped to a dewatering screen located over the reactivated carbon hopper. Fresh carbon would be conditioned in an agitated tank and pumped to the reactivated carbon hopper. Carbon from the reactivated carbon hopper would be added to the carbon columns as required.

2.1.7.6 Refining

The refining of the precious metals sludge would be performed on-site in an electric induction furnace located in the process building. The precipitate would be fluxed and refined to produce doré bullion. The high-grade slag would be recycled in subsequent refining charges, and the low grade slag would be recycled back to the grinding circuit.

2.1.7.7 Solution and Storm-Event Storage Ponds

In accordance with Nevada Administrative Code 445A.24364(1), the process solution overflow pond would be constructed with primary and secondary synthetic liners with a leak detection/collection system placed between the two liners. As allowed by Nevada Administrative Code 445A.24364(3), the storm-event pond would be constructed with a single high density polyethylene liner without leak detection.

After the pond sites have been adequately graded, the soil subgrade surface would be compacted with a smooth-drum vibratory roller. A 6-inch minimum thickness layer of fine-grained bedding material (liner bedding fill) would be moisture-conditioned, placed, and compacted with a smooth-drum roller to provide a surface free of protrusions to prevent damage to the secondary synthetic liner.

The primary and secondary liners for the process solution overflow pond would be constructed of 80-mil and 60-mil high density polyethylene, respectively. A high density polyethylene drainage geonet would be placed between the two liners to act as a leak detection/leak collection layer. The single lined storm-event pond would be constructed with a 60-mil high density polyethylene liner.

The process solution overflow pond would be netted to prevent access by waterfowl, birds, and other wildlife. Homestake may elect to utilize other methods of excluding wildlife from the pond. These methods would be coordinated with the BLM and the Nevada Division of Wildlife.

2.1.7.8 Process Solution Overflow Pond Leak Detection

The process solution overflow pond has been designed with a high density polyethylene geonet leak detection layer constructed between the primary and secondary liner. In the event of a leak in the primary liner, the solution would be collected in the leak detection/collection layer and transported by gravity to a sump in one corner of the pond. The sump would contain a 1-foot thick layer of free-draining sand and gravel. A 4-inch diameter pipe would extend from the base of the sump to a high density polyethylene leak detection manhole constructed adjacent to the pond, where the presence of fluids may be visually checked, sampled, or measured on a regular basis. The portion of the pipe constructed in the pond sump would be perforated to allow fluids to drain from the sand and gravel into the pipe.

In the event of a major leak within the solution pond's primary liner, a pump may be used to evacuate the collected fluids from the manhole. The leak detection manhole would be 3 feet in diameter. The base of the manhole would extend 2 feet below the invert elevation of the inlet pipe, providing for a sump capacity of about 106 gallons. The high density polyethylene manhole would have welded seams to provide watertight containment to the ground surface in the case of a major leak in the primary pond liner.

2.1.8 Water Supply

Fresh water would be required for drinking, fire fighting, and general utility uses. Water would be obtained from one or more of the existing water wells located on the Homestake-owned Collingwood Ranch. The locations of the water wells and the proposed water line are illustrated on Map 2-2. Fresh water storage tanks would be installed near the wellfield and southeast of the process facility on Mineral Point. The tank on Mineral Point would hold up to 250,000 gallons. The tanks would provide water for process needs and to maintain a fire water reserve. Potable water would be supplied by a bottled-water vendor or the Homestake water wells. Homestake has water rights associated with the Collingwood Ranch totaling approximately 1,100 acre-feet per year. Water consumption for the project is estimated below.

- Process Water - 280 acre-feet per year
- Domestic Uses - 15 acre-feet per year
- Dust Control - 105 acre-feet per year
- Total - 400 acre-feet per year

After mine operation, the water pipeline would be removed or plugged with cement at both ends.

2.1.9 Electric Power

Power would be supplied to the project area by the Mount Wheeler Power and Light Company. A new powerline would be constructed by Homestake to service the various facilities. The locations of the local substation and the proposed powerline corridor are presented on Map 2-2. Right-of-way width associated with the overhead powerline would be approximately 25 feet. Diesel generators would be installed where necessary to provide emergency power when required.

2.1.10 Ancillary Facilities

Ancillary facilities, including the administration building, truck shop, and laboratory would be located as shown on Map 2-2. The administration building would provide space and facilities for the personnel required for the day-to-day operation of the mine. The warehouse and maintenance facilities would be equipped to handle routine maintenance and most repair work on mine equipment. Maintenance facilities would include indoor repair bays, a truck wash down area, and a welding and machining area. The spare parts inventory would be stocked in the warehouse portion of these facilities. The laboratory would include areas for sample preparation, fire and atomic adsorption assaying, chemical analyses, and metallurgical testing.

The sanitary waste system would consist of a combination of permanent and portable facilities. The permanent facilities would be State of Nevada approved, engineered leach field systems. Portable facilities would consist of chemical toilets that may be moved to various locations as operations dictate. Wastes from the portable toilets would be disposed of according to state and local requirements.

2.1.11 Security and Fencing

Security in the project area would be the responsibility of Homestake. The security system would include direct security measures, supported by employees involved in the day-to-day operation. Persons entering and leaving the area would be required to gain clearance through a gate located near the administration building along the main access road.

An 8-foot chain-link fence would be installed around the solution overflow pond and storm-event pond areas to prevent access by wildlife and livestock. The entire area of operations would be enclosed with a range control fence (4-strand barbed wire). ***The range control fence may be relocated, with BLM approval, depending on operational conditions.*** Any monitoring wells located outside the fenced area would be clearly marked and locked. Additional fences or controls would be installed as necessary.

2.1.12 Fire Protection

Fire protection would be a high priority of the operation at all times. All employees would be briefed on the fire protection program at the project as part of job training. Specific measures anticipated to be included in the project for fire protection include:

- Process Operations personnel would be on duty 24 hours per day and would be the initial response to fires.
- All mobile equipment would be equipped with fire control equipment including: approved mufflers and spark arresters and fire extinguishers.
- Water trucks equipped with water monitors and hose reels would be maintained for fire protection needs.
- The office, warehouse, shop, laboratory, and process buildings would be equipped with a fire water system including a fire water tank and hydrants at appropriate locations.
- Fire extinguishers, shovels, and other control equipment would be located at convenient and readily visible caches throughout the project area.
- Fire hydrants, hoses, and emergency supplies would be strategically located around the mine.
- Homestake's Environmental Coordinator, or his designee, would serve as the Fire Control Coordinator.
- Homestake's Fire Control Coordinator would coordinate with the Eureka Volunteer Fire Department.
- *Homestake will contact the BLM in the event of a fire.*

2.1.13 Hazardous Materials and Wastes

2.1.13.1 Reagent Transportation and Storage

All liquid reagents including sodium cyanide, antiscalant, sodium hydroxide, and hydrochloric acid would be trucked to the site and stored in specially designed containers within bermed areas. These bermed areas would be designed to contain 110 percent of the capacity of the largest storage tank within the berm. With the exception of the hydrochloric acid storage area, bermed storage areas would be designed to drain into the process solution pond. Solid reagents including sodium cyanide, cement, lime, flocculent, and caustic soda beads would be trucked to the site and also stored in flow bins or silos specifically designed for these materials. All reagents would be stored in a manner that would inhibit any inter-mixing and subsequent reactions. Reagent storage and cleanup procedures are presented in the *Emergency Response and Contingency Plan* contained in the Plan of Operations and summarized in Section 2.1.13.2, Spill Prevention and Emergency Response. The use and storage of key reagents are summarized in Table 2-4.

Calcium hypochlorite would be used to neutralize cyanide spills.

Hydrochloric acid would be delivered in portable storage containers as a 32 percent solution, and no further preparation would be required. Acid would be added to the process using a metering pump as needed. Hydrochloric acid would be contained in a specially designed storage tank. This tank would have a separately bermed area within the process facility containment area. Any acid spilled would be contained within the bermed area, neutralized, and returned to the process.

Pebble lime or Portland cement would be added to the high grade ore before grinding. Lime would be delivered in bulk trucks and stored in the lime silos near the process building. Lime or Portland cement consumption would be

Table 2-4

Hazardous Materials Summary

Material	Use	Rate of Use	Amount Stored (typical)	Storage Method	Waste Management /Disposal	Use Location	Hazard Characteristic	Amount per Load
Calcium Hypochlorite	Spill Clean-up	< 1 ton/year	2,000 lb	Sack	Spent	Process Facility	Reactive	2,000 lb
Hydrochloric acid	Process	100 tons/year	20 tons	Bin/Barrel	Spent	Process Facility	Corrosive	20 Tons
Lime (calcium oxide)	Process	800 tons/year	60 tons	Silo	Spent	Process Facility	Corrosive	40 Tons
Portland cement	Process	6,250 tons/year	120 tons	Silo	Spent	Process Facility	Corrosive	40 Tons
Sodium cyanide (solid or liquid)	Process	450 tons/year	40 Tons	Bin/Tank	Spent	Process Facility	Poison	30 Tons
Sodium Hydroxide (solid or liquid)	Process	250 tons/year	30 Tons	Bin/Tank	Spent	Process Facility	Corrosive	10 Tons
Diesel Fuel	Mine	600,000 gal/yr	40,000 gal	Tank	Spent	Truck Shop	Flammable	6,000 gal
Gasoline	Mine	30,000 gal/yr	10,000 gal	Tank	Spent	Truck Shop	Flammable	6,000 gal
Propane	Mine	20,000 gal/yr	10,000 gal	Tank	Spent	Office, Lab, Truck Shop, Process Facility	Flammable	2,000 gal
Petroleum Oils	Mine	60,000 gal/yr	10,000 gal	Tank	Recycled	Truck Shop	Flammable	2,000 gal
Antifreeze	Mine	1,000 gal/yr	500 gal	Tank	Recycled	Truck Shop	Poison	500 gal
Solvents	Mine	100 gal/yr	60 gal	Barrel	Recycled	Truck Shop	Flammable	30 gal
ANFO	Mine	1,800 tons/yr	100 tons	Bin	Spent	Mine	Explosive	20 tons
Class A Explosive	Mine	12 tons/year	2 tons	Magazine	Spent	Mine	Explosive	2 tons
Fluxes/Reagents	Lab/Refine	1 ton/year	1,000 lbs	Various	Spent	Laboratory	Poison	100 lbs

approximately 5 pounds per ton of ore feed. Cleanup in this area would be completed by shoveling up any solid spills and adding to the grinding circuit.

Portland cement would be added to the agglomeration drum in the processing area at a rate of 10 pounds of cement to 1 ton of ore. The cement would be shipped via a bulk transport truck and stored in a silo adjacent to the process building.

Liquid and solid sodium cyanide would be shipped to the site in U.S. Department of Transportation-approved transport vehicles. Solid sodium cyanide would be shipped and stored in recyclable flow bins that are delivered and removed by the vendor or stored in a bulk storage tank. Liquid sodium cyanide would be stored in an insulated storage tank designed for this reagent. The sodium cyanide would be stored adjacent to the process building within a fenced or enclosed area that is clearly marked and closely monitored. The cyanide storage area would be physically separated and protected from other substances that are not chemically compatible. Cyanide consumption would be approximately 1 pound per ton of ore.

The entire cyanide unloading and storage area would be bermed to provide containment of any spills. The storage area would be designed with a gravity drain that leads into the process area. Clean-up of spills in this area would be completed by either shoveling up any solid material and adding them to the cyanide mix tank, or neutralizing the spills of liquid cyanide prior to washing the area down.

Sodium hydroxide would be delivered by truck as a 50 percent aqueous solution or as solid beads. Liquid sodium hydroxide would be stored in a tank within a bermed area. Solid sodium hydroxide beads would be shipped and stored in recyclable flow bins that would be delivered and removed by the vendor. The flow bins also would be located within the bermed area. Both the liquid and the solid sodium hydroxide would be stored adjacent to the process building. Sodium hydroxide would be added to the process circuit as needed. Spilled sodium hydroxide would be washed into the process circuit. Solid spills would be collected and added to the process circuit.

Fuel (including gasoline, diesel fuel, and propane), antifreeze, petroleum oils, and solvents would be delivered to the project site in tanker trucks for transfer to storage tanks. The storage tanks would be enclosed by berms sized to contain 110 percent of the capacity of the largest tank in the event of a spill or tank rupture. A *Spill Prevention, Control, and Countermeasures Plan* for handling spills or releases of petroleum products is presented in the Plan of Operations.

Explosive materials that would be transported to the site include blasting agents and initiation devices. Blasting agents would be comprised primarily of ammonium nitrate and fuel oil. The ammonium nitrate and fuel oil would be stored in appropriate storage bins separate from the explosive magazine. Blasting initiation devices would be stored in prefabricated magazines that would be selected and located to conform to Federal and state regulations. Soda ash, silica, borax, and potassium nitrate would be used as fluxing agents in the assay laboratory and refinery. These agents would be stored in appropriate covered containers in the laboratory and refinery.

Antiscalant would be transported to the site in bulk tanker trucks. Two antiscalant storage tanks would be located at the facilities, one at the heap leach pregnant tank and one at the heap leach barren tank. Any spills of the solution during unloading or handling would be contained within a bermed area. Spills would be washed into the process solution pond. Specific antiscalant products to be used have not been identified.

Dry granular or liquid flocculent would be delivered in bulk bags or bulk liquid to minimize handling. A packaged flocculent wetting system would be used to prepare flocculent solution that would then be transferred to a storage tank. Flocculent would be diluted by an in-line mixer prior to addition to the process. Flocculent consumption would be 0.10 pound per ton of ore feed. Specific flocculent products that would be used have not been specified.

2.1.13.2 Spill Prevention and Emergency Response

Of the chemicals needed to implement the Proposed Action, sodium cyanide, sodium hydroxide, hydrochloric acid, and calcium hypochlorite are hazardous substances that are listed in 40 Code of Federal Regulations 302.4 of the Comprehensive Environmental Response, Compensation, and Liability Act (including The Emergency Planning and Community Right-to-Know 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. 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 and sodium hydroxide are 10 pounds and 1,000 pounds, respectively, the reportable quantity value for hydrochloric acid is 5,000 pounds; calcium hypochlorite 10 pounds; and petroleum products 25 gallons. Petroleum products are excluded as hazardous substances under Comprehensive Environmental Response, Compensation, and Liability Act Section 101(14), but are addressed in the *Spill Prevention, Control, and Countermeasures Plan* contained in the Plan of Operations.

The Emergency Planning and Community Right-to-Know Act is a subpart of the Superfund Amendments Reauthorization Act, Title III. As mentioned above, the Emergency Planning and Community Right-to-Know Act primarily designates threshold planning quantities and reportable quantities for regulated hazardous materials. However, based on these quantities, the Emergency Planning and Community Right-to-Know Act also specifies the following:

- Emergency Response Plan requirements for those facilities with materials stored on-site in quantities greater than the threshold planning quantities;

- Hazardous material reporting requirements;

- Notification requirements based on the reportable quantities;

- All reporting, notification and other plans supplied to the local, state or Federal authorities under EPCRA shall be made available to the public; and

- Provides guidelines for citizen awards for information on criminal violations of the Comprehensive Environmental Response, Compensation, and Liability Act.

Information would be voluntarily provided to the Eureka Local Emergency Planning Commission, Eureka Volunteer Fire Department, ***and Eureka Clinic and Emergency Medical Service***. Hazardous materials on site would be provided in an annual State Fire Marshals report.

The U.S. 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 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, cement, and calcium oxide (lime) must comply with Department of Transportation hazardous materials packaging and labeling requirements.

Homestake has developed a fluid management plan that describes the capabilities of the fluid containment systems to accommodate unusual natural or operational events to prevent fluid losses from containment areas. The plan also discusses monitoring capabilities to detect leaks from the leach pad. Homestake also has developed an *Emergency Response and Contingency Plan* for the Proposed Action, which is contained in the Plan of Operations. This plan describes the system that would be used for the prevention, response, containment, and safe cleanup of all spills or discharges that may potentially degrade the environment. Also included are procedures to be followed after a seismic event.

The Spill Response Plan outlines 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 plan also would 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 Spill Response Plan identifies 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 and discussed in the Spill Response Plan would be kept at locations that are accessible to the working personnel.

The person discovering a chemical spill or an accidental discharge from any component of the fluid management system would immediately shut down that portion of the failed system to eliminate further 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 Spill Response Plan.

A release or spill from the fluid management system would be considered an event that is not in compliance with Homestake's Water Pollution Control Permit. The Environmental Coordinator would be responsible for reporting all spills to the Nevada Division of Environmental Protection and to the BLM. A release from the fluid management system would be reported orally 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 written summary also would be provided to the Nevada Division of Environmental Protection within 10 days of the oral notification. 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.

Homestake would notify the Eureka County Department of Public Works in the event of a spill that would require State of Nevada reporting. The reporting commitment would be similar to Nevada reporting requirements.

The size of the release or spill also could result in notification of additional offices as part of the requirements. They would include the Nevada Division of Emergency Management and the National Response Center. Notification to these agencies would be made as soon as possible after knowledge of such releases. Notification procedures are detailed in the Spill Response Plan.

2.1.13.3 Waste Management

Class III Landfill

To allow for the disposal of non-toxic and non-hazardous solid waste, Homestake would construct a Class III landfill on site. A Class III landfill permit would be obtained from the Nevada Division of Environmental Protection, Bureau of Waste Management, ***in coordination with*** the BLM. To facilitate final closure, Homestake also would explore the possibility of utilizing the lined process solution pond or the storm-event pond as a Class III landfill during closure. Homestake would coordinate these options with the BLM, Nevada Division of Environmental Protection, and the Bureau of Waste Management.

Equipment Wash Water and Maintenance Shop Wastes

All petroleum-contaminated wash water that results from equipment washing activities would be collected in concrete sumps that drain the reinforced concrete floor of the wash facility. The accumulated sump solution would be pumped through an oil/water separator. Water recovered from the separator would be: 1) recycled for wash water or process water, 2) allowed to evaporate, or 3) disposed of in accordance with all appropriate Federal and state regulations. All oily wastes (oil changes, sump separation, and oil absorbents) would be disposed of in accordance with all appropriate Federal and state regulations.

Laboratory Wastes

The laboratory facility would be equipped to perform daily analyses of pit and process samples, screen analyses, and environmental analyses for solids and liquids. Laboratory wastes would be collected and disposed of in the process circuit or off-site in an approved depository and in accordance with all appropriate Federal and state regulations.

2.1.14 Environmental Protection Measures

During construction and operation of the Ruby Hill Project, measures would be taken to minimize impacts to air, land, and water resources and to prevent undue or unnecessary degradation of the environment in the project area. Protection measures would be taken to comply with all appropriate Federal and state air quality and water quality standards and solid waste disposal requirements. All project-related roads would be constructed and maintained to provide adequate drainage and to minimize damage to soil and water resources.

Pre-development planning, pollution prevention measures, and use of pollution control measures and equipment would substantially reduce potential environmental impacts on public resources. Pollution control measures to be implemented would include water application and surface treatment for dust suppression, retention basins and diversions to control surface water drainage, revegetation for erosion control, noise suppression devices for equipment, filters and collectors to control air emissions, and treatment of process water as required.

The following discussion presents the various control measures proposed by Homestake for the operation of the Ruby Hill Project.

2.1.14.1 Water Management and Sediment Control

Erosion control techniques would be employed during project construction, operation, and closure phases to control sediment and surface water runoff around areas of surface disturbance. Sediment control measures would be employed during construction when soils are disturbed as a part of clearing and grubbing activities, during operations in areas that are subject to sediment transport, and as necessary during the reclamation phase.

Runoff from undisturbed areas would be diverted around all surface disturbance areas by ditches or berms. Permanent diversion systems would be designed and constructed to divert flows from the 100-year/24-hour storm event. Appropriate measures would be taken to assure that the Eureka County water line and the Hogpen Canyon road would not be adversely affected by storm drainage in the east diversion ditch. Temporary diversions shall be designed to divert the flows from the 10-year/24-hour storm event.

Non-point source sediment control measures would consist of practices such as: minimizing the number and size of soil disturbance areas, concurrent reclamation when feasible, intercepting and treating runoff from disturbed areas to prevent sediment from leaving the site, and diversion of all runoff from undisturbed areas around areas of disturbance. No surface disturbing activities shall commence until provisions for erosion and sediment control have been reviewed and have been implemented.

Berms and ditches would exclude runoff from road surfaces. Settling basins would be constructed in the ditches, or hay bales or silt fences would be placed in the ditches to control sediment. Culverts sized to meet BLM standards would be installed for road drainage. Sediment control structures such as storm water dispersion terraces, silt fences, gabion sediment traps, grass filter waterways, or straw bale barriers, would be placed, as needed, to minimize road runoff on the undisturbed areas. Road cuts and fills would be seeded with the mix listed in Table 2-5 to minimize the sediment transport from these disturbed areas. Road revegetation techniques would consist of broadcast seeding and fertilizing. Seed may be drilled rather than broadcasted depending on the results of the test plot program which would evaluate various seeding techniques. If the seed is drilled, the seeding rate and mixture would be adjusted.

Based on groundwater flow data obtained by WESTEC (1996a), an additional monitoring well would be established in the upper 20 to 30 feet of the water table. The location of this well would be approximately 1,500 feet due north of the proposed solution overflow ponds. This additional monitoring well would monitor downgradient groundwater quality from the East Waste Rock Dump of the Proposed Action, solid waste landfill, and heap leach pad.

2.1.14.2 Acid Rock Drainage

Results of initial geochemical testing conducted on representative samples of waste rock indicate that all of the material in the West Archimedes pit has a net acid neutralizing capacity. To verify these results, Homestake would conduct a waste rock and overburden testing program during project operations. A basic testing program is presented in the *Preliminary Environmental Monitoring Plan* in the Plan of Operations. Specific testing procedures would be contained in the State of Nevada Water Pollution Control Permit.

Table 2-5

***Preliminary* Reclamation Seed Mix**

Species	Broadcast Application Rate[1] in Pounds of Pure Live Seed Per Acre
Antelope bitterbrush[2]	4.0
Winterfat[2]	4.0
Small burnet	0.5
Palmer penstemon[2]	1.5
Blue flax[2]	2.0
Cicer milkvetch	2.0
Yellow sweet clover	2.0
Bluebunch wheatgrass[2]	3.0
Needleandthread[2]	1.0
Sandberg's bluegrass[2]	2.0
Western wheatgrass[2]	4.0
Great Basin wildrye[2]	3.0
Indian ricegrass[2]	2.0
Total	31.0

[1]Reduce broadcast application rate by one-half for drill seed application rate.

[2]Native species.

2.1.14.3 Spill Prevention Planning

Spill prevention measures and contingency plans for containing accidental spills, and for preventing uncontrolled discharges to the environment, have been developed for the project as required by Federal and state laws and regulations. Protection measures are designed for the fuel storage, heap leach, processing facility areas to ensure that spills of fuel and reagents are contained, collected, and reintroduced into the process stream or safely disposed of in accordance with all appropriate Federal and state regulations.

A *Spill Prevention, Control, and Countermeasures Plan* has been prepared as required by 40 Code of Federal Regulations 112 for fuel, oil, and oil refuse storage facilities, and is presented in the Plan of Operations. This plan has been prepared in accordance with good engineering practices and describes in detail the measures to be taken to prevent the escape of pollutants from containment facilities and to ensure subsequent cleanup as necessary for petroleum products. Homestake would routinely review all storage and containment facilities to ensure they are maintained to adequately contain spills.

State of Nevada regulations governing the design, construction, operation, and closure of mining operations (Nevada Administrative Code 445A.242 through 445A.24388) require the preparation of a plan for an *Emergency Response and Contingency Plan* that describes procedures and methods to be implemented for the abatement and cleanup of any pollutant that may escape proper containment at the facility. A preliminary *Emergency Response and Contingency Plan* is presented in the Plan of Operations and would govern spill response for the heap leach, crushing, grinding, agglomeration, process plant, and reagent storage facilities. Generally, the process system would be designed so that any solution spills drain to a collection area where spillage can return to the system. Collection ditches from the leach pad and the solution ponds would be designed to accommodate predicted maximum run-off volumes. The total interconnected storage capacity of the solution ponds would be adequate to contain design storm events and maintain adequate operating freeboard capacity.

2.1.14.4 Stability of Facilities

Facilities including the waste rock dumps and the heap leach pad would be designed to be stable during operations and following project closure. Stability modeling results for the heap leach pad and the waste rock dump would be contained in the application for the State of Nevada Water Pollution Control and Reclamation Permits. Results of the heap leach and waste rock dump stability modeling also would be contained in the Final Plan of Operations. In addition, these facilities would be visually monitored on a regular basis during operations to identify any visible stability problems.

2.1.14.5 Wildlife and Livestock Protection

The project has been designed to incorporate a number of measures for the protection of wildlife and livestock during construction and operation. Measures have been incorporated into the facilities' design to reduce the attraction of wildlife and to discourage entry into hazardous areas. These features include:

- Barbed wire fencing around the mine site operations area to exclude livestock. An 8-foot chain-link fence would be constructed around the solution overflow pond and storm-event pond to exclude wildlife. In addition, the process solution overflow pond would be netted or covered to prevent bird and bat mortality.

- Tanks would be used to contain normal process flows.

- Project waste would be properly managed and the site monitored to control garbage that could attract wildlife.

- Heap leach pregnant solution would be collected in pipes to minimize bird and bat mortality from open process solution channels.

- Power transmission and distribution line towers constructed to service the proposed facilities would be designed to avoid raptor electrocutions.

- Anti-perching features would be used on power transmission and distribution line towers to minimize predation on sage grouse by raptors.

In addition, Homestake would monitor wildlife mortality on the general mine site and report all mortalities to the BLM and the Nevada Division of Wildlife as required by Federal and state approvals and permits for the project. As part of this monitoring process, Homestake would monitor the heap leach top for any pooling of cyanide solutions. If necessary, Homestake would implement appropriate procedures to eliminate pooling. Should any terrestrial wildlife mortality occur at the pad, measures to exclude wildlife would be developed with the Nevada Division of Wildlife.

2.1.14.6 Range

Homestake would construct and maintain range fences in locations approved by the BLM. All fences would be constructed to BLM standards to exclude cattle from the project area and to avoid adverse effects to the range or grazing cattle. Homestake would maintain these fences during operation and reclamation of the project. Fences would be constructed to avoid injury to wildlife. Homestake would meet with the BLM ***and any other interested parties, when necessary,*** to discuss range issues and ***possible*** modifications or supplements to the Plan of Operations. ***The BLM has final authority for rangeland management on Public Land.***

Homestake would utilize certified weed-free mulch and seed mixtures to reclaim disturbed areas.

2.1.14.7 Visual Resources

Homestake has designed and located project facilities to minimize, to the extent possible, short-term visual impacts. Measures that Homestake would undertake to minimize visual impacts are:

- Buildings would be painted, as much as practical, in earth-toned colors (as approved by the Authorized Officer) to blend with the predominant background;
- Water and dust inhibiting agents shall be employed as needed to reduce the potential visual impact of fugitive dust during the operational period;
- At the conclusion of operations and with BLM concurrence, Homestake would remove all operating facilities including structures, equipment, and transmission lines in conformance with reclamation plan requirements;
- Revegetation of the reclaimed project facilities, including the trial plantings of piñon and juniper seedlings on the waste rock dump to reduce visual impacts;
- A concurrent reclamation program would be implemented in accordance with the reclamation ***section of the Plan of Operations***; and
- Reclaimed waste rock slopes would be approximately 3H:1V.

2.1.14.8 Air Quality

Homestake would obtain the required air quality permits for the project from the Nevada Division of Environmental Protection, Bureau of Air Quality for those activities regulated by the State of Nevada air quality laws. The air quality permit would not allow exceedences of state air quality standards and would specify required controls. Homestake would incorporate the following measures into the project design to control the generation of PM_{10} particulates.

- The main access and haul roads within the site boundary would be surfaced with durable gravel and would be well maintained.
- Water or surface binding agents would be applied to haul and access roads within the site boundary as needed***; Homestake would consult with the BLM regarding surface binding agents to be applied to roads.***
- Speed restrictions would be enforced on mine roads to minimize particulate emissions from roadways.

- Dust control measures, including watering, chemical stabilization, and other controls approved by the Nevada Bureau of Air Quality, would be implemented during mine operation to reduce the amount of fugitive dust.

- The crushers, screens, and all transfer points would be enclosed or shrouded to minimize exposure to wind and would use baghouses or equivalent to control dust emissions.

- Revegetation efforts for completed portions of the project would be initiated during the operational period rather than deferring reclamation and revegetation until operations are completed.

2.1.14.9 Cultural *Heritage*

Detailed cultural resources surveys of the Ruby Hill Project area have been completed and submitted to the BLM, State Historic Preservation Office, and Advisory Council on Historic Preservation. A Programmatic Agreement has been established among Homestake, the BLM, the State Historic Preservation Office and, the Advisory Council of Historic Preservation. The Programmatic Agreement provides for mitigation of adverse impacts to significant cultural resources. Mitigation measures ***have*** included data recovery ***and*** protection of sites that have been found to be eligible for nomination to the National Register of Historic Places.

During construction, Homestake also would have a qualified individual inspect and/or monitor surface disturbing activities in the vicinity of any identified, un-mitigated significant cultural resource. Monitoring and inspection of proposed mitigation activities would occur on a regular basis and include consultation with the BLM Archaeologist. A cultural resources education program for construction workers and employees would be implemented to acquaint personnel with laws protecting cultural resources.

2.1.14.10 Land Use Authorizations and Access

Prior to disturbing any bench mark, section, or corner monument, Homestake would advise the BLM and describe plans to protect or reference them. Witness corner surveys would be provided by Homestake to protect existing monuments as required by state surveying procedures.

There are many routes to access public lands near the project. Though direct access through the project would be eliminated, alternate routes are currently available. Project access would be from U.S. Highway 50, west of the intersection with State Route 278. This access location minimizes the amount of heavy truck and vehicular traffic through Eureka as most mine deliveries would arrive from U.S. Highway 50, west or Highway 278, north.

2.1.14.11 Vibration Monitoring Program

Homestake would design and conduct the Ruby Hill blasting program to minimize impacts to the Town of Eureka and its residents. Blasting would be conducted during daylight hours only. In addition, Homestake has completed a survey of selected buildings in Eureka to determine their pre-operation condition. This survey has been coordinated with appropriate county officials. Crack monitors used in the survey would be left in place for future reference. Homestake would operate vibration monitors at the company office in downtown Eureka and at the mine pit. If blasting-related vibrations greater than 0.25 inch per second are detected at the company office, the blasting program would be modified to eliminate the potential for adverse effects to historic buildings in Eureka. Homestake would, after consultation with property owners and the State Historic Preservation Office, take appropriate measures to eliminate any blasting related impacts as necessary. Homestake would coordinate any needed mitigation with property owners and the appropriate Federal, state, and county agencies.

Studies conducted by Golder Associates, Inc., in support of the EIS, have documented the pre-development condition of historic buildings, and test blasting/vibration analyses have demonstrated that blast-induced vibration would not be measurable in Eureka. Additionally, Golder is developing a blasting program for the Ruby Hill Project that would address blast design, blasting methods, and vibration monitoring.

Homestake would design and monitor blasting operations to ensure that threshold noise and vibration levels are not exceeded.

2.1.14.12 Noise

Homestake will cooperate with Eureka County and the Eureka County School District to minimize mine noise when noise-sensitive activities are scheduled to take place at the Eureka County Fairgrounds and High School. Mining activities in the pit and on the waste rock dumps can be scheduled to avoid these time periods. By working on pit or dump faces that are not in line-of-sight to the Fair Grounds or High School, noise propagation will be minimized.

2.1.14.13 Environmental Monitoring Plan

The goal of the environmental monitoring plan is to ensure that the project is conducted in a manner that would prevent unnecessary and undue degradation of the environment. A key objective would be to protect the beneficial uses of groundwater in the vicinity of the Ruby Hill Project. Routine monitoring would be conducted of the process fluid management system, including the heap leach, process plant, and crushing, grinding, agglomeration facilities. A *Preliminary Environmental Monitoring Plan* is presented in the Plan of Operations. This plan would be updated following completion of detailed design and would incorporate any additional monitoring requirements.

2.1.14.14 Employee Environmental Education Program

In an attempt to help reduce potential impacts to the environment, Homestake would implement an employee orientation course in environmental awareness. This program would be designed to acquaint employees with the project area environment and would be included in the required safety training program for all new employees. The objectives of the Environmental Education Program are:

- Familiarize employees with the local, state, and Federal laws regarding wildlife, hunting, land use considerations, and general environmental concerns.

- Familiarize employees with the day-to-day general operations of the project so that everyone is acquainted with the safe use of reagents and chemicals, and with their cleanup procedures. This part of the program would be closely coordinated with the safety program and would include training as required by the *Spill Prevention, Control, and Countermeasures Plan*, and the *Emergency Response and Contingency Plan*.

- Ensure employees are aware of their responsibility to protect cultural resources of the project area.

While on the job, all employees would be made aware of the stringent environmental protection measures associated with the mining operation and the procedures that must be followed to comply with these measures.

2.1.15 Reclamation Plan

The design and construction of the Proposed Action would facilitate concurrent reclamation during mine operations and closure. The intent of the reclamation program for the Ruby Hill Project is to restore the project area to a beneficial post-mining land use, prevent undue or unnecessary degradation of the environment, and reclaim disturbed areas such that these areas are visually and functionally compatible with the surrounding topography. The BLM and Nevada Division of Environmental Protection, Bureau of

Mining Regulation and Reclamation are the primary Federal and state agencies with regulations for the reclamation of surface mines in Nevada (43 Code of Federal Regulations 3809, Nevada Revised Statute 519A, and Nevada Administrative Code 519A, respectively). These reclamation regulations have been used to develop the reclamation plan for the Ruby Hill Project. The reclamation approach and procedures outlined in the reclamation *section of* the Plan of Operations were developed for the site-specific conditions of the Ruby Hill Project. Map 2-3 presents the proposed post-mining contours for the project area. As allowed by the existing Memorandum of Understanding between the State of Nevada and the BLM, the BLM would be the lead regulatory agency with responsibility for overseeing project reclamation.

2.1.15.1 Introduction

The reclamation procedures proposed for the Ruby Hill Project incorporate four basic components:

- Establishment of stable surface and drainage conditions that are compatible with the surrounding landscape and serve to control erosion;
- Utilizing proper growth media management techniques, including stripping, stockpiling, and possible reapplication of soil, to establish surface soil conditions that would enhance regeneration of a reclaimed disturbed plant community;
- Revegetation of disturbed areas, where practical, using plant species adapted to site conditions in order to establish a long-term productive biotic plant community compatible with proposed future land uses; and
- Consideration of public safety through the stabilization, removal, or fencing of structures or landforms that could constitute a public hazard.

2.1.15.2 Test Plot Program

The primary objectives of the test plot program are to evaluate reclamation variables over time and determine which combination of variables provide a high probability for reclamation success. The test plot program would be conducted during mine operation to evaluate reclamation success based on the following variables:

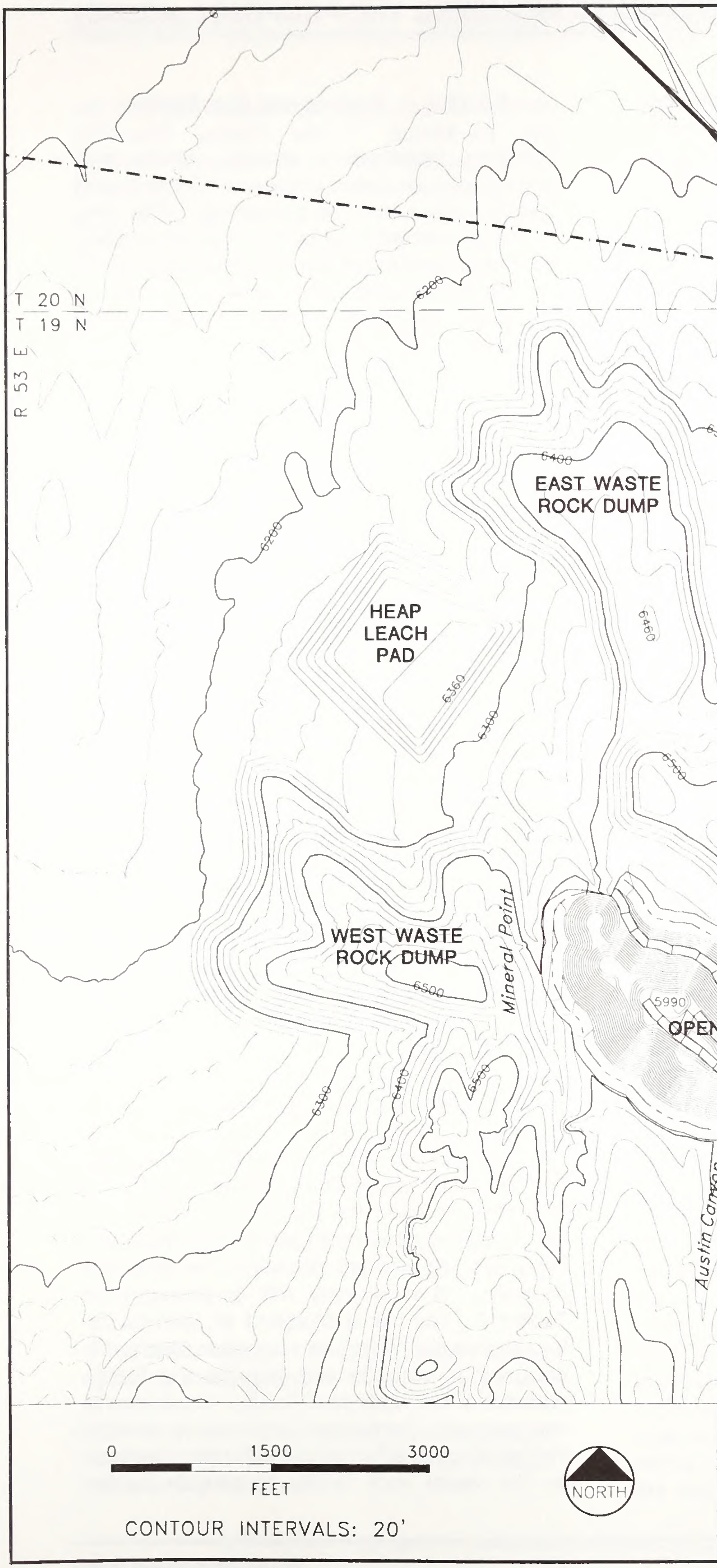
- Application or no application of growth media;
- Depth of growth media applied;
- Application or no application of soil amendments; and
- Species mixture and seed application rate.

Test plots would be established on the growth media stockpiles and waste rock dumps. Seeding would be completed on the growth media stockpiles to evaluate reclamation success with the use of growth media. Portions of the waste rock dumps would be seeded without the application of growth media and with various depths of growth media to evaluate reclamation success under these scenarios. Soil amendments may also be applied to enhance reclamation success. All of these test plots would be initially seeded with the same seed mix, which is a combination of mostly native and several non-native species (Table 2-5). Different seed mixtures and seeding rates would be *evaluated* depending on seeding success and seed availability.

Information obtained during the test plot program would be incorporated into the final Reclamation Plan which would include the reclamation measures that are most likely to result in reclamation success. This plan would require approval by the BLM prior to implementation.

2.1.15.3 Growth Media Stockpiling and Use

Suitable reclamation growth media would be stripped from facility areas (the waste rock dump areas, the open pit, the processing area, and the heap leach area) scheduled for disturbance.



RUBY HILL PROJECT

MAP 2-3
POST-MINING RECLAMATION TOPOGRAPHY
PROPOSED ACTION

Proposed growth media stockpile areas would not be stripped prior to stockpiling; no growth media would be salvaged from the safety berm setback area. Stripping operations would proceed concurrently with various mining operations over the life of the project. Growth media stripping would be performed using scrapers where possible. In addition, dozers, trucks, and loaders also would be used. The growth media would be taken to designated stockpile areas with the exception of material removed along the main access road, haul road, diversion channels, and overflow ponds. This material would be used to construct safety berms and impoundments. Safety berms would be seeded as soon as possible after the completion of road construction to stabilize soils. Soil stockpiles would be constructed where possible with a 3H:1V slope and growth media signs would be placed along the perimeter of the stockpiles. Soil stockpiles such as these are common throughout the industry where soil is salvaged by scrapers. The area around the stockpile would be surrounded by a ditch that would serve to contain any material sloughed or eroded from the pile.

The stockpiles would be seeded with the seed mix listed in Table 2-5 to minimize water and wind erosion. This would allow the stockpiles to be used as revegetation test plots.

Suitable growth media would be salvaged from areas scheduled for disturbance; however, the actual amount salvaged would be determined during the stripping operations in order to optimize project area reclamation. Homestake would maximize growth media use on critical reclamation sites. The actual amount of growth media placed on the facilities would be determined during the revegetation test plot program. Homestake would coordinate this activity with the BLM, the Nevada Division of Environmental Protection, *and any interested agencies. The BLM has final authority regarding mine reclamation on Public Land.*

2.1.15.4 Grading and Stabilization

Following construction activity, interim and concurrent reclamation of cut and fill slopes and borrow areas would be conducted. This may include placement of growth media and seeding in areas that would not be redisturbed and interim seeding in areas that would be redisturbed in the future. During operations, disturbances would be concurrently reclaimed as soon as practical to reduce visual impacts.

2.1.15.5 Surface and Seedbed Preparation

Upon completion of final slope construction, the disturbed areas would be inspected for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction, where appropriate. Based on the results of the revegetation test program, sites would be revegetated with or without the placement of growth media. Facilities selected for revegetation without the placement of growth media would have their final surfaces cross-contour ripped or scarified along the contour to prepare a final seedbed.

Sites selected for revegetation with growth media would first have their final surfaces ripped or scarified. Growth media would then be placed on these roughened surfaces which would ensure good contact. The final resoiled surfaces would be cross-scarified to maximize water retention and to minimize erosion, and to prepare the final seedbed.

2.1.15.6 Seeding Mixtures and Rates

Seeding would be accomplished by broadcasting and dragging, or drilling. Drilling is preferred where slopes allow the use of such equipment. The reclaimed sites would be revegetated with a seed mix *determined through the test plot program. A preliminary mix is* presented in Table 2-5. The mix is designed to optimize the forage potential of the lower elevation sites and is designed to stabilize and improve the forage potential of the waste rock facility. In addition to this seed mix, Homestake proposes to conduct trial plantings of piñon pine and juniper seedlings on the waste rock facility to provide habitat diversity and improve the visual aesthetics of the reclaimed project site. Bitterbrush and serviceberry seeds would be collected in the project vicinity. These seeds would be used to grow seedlings in a nursery. These seedlings or young shrubs would be planted on the waste rock dump slopes and other areas to be reclaimed. The seed mixtures would evolve throughout the project life. ***The final seed mixes that would be used for reclamation of disturbed lands would include seed mixes that have the highest probability for reclamation success. These seed mixes would include mixes of native and non-native species and/or native species only.*** The long-term reclamation goal of returning the land to its pre-mining land use would be accomplished, regardless of the actual seed mixtures.

2.1.15.7 Weed Control

During vegetation establishment, weed control practices would be implemented to limit the growth and spread of noxious weeds, and to ensure that revegetation is successful with the proposed seed mixtures. Homestake would work with the Nevada Division of Environmental Protection, Diamond Valley Weed District, and the BLM, as appropriate, to minimize the spread of noxious weeds throughout the project area.

2.1.15.8 Reclamation Scheduling

Reclamation activities at each phase of mine development would be timed to take advantage of optimal climatic conditions. Reclamation activities also would be scheduled to occur as soon as possible after the mining activities in a particular area are completed, thus minimizing erosion and sedimentation problems. General scheduling procedures to be followed include:

- Grading and drainage control establishment and maintenance would be conducted in mid- to late-summer;
- Seedbeds would be prepared in early fall just prior to seeding; and
- Seeding would be completed between October and April in order to take advantage of winter and spring moisture.

2.1.15.9 Facility Reclamation

Mine Areas

The objective of reclamation efforts for the mine pit would be to create a safe and stable topographic feature. The in-pit benches and highwalls would be left in place upon completion of mining. Safety berms, a barbed wire fence, and warning signs would be placed around the perimeter of the pit. The safety berms would be revegetated.

Waste Rock Dump Areas

The waste rock dump areas would be constructed and reclaimed to blend into the surrounding topography to the extent practical. The waste rock dumps would be constructed in approximately 50-foot lifts by conventional end dumping methods. Waste rock dump construction methods are described in Section 2.1.4, Waste Rock Dumps. The angle of repose slopes would then be ***reduced*** to approximately 3H:1V ***undulating slopes (without benches),*** and revegetation activities would be initiated. Drainages would be maintained on either side of the facilities. Results of the revegetation test program would determine if the waste rock dumps would be reclaimed with or without growth media. The dumps would be revegetated with a seed mix ***determined through the test plot program. A preliminary mix is*** listed in Table 2-5. Trial plantings of piñon pine and juniper seedlings also would be implemented on selected areas of the waste rock dumps. Bitterbrush and serviceberry seedlings or young shrubs also would be planted on the waste rock dump slopes.

Crushing and Processing Facilities

All buildings and structural materials, equipment, and hazardous or toxic materials associated with the crushing and processing facilities would be removed and disposed of in accordance with appropriate Federal and state regulations. The foundations would be broken-up, buried, and regraded for drainage and to blend with the adjacent topography. The sites would be seeded with a reclamation seed mix ***determined through the test plot program. A preliminary mix is*** presented in Table 2-5. The revegetation test program would determine if the sites would be revegetated with or without growth media.

Heap Leach Facilities

Reclamation procedures for the heap leach facility incorporate ore and solution characteristics, site conditions, and climatic conditions. The reclamation phases for the heap leach facility include:

- Heap rinsing;
- Heap regrading, resoiling if necessary, and revegetation;
- Rinse solution management; and
- Pond reclamation.

Details of heap neutralization and closure would be developed 2 years prior to project closure pursuant to the requirements of Nevada Division of Environmental Protection (Nevada Administrative Code 445A.446 and Nevada Administrative Code 445A.447).

Heap Rinsing

The heap would be neutralized to a 0.2 milligram per liter (mg/L) concentration of weak acid dissociable cyanide or less and a pH of 6.0 to 9.0. Other mobilized constituents would be reduced to meet State of Nevada water quality standards. It has been estimated that approximately 1.5 years may be required to completely rinse and drain the ultimate 8-million-ton heap.

Heap Regrading, Resoiling, and Revegetation

The heap grading plan consists of grading to eliminate the benches, reduce the side slopes to an approximate 3H:1V grade, and round off the heap edges to more natural contours. Growth media may be applied to the regraded heap, if necessary. The amount and depth of the growth media would be determined by the revegetation test program. The resoiled heap would be scarified to prepare a final seedbed, then seeded with a reclamation seed mix ***determined through the test plot program. A preliminary mix is*** presented in Table 2-5.

Rinse Solution Management

The rinse solution disposal plan combines a "contained" land application system with enhanced evaporative spray nozzles installed on the heap application spray system. This system would include recirculation of rinse solutions back onto the heap to evaporate solutions and assist in revegetation establishment. Evaporative nozzles also may be used on the solution ponds to further accelerate evaporation of solutions. Based on the estimated final rinse water volumes, approximately 2 years would be required to consume all of the rinse water.

Pond Reclamation

After the rinse solution is evaporated, the solution pond and storm-event pond would be reclaimed. The pond reclamation plan would include testing pond sediments for hazardous constituents, folding the liners into the pond areas, ripping the liners, and backfilling and grading the ponds to provide free drainage and blend the sites into the adjacent topography. These reclamation activities would be completed in a manner to avoid potential effects to groundwater movement and revegetation. The sites would be revegetated with a seed mix ***determined through the test plot program. A preliminary mix is*** listed in Table 2-5. The ponds would be backfilled with the original excavated soil material that would be stockpiled in the pond berms.

The process solution pond also may be used as a biological treatment for heap solutions, if necessary, at final closure. Homestake may permit the ponds as Class III landfills for use in disposing of non-toxic and non-hazardous solid waste during final reclamation.

Roads

Haul and access roads, and rights-of-way abandoned during the operating life of the project or at closure would be recontoured to approximate original contours and revegetated, unless the BLM requests that they remain open. Road surfaces at grade would be ripped to a depth of at least 12 inches to reduce compaction and reseeded. The roads may be resoiled with growth media that was stripped and stockpiled along the roadways during construction, if necessary.

Soil Borrow Source

The side walls of the 23-acre soil borrow source area would be graded to reduce side slopes. Soils would then be ripped and seed would be broadcast to enhance revegetation. The depth of the soil borrow source area would be approximately 14 feet.

Ancillary Facilities

All ancillary facilities would be decommissioned, and all associated equipment would be removed or salvaged, if possible. Building foundations would be mechanically fractured, buried, and graded to allow for drainage and to blend the sites into the adjacent topography. The final surfaces would be contour ripped or scarified to prepare a seedbed, and revegetated with a seed mix ***determined through the test plot program. A preliminary mix is*** listed in Table 2-5. The revegetation test program would determine if the sites would be revegetated with or without the addition of growth media.

Monitoring wells would be plugged and abandoned according to State of Nevada water well requirements contained in Nevada Revised Statute 534.421 and Nevada Revised Statute 534.428. Homestake considers the project water wells to be an economic resource that may be utilized for post-mining purposes including irrigation in the Diamond Valley area.

Class III Landfill

The permitted Class III landfill would be closed in accordance with appropriate State of Nevada regulations. This would include placement of a compacted soil cap, site regrading to provide drainage and inhibit infiltration of meteoric waters, and revegetation with a seed mix ***determined through the test plot program. A preliminary mix is*** listed in Table 2-5. Closure of other sites that may be permitted as Class III landfills, including portions of the waste rock dump or the lined process solution pond, and storm-event pond, also would be in accordance with state regulations.

Water Well Abandonment

After completion of reclamation activities, the water supply wells located on private lands would remain intact. The water rights would be converted from mining use back to agricultural use.

Exploration Drill Hole Abandonment

After data has been gathered from exploration drill holes, they would be abandoned pursuant to Nevada Administrative Code 534.425, or State Engineers Office guidelines.

2.1.15.10 Reclamation Bonding

Detailed reclamation cost estimates for the project ***are provided in the Plan of Operations.*** As lead regulatory agency, the BLM would hold the bond for the actual cost of reclamation.

The bond amount would be adjusted on an annual basis, based on planned disturbance and reclamation activity conducted to date. Homestake would submit an annual disturbance and reclamation plan to the BLM and Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation that would include estimated bonding requirements.

2.2 East Waste Rock Dump Alternative

The East Waste Rock Dump Alternative would include one waste rock dump with a capacity of 60 million tons of waste rock and would result in approximately 715 acres of total project surface disturbance (Map 2-4; Table 2-6). The waste rock dump would cover 360 acres and the approximate dimensions of the dump would be 5,300 feet long by 3,000 feet wide. Surface disturbance associated with other project components would be the same as those listed for the Proposed Action, except surface disturbance associated with haul road construction ***is*** not associated with this alternative. ***The specific project area consists of all the mine components listed above and can be described as the area within the proposed perimeter fence plus the proposed access roads, growth media***

Table 2-6

East Waste Rock Dump Alternative
Estimated Surface Disturbance Acreage by Facility and Land Status

Facility	Public Land	Private Land	Subtotal
Open Pit	88	0	88
Safety Berm Setback Area	34	0	34
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	57	0	57
Waste Rock Dumps	360	0	360
Heap Leach Pad/Solution Overflow Ponds	84	0	84
Fresh Water Pipeline[1]	5	3	8
Main Access Road	9	0	9
Overhead Power Line	--[2]	--[2]	--[2]
Miscellaneous Access Roads	3	0	3
Growth Medium Stockpiles	45	0	45
Diversion Channels	3	1	4
Soil Borrow Source	23	0	23
Total	711	4	715

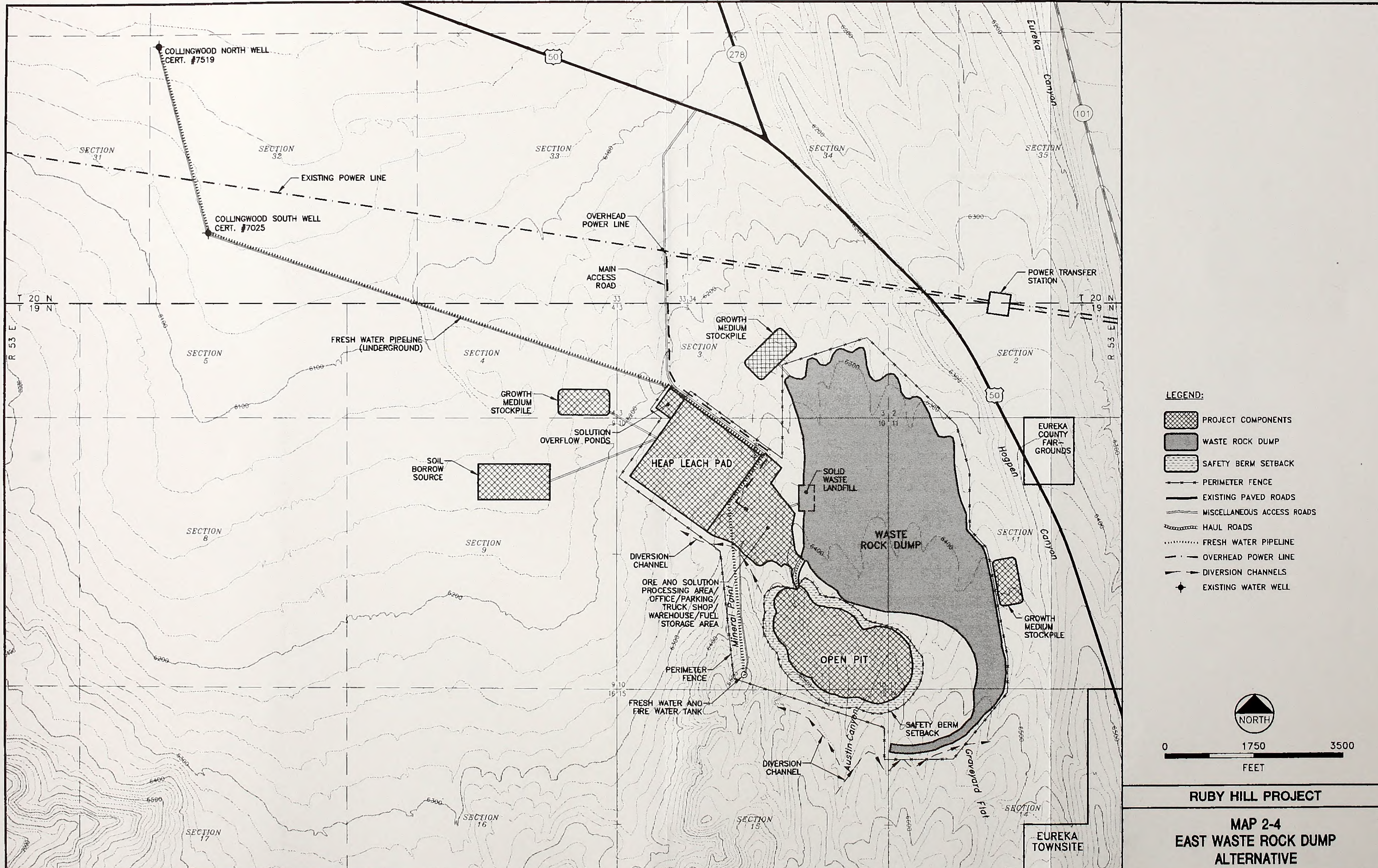
[1]Width = *20 feet.*

[2]Disturbance would be minimal since an existing road within the power line corridor would be used during construction and the remainder of the power line would be constructed within the main access road disturbance area.

stockpiles, soil borrow source, fresh water pipeline, overhead powerline, and diversion channels to be located outside the perimeter fence. Post-mining contours are illustrated on Map 2-5.

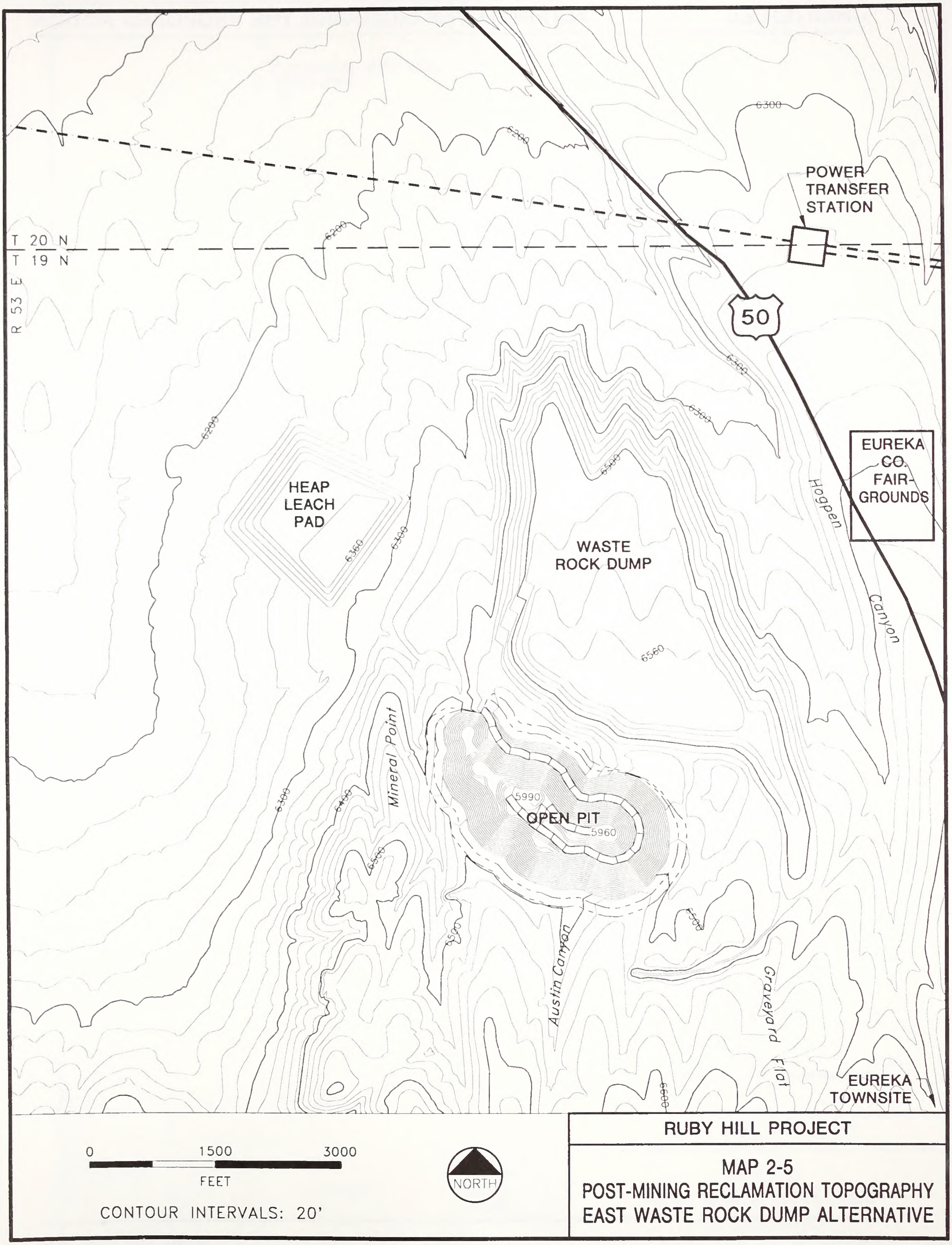
2.3 West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative would include one waste rock dump with a capacity of 60 million tons of waste rock and would result in approximately 577 acres of total project surface disturbance (Map 2-6; Table 2-7). The waste rock dumps would cover 214 acres and the approximate dimensions of the dump would be 4,300 feet long by 2,000 feet wide. Surface disturbance associated with other project components would be the same as those listed for the Proposed Action, except construction of the solid waste landfill would disturb an additional 4 acres. ***The specific project area consists of all the mine components listed above and can be described as the area within the proposed perimeter fence plus the proposed access roads, growth media stockpiles, soil borrow source, fresh water pipeline, overhead powerline, and diversion channels to be located outside the perimeter fence.*** Post-mining contours are illustrated on Map 2-7.



RUBY HILL PROJECT

MAP 2-4
EAST WASTE ROCK DUMP
ALTERNATIVE



RUBY HILL PROJECT

MAP 2-5
POST-MINING RECLAMATION TOPOGRAPHY
EAST WASTE ROCK DUMP ALTERNATIVE

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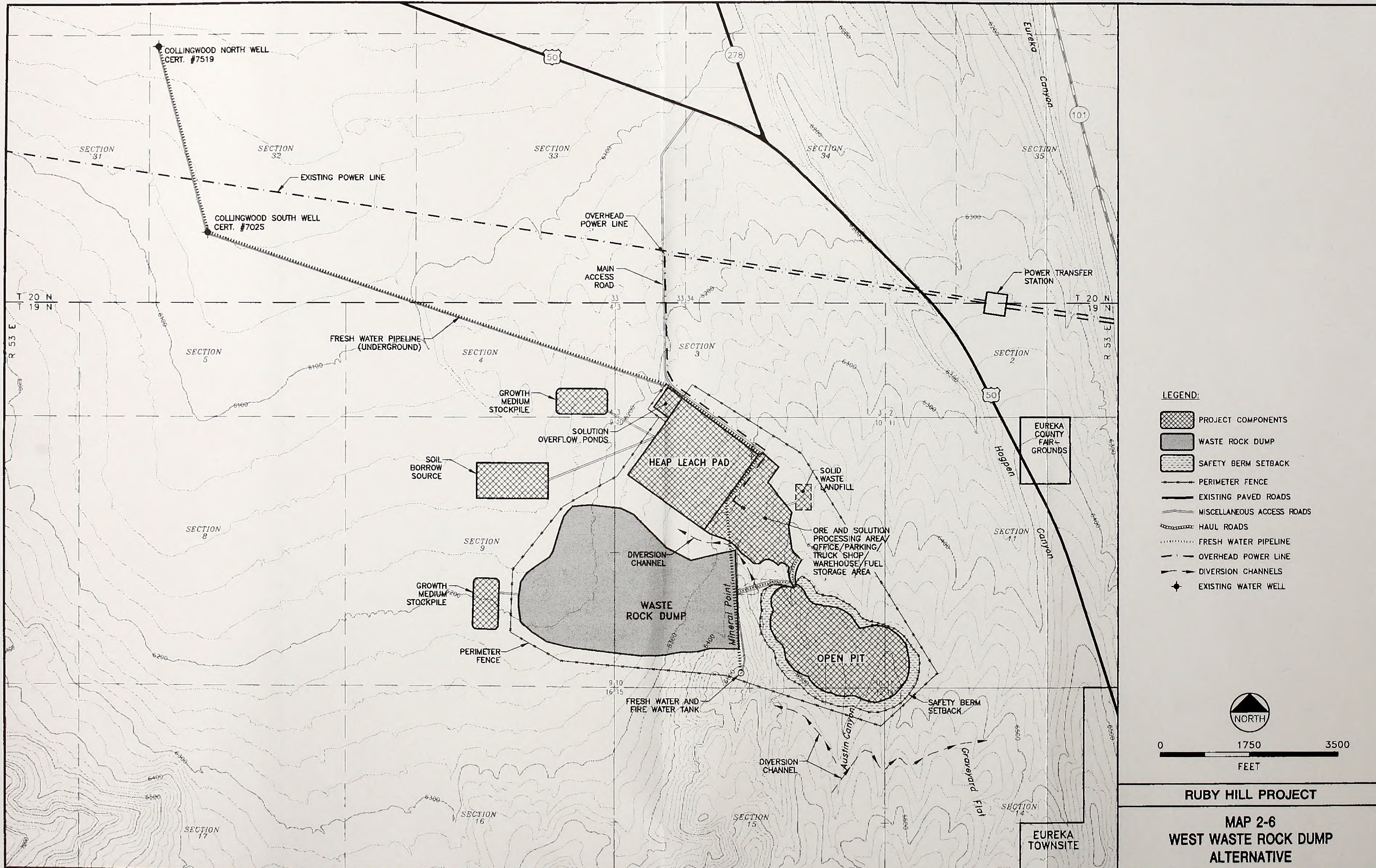
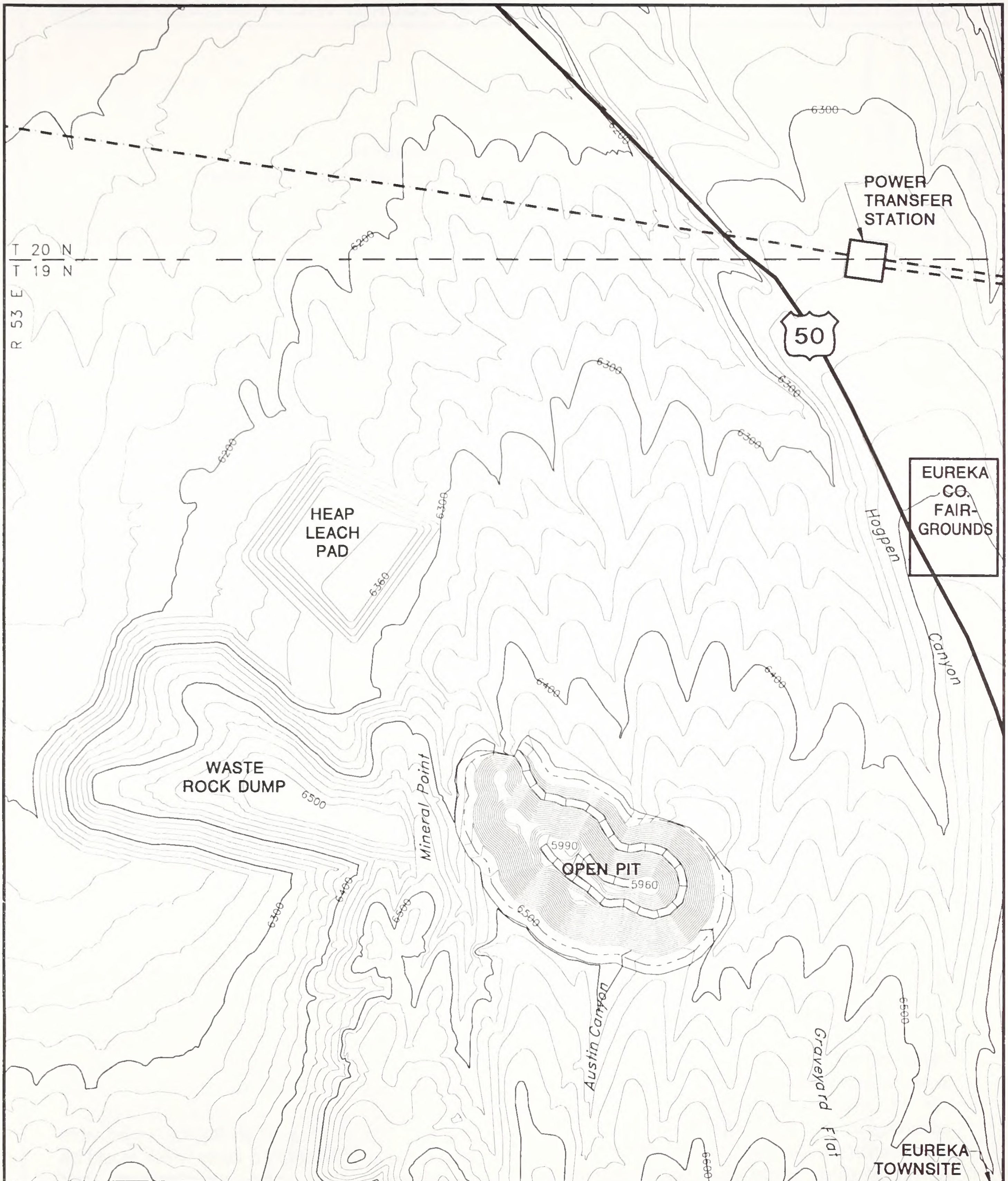


RUBY HILL PROJECT

MAP 2-6
WEST WASTE ROCK DUMP
ALTERNATIVE



RUBY HILL PROJECT

MAP 2-7
POST-MINING RECLAMATION TOPOGRAPHY
WEST WASTE ROCK DUMP ALTERNATIVE

Table 2-7

West Waste Rock Dump Alternative
Estimated Surface Disturbance Acreage by Facility and Land Status

Facility	Public Land	Private Land	Subtotal
Open Pit	88	0	88
Safety Berm Setback Area	34	0	34
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	57	0	57
Solid Waste Landfill	4	0	4
Waste Rock Dumps	211	3	214
Heap Leach Pad/Solution Overflow Ponds	84	0	84
Fresh Water Pipeline	5	3	8
Overhead Power Line	--[2]	--[2]	--[2]
Haul Roads	4	0	4
Main Access Road	9	0	9
Miscellaneous Access Roads	3	0	3
Growth Medium Stockpiles	45	0	45
Diversion Channels	3	1	4
Soil Borrow Source	23	0	23
Total	570	7	577

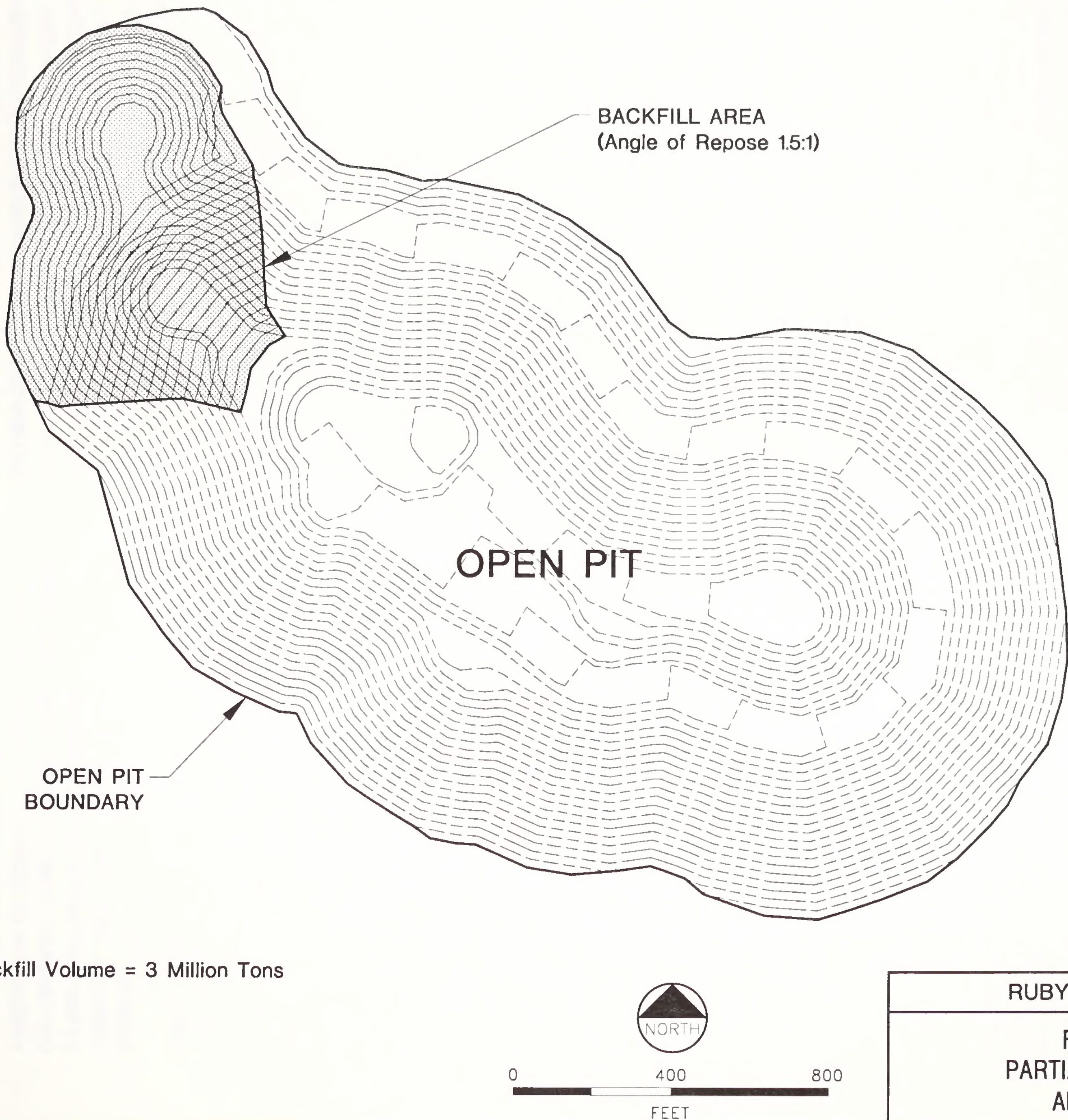
[1]Width = *20 feet.*

[2]Disturbance would be minimal since an existing road within the power line corridor would be used during construction and the remainder of the power line would be constructed within the main access road disturbance area.

2.4 Partial Backfilling Alternative

Partial backfilling of the mine pit could occur in areas where potential mineral resources would not be affected and backfilling offers cost advantages. This alternative could be implemented in conjunction with the Proposed Action or either waste rock dump alternative. Homestake's current design for this alternative includes one potential backfilling area located in the northwest portion of the mine pit (Figure 2-6).

Approximately 3 million tons of fill material would be removed from the eastern portion of the pit and placed in the northwestern portion of the pit without affecting the future development of additional mineral resources. The partial backfilling of the pit with waste rock would not affect the areal extent (i.e., surface acreage) of the pit. The fill area would have a reclaimable surface of approximately 6 acres which would be revegetated after mine development and operation.



Potential Backfill Volume = 3 Million Tons

RUBY HILL PROJECT

FIGURE 2-6
PARTIAL BACKFILLING
ALTERNATIVE

2.5 No Action Alternative

Under the No Action Alternative, gold mining in the Ruby Hill Project area would not occur. Mineral resources in this area would remain undeveloped, and no construction of the mine pit, waste rock dump, heap leach pad and ponds, ore and solution processing area, and other ancillary facilities would occur. Homestake would be required to reclaim all disturbances associated with its current exploration program.

2.6 Alternatives Considered but Eliminated from Detailed Analysis

2.6.1 Completely Backfilling the Pit

Approximately 50 million tons of material would be required to completely backfill the proposed mine pit. Based on the mine plan and pit configuration, backfilling could not commence until late in the project life; therefore, most of the backfilled material would be hauled from the waste rock dump. The backfilling operation would occur over a 5-year period and would require approximately 44 employees. The estimated equipment and personnel requirements are summarized in Table 2-8.

Backfilling the pit is not considered economically feasible because it would increase the total mining cost from approximately $0.90 per waste ton to approximately $1.63 per waste ton and the Ruby Hill Project would incur a total additional cost of approximately $37 million. More importantly, completely backfilling the mine pit would cover additional mineral resources (East Archimedes) making reasonably foreseeable future development less attractive.

Because the combined factors make this alternative impractical, completely backfilling the pit has been eliminated from detailed analysis and the environmental impacts have not been evaluated in the EIS.

2.6.2 Reslope Pit Highwalls to Facilitate Revegetation

Resloping of pit highwalls would require approximately 20 million tons of fill material. This material would be loaded and hauled from the waste rock facility and dumped into the open pit after completion of ore removal. After the completion of filling activities, the dumped slopes would be reduced by grading equipment to accommodate reclamation of the final slopes. After completion of grading activities, the fill material would cover approximately 50 percent of the mine pit. The total cost to reduce pit highwalls would be approximately $18 million based on an estimated backfilling cost of $0.73 per ton and an additional $0.15 per ton for slope reductions. These additional costs would reduce the economic feasibility of the Ruby Hill Project.

Additionally, reducing pit highwalls would likely condemn any remaining mineral resources in areas adjacent to the mine pit. Similar to completely backfilling the pit, the potential economic benefits from mining additional mineral resource would not likely exceed the additional costs associated with the removal of backfilled material. The remaining mineral resources are deeper, smaller, and generally lower grade than the West Archimedes deposit, which would be developed by the Proposed Action. These attributes make the remaining mineral resource areas economically sensitive to any additional costs.

For these reasons, resloping pit highwalls was considered but eliminated from detailed analysis.

2.6.3 Underground Mining

Underground mining of the West Archimedes deposit was considered but eliminated due to the high costs and technical constraints associated with the construction of ground support structures required for underground mining activities. Geotechnical studies conducted in the project

Table 2-8

Estimated Equipment and Personnel Requirements and Costs for the Complete Backfilling Alternative

Mining Equipment[1]	Quantity	Years[2]	Hours/yr[3]	Hours	$/Hour	Total Cost
992 Loader	1	5	7,000	35,000	$125	$4,375,000
777 Haul Trucks	4	5	7,000	140,000	$80	$11,200,000
16-G Grader	1	5	3,500	17,500	$45	$787,500
D-9 Dozer	1	5	7,000	35,000	$80	$2,800,000
834 RTD	1	5	3,500	17,500	$60	$1,050,000
777 Water Truck	1	5	7,000	35,000	$80	$2,800,000
Subtotal	--	--	--	**280,000**	--	**$23,012,500**
Personnel						
Administration	6	5	2,080	62,400	$30	$1,872,000
Engineering	2	5	2,080	20,800	$30	$624,000
Mining	30	5	2,080	312,000	$30	$9,360,000
Maintenance	6	5	2,080	62,400	$30	$1,872,000
Subtotal	**44**	--	--	**457,600**	--	**$13,728,000**
Total	--	--	--	--	--	**$36,740,500**

[1]Equipment costs are from Caterpillar handbook #26 quick estimator.

[2]50 MM Tons backfilled @ 10 MM Tons per year.

[3]Mining - 2 ten-hour shifts per day, 350 days per year.

area suggest that underground support structures would be needed to support unstable geologic material thereby limiting the amount of the ore body that could be mined. This alternative would result in the extraction of only 40 percent of the ore body. Therefore, the higher costs and reduced amount of ore that could be mined with underground mining methods would render the mining of the West Archimedes deposit infeasible.

2.7 Interrelated Projects

Interrelated projects are defined for this EIS as those activities that could interact with the Ruby Hill Project (Proposed Action) in a manner that would result in cumulative impacts. For ease of presentation, interrelated projects have been divided into subsets of past, present, and reasonably foreseeable future projects, as shown on Table 2-9. The locations of the interrelated projects are shown on Map 2-8 and Map 2-9.

Cumulative impacts are those effects on the environment that result from the incremental impact of the Proposed Action when added to the impacts of past, present, and reasonably foreseeable future 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). BLM Instruction Memo NV-90-435 specifies that impacts must first be identified for

Table 2-9

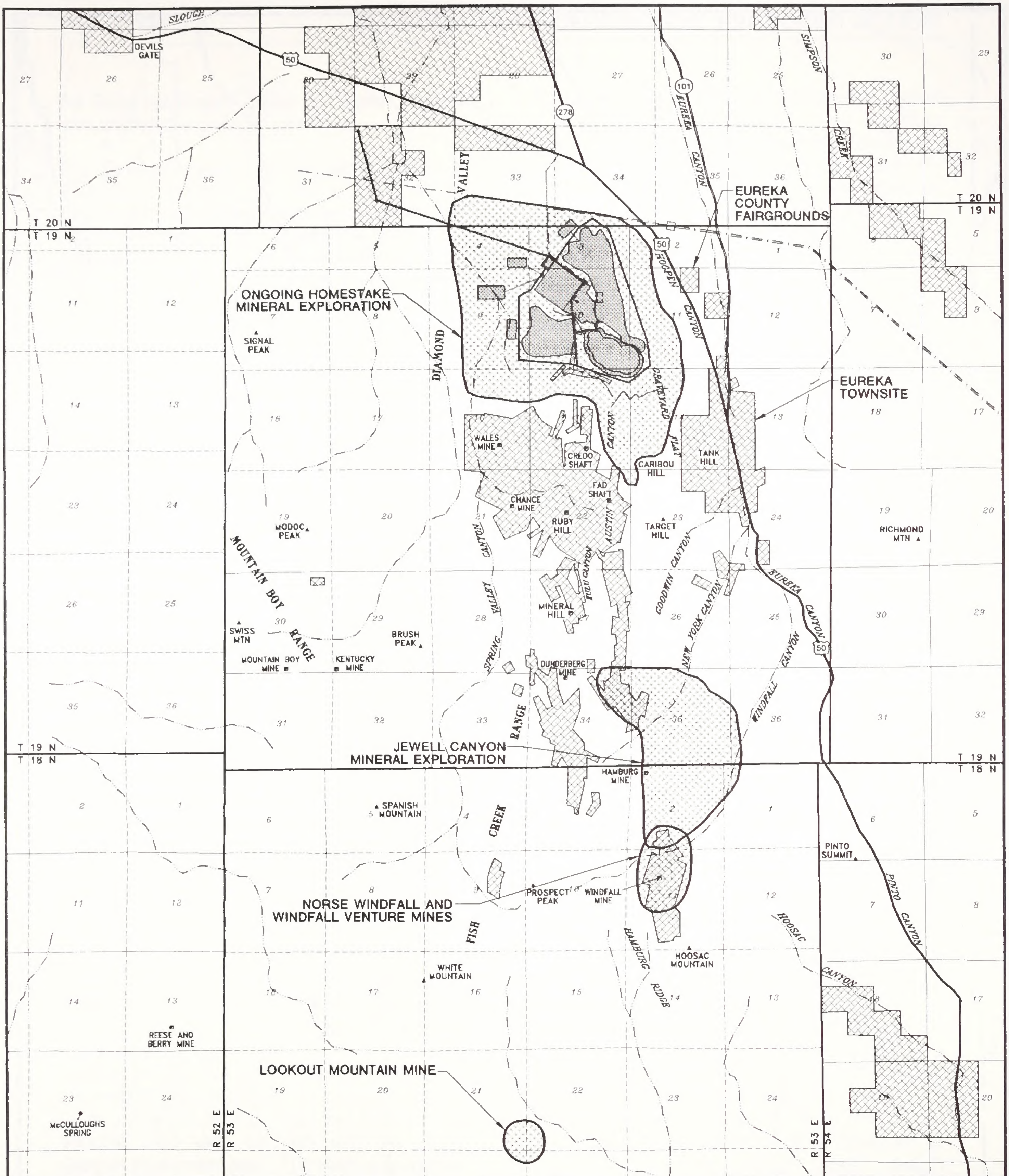
Disturbance From Interrelated Projects

	Disturbance Acreage in Cumulative Effects Area
Past Disturbance	
Mining Activity (Patented Lands)[1]	2,165
Eureka Town Site	548
Eureka County Fairgrounds	29
Private Agricultural Development	1,656
Subtotal	4,398
Present Actions	
Norse Windfall Mine	220
Windfall Venture Mine	150
Lookout Mountain Mine	60
Ongoing Homestake Mineral Exploration	164
Other Mineral Exploration	65
Jewell Canyon Mineral Exploration	18
Subtotal	677
Reasonably Foreseeable Future Actions	
East Archimedes Oxide Project	300
Tonkin Springs Mine	0[2]
Atlas Mine	0[2]
Other Mineral Exploration	50
Subtotal	350
Proposed Action (Ruby Hill Project)	696
Correction Factor[3]	<100>
Total Disturbance	6,021

[1]The majority of historic mining disturbance has occurred on patented lands.

[2]Surface disturbance would occur in previously disturbed areas.

[3]Correction factor used to minimize double-counting of disturbance in exploration areas that subsequently undergo mine development.



LEGEND:

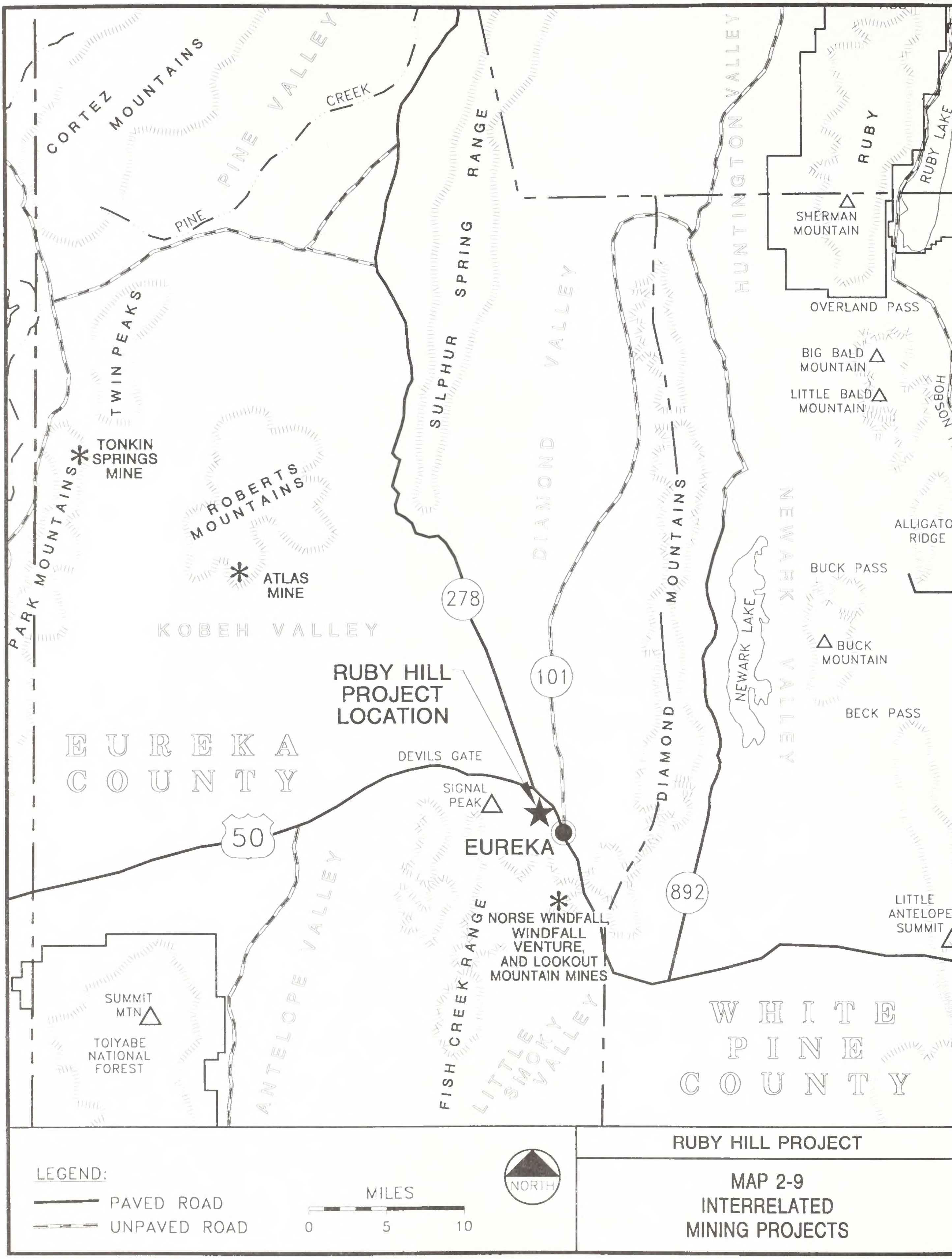
PAST DISTURBANCE

PRESENT DISTURBANCE

PROPOSED ACTION

RUBY HILL PROJECT

MAP 2-8
INTERRELATED PROJECTS



RUBY HILL PROJECT

MAP 2-9
INTERRELATED
MINING PROJECTS

the Ruby Hill Project before cumulative impacts with interrelated projects can occur.

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 2-8 shows the distribution of the primary surface-disturbing actions throughout the Eureka area. Detail on these actions can be found in the following paragraphs. The area of concern for cumulative impacts would vary by resource, with impacts to certain resources being restricted to the actual area of disturbance. Other resources, such as livestock and wildlife, may range over a wide area, and cumulative impacts could involve more than surface disturbance.

Resource-specific cumulative effects areas were developed for each resource, as appropriate, and are discussed in Chapter 3.0. For example, the cumulative effects area for range resources is the Ruby Hill Grazing Allotment.

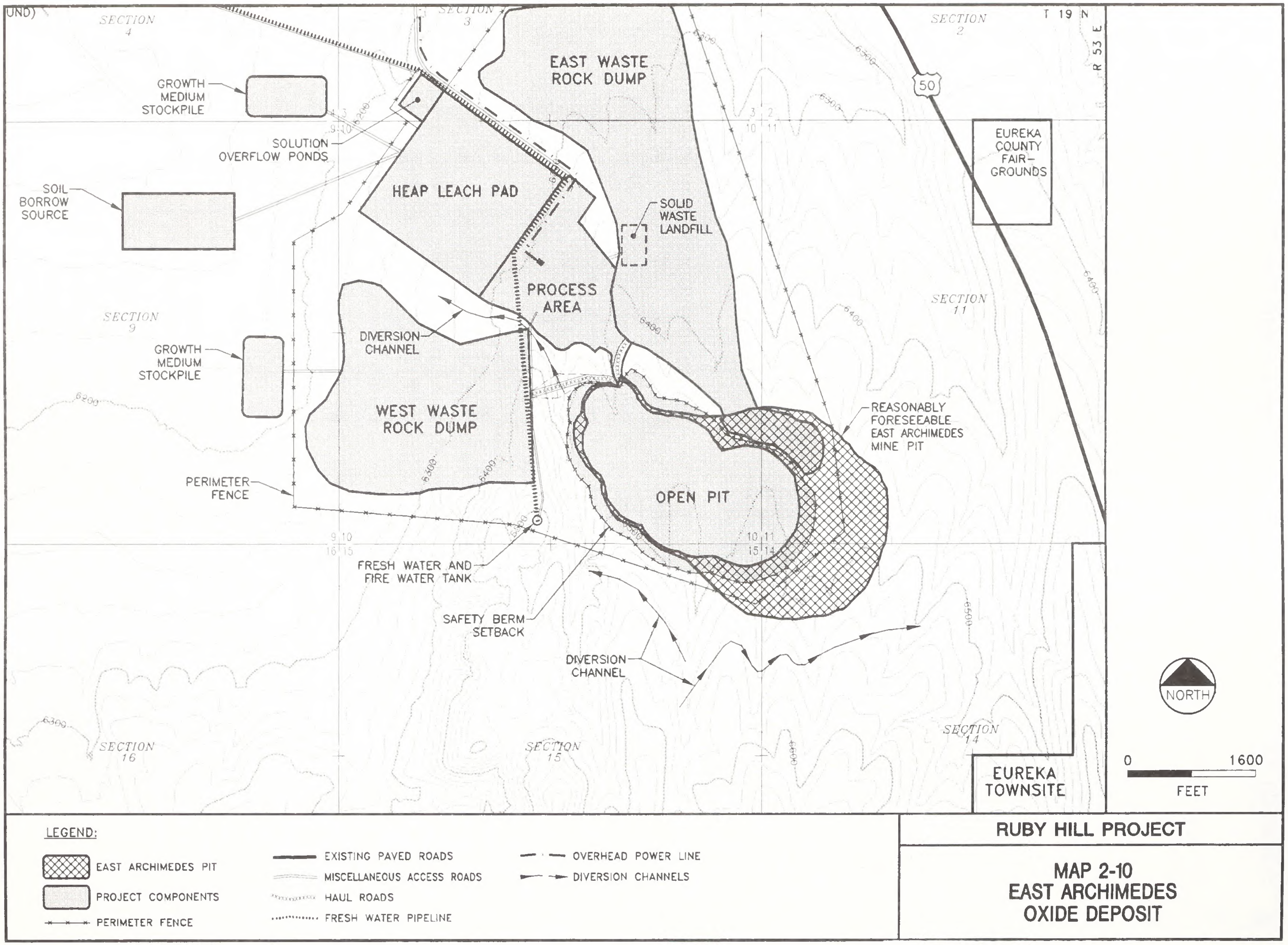
Past disturbance (see Table 2-9) has resulted from historic development in the Eureka area. This includes historic mining activity, development of the Town of Eureka and the Eureka County Fairgrounds, and private agricultural development in the southern end of Diamond Valley. The Eureka area has been explored and mined since the mid-1800s. The majority of the past mining activity has taken place on patented lands located west and south of the Eureka town site (see Map 2-8); however, some mines are located on public land. The total historic mining disturbance shown on Table 2-9 is approximate as it includes disturbed areas on patented land and does not include those mines located on public land.

Present disturbances include mining and mineral exploration. The Norse Windfall and Windfall Venture mines are existing and total 370 acres. Exploration activities in the Mineral Point area by Homestake total 164 acres and include the area to be disturbed by the Proposed Action. The Windfall mine area overlaps with the Jewell Canyon Exploration area. Therefore, a correction factor of 100 acres has been applied to minimize double counting of disturbance. Present actions also include several notice-level mineral exploration projects ***(5 acres or less)***.

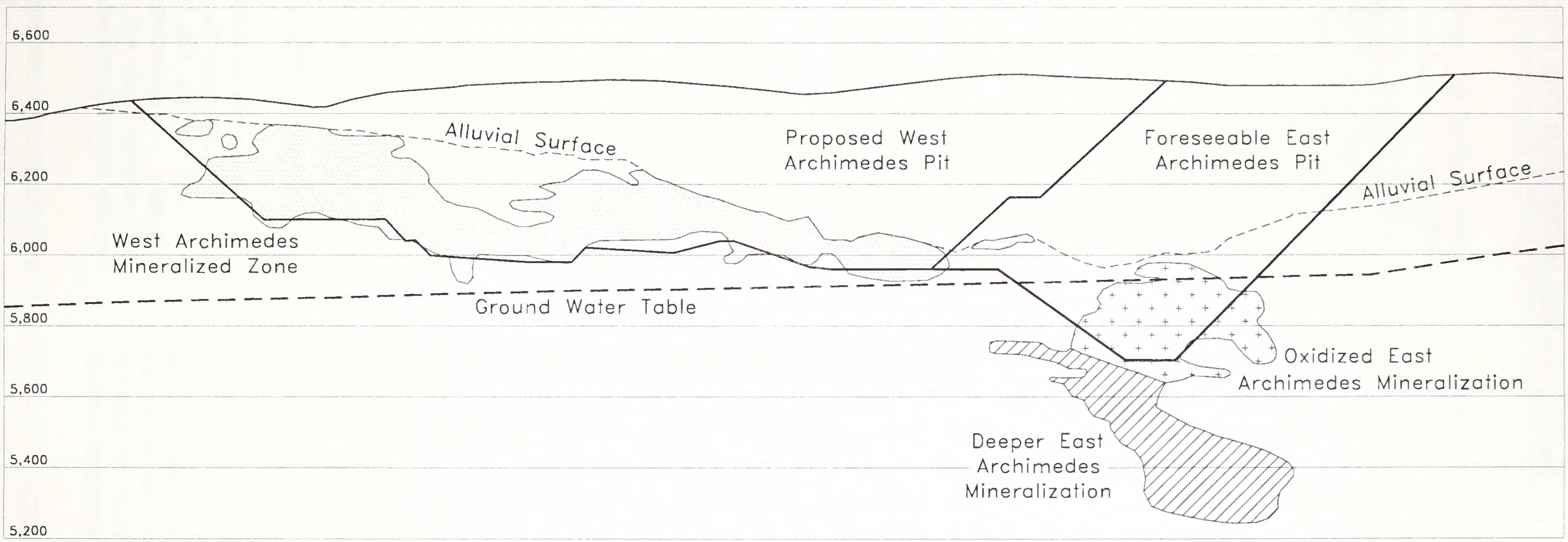
The Jewell Canyon Exploration Project is located at the north end of the Fish Creek Mountain Range, and the project is intended to determine if precious metals are present in economically viable quantities to satisfy the commencement of a mine feasibility study. Homestake has conducted previous exploration and reclamation activities in the Jewell Project area since April 1994. The Jewell Exploration Project activities are currently being conducted on patented and unpatented lode mining claims controlled by Homestake. All of the unpatented claims are located on public lands administered by BLM Battle Mountain District office. Surface disturbance associated with the Jewell Exploration Project would total approximately 18 acres.

Homestake would drill a maximum of 130 exploration drilling sites within the project area. Based on current operations, each drill site would disturb a maximum 40-foot by 60-foot area (0.055 acre per site). All drilling activities, including sump construction, would be completed within the drill sites. Homestake would construct approximately 17,500 linear feet of drill road (average 25 feet in width) and utilize approximately 5,000 linear feet of cross-country access routes (average 10 feet in width) for site access by drill rigs. The program began in early 1996 and would continue through the spring 1997 field season.

Four reasonably foreseeable future actions have been identified in the Eureka area, including the East Archimedes Oxide Project, Tonkin Springs Mine, Atlas Mine, and other mineral explorations. In order to qualify as a reasonably foreseeable future action for the cumulative impacts analysis, a project must impact the same resources as the Ruby Hill Project, must occur within the life of the Proposed Action including reclamation, and must have a reasonably likelihood of going forward. The East Archimedes Oxide project would be a potential continuation of mining immediately adjacent to the project area (Map 2-10). A geologic cross-section of the East Archimedes oxide deposit and potential pit is illustrated in Figure 2-7. This project would disturb approximately 300 acres of land, of which 86 and 214 acres would be disturbed by the mine pit and waste rock dump, respectively. ***Approximately***



MAP 2-10
EAST ARCHIMEDES
OXIDE DEPOSIT



NOT TO SCALE

RUBY HILL PROJECT

FIGURE 2-7
EAST ARCHEMIDES OXIDE DEPOSIT
CROSS-SECTION

60 million tons of waste rock would be placed in one or more dump locations. The possible future East Archimedes waste rock dump has not been illustrated since this project has not reached this stage in the evaluation and design process. The waste rock dump would likely disturb acreages similar to the Proposed Action. Facilities associated with the Proposed Action would be used during mine operation. The East Archimedes Oxide Project would include the mining of the East Archimedes oxide deposit. The East Archimedes deposit is located below the water table and directly southeast of the West Archimedes deposit. This deposit is basically composed of two zones of varying gold grades and metallurgy.

The deeper zones of the East Archimedes deposit are not expected to be mined because of the poor economics associated with expensive mining and processing costs. Mining of much of these deeper zones would entail either open pit mining with very high waste removal costs and/or expensive underground mining in poor ground conditions. Because of the difficult metallurgy, processing of the deeper ore would require a significantly more complex processing facility than is proposed for the West Archimedes ore. Even at very high gold prices, the estimated revenues do not justify the increased capital investment and higher operating costs associated with the deeper East Archimedes zones.

The upper portion of the East Archimedes is located closer to the surface. This zone is oxidized and has more favorable metallurgy than the deeper East Archimedes mineralization. Although considerable additional work is required by Homestake to determine the feasibility of this oxidized portion of the East Archimedes deposit, preliminary evaluations indicate it has potential to be mined as an extension of the proposed West Archimedes Project. This mineralized zone has marginal economics and would be economically feasible only if the West Archimedes processing facilities could be utilized. Therefore, mining of the oxidized upper portion of the East Archimedes deposit would result in an extended mine life rather than an increase in the processing rate and size of the facility. A minor increase in the mine workforce and mining rate would be expected during excavation of the unmineralized material, which overlays the oxidized East Archimedes zone.

The Tonkin Springs mine is located approximately 35 miles northwest of Eureka and would likely become active during the Proposed Action's mine operations (Map 2-9). This mine has been inactive for several years and mining activities associated with the reactivation of this mine would occur on previously disturbed land (537 acres). This bioleaching mine project would have an estimated mine life of approximately 10 years; employ 45 people; and process approximately 2.3 million tons of ore per year. The Atlas mine is located approximately 22 miles northwest of Eureka and would likely become active during the Proposed Action's mine operations (Map 2-9). This mine has been inactive for several years and mining activities associated with the reactivation of this mine would occur on previously disturbed land (1,298 acres). This mine project would have an estimated mine life of approximately 3 years; employ 130 to 140 people; and process approximately 10 million tons of ore per year.

2.8 Summary Comparison of Impacts Among the Proposed Action and Alternatives

Table 2-10 summarizes and compares the environmental impacts among the Proposed Action and the four alternatives considered in detail: the East Waste Rock Dump Alternative, the West Waste Rock Dump Alternative, the Partial Backfill Alternative, and the No Action Alternative. Detailed descriptions of impacts are contained in Chapter 3.0. The summarized impacts include the implementation of mitigation measures presented as part of the resource discussions in Chapter 3.0.

2.9 Agency-Preferred Alternative

The agency-preferred alternative is the Proposed Action plus the Partial Backfilling Alternative, as described in the EIS, with all appropriate mitigation. 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 Draft EIS, if a preference has been identified, and in the Final EIS 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 alternatives identified above are the BLM's preferred alternative at the Final EIS stage in the environmental review process. Homestake, Eureka County, and the BLM have reached consensus that the BLM's preferred alternatives would be acceptable provided that the new mitigation measures (listed below) for visual resources, air quality, and noise are implemented. The BLM's preference at this time considers all information that has been received and reviewed relevant to the proposed project.

Rationale

- *The Proposed Action would allow maximum operational flexibility by providing Homestake with two locations for the disposal of waste rock.*
- *The Partial Backfilling Alternative would reduce the amount of waste rock placed in dumps by 3 million tons and would increase the surface area to be revegetated by 6 acres.*
- *A new mitigation measure (Measure 3) for visual resources would limit the capacity of the East Waste Rock Dump to 25 million tons, 10 million tons less than the Proposed Action. This measure would not reduce the area disturbed by the dump (footprint) but would reduce the overall height of the dump, thereby reducing visual impacts.*
- *New mitigation measures for air quality, visual resources, and noise and blasting vibrations (see Mitigation and Monitoring sections in Chapter 3.0) would establish an advisory group in Eureka County to address public concerns throughout the project life. Homestake would facilitate this group and the group would identify areas where monitoring for dust, noise, or blasting vibrations is needed and would develop additional mitigation that would address impacts that may not be fully identifiable until mining activities begin.*
- *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 2-10

Comparison of the Proposed Action and Alternatives

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Air Quality	The proposed development of the mine would result in insignificant impacts to air quality. Modeling results indicate that maximum concentrations of PM_{10}, NO_2, CO, and SO_2 would not exceed Nevada or National Ambient Air Quality Standards and that impacts to PSD Class I areas would be insignificant. Homestake plans to follow standard construction practices to minimize fugitive emissions and impacts to air quality. The project would comply with all existing air quality standards in Nevada.	**Predicted air quality impacts would be higher than the Proposed Action.**	Predicted air quality impacts would **result in lower 24-hour concentrations but higher annual concentrations than the Proposed Action.**	Same as the Proposed Action.	No impacts to air quality.
Geology and Minerals	755,000 ounces of gold would be permanently removed. Disturbance of 696 acres of alluvial material.	Disturbance of 715 acres of alluvial material. 755,000 ounces of gold would be permanently removed.	755,000 ounces of gold would be permanently removed. Disturba nce of 577 acres of alluvial material.	Same as the Proposed Action.	No gold would be produced.
Paleontology	No impacts to significant paleontological resources are expected.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts to paleontological resources
Water Quality and Quantity	Withdrawal of 400 acre-feet per year of groundwater for 7.5 years would have minimal effects on existing wells, and no effects on springs to the south (upgradient) of the project area. Surface water is not present within the project area and would not be impacted. Geochemical testing indicates that arsenic and aluminum could leach from the alluvium and oxidized limestone. Analytical transport modeling indicates that if arsenic reaches the groundwater, concentrations would be below Primary Drinking Water Standards within 1,000 feet downgradient of the proposed pit. Due to geochemical conditions aluminum should not reach the groundwater. Loss of **0.6 acre of non-jurisdictional** waters of the United States.	Same as the Proposed Action.	Loss of **0.5 acre of non-jurisdictional** waters of the United States.	Similar to the Proposed Action with the following exception. Placing waste rock within the pit would decrease the vertical distance that arsenic would have to travel to reach groundwater. However, analytical transport modeling indicates that concentrations would be below Primary Drinking Water Standards within 1,000 feet downgradient of the proposed pit. Due to geochemical conditions aluminum is not expected to reach the groundwater.	Groundwater would continue to be pumped for irrigation purposes.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Soils	Seven soil associations and 696 acres would be impacted. Soils would be salvaged 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.	715 acres would be disturbed.	577 acres would be disturbed.	Impacts would be the same as the Proposed Action, except an additional 6.4 acres would be reclaimed.	No soils would be impacted.
Vegetation Resources	Two range sites and five plant communities totalling 696 acres would be impacted. **A total of 608 acres would be reclaimed**. The seed mixture for reclamation would evolve through the test plot program.	715 acres would be disturbed and removed; 627 acres would be reclaimed.	577 acres would be disturbed or removed; 485 acres would be reclaimed.	Impacts would be the same as Proposed Action, except an additional 6.4 acres would be reclaimed.	No vegetation would be impacted.
Woodland Products	Long-term **(35 years+)** productivity loss of between: 535 and 749 cords of fuel wood, **10,175 and 14,245** Christmas trees, **79,550 and 111,370** juniper fence posts, or 146,030 and 204,425 pounds of piñon pine nuts.	Long-term **(35 years+)** productivity loss of between: 695 and 973 cords of fuel wood, **13,200 and 18,480** Christmas trees, or 189,422 and 265,200 pounds of pine nuts; and **103,200 and 144,480** juniper fence posts.	Long-term **(35 years+)** productivity loss of between: 305 and 427 cords of fuel wood, **5,775 and 8,085** Christmas trees, or 82,875 and 116,025 pounds of pine nuts; and **45,150 and 63,210** juniper fence posts.	Same as the Proposed Action	Mining uses would not be established on the project area and woodland products would continue to be available for harvest.
Range Resources	Temporary loss of 82 animal unit months and permanent loss of 20 animal unit months.	Temporary loss of 80 animal unit months and permanent loss of 20 animal unit months.	Temporary loss of 70 animal unit months and permanent loss of 20 animal unit months.	Same as the Proposed Action.	**Temporary loss of 60 animal unit months and permanent loss of 9 animal unit months.**
Wildlife and Fisheries Resources					
Wildlife habitat disturbed	696 acres disturbed.	715 acres disturbed.	577 acres disturbed.	Same as the Proposed Action.	No wildlife habitat would be disturbed.
Wildlife habitat not reclaimed	88 acres not reclaimed.	88 acres not reclaimed.	88 acres not reclaimed.	81.6 acres not reclaimed.	No wildlife habitat would be disturbed.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Mule deer year-long range disturbed.	498 acres disturbed; 88 acres not reclaimed.	475 acres disturbed; 88 acres not reclaimed.	313 acres disturbed; 88 acres not reclaimed.	Same as the Proposed Action.	No wildlife habitat would be disturbed.
Mule deer low-density range disturbed.	214 acres disturbed; total area disturbed would be reclaimed.	240 acres disturbed; 88 acres not reclaimed.	264 acres disturbed; 88 acres not reclaimed.	Same as the Proposed Action.	No wildlife habitat would be disturbed.
Animal displacement and habitat fragmentation.	Increased displacement and habitat fragmentation from mine development.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No additional displacement or fragmentation.
Impacts to breeding birds	Habitat removal; possible loss of nests, eggs, or young; **significant impacts** to nesting raptors.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No adverse effects to breeding birds.
Potential for hazardous materials spill.	Low probability of a spill into perennial streams along the transportation corridor.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No spills would occur as a result of mine operations.
Noise and human presence.	Increased noise and access from mine development and mining activities.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No increased noise and human access; would continue at the current level.
Impacts to bats.	**Potentially significant** impacts to bat hibernacula and maternity roosts.	Less than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No additional impacts to roosting bat concentrations
Cyanide effects.	Barriers would be installed to prevent access of wildlife to cyanide solutions.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No potential mortalities from cyanide ingestion.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Special Status Species					
Impacts to bats.	**Potentially significant impacts** to bat hibernacula and maternity roosts.	Less than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No additional impacts to roosting bat concentrations
Impacts to nesting ferruginous hawks	**Significant impacts** to three breeding territories (six nest sites) and potentially significant effects to two additional territories.	Less than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No impacts to breeding ferruginous hawks would occur.
Loss of potential burrowing owl habitat.	238 acres disturbed; 88 acres not reclaimed.	257 acres disturbed; 88 acres not reclaimed.	125 acres disturbed; 88 acres not reclaimed.	Same as the Proposed Action.	No potential habitat would be disturbed.
Impacts to the loggerhead shrike.	Habitat loss and potential impacts to nesting birds.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No habitat or nesting birds would be disturbed.
Impacts to the pygmy rabbit.	Loss of 10.9 acres of habitat with high relative abundance and 43.4 acres of habitat with low to moderate relative abundance. Individual rabbits would be lost.	Less than the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No pygmy rabbits would be disturbed, and no animals would be lost.
Potential for hazardous materials spill.	Low probability of a spill into perennial streams along the transportation corridor.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No spills would occur.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Land Use Authorizations and Access	689 acres of public lands would be converted to mining activities, of which approximately 213 occur on lands identified in the BLM's Resource Management Plan **(RMP)** as suitable for disposal for public purposes. **This impact is considered significant since the use of disposal lands for mining purposes would be inconsistent with the intent of the RMP.** The action would not result in the disruption of existing rights-of-way or access to public lands in the mine vicinity.	711 acres of public lands including 338 acres identified as suitable for disposal would be converted to mining activities. **This impact is considered significant since the use of disposal lands for mining purposes would be inconsistent with the intent of the RMP.** No disruption to existing rights-of-way or public access would occur.	570 acres of public lands including 42 acres identified as suitable for disposal would be converted to mining activities. **This impact is considered significant since the use of disposal lands for mining purposes would be inconsistent with the intent of the RMP.** No disruption to existing rights-of-way or public access would occur.	Same as the Proposed Action.	There would be no change from current uses on the project site
Recreation and Wilderness	689 acres of public land would be temporarily removed from dispersed recreational use; however, adjacent public lands could be utilized. 88 acres would not be reclaimed. Wilderness and developed recreational facilities in the region are not expected to be adversely impacted.	Same as the Proposed Action except 711 acres of public lands would be temporarily removed from dispersed recreational use.	Same as the Proposed Action except 570 acres of public lands would be temporarily removed from dispersed recreational use.	Same as the Proposed Action.	Public lands within the project area would not be dedicated for mining and would remain available for dispersed recreational uses.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Visual Resources	Visual contrasts allowable for Visual Resource Management Class III lands within the mine site would be exceeded as a result of the proposed East Waste Rock Dump, resulting in moderate to high visual contrasts when viewed from the Eureka County Fairgrounds and south-bound State Route 278. This would constitute a **significant impact**. Proposed reclamation and trial plantings would reduce the magnitude of most of these contrasts over time.	Visual contrasts would be greatest under this alternative as a result of the larger **East** Waste Rock Dump. Reclamation would reduce these contrasts over time; however, contrasts with natural land forms would remain and would constitute a **significant impact**.	Visual contrasts would be the least under this alternative; reclamation would reduce contrasts over time.	Same as the Proposed Action.	Management guidelines for Visual Resource Management Class III lands would not be exceeded; project-related disturbance and construction would not occur.
Cultural Heritage	**Six** NRHP-eligible or potentially eligible sites would be directly impacted.	**Seven** National Register of Historic Places-eligible or potentially eligible sites would be directly impacted.	Same as the Proposed Action.	Same as the Proposed Action.	No cultural sites would be directly impacted. Erosional effects and illegal collecting would continue to occur.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Social and Economic Values	The local economy would benefit from 9 years of enhanced economic opportunities, creating jobs for households and sales for local businesses. Temporary population impacts of up to 391 people, with long-term growth projected at 275 people. Short-term housing shortages would occur, increasing housing values and rents and triggering additional construction. Tax revenues would increase for Eureka County and the school district, as would demands for public services. Revenue accruing to Eureka County exceeds costs, yielding fiscal benefits. Revenue to the school district would not fully cover added costs, resulting in a minor adverse fiscal impact for the district.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	Economic opportunities from the Proposed Action would be foregone, at least temporarily if not permanently, and impacts on public infrastructure and services would not occur. No changes in public sector fiscal conditions would occur, maintaining the existing reliance on gold mines located in the extreme northern portion of the county.
Noise and Blasting Vibrations	Noise from operations at the mine would be perceptible at nearby sensitive receptors but generally would remain below 55 dBA, L_{eq}, the standard for community noise levels. Peak noise levels from blasting in the pit would not exceed thresholds for impulse noises. It is extremely unlikely that any structure in the Eureka area would be damaged as a result of blasting vibration.	Noise from operations would be slightly less at sensitive receptors as a result of the berm along the eastern and southeastern perimeter of the open pit.	Same as the Proposed Action.	Same as the Proposed Action.	Mine-related noise and blasting would not occur; the existing noise environment would remain essentially unchanged.

Table 2-10 (Continued)

Resource Areas	Proposed Action	East Waste Rock Dump	West Waste Rock Dump	Partially Backfilled Pit	No Action
Hazardous Materials and Wastes					
Hazardous waste generation	The facility probably would not generate hazardous waste. If hazardous waste were generated, the facility would be a conditionally exempt small quantity generator.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No wastes would be generated.
Hazardous material spills	Spills could be associated with truck deliveries of process chemicals and fuels. The number of chemical or fuel releases expected during the project life is about 0.03. Emergency response actions would contain and cleanup any spill. 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.	Same as the Proposed Action.	Same as the Proposed Action.	Same as the Proposed Action.	No spills would occur.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter describes the environment that would be affected by the proposed Ruby Hill Project and the direct and indirect impacts of the Proposed Action, the No Action Alternative, and *three* action alternatives. 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 in the Eureka 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 Ruby Hill Project. 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 18 categories of resources, the affected environment was defined by the potential environmental impacts of the Proposed Action.

The analysis of impacts from the Proposed Action and alternatives assumed the implementation of the Environmental Protection Measures that have been developed as part of the Proposed Action and are presented in Chapter 2.0. Mitigation and monitoring measures developed in response to anticipated impacts are discussed at the end of each resource section. All actions listed as mitigation measures have been developed by the BLM and are not part of the Proposed Action. These measures *will* be required by the BLM as a condition or stipulation of approval of the Plan of Operations. Residual adverse impacts are those remaining following the implementation of the mitigation measures. A discussion of cumulative impacts is included for each resource. Descriptions of short-term uses compared to long-term productivity, irreversible or irretrievable commitments of resources, and energy consumption by the Ruby Hill Project are provided at the end of the chapter.

The BLM's National Environmental Policy Act Handbook (H-1790-1) requires that all EISs address certain Critical Elements of the Human Environment. These critical elements are presented below along with the location in this chapter where the element is discussed. If the element does not occur within the Ruby Hill Project area and would not be affected, this is indicated below, and the element is not discussed further in the EIS. This elimination of nonrelevant issues follows the Council on Environmental Quality guidelines as stated in 40 Code of Federal Regulations 1500.4.

- *Air Quality - refer to Section 3.1.*
- Areas of Critical Environmental Concern - none would be affected.
- Cultural Heritage - refer to Section 3.14.
- Prime or Unique Farm Lands - none would be affected.
- Floodplains - none would be affected; refer to Section 3.4.1.1.
- Native American Religious Concerns - refer to Section 4.2.
- Special Status Species - refer to Section 3.11.
- Solid or Hazardous Wastes - refer to Sections 2.1.13 and 3.17.
- Drinking Water/Groundwater Quality - refer to Section 3.4.
- Wetlands and Riparian Zones - none would be affected; refer to Sections 3.4.1.1 and 3.6.2.1.
- Wild and Scenic Rivers - none would be affected.
- Wilderness - none would be affected; refer to Section 3.12.1.2.
- *Wild Horses - The Ruby Hill Project does not fall within a wild horse herd management area. The Fish Creek Herd Management Area does extend into the Ruby Hill Allotment, but the Ruby Hill Project is outside the boundaries of the herd management area.*
- Paleontological Resources - none would be affected; refer to Section 3.3.

- Environmental Justice - Environmental justice deals with the disproportionate impacts of Federal actions on minority communities and low-income groups. This evaluation must consider social, cultural, economic, and human health effects and whether BLM's decision results in any inequity in the distribution of benefits or risks. The Ruby Hill Project was evaluated and no disproportionately high or adverse human health or environmental effects were identified for minority or low-income populations.

3.1 Air Quality

3.1.1 Affected Environment

Baseline meteorology, air quality, and dispersion conditions at the project site were characterized from on-site data taken during 1994-1995, and from data records from the monitoring station at Eureka. The proposed Homestake Ruby Hill Mine project area is located near the east-central portion of the Great Basin. The surrounding terrain consists of alternating mountain ranges and sagebrush-covered valleys, with the mine site situated in the Basin and Range physiographic province. The Diamond Mountains lie north of the mine site with highest peaks reaching elevations over 10,000 feet. Elevations at the project location range from approximately 6,200 feet to 6,500 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 receiving 11 to over 15 inches of precipitation annually. A semi-arid climate is characterized by low rainfall, low humidity, clear skies, and relatively large annual and diurnal temperature ranges (National Oceanographic and Atmospheric Administration 1974).

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 generally occurs 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.

3.1.1.1 Climatology and Meteorology

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 above ground within which rising warm air from the surface would 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 project 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.

Weather conditions are monitored at the existing FAD shaft mine site. Average temperatures at the mine site station range from the upper 20s (°F) in January to the low 70s in July. Figure 3-1 depicts maximum, average, and minimum temperatures at the mine during the period April 1994 through March 1995. Regional climatological temperatures are represented in Table 3-1 and Figure 3-2 where minimum, maximum, and average temperatures at Eureka are presented. 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 12 inches at Eureka, but is about 13 inches at the mine. Precipitation totals by month for Eureka are presented in Table 3-2. 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 Oceanographic and Atmospheric Administration 1990). Net evaporation exceeds precipitation in the project area.

The proposed project is located at a latitude that places it within the belt of prevailing westerly

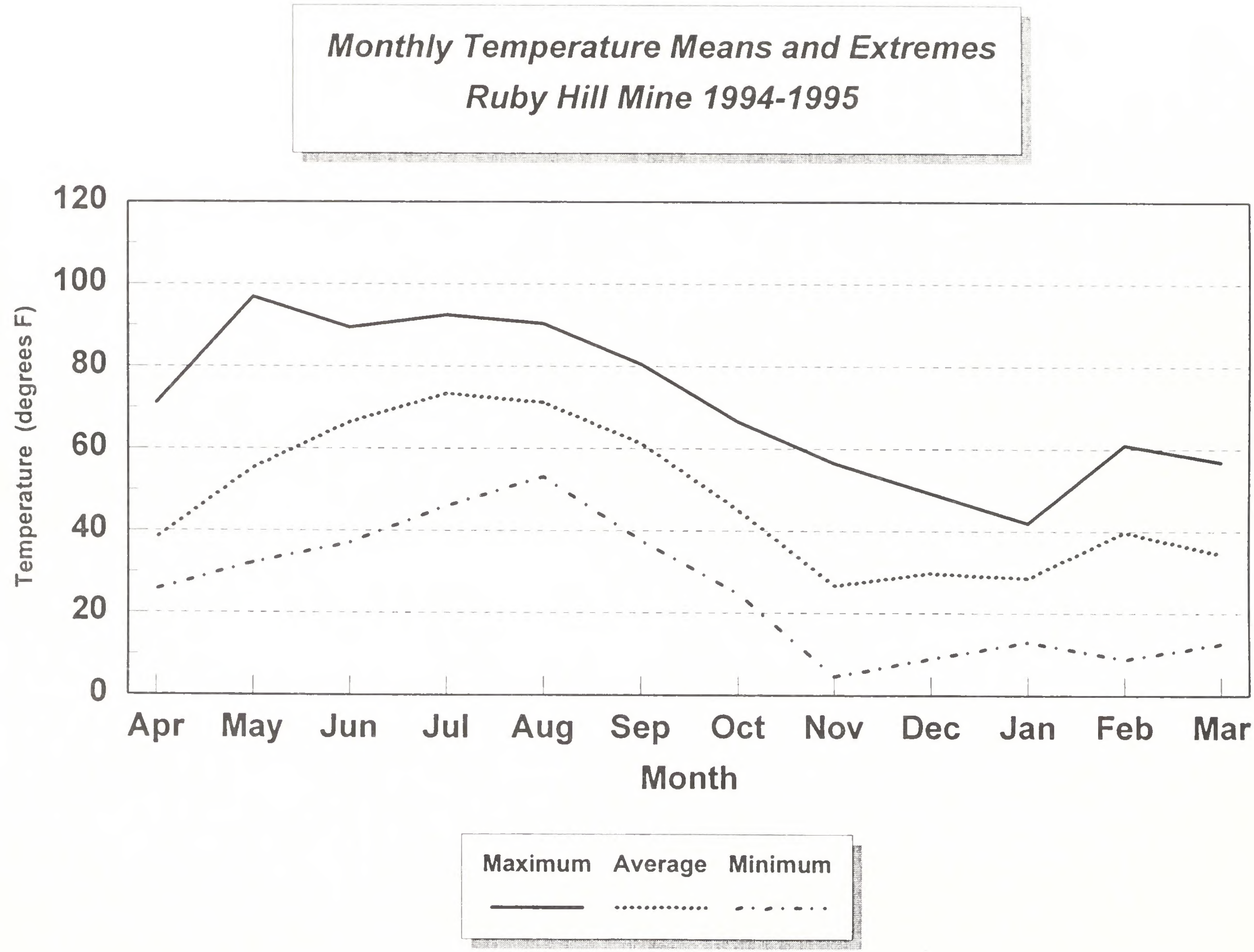


Figure 3-1. Monthly Temperature Average and Extremes at Ruby Hill Mine

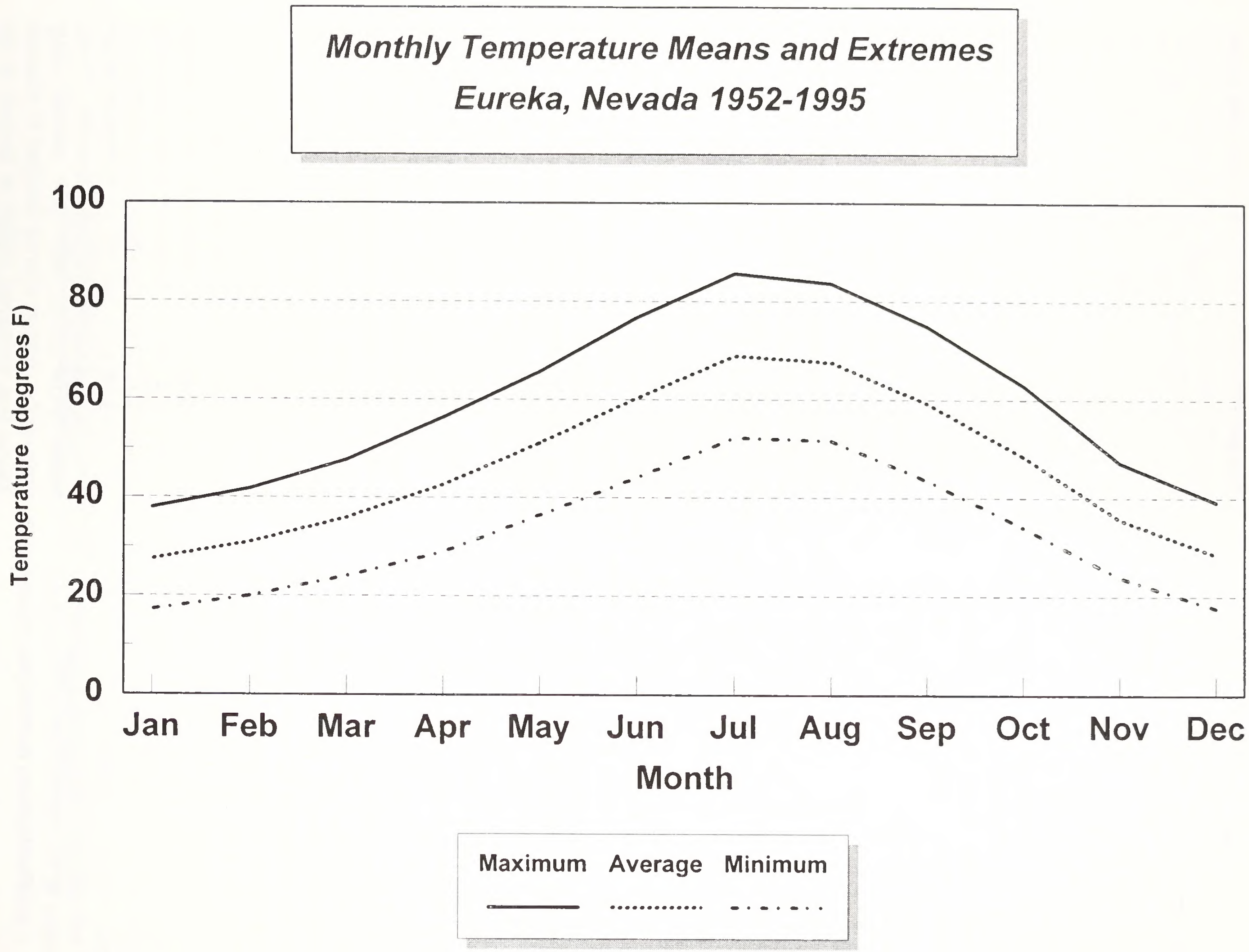


Figure 3-2. Monthly Temperature Average and Extremes - Eureka, Nevada

Table 3-1

Minimum, Maximum, and Average Temperatures (°F)
Eureka, Nevada

Month	Minimum[1]	Maximum[1]	Average[1]
January	17.2	37.9	27.5
February	20.0	41.8	30.9
March	24.1	47.7	35.9
April	28.9	56.3	42.6
May	36.4	65.7	51.1
June	44.0	76.7	60.3
July	52.2	85.6	68.9
August	51.6	83.6	67.6
September	43.6	74.9	59.2
October	34.0	62.9	48.4
November	23.9	47.2	35.6
December	17.7	39.2	28.5
Annual	32.8	60.0	46.4

[1]Temperatures are averaged through 1995, beginning in 1952.

Table 3-2

Monthly Precipitation
Eureka, Nevada

Month	Precipitation (inches)[1]
January	0.92
February	0.93
March	1.41
April	1.15
May	1.54
June	0.91
July	0.67
August	0.89
September	0.87
October	0.86
November	0.90
December	1.04
Annual Average	12.09

[1]Precipitation is averaged through 1995, beginning in 1952.

Source: National Oceanographic and Atmospheric Administration 1990.

winds that circle the globe around the earth's northern hemisphere. However, the proposed mine site is located in complex terrain where the winds are affected by local topographic features. This is evident in the on-site wind data collected during 1994-1995, that show predominant winds blowing from the south along the valley parallel to the major mountain ranges. Winds were measured on a 10-meter tower near the proposed mine and an annual wind rose for the monitoring site is shown in Appendix A. These data show the percentage of time that the wind blows from a particular direction. For the project site, the most frequently reported wind direction is from the south.

Although Ely, Nevada, is located about 70 miles east of the project area, the wind rose for Ely (Appendix A) is representative of the regional wind climatology. The wind rose indicates that winds are predominantly from the southwest but also shows that there is a secondary maximum of wind occurrences from the northwest.

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.

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 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 than locations in lower valleys.

3.1.1.2 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 3-3. These are the standards applicable to Hydrographic Basin 154 that encompasses the project area. An area is designated by the U.S. 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 existing air quality of the project area 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 in attainment for all pollutants that have an ambient air quality standard.

Table 3-3

National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Nevada Standards[1] Concentration[3]	National Standards[2,3] Primary[4]	National Standards[2,3] Secondary[5]
Sulfur Dioxide	Annual Arithmetic Mean	80 µg/m^3 (0.03 ppm)	80 µg/m^3 (0.03 ppm)	---
	24 hours	365 µg/m^3 (0.14 ppm)	365 µg/m^3 (0.14 ppm)	---
	3 hours	1,300 µg/m^3 (0.5 ppm)	---	1,300 µg/m^3 (0.5 ppm)
PM_{10}[6]	Annual Arithmetic Mean	50 µg/m^3	50 µg/m^3	50 µg/m^3
	24 hour	150 µg/m^3	150 µg/m^3	150 µg/m^3
Ozone[7]	1 hour	235 µg/m^3 (0.12 ppm)	235 µg/m^3 (0.12 ppm)	Same as Primary Standards
Carbon Monoxide (below 5,000 feet MSL)	8 hours	10,000 µg/m^3 (9.0 ppm)	10,000 µg/m^3 (9 ppm)	Same as Primary Standards
Carbon Monoxide (at or above 5,000 feet MSL)	8 hours	6,670 µg/m^3 (6.0 ppm)	---	---
Carbon Monoxide (at any elevation)	1 hour	40,000 µg/m^3 (35 ppm)	40,000 µg/m^3 (35 ppm)	Same as Primary Standards
Nitrogen Dioxide	Annual Arithmetic Mean	100 µg/m^3 (0.05 ppm)	100 µg/m^3 (0.05 ppm)	Same as Primary Standards
Crystalline Silica	8 hours	2.38 µg/m^3	---	---

[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]Concentration expressed first in units in which it was promulgated micrograms per cubic meter (µg/m^3), and are based upon a reference temperature of 25°C and a reference pressure of 760 mm of mercury. All measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 mm of Hg (1,013.2 millibar); 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 EPA.

[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 EPA.

[6]The Nevada State Implementation Plan adopted the Federal PM_{10} Standard as of December 1991.

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

Table 3-4 summarizes particulate matter concentrations collected during 1994 to 1995 at the Ruby Hill sites. The maximum 24-hour value during this period was 70 $\mu g/m^3$, which is less than the Nevada state and Federal 24-hour particulate standards of 150 $\mu g/m^3$. The maximum annual value, based on the arithmetic average of the fourth quarter 1994 through the third quarter of 1995 was 15.1 $\mu g/m^3$, which is less than the Nevada and Federal annual arithmetic mean particulate matter standard of 50 $\mu g/m^3$.

3.1.2 Environmental Consequences

3.1.2.1 Proposed Action

The significance criteria for air resources have been established for this environmental impact statement at levels which represent the lowest concentration at which adverse human health or ecological effects from exposure to air pollution are known or suspected to occur. For criteria pollutants, these levels have been established through the National and State Ambient Air Quality Standards. The Ambient Air Quality Standards are concentrations set by law designed to protect public health and welfare from the air pollutants listed in Table 3-3.

Air quality impacts calculated in this analysis would be considered significant if any of the following criteria are met:

- Impacts from the mining operations ***cause or contribute to*** a violation of a Nevada or National ***regulatory impact limit.***
- Construction emissions would be considered significant if ***common*** construction management practices are not followed.

Mitigation measures would be recommended for impacts that are found to be significant. Additional mitigation measures would be recommended where appropriate.

There will be no significant air quality impacts on Class I areas. There are no Class I areas within 100 kilometers of the Ruby Hill Project.

Mining, ore-processing, and construction activities at the Ruby Hill Mine would be a source of both total suspended particulates and PM_{10}. Ore processing operations and gasoline and diesel-powered vehicles and equipment would be primary sources of gaseous pollutants such as SO_2, oxides of nitrogen (NO_2), carbon monoxide (CO), and volatile organic compounds.

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 near the source, while fine 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 (mph), 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

Table 3-4

Summary of Particulate Matter Measurements at the Ruby Hill Project Site $\mu g/m^3$

Sampler	24-Hour Maximum	24-Hour 2nd Maximum	Annual Average	Number of Samples
Primary	73	69	14.8	59
Collocated	76	74	15.1	61

are generally recognized as emissions that may remain suspended indefinitely.

Air quality in the study area would be affected by both construction and operation of mining facilities. Reclamation activities associated with eventual closing of the Ruby Hill Mine would cause an increase in fugitive and gaseous emissions in the local area during the reclamation phase. Air quality effects from construction would result in temporary impacts due to increases in local fugitive dust levels. Dust generated from these 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 construction activities, including land clearing, earth moving, scraping, hauling, and materials storage and handling; drilling and blasting; truck loading operations; wind erosion from stockpiles; and ore handling operations. In addition, other fugitive emissions impacts would be caused by mud/dirt carry-out onto paved surfaces. The additional surface loading would cause an increase in fugitive emissions during the lifetime of the construction project.

During construction, operation, and reclamation, vehicle exhaust emissions would be generated, but such emissions are small compared to fugitive emissions from earth moving, hauling, and other construction activities and would not affect regional air quality. Particulate levels from construction, operation, and reclamation 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 Nevada Department 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 construction and reclamation, 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.

Air quality impacts due to emissions from mining operations would occur throughout the operational phase of the project. The primary pollutant would be fugitive dust particulates (total suspended particulates and PM_{10}) generated by the crushers, screens, conveyors, and other processes. Other pollutants include NO_2, CO, and SO_2 from exhaust emissions from the electrical generators, vehicles, and other fuel burning equipment. Volatile organic compounds are emitted from fuel storage tanks. All criteria pollutant emission rates would be less than 250 tons per year, therefore the Ruby Hill Mine would not be a "major stationary source" as defined by the Environmental Protection Agency. Air pollutant sources are deemed "major" for Prevention of Significant Deterioration purposes if their emissions exceed 250 tons per year.

Sources of fugitive dust and other pollutants include:

- Primary, secondary, and tertiary crushers
- Conveyors and stackers
- Screens
- Blasting
- Lime or cement silo loading and unloading
- Bullion furnace and carbon reactivation kiln
- Truck loading
- Diesel generators
- Overburden and ore stockpiles
- Paved and unpaved roads

Fugitive dust emissions may be generated by wind erosion of open aggregate storage piles and exposed areas within an industrial facility. These sources typically are characterized by nonhomogeneous surfaces impregnated with nonerodible elements (particles larger than approximately 1 centimeter in diameter). Field testing of aggregate piles and other exposed materials using a portable wind tunnel has shown that (a) threshold wind speeds exceed 5 meters per second (11 miles per hour) at 15 centimeters above the surface or 10 meters per second (22 miles per hour) at 7 meters above the surface, and (b) particulate emission rates tend to decay rapidly (half-life of a few minutes) during an erosion event (USEPA 1995). In other words, these aggregate material surfaces are characterized by finite availability of erodible material (mass/area) referred to as the erosion potential. Any natural crusting of the surface binds the erodible material, thereby reducing the erosion potential.

Emissions generated by wind erosion also are dependent on the frequency of disturbance of the erodible surface because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action that results in the exposure of fresh surface material. On a storage pile, this would occur whenever aggregate material is either added to or removed from the old surface. A disturbance of an exposed area also may result from the turning of surface material to a depth exceeding the size of the largest pieces of material present.

The emission factor for wind-generated particulate emissions from mixtures of erodible and nonerodible surface material subject to disturbance may be expressed in units of tons per acre per year or other appropriate units.

In calculating emission factors, each area of an erodible surface that is subject to a different frequency of disturbance is treated separately. For a surface disturbed daily, N = 365 per year, and for a surface disturbance once every 6 months, N = 2 per year.

Activities at the mine were apportioned in space and time for the Proposed Action and each alternative to arrive at the emissions shown in Table 3-5. Fugitive emissions shown in Table 3-5 were calculated based on the annual percentage of occurrence of winds greater than 11 miles per hour (mph). Winds at the mine exceed this threshold on average approximately 10.2 percent of the time.

Results from modeling these various mine sources show that maximum concentrations of PM_{10}, NO_2, CO, and SO_2 would not exceed Nevada or National Ambient Air Quality Standards (Table 3-6). Modeling studies show that maximum 24-hour PM_{10} concentrations are ***111.0*** $\mu g/m^3$ at the fenceline and that annual concentrations of PM_{10} are ***28.1*** $\mu g/m^3$ at the fenceline. Process and fugitive dust emissions from the facilities would be below the 250 tons per year threshold requiring a PSD permit. The project would comply with all existing air quality standards in Nevada.

3.1.2.2 East Waste Rock Dump Alternative

The impacts to air quality under the East Waste Rock Dump Alternative are similar to those described for the Proposed Action, and the results of modeling are shown in Table 3-6. Maximum 24-hour concentrations of PM_{10} at the fenceline are ***130.4*** $\mu g/m^3$ and annual concentrations of PM_{10} are ***37.4*** $\mu g/m^3$. These levels would not exceed Nevada or National Ambient Air Quality Standards.

3.1.2.3 West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative would result in air quality impacts somewhat ***lower*** than the Proposed Action ***for*** 24-hour PM_{10} concentrations, ***at the fenceline which are*** predicted to be ***90.3*** $\mu g/m^3$. Annual concentrations are predicted to be ***30.3*** $\mu g/m^3$ for this alternative, which ***is higher than the Proposed Action but still below*** the ambient air quality standard for annual concentrations of PM_{10}.

3.1.2.4 Partial Backfilling Alternative

The impacts to air quality under the Partial Backfilling Alternative would be the same as those described for the Proposed Action.

3.1.2.5 No Action Alternative

Under the No Action Alternative the impacts to air quality would be limited to ongoing mineral exploration activities.

Table 3-5

Summary of Air Emissions
(tons per year)

Pollutant	Proposed Action	East Waste Dump Alternative	West Waste Dump Alternative
NO_2	0.58	0.58	0.58
CO	0.08	0.08	0.08
TOC	0.02	0.02	0.02
PM_{10} (Point Sources)	*39.2*	*39.2*	*39.2*
PM_{10} (Fugitive Sources)	*139.1*	*139.1*	*139.1*

Table 3-6

PM_{10} Modeling Results ($\mu g/m^3$)

Receptor Location	24-Hour Concentration	Background	Total 24-Hour Concentration	24-Hour Standard	Annual Concentration	Background	Total Annual	Annual Standard
Proposed Action								
Project fenceline	100.8	10.2	111.0	150	19.1	9	28.1	50
Eureka High School	26.0	10.2	36.2	150	1.3	9	10.3	50
Eureka County Fairgrounds	36.7	10.2	46.9	150	6.5	9	15.5	50
Diamond Valley	1.9	10.2	12.1	150	0.4	9	9.4	50
East Waste Rock Dump Alternative								
Project fenceline	120.2	10.2	130.4	150	28.4	9	37.4	50
Eureka High School	30.8	10.2	41.0	150	1.5	9	10.5	50
Eureka County Fairgrounds	34.2	10.2	44.4	150	5.3	9	14.3	50
Diamond Valley	7.7	10.2	17.9	150	0.5	9	9.5	50
West Waste Rock Dump Alternative								
Project fenceline	80.1	10.2	90.3	150	21.3	9	30.3	50
Eureka High School	30.0	10.2	40.2	150	1.5	9	10.5	50
Eureka County Fairgrounds	43.2	10.2	53.4	150	9.0	9	18.0	50
Diamond Valley	5.7	10.2	15.9	150	0.3	9	9.3	50

3.1.3 Cumulative Impacts

Cumulative impacts to air quality include impacts from the proposed Ruby Hill Mine emission sources including mining operations and fugitive dust, impacts from nearby existing/proposed industrial or mining operations, and impacts from background emission sources (e.g., natural background from windblown dust and public traffic on unpaved roads in the region).

As stated previously, air impacts from mining operations tend to be localized in the vicinity of the source. The geographic extent of impacts is therefore small. For the Ruby Hill Proposed Action, the maximum extent of impacts greater than 1 $\mu g/m^3$ is generally less than about 10 kilometers (6.2 miles) from the mine boundary (see Map 3-1). Even nearby operations would have only limited overlap with impacts from the Ruby Hill Mine site. Since the Ruby Hill Mine site would be the largest air emission source in the immediate vicinity, its impacts dominate any cumulative impacts to air quality.

Cumulative impacts from existing operations are already reflected in the measured particulate levels at the site. As shown in Table 3-5, measured concentrations near the project site are relatively low, indicating no significant impacts from other sources in the local region. Modeling results shown in Table 3-6 confirm that when impacts from the existing mine operations and from other mines in the area are added to the new impacts from the Proposed Action or alternatives the resultant cumulative impacts are well below state and Federal ambient air quality standards. Therefore, cumulative air quality impacts from the Proposed Action and Interrelated Projects are not considered significant.

3.1.4 Mitigation and Monitoring

The Ruby Hill Mine currently has an ongoing program for monitoring particulate matter concentrations at the existing facilities. Homestake is expected to continue monitoring ambient concentrations of particulates as well as meteorology at the mine site.

Air quality permits issued by the Nevada Division of Environmental Protection would require Homestake to control emissions, including fugitive emissions, from sources at the mine site due to mining activities. Homestake would apply all air pollution controls specified in its air quality permit to reduce emissions during construction and operation of the mine ***(Nevada Administrative Code 445B.365).***

Issue: Dust generated by mining activities would affect residents in the surrounding area, including Eureka and Diamond Valley.

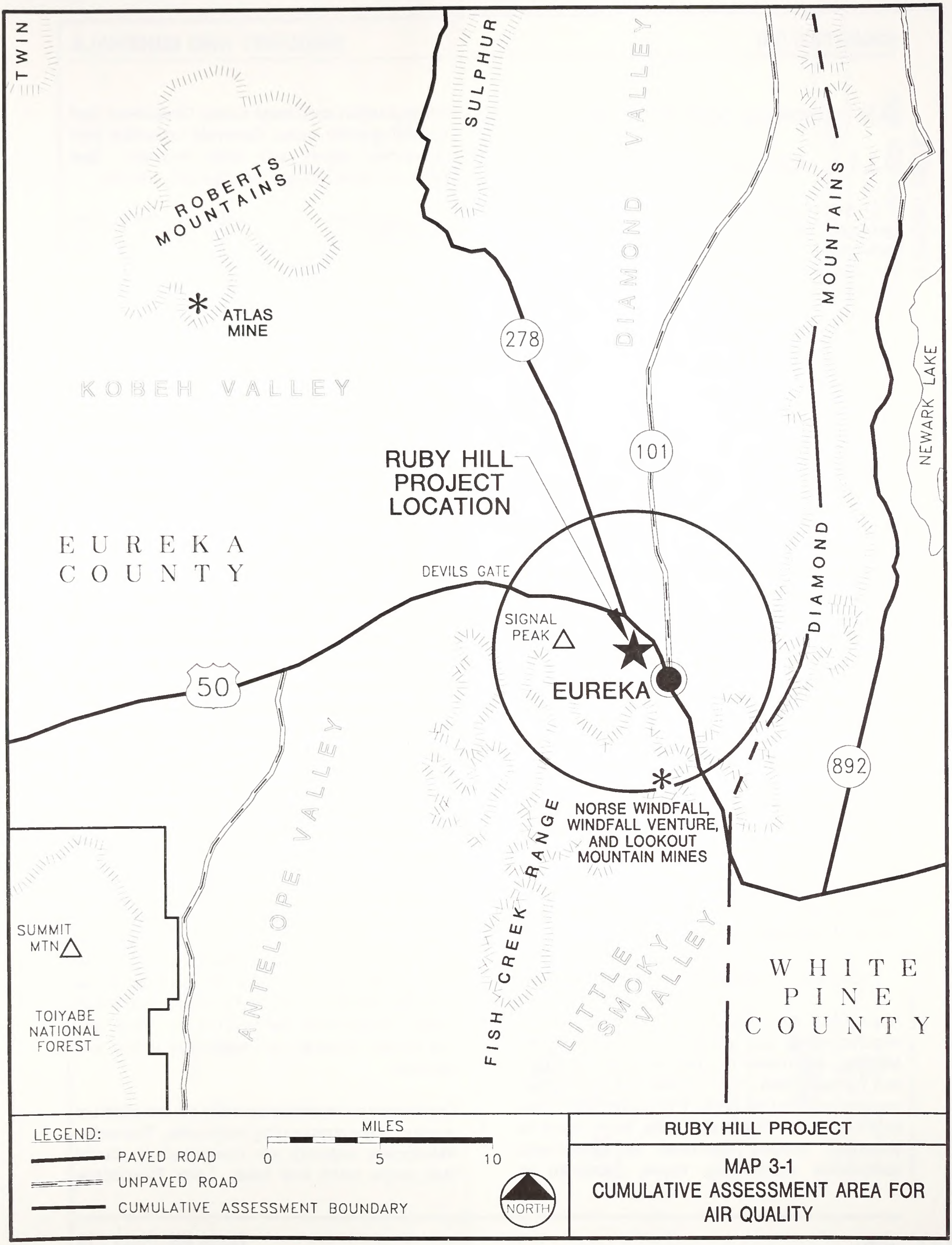
<u>Measure 1</u>: Homestake would establish an advisory group of interested parties, to address issues that are of concern to the public. The group would include Homestake, agencies, and citizens. These issues include noise, dust, blasting vibrations, and visual impacts. This group is intended to function as a clearing house for public concerns, so that they can be brought to the attention of Homestake as quickly as possible for corrective actions. Homestake has agreed to work with the group throughout the life of the project to identify areas where monitoring for dust is needed and to develop additional mitigation that would address impacts that may not be fully identifiable until mining activities actually begin. Monitoring information that is collected by Homestake would be available to the group for their review and consideration in suggesting additional mitigation. Homestake would review all suggested mitigation considering feasibility, effectiveness, and cost and advise the group as to which measures would be implemented, implemented with modification, or not implemented (along with the reason for this decision). The objectives for the group are to minimize impacts of the project on the community and facilitate Homestake's interaction with the public.

<u>Effectiveness</u>: This measure would be effective in addressing public concerns as they may arise throughout the life of the project.

<u>Application</u>: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

3.1.5 Residual Adverse Impacts

There would be no residual adverse impacts to air quality from the planned mine development, since 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. Once the disturbance ceases and wind erodible surfaces are reclaimed, air resources would return to the premining condition.



RUBY HILL PROJECT

MAP 3-1
CUMULATIVE ASSESSMENT AREA FOR AIR QUALITY

3.2 Geology and Minerals

3.2.1 Affected Environment

This section addresses the topography, regional geology, bedrock geology, surficial deposits, seismicity, geologic hazards, and mineral resources for the Ruby Hill Project. The geologic elements discussed below also provide background information for the characterization of the hydrogeologic conditions presented in Section 3.4, Water Quality and Quantity.

3.2.1.1 Physiographic and Topographic Setting

The project area is located at the northern end of Prospect Ridge, which forms the north end of the Fish Creek Range, in the Basin and Range Province of Nevada. The Basin and Range Province is characterized by a series of generally north-trending mountain ranges separated by broad basins. This physiography developed from extension-related faulting that was initiated about 40 million years ago (Ma) (Ekron et al. 1968) and is ongoing. The ranges are uplifted fault blocks that consist chiefly of marine sedimentary rocks and younger volcanics. The basins are filled with accumulations of unconsolidated sediments that were mostly derived from the erosion of adjacent bounding mountain ranges.

Mountains and rolling hills dominate the area; the proposed Ruby Hill Site is situated on gently sloping alluvial fans leading into Diamond Valley. Elevations within the project area vary from a high of 7,260 feet on Ruby Hill to a low of approximately 6,060 feet in the site's northwest corner (Homestake 1995a).

3.2.1.2 Regional Geologic Setting

A simplified lithologic sketch map of the region encompassing the project site is shown on Map 3-2; information is based on a map by Harrill and Lamke (1968). Units shown are generalized and are grouped by similar lithologies rather than by formations. The major units, from oldest to youngest, include Cambrian to Cretaceous terrigenous sedimentary rocks; Cambrian to Pennsylvanian carbonate rocks; Cretaceous and Tertiary granitic rocks; Cenozoic volcanics; and Quaternary alluvial and playa deposits. See Table 3-7 for a detailed stratigraphic column.

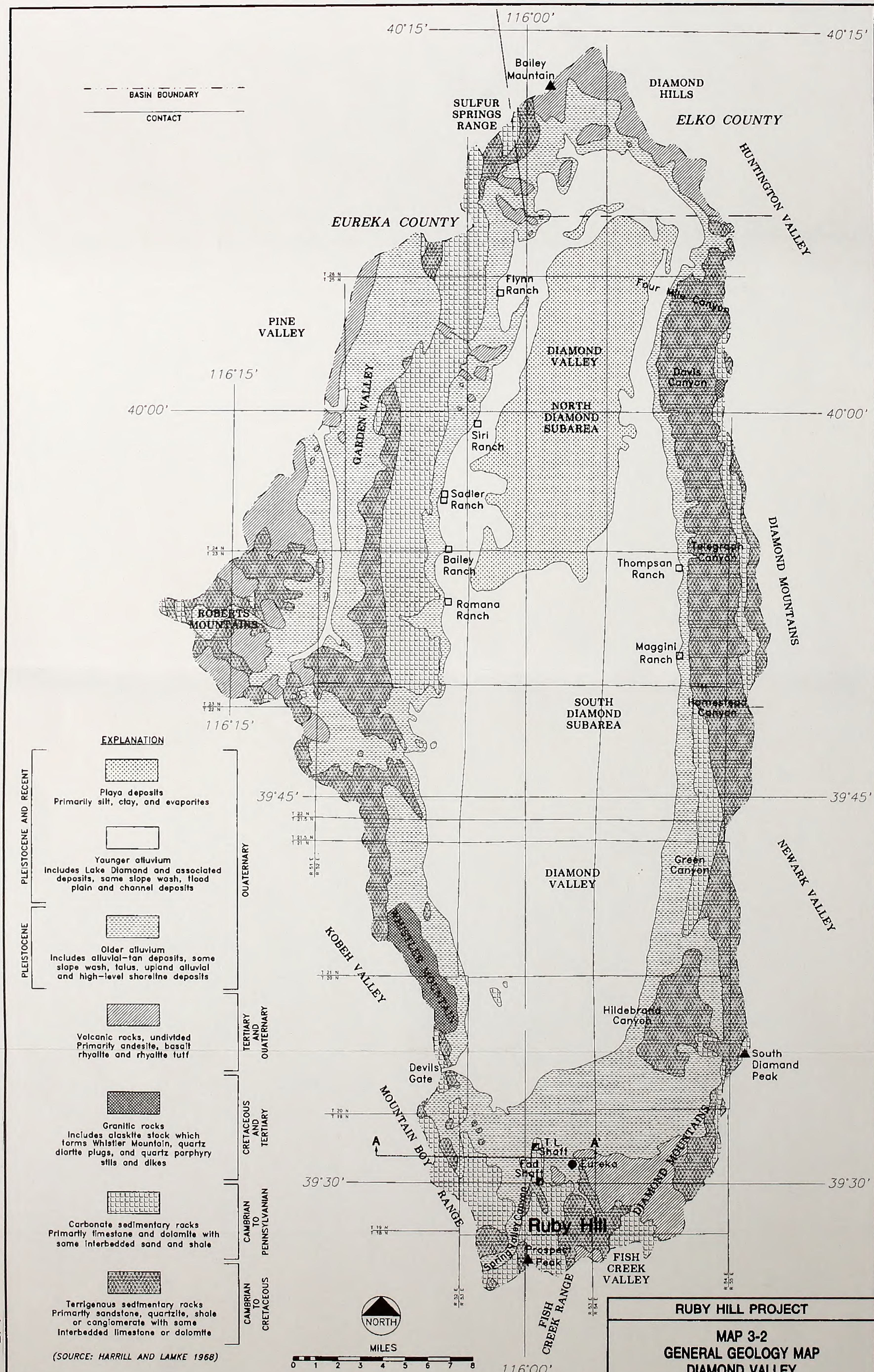
The Cambrian to Cretaceous terrigenous sedimentary unit includes thick Cambrian sections of quartzite, shale, and siltstone, Western Assemblage rocks, and Mississippian "Overlap" sandstone, shale, and conglomerate.

The Cambrian to Pennsylvanian carbonate unit is primarily dolomite and limestone but includes some siltstone and shale. The main economic deposits of the region are hosted by carbonate rocks. Important units include the Eldorado Dolomite and the Hamburg Dolomite, which are hosts of previously mined deposits, and units of the Pogonip Group, which host the Archimedes deposit.

Cretaceous to Tertiary granitic rocks in the area include a large granitic pluton at Whistler Mountain, northwest of the project area and a small pod of intrusive rocks in the Diamond Range. Granitic rocks not clearly visible on the map are also located near the Ruby Hill project area. Cretaceous quartz diorite (99.5 to 102 Ma; Shaw Nolan 1989) crops out south of Ruby Hill; this body appears genetically related to the rich replacement ores mined in the previous century. Rocks of similar age and composition form sills exposed on Mineral Point, west of the Archimedes deposit, and a larger intrusive body in the subsurface east of West Archimedes (identified by drilling).

Tertiary volcanic rocks present in the area include older rhyolite tuffs and intrusives and younger ash flows, lamprophyre dikes, and basaltic andesite lavas and intrusives. Age determinations for the older group range from 39 to 34 Ma, whereas the younger group is 23 to 21 Ma (Shaw and Nolan 1989). These rocks are found in the valleys and are usually covered by Quaternary gravel and alluvium.

Quaternary sedimentary deposits are derived from erosion of the surrounding mountains. The earlier Pleistocene deposits are composed of alluvial fans, slope wash, and talus. Later Pleistocene



40°15'
116°00'
40°15'
BASIN BOUNDARY
CONTACT
Bailey Mountain
DIAMOND HILLS
SULFUR SPRINGS RANGE
ELKO COUNTY
HUNTINGTON VALLEY
EUREKA COUNTY
Flynn Ranch
Four Mile Canyon
PINE VALLEY
DIAMOND VALLEY
Davis Canyon
116°15'
40°00'
GARDEN VALLEY
NORTH DIAMOND SUBAREA
40°00'
Siri Ranch
Sadler Ranch
DIAMOND MOUNTAINS
Bailey Ranch
Telegraph Canyon
Thompson Ranch
Romana Ranch
ROBERTS MOUNTAINS
Maggini Ranch
SOUTH DIAMOND SUBAREA
Homestead Canyon
116°15'
EXPLANATION
Playa deposits
Primarily silt, clay, and evaporites
Younger alluvium
Includes Lake Diamond and associated deposits, some slope wash, flood plain and channel deposits
Older alluvium
Includes alluvial-fan deposits, some slope wash, talus, upland alluvial and high-level shoreline deposits
Volcanic rocks, undivided
Primarily andesite, basalt rhyolite and rhyolite tuff
Granitic rocks
Includes alaskite stock which forms Whistler Mountain, quartz diorite plugs, and quartz porphyry sills and dikes
Carbonate sedimentary rocks
Primarily limestone and dolomite with some interbedded sand and shale
Terrigenous sedimentary rocks
Primarily sandstone, quartzite, shale or conglomerate with some interbedded limestone or dolomite
PLEISTOCENE AND RECENT
PLEISTOCENE
QUATERNARY
TERTIARY AND QUATERNARY
CRETACEOUS AND TERTIARY
CAMBRIAN TO PENNSYLVANIAN
CAMBRIAN TO CRETACEOUS
(SOURCE: HARRILL AND LAMKE 1968)
39°45'
39°45'
NEWARK VALLEY
Green Canyon
DIAMOND VALLEY
KOBEH VALLEY
WHISTLER MOUNTAIN
Hildebrand Canyon
South Diamond Peak
Devils Gate
MOUNTAIN BOY RANGE
A
A'
T.L. Shaft
Fad Shaft
Eureka
39°30'
39°30'
DIAMOND MOUNTAINS
Spring Valley Canyon
Ruby Hill
Prospect Peak
FISH CREEK VALLEY
FISH CREEK RANGE
NORTH
MILES
0 1 2 3 4 5 6 7 8
116°00'
RUBY HILL PROJECT
MAP 3-2
GENERAL GEOLOGY MAP
DIAMOND VALLEY

Era	Age	Time (Ma)	Name	Thickness (feet)	Lithologic Character
CENOZOIC	Quaternary		Alluvium	0–500±	Stream and slope alluvium, terrace gravels, and mine and smelter dumps
			Unconformity		
	Late Tertiary or Quaternary		Pyroxene andesite and basalt	700+	Lava flows; a few dikes and small plugs.
			Intrusive contact and unconformity		
	Oligocene or Miocene		Rhyolite tuff	400±	White, layered tuff.
			Rhyolite	100± of flows exp.	Chiefly intrusive plug, dikes, and breccia pipes; vitrophyre sill; and local lava flows.
	Eocene	65	Hornblende andesite	300± of flows exp.	Dike and lava flows.
MESOZOIC	Late Cretaceous		Quartz porphyry	-------	Sills and dikes
			Quartz diorite	-------	Intrusive plug south of Ruby Hill.
			Intrusive contact		
	Early Cretaceous	225	Newark Canyon Formation	200±	Fresh-water conglomerate, sandstone grit, shale, and limestone
			Unconformity		
PALEOZOIC	Permian		Carbon Ridge Formation	1,000±	Thin-bedded sandy and silty limestone; some included sandstone and dark shale.
			Unconformity–Ely Limestone absent		
	Late Mississippian		Diamond Peak Formation	0–300	Conglomerate, limestone, and sandstone.
			Chainman Shale	500± exp.	Black shale with thin interbedded sandstone
			Break in section		
	Middle and Late Devonian		Devils Gate Limestone	500± exposed	Thick-bedded limestone, locally dolomitized.
			Break in section–Nevada, Lone Mountain, and Roberts Mountains Formations not recognized in mapped area		
	Late Ordovician		Hanson Creek Formation	300± exp.	Dark-gray to black dolomite.
			Unconformity?		
	Middle to Late (?) Ordovician		Eureka Quartzite	300±	Thick-bedded vitreous quartzite.
			Unconformity		
	Early and Middle Ordovician		Pogonip Group	1,600–1,830	Chiefly cherty thick-bedded limestone at top and bottom; thinner bedded shaly limestone in middle.
	Late Cambrian		Windfall Formation: Bullwhacker Member	400	Thin-bedded sandy limestone.
			Windfall Formation: Catlin Member	250	Interbedded massive limestone, some cherty, and thin sandy limestone.
			Dunderberg Shale	265	Fissile brown shale with interbedded thin nodular limestone.
	Middle and Late Cambrian		Hamburg Dolomite	1,000	Massively bedded dolomite; some limestone at base.
	Middle Cambrian		Secret Canyon Shale: Clarks Spring Member	425–450	Thin-bedded platy and silty limestone, with yellow or red argillaceous partings.
			Secret Canyon Shale: Lower Shale Member	200–225	Fissile shale at surface; green siltstone underground.
			Geddes Limestone	330	Dark-blue to black limestone; beds 3–12 in. thick; some black chert.
			Eldorado Dolomite	2,500±	Massive gray to dark dolomite; some limestone at or near base.
	Early Cambrian		Pioche Shale	400–500	Micaceous khaki-colored shale; some interbedded sandstone and limestone
		570	Prospect Mountain Quartzite (base not exposed)	1,700+	Fractured gray quartzite weathering pink or brown; a few thin interbeds of shale.

(SOURCE: NOLAN 1962)

RUBY HILL PROJECT

TABLE 3-7
STRATIGRAPHIC COLUMN
EUREKA MINING DISTRICT

and Holocene deposits contain less slope wash and alluvial fan deposits and more fluvial and channel deposits. Silt and clay playa deposits are the most recent deposits in Diamond Valley (Nolan 1962). Areas labelled as Quaternary in Map 3-2 also include some late Tertiary gravel. Alluvial deposits are as much as 7,500 feet thick in the center of Diamond Valley (Harrill and Lamke 1968), but in the project area the deposits typically range from 0 to 750 feet thick.

Structure in the area is very complex. Older rocks are affected by both Mississippian- and Mesozoic-age deformation, which produced imbricate thrust sheets and related folds and high-angle faults. Present topography is mostly a reflection of Basin and Range faulting that has overprinted or segmented structural blocks created by previous tectonic activity. Inception of Basin and Range extension and faulting has been dated variously at 10 to 30+ Ma at different locations within the Great Basin. Major fault zones of the region are shown in Figure 3-3; these faults have aided in recognition of distinct structural domains or blocks. The project area and the historic Ruby Hill deposits are located within the Prospect Ridge block, which is a faulted and folded antiform. The Mahogany Hills block, to the west, is separated from the Prospect Ridge block by the Spring Valley and Sharp faults, which account for several thousand feet of Pleistocene and late Tertiary motion; these faults, along with the eastern branches of the Jackson-Lawton fault zone, are largely responsible for uplift and the present relief of the Prospect Ridge block.

Mineral deposits in the district are mostly confined to a few stratigraphic units. The Eldorado Dolomite hosts the rich gold, silver, and lead replacement deposits mined at Ruby Hill in the previous century, as well as the deep Fad resource defined and partly developed, but not mined, during the period 1940 to 1965. The Hamburg Dolomite hosts the TL ore body southwest of West Archimedes and a group of deposits further south in the district, including the Windfall and Ratto Canyon ore bodies. Pogonip Group rock, especially the upper portion of the Goodwin Limestone, host most of the West Archimedes gold deposit. Carbonate rocks of the Windfall Formation host a few district deposits, including the Holly replacement ores mined in the period 1915 to 1927. All mineralization in the district is believed to be related either to Cretaceous intrusive bodies or to Tertiary hydrothermal activity.

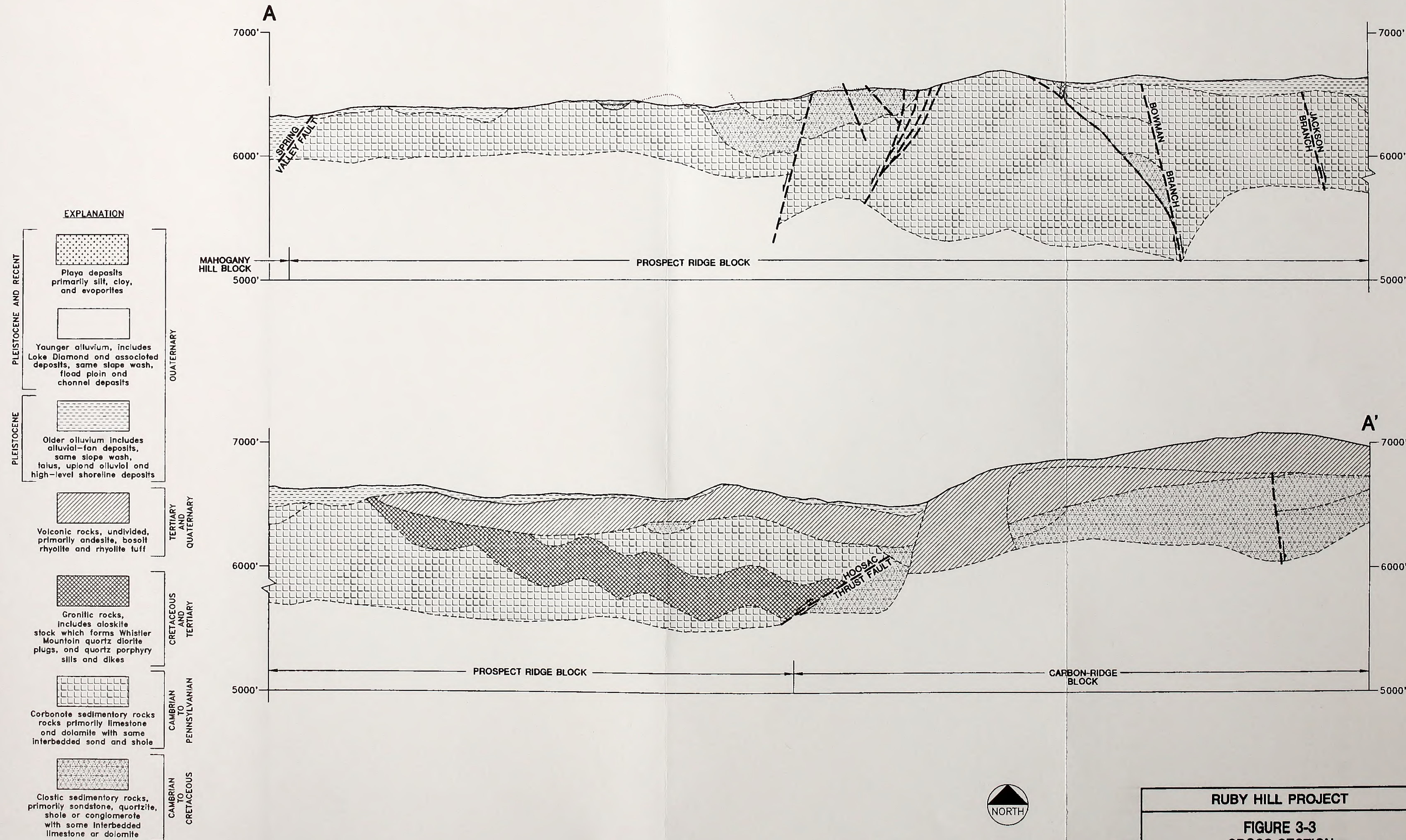
3.2.1.3 General Site Geology

Stratigraphy

The general site geology is illustrated in Map 3-3. The stratigraphic column in the immediate project area includes most of the major rock types listed in Table 3-7, Regional Geologic Setting. Cambrian rocks and the granitic plutons exposed on Prospect Ridge to the southwest would not be exposed by the proposed pit. The Quaternary Alluvium and Pogonip Group rocks, specifically those of the Ninemile Formation and the Goodwin Limestone, would be affected by the proposed pit operation. The ore from the proposed pit would come mostly from the Goodwin Limestone (WESTEC 1996a). The overlying alluvium has a varying thickness and would be removed as overburden. Most of the proposed Ruby Hill Project, including the pit, rock dump and heap, and processing facilities, will be located on alluvium, which is part of extensive alluvial fan deposits on the margins of the Fish Creek Range.

Structure

The project area lies within the Prospect Ridge block, as discussed in Section 3.2.1.2, Regional Geologic Setting. The major faults of the project area, as identified by previous field work and drill data, include the Jackson, Holly, Bowman-150, and Austin Canyon faults (Map 3-3). Fault traces are not well exposed in the area. These faults appear to include both Basin and Range and older (Cretaceous) offsets. Most are believed to be high-angle normal faults. The Jackson, Bowman-150, and Holly faults probably represent the most offset; the latter two will be prominent in the pit. The Bashful Molly and Austin Canyon faults may include some strike-slip component.



(SOURCE: NOLAN 1962 AND HARRILL AND LAMKE 1968)

RUBY HILL PROJECT

FIGURE 3-3
CROSS-SECTION
SOUTHERN PART OF DIAMOND VALLEY

LEGEND

Qal Quarternary Alluvium	Op Ordovician Pogonip Group	-Ɛd Cambrian Dunderburg Shale	Piezometer
Tv Tertiary Volcanic	-Ɛwb Cambrian Windfall Fm. Bullwhacker Member	Fault	Monitoring Well
Krp Cretaceous Rhyolite Porphyry	-Ɛwc Cambrian Windfall Fm. Catlin Member	Axis of Anticline	
Kgf Cretaceous Graveyard Flat Intrusive		Formation Contact	

(SOURCE: WESTEC 1996a)

RUBY HILL PROJECT

MAP 3-3
GEOLOGY IN THE PROPOSED PIT

Mineralization and Pit Geology

West Archimedes is a disseminated gold deposit hosted by Ordovician carbonate rocks. Primary hosts include the upper portion of the Goodwin Limestone and the lower Ninemile Formation. Beds in the project area mostly strike northwest and dip gently northeast. Economic gold concentrations appear to correlate with minor faults lying between the Holly and Jackson faults. These less-obvious faults, including sets with northeast and west-northwest orientations, have been modeled within the pit area but are not shown on the map; most represent modest offsets. Ore zones are confined mostly to tabular, elongate jasperoid bodies and lenses of stained, decalcified limestone. Gold is present as finely disseminated particles and was originally deposited with various sulfide species from hydrothermal solutions that circulated through permeable horizons and along fault zones. Oxidation of mineralized bodies extends more than 700 feet in the project area, and virtually all ore in the proposed pit is oxidized. Figure 3-4 shows a generalized cross-section through the pit.

Other metals besides gold are present in the area but not in identified economic concentrations. Small bodies of lead, silver, and gold ore were extracted from the Holly and Bullwhacker mines southwest of the proposed pit, and some pyrite-bearing lead, zinc, gold, and silver-rich zones have been identified beneath the eastern portion of the Archimedes deposit. The oxidized Archimedes ores contain anomalous amounts of arsenic, mercury, and antimony, and arsenic sulfide minerals have been identified in drill core and cuttings from deeper in the system.

Most of the suspected major faults strike NNW or NNE and represent several hundred or more feet of offset; most appear to dip steeply to the east. Much of this offset is believed to have occurred prior to mineralization and appears to be related to the Hoosac thrust system, but Basin and Range offset has overprinted this earlier deformation. Best examples of Basin and Range offset are the Spring Valley and Xenophon/Graveyard faults, but some suspected faults north of the pit with northwest and northeast orientations appear to record Basin and Range adjustments.

Mineral Resources

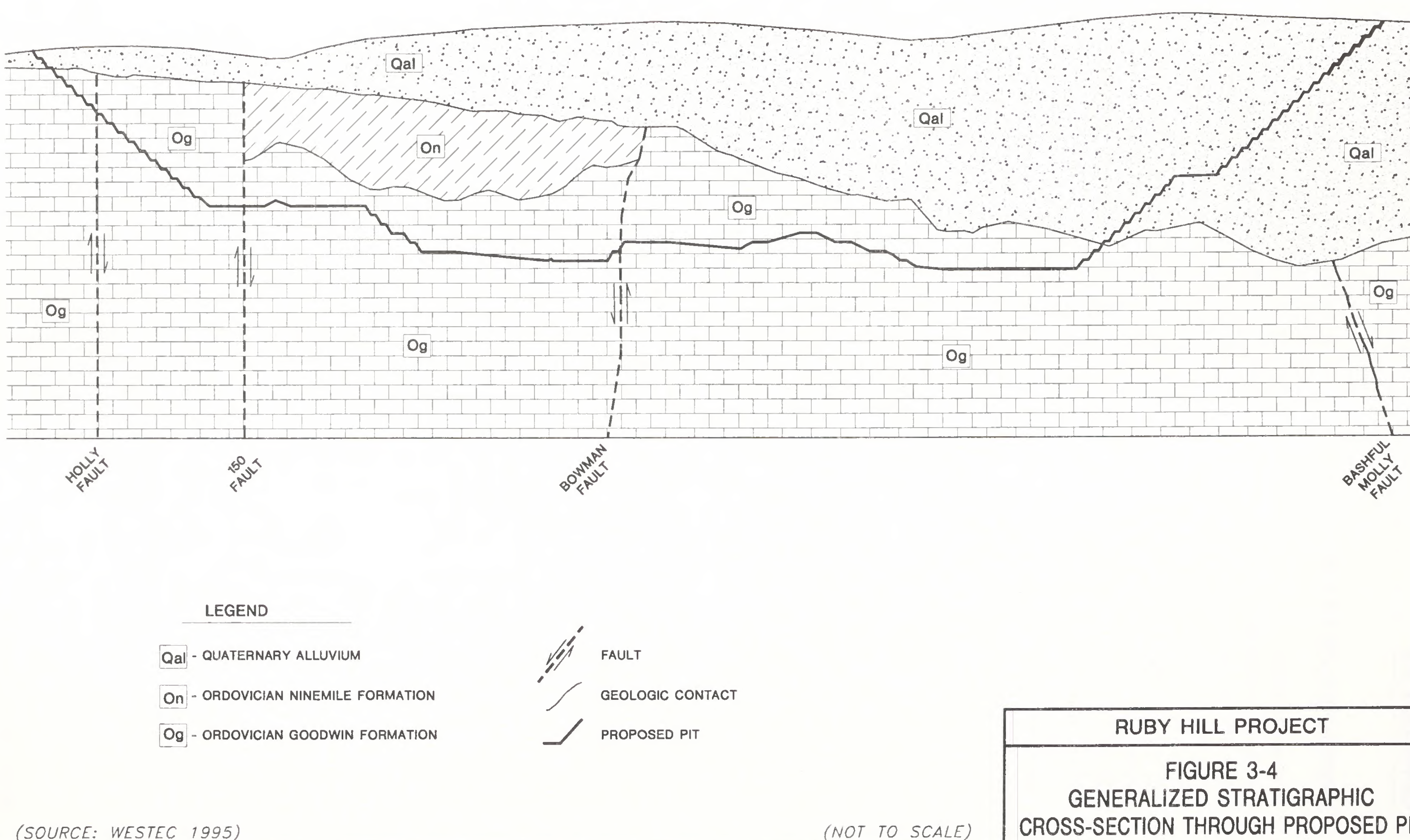
Metal resources are typically associated with the region. The Eureka mining district is famous for silver and lead. The are some minor occurrences of copper and other base metals (Nolan 1962). Industrial rock and mineral operations in the area include gypsum and barite mines far to the north and possible sand and gravel operations in the local area. Only minor amounts of silver have been detected in the proposed pit. The mine should not affect any other mineral resource.

Oil and Gas

Oil and gas production is low in Nevada; there are fewer than 50 producing wells in the whole state, according to Nevada Division of Minerals (1995). The Eagle Springs area, approximately 100 miles south, was well explored in the 1950s by Shell and a few productive wells were established there. Exploration by other companies found no productive wells, and exploration in the state dropped off until the oil embargo occurred in the 1970s. Within the past decade, some small productive wells have been established in four oil fields, in the northeastern corner of Eureka county near Elko (Nevada Division of Minerals 1993). In 1954, Diamond Valley Corporation drilled an exploratory well in Section 15, T26N, R54E to a depth of 1,072 feet, and in 1956 Shell Oil Company drilled an exploratory well to a depth of 8,042 feet in Section 30, T23N, R54E in Diamond Valley (Harrill and Lamke 1968). No oil was discovered. There is no known oil or gas potential in the project area; thus, production is not expected to occur near the site.

Geothermal Energy

In the northern part of Diamond Valley, springs are warm and considered to be fault-controlled, deep-circulating groundwater (Harrill and Lamke 1968). Further geothermal activity does not occur at any other known sources in Diamond Valley or in the project area. The nearest source of geothermal energy, a geothermal plant, is



RUBY HILL PROJECT

FIGURE 3-4
GENERALIZED STRATIGRAPHIC
CROSS-SECTION THROUGH PROPOSED PIT

approximately 100 miles northwest of the site (Nevada Division of Minerals 1993). There is no geothermal activity associated with the proposed project site.

3.2.1.4 Faulting and Seismicity

Faulting

The proposed project site is located in a seismically active region; however, there has been little seismic activity within 10 miles of the proposed site. There has been no seismic activity at the proposed site, since record keeping began in 1872 (National Earthquake Center 1996). There has been activity on the Ruby Hill and Spring Valley Faults between the Pleistocene to Holocene epochs, as determined by fault scarps in the area. The Ruby Hill Fault is approximately 3 miles southwest of and the Spring Valley Fault is approximately 6 miles west of the proposed pit.

Seismicity

The project site is located in a region that has experienced a high level of seismic activity over historic time. The State of Nevada is seismically very active due to the extension associated with Basin and Range activity (557 recorded earthquakes within 100 miles of the site). The earthquake records, compiled by the National Earthquake Center in Golden, Colorado (1996) from multiple databases, indicate that 87 earthquakes with a known magnitude >3.0 have been recorded within a 50-mile radius of the site from 1872 to 1995, as presented in Table 3-8. Of these, 31 have had a local magnitude of 4.0 to 4.7, with 4.7 being the highest recorded magnitude within 50 miles of the site (on February 13, 1952). The highest recorded magnitude within 10 miles of the site was 4.0, which occurred on June 16, 1974. The largest seismic events that have occurred within 100, 50, and 10 miles of the proposed pit are presented in Table 3-9. No recorded earthquakes have occurred within 1 mile of the proposed pit.

The attenuation relationships of Joyner & Boore (1988), Krinitzsky et al. (1987), and Schnabel and Seed (1973) were applied using the significant earthquake events compiled by the National Earthquake Center in Golden, Colorado (1996). The mean peak acceleration value for the respective magnitude was used for each method. Krinitzsky et al. (1987) gave relationships for distance and peak acceleration for both the hard site and soft site case. The highest values from the two cases were used. For Schnabel and Seed (1973), peak accelerations for magnitudes 4.0 and 4.7 were not given. The lowest magnitude given (5.2) was used in the determination of peak acceleration for these cases.

Table 3-8

Seismic Events (> 3.0) Recorded Near the Site Between 1872 and 1995

Local Magnitude	Number Within 50 Miles	Number Within 10 Miles
7-8	0	0
6-7	0	0
5-6	0	0
4-5	26	1
3-3.9	50	10
unknown	8	5

Table 3-9

Largest Seismic Events to Affect Area

Year	Location (Latitude, Longitude)	Largest Event Within	Magnitude	Estimated Peak Site Acceleration: Joyner & Boore 1981	Krinitzsky & Others 1987	Schnabel & Seed 1973
1872	39.0,117.0	100 miles	6.0	0.01g	0.02g	0.01g
1952	39.60, 116.50	50 miles	4.7	0.01g	0.03g	0.01g
1974	39.494, 115.978	10 miles	4.0	0.03g	0.03g	0.03g

Design Earthquake

The design earthquake having a magnitude of 6.2 was determined by WESTEC (1996c) using National Oceanographic and Atmospheric Administration (1987) data. This design earthquake was determined using the relationship of number of earthquake events for magnitude ranges. This relationship was applied to the 100-year return event. Nevada uses the 100-year return period for determining design earthquakes (Homestake 1995a).

A general effective peak acceleration for the site of 0.16g was determined by calculations for a 6.2 magnitude earthquake 18.7 miles from the site with a 1.0 percent chance per year of exceeding that magnitude (WESTEC 1996c).

3.2.2 Environmental Consequences

Issues related to geology and minerals include: 1) creation or exacerbation of geologic hazards from the project development and 2) impacts to potential future resource availability. Environmental impacts to geology and minerals are considered significant if the proposed action or the selected alternative results in the following:

- Construction in an area where the facility could potentially be affected by or induce geologic hazards.
- Concealment or prohibition of other known mineral resources.

3.2.2.1 Proposed Action

Geology and Mineral Resources

Direct impacts of the proposed action on geologic and mineral resources would include: 1) the generation and permanent disposal of approximately 60 million tons of waste rock and overburden and approximately 8 million tons of spent ore, 2) the disturbance of approximately 696 acres of alluvial fan, and 3) the extraction of approximately 755,000 ounces of gold from the ore resource (Protani 1996).

Existing geologic information and condemnation drilling results indicate that no known mineral resources exist beneath the footprint of the proposed processing and disposal facilities; therefore, placement of these facilities should not inhibit future attempts to recover minerals from the area, except for decreasing access to the alluvium below. There are no known active faults in the area, and there have been no earthquakes on the site since record keeping began in the area in 1872 (see Section 3.2.1.4, Faulting and Seismicity).

3.2.2.2 East Waste Rock Dump Alternative

The impacts caused by the East Waste Rock Dump Alternative would not change from the impacts caused by the Proposed Action, except for disturbance of alluvial fan material, which would increase to 715 acres.

3.2.2.3 West Waste Rock Dump Alternative

The impacts caused by the West Waste Rock Dump Alternative would not change from the impacts caused by the Proposed Action, except for disturbance of alluvial fan material, which would decrease to 577 acres.

3.2.2.4 Partial Backfilling Alternative

The Partial Backfilling Alternative would not reduce the overall size of the proposed pit or waste rock dump. Relative to the Proposed Action, the alternative would not have different effects to the geology of the proposed site.

3.2.2.5 No Action Alternative

No impacts to geology would occur with the No Action Alternative.

3.2.3 Cumulative Impacts

Surface mining activity affects geology and mineral resources by excavating, modifying, or covering natural topographic and geomorphic features and by removing mineral deposits. The cumulative effects area for geology and mineral resources is shown on Map 3-4. Historically, this area has been mined for many commodities.

Mining disturbance has included open pit and underground mining, waste rock disposal, heap leach ore milling and processing, tailing disposal, and exploration (road construction and drilling pads). Production in this district has included gold and silver. The estimated cumulative area of disturbance by past mining activities is approximately 26 acres. Present disturbance is calculated to be 150 acres, with an additional 696 acres for the proposed site.

Because mining is a major activity in this area, large-scale mining would likely continue and would probably result in the creation or expansion of open pits, waste rock disposal areas, heap leach pads, and tailing facilities in the foreseeable future. A reasonably foreseeable future action is the East Archimedes Oxide Project, which would expand the proposed pit and waste rock disposal facilities, and increase the total disturbance area by 300 acres. Table 3-10 presents the total disturbances from interrelated projects.

The interrelated projects would be expected to remove the remaining estimated recoverable gold resources. Future mining projects would be developed to avoid covering potential resources with project facilities such as leach pads and waste rock dumps.

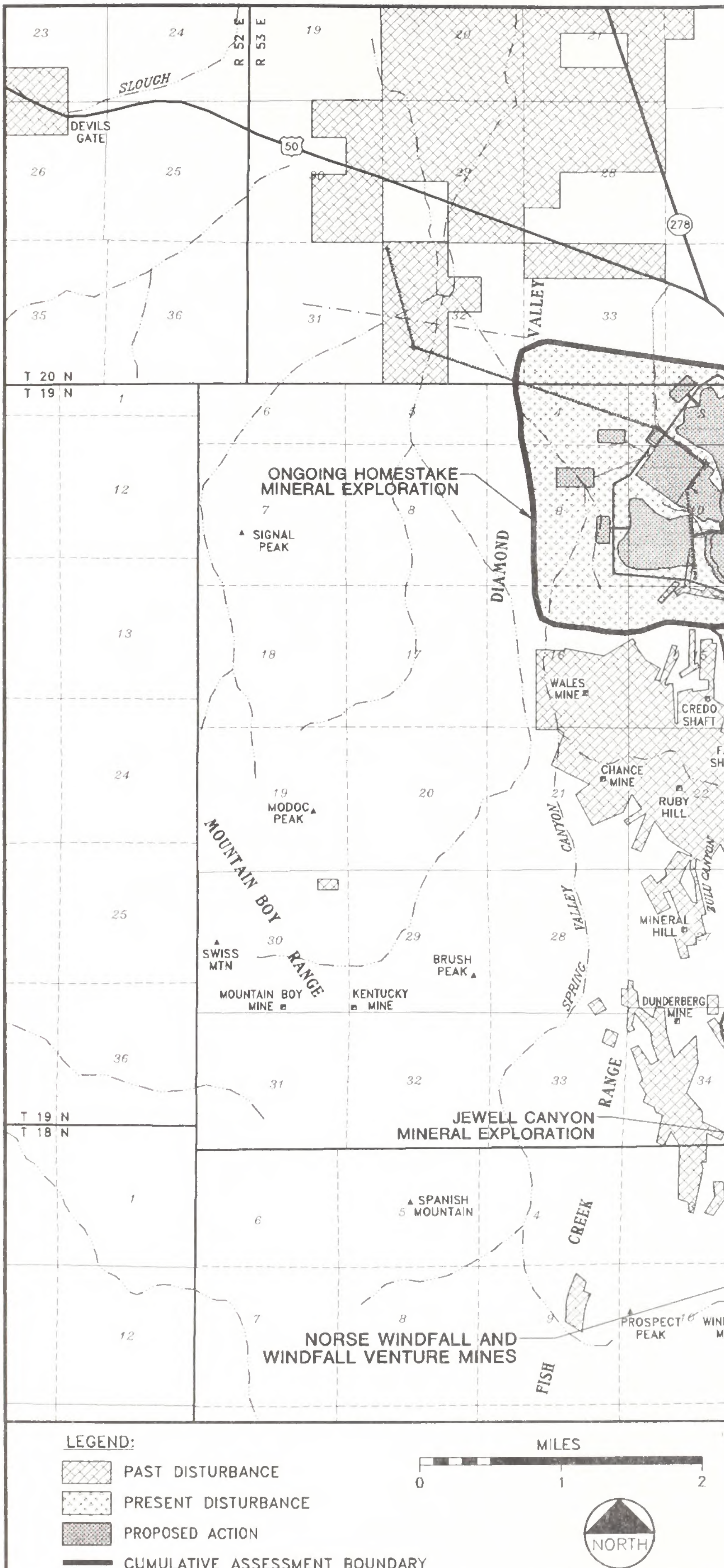
The primary geologic impact of open pit mining is the permanent removal and loss of resources for future generations. The removal of the resources is an inevitable result of mining; however, the loss of future resources by placing waste and other structures above them would be avoided by condemnation drilling.

3.2.4 Mitigation and Monitoring

Potential impacts to geology and minerals would be minimized by reclamation practices included as part of the Proposed Action (see Section 2.1.15, Reclamation Plan). No additional measures are recommended for geology and minerals.

3.2.5 Residual Adverse Impacts

Adverse residual effects associated with the Proposed Action would include the generation and permanent disposal of approximately 60 million tons of waste rock, approximately 8 million tons of spent ore, and the disturbance of approximately 696 acres of alluvial fan. Under the Proposed Action, these direct impacts would not be mitigated.



RUBY HILL PROJECT

MAP 3-4
CUMULATIVE ASSESSMENT AREA
FOR GEOLOGY

Table 3-10

Disturbance Acreage in the Cumulative Assessment Area for Geology

	Disturbance Acreage in Cumulative Effects Area
Past Disturbance	
Mining Activity (Patented Lands)[1]	26
Present Action	
Ongoing Homestake Mineral Exploration	150
Reasonably Foreseeable Future Action	
East Archimedes Oxide Project	300
Proposed Action (Ruby Hill Project)	696
Correction Factor[2]	<50>
Total Disturbance	822

[1]The majority of historic mining disturbance has occurred on patented lands.

[2]Correction factor used to minimize double-counting of disturbance in exploration areas that subsequently undergo mine development.

3.3 Paleontology

3.3.1 Affected Environment

Exposed geologic formations located within the proposed project area consist largely of Pleistocene alluvium, Upper Cretaceous quartz porphyry, and Cambrian to Ordovician-age sedimentary rocks, primarily composed of limestone and dolomite with some interbedded sandstone and shale (Nolan 1962). Of these formations, the Ordovician-age Pogonip Group and the Cambrian-age Dunderberg Shale have been identified as containing paleontologic resources.

Pogonip Group limestone underlies the proposed leach pad and pit areas. Exposures of Dunderberg Oil Shale is located immediately adjacent to the proposed leach pad and pit areas. Pogonip limestones located near Prospect Peak and Hoosac Mountain approximately 5 miles to the south of the proposed project area are known to contain abundant invertebrate fossils of Early and Middle Ordovician age (Nolan 1962). Limestone beds in the Dunderberg Shale are highly fossiliferous and have yielded large and varied invertebrate fauna of Late Cambrian age. Similar fossils have been recorded from many other localities in eastern Nevada (Nolan 1962).

No paleontological resources of critical scientific or educational value are known to occur within the proposed mine area. The nearest significant fossil locality in the vicinity of the Proposed Action is near Conical Hill, approximately 8 miles east/northeast of the proposed mine area. No vertebrate fossil localities are known to occur within the proposed project area (Henry 1996).

3.3.2 Environmental Consequences

To be considered significant, a paleontological resource must retain integrity and satisfy at least one of the criteria listed below:

- The resource is a unique or site-specific fossil occurring in formations that are found in the proposed project disturbance area.
- The resource qualifies as significant, or of critical scientific or educational value and requires protection under the Antiquities Act of 1906.

Degradation of unique, site-specific, or diagnostic fossils occurring in formations found in the project area or degradation of paleontological resources that have been identified by the paleontological community as significant or of critical scientific or educational importance that are protected under the Antiquities Act of 1906 would constitute a significant environmental impact.

Potential direct impacts to paleontological resources from the proposed action would be limited to areas of disturbance; potential indirect impacts could result from increased accessibility to fossil beds from improved access.

3.3.2.1 Proposed Action

Invertebrate and paleobotanical fossils occur in rocks of the Pogonip Group and Dunderberg Shale. Both of these geologic units are found underlying or adjacent to the proposed leach pad and pit area and potentially portions of the waste rock dump. None of these fossils, however, appear to be unique or site-specific to the area, and no impacts to significant or critical fossil resources requiring protection are anticipated. None of the paleontological resources identified in the Proposed Action area appear to have critical scientific or educational value (Henry 1996).

Because fossils are usually buried, their locations cannot be confirmed until excavation occurs. If significant fossiliferous deposits, particularly vertebrate fossils, are located during construction, operation, or reclamation, measures would need to be taken to identify and preserve the fossils. Waste rock dump areas would not destroy any known fossil beds but could potentially restrict access and limit future study.

3.3.2.2 East Waste Rock Dump Alternative

Under the East Waste Rock Dump Alternative, impacts to paleontological resources and mitigation requirements would be generally identical to those identified for the Proposed Action. Potential fossil-bearing formations would not be covered by the waste rock dump.

3.3.2.3 West Waste Rock Dump Alternative

Under the West Waste Rock Dump Alternative, impacts to paleontological resources and mitigation requirements would be identical to those identified for the Proposed Action.

3.3.2.4 Partial Backfilling Alternative

Since no reduction in area disturbed by the project would occur under this alternative, impacts to paleontological resources and mitigation under the Partial Pit Backfill Alternative would be identical to those identified for the Proposed Action.

3.3.2.5 No Action Alternative

Under the No Action Alternative, impacts to paleontological resources from mine development would not occur. Continued erosional effects and collecting would continue to occur at a rate similar to what is currently taking place in the area. Data that would have been obtained from mitigation of deposits that may have been impacted under the Proposed Action would not be collected.

3.3.3 Cumulative Impacts

Portions of the cumulative effects area, including the proposed project area, past and present effects area, and the Jewell Canyon mineral exploration area, lie on known fossiliferous geologic deposits.

The Pogonip limestones located near Prospect Peak and Hoosac Mountain contain abundant invertebrate fossils of Early and Middle Ordovician age. Cambrian to Cretaceous-age sedimentary rocks that include primarily sandstone, quartzite, shale or conglomerate with some interbedded limestone or dolomite are located near the Locan Shaft. Early Cambrian-age invertebrate fossils have been found in both the shales and limestones of this formation (Nolan 1962).

South of Prospect Peak and along the Prospect Ridge, the Secret Canyon Shale contains fossils of Middle Cambrian age. The late Ordovician-age Hanson Creek Dolomite found at Roberts Creek Mountain and at Wood Cone, southwest of Eureka, is fossiliferous. The Devils Gate Limestone, found on the west side of Spring Valley, west of the Prospect Mountain tunnel, and at the head of Mountain Valley, on the south flank of Prospect Peak, contains abundant Devonian fauna including brackiopods, gastropods, and stromatoporoids. The Diamond Peak Formation, which outcrops in the lower Windfall Canyon area and on the lower eastern slopes of Hoosac Mountain is abundantly fossiliferous, containing invertebrate fossils of Late Mississippian age. The Permian-age Carbon Ridge Formation, located along the eastern border of the Eureka mining district, consists mostly of limestones and has an abundant fossil assemblage, characterized especially by fusulinids. The Early Cretaceous-age Newark Canyon Formation, which generally lies just south of Eureka to the southern border of the Eureka Mining District and from the western slopes of McCoy Ridge to the summit of Hoosac Mountain, commonly contains gastropods and clams. Plant fragments, including silicified wood, have been found in the formation and fish remains and bone also have been identified. Cambrian-age limestone beds with the Hamburg Dolomite locally are fossiliferous and have yielded varied assemblages. Hamburg Dolomite crops out on Adams Hill, north of Ruby Hill (Nolan 1962).

None of the above fossils in formations exposed within the cumulative effects area have been identified as critical, significant or unique; all are relatively common throughout Nevada (Henry 1996; Nolan 1962). Therefore, no impacts to critical or significant fossils are anticipated from the proposed action and interrelated projects in the cumulative effects area.

3.3.4 Mitigation and Monitoring

Issue: Disturbance of significant fossils

Measure 1: If potentially significant fossils, such as vertebrate fossils, are discovered during mine development, operations, or reclamation, steps would be taken to identify and preserve them. Homestake would contact the BLM paleontologist in the Battle Mountain District office to determine the steps necessary for dealing with the fossils.

Effectiveness: This measure would allow for the evaluation of the importance of any vertebrate fossils that may be discovered and provide adequate time for their preservation or data recovery.

Application: This measure would be applied to the Proposed Action and all alternatives, except the No Action Alternative.

3.3.5 Residual Adverse Impacts

Since no known significant paleontological resources have been identified in the project area, no adverse impacts to the resource are anticipated and no residual adverse effects are expected to occur.

3.4 Water Quality and Quantity

3.4.1 Affected Environment

3.4.1.1 Surface Water

Hydrologic Setting

The Ruby Hill Project area is located in the southern end of Diamond Valley on an alluvial fan approximately 1 mile northwest of Eureka, Nevada. Diamond Valley is an intermountain valley, with an area of approximately 735 square miles, and is bounded on the east by the Diamond Mountains and on the west by the Sulphur Spring Range, Whistler Mountain, and the Mountain Boy Range. The southern boundary is formed by the Fish Creek Range and the northern boundary by the Diamond Hills (Harrill and Lamke 1968). Due to these surface boundaries, Diamond Valley is a closed basin except for inflow through Devils Gate. Devils Gate is a topographic low between Whistler Mountain and the Mountain Boy Range and permits surface and subsurface inflow from Antelope, Kobeh, and Monitor Valleys (Harrill and Lamke 1968). Garden Valley also contributes subsurface flow to the Diamond Valley basin (WESTEC 1996a). For the purposes of this section, the Diamond Valley Hydrographic Basin has been subdivided into two hydrographic subareas: the North Diamond Subarea and the South Diamond Subarea. The Diamond Valley Hydrographic Basin and the North and South Subareas are shown in Map 3-5. The Ruby Hill Project Area is located within the southern portion of the South Diamond Subarea.

Surface Water Inventory

A few perennial streams occur in Diamond Valley, and are located on the ***western*** slopes of the Diamond Mountains (Harrill and Lamke 1968). During very wet years the channel at Devils Gate and the ditch in Eureka may carry minor amounts of water throughout the year. The only ephemeral streams carrying a significant snowmelt volume also are located in the Diamond Mountains. Most of the ephemeral and perennial streams flow radially inward from the mountains toward the playa in the north-central part of the valley and have maximum flow near the base of the mountains. Streamflow diminishes downslope on the alluvial apron because of increased infiltration and evapotranspiration (Harrill and Lamke 1968). No perennial streams are found in the southern region of Diamond Valley, where the Ruby Hill project site is located. Sixteen intermittent drainages, trending south to north, were identified within the project area by WESTEC. These drainages were dry at the time of identification and probably carry flow only during precipitation events or seasonal snowmelt.

A waters of the United States survey was conducted within the project area (WESTEC 1995). Small intermittent drainages that had a definable channel and bank were identified as waters of the United States. Seven of the 16 intermittent drainages located within the project area were identified as waters of the United States (Map 3-6). Definable channels within these drainages have an average width of approximately 2 feet (range - 0.7 to 2.5 feet) and support only upland vegetation. ***After field review of these waters of the United States, the U.S. Army Corps of Engineers determined that these drainages were not jurisdictional waters of the United States (U.S. Army Corps of Engineers 1996).*** Wetlands are not present within the project area.

Several springs are found in the northern and northwestern sections of the North Diamond Subarea. In the Southern Diamond Subarea, a few small springs occur along the east side of the valley. Most of the springs in Diamond Valley occur near the bases of alluvial fans (Harrill and Lamke 1968). No springs have been identified inside the Ruby Hill Project area (WESTEC 1996a). A regional survey in June 1995 located seven springs and one seep ***between 2.5 and 3.5*** miles away from the proposed pit, and occur at elevations above the project area. All of the springs and the seep were found to the south and southeast of the project area, which is hydrogeologically upgradient.

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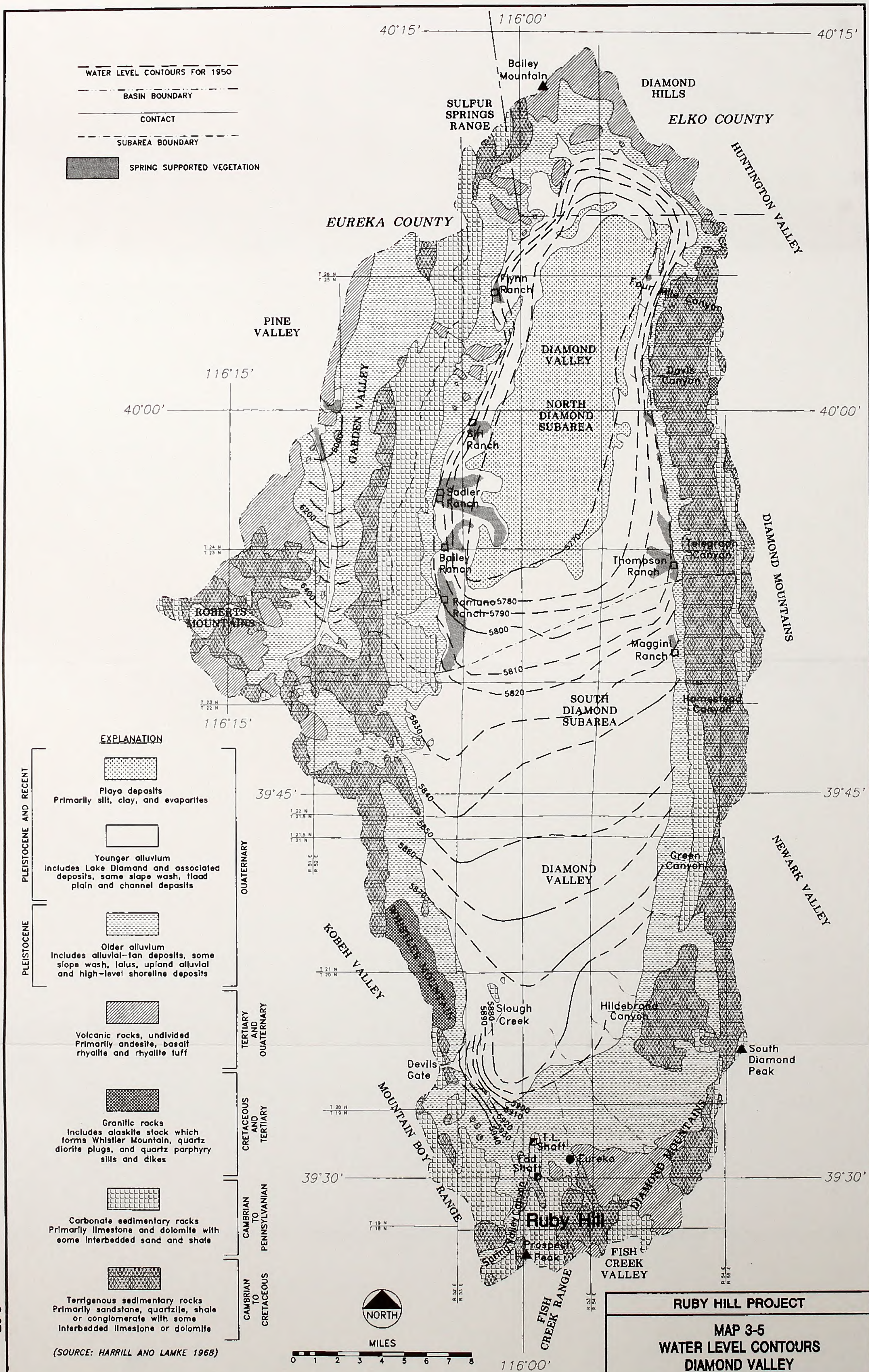


RUBY HILL PROJECT

MAP 3-5
WATER LEVEL CONTOURS
DIAMOND VALLEY

Flood Hydrology

The surface water at the Ruby Hill Mine flows generally from south to north across the site. Most of the flow across the site is storm runoff. No perennial streams exist at the site. Average annual precipitation for the proposed Ruby Hill Mine, for the period from 1952 to 1992, is 12.64 inches; average annual snowfall is 66.5 inches (WESTEC 1996c). Total precipitation for the 10-, 25-, and 100-year, 24-hour storms is shown below.

Storm Event	Total Precipitation (inches)
10-yr, 24-hr	2.1
25-yr, 24-hr	2.6
100-yr, 24-hr	3.2

Source: WESTEC 1996c.

Surface Water Quality

Waters of the State of Nevada are defined in the Nevada Revised Statutes, Chapter 445, Section 445.191, *Waters of the State Defined*, and include but are not limited to the following: 1) all streams, lakes, ponds, impounding reservoirs, marshes, water courses, waterways, wells, springs, irrigation systems, and drainage systems; and 2) all bodies or accumulations of water, surface or underground, natural or artificial. Water quality standards for state waters have been established by the State of Nevada and are described in the Nevada Administrative Code, Chapter 445, Sections 445.117 through 445.13976. Water quality criteria for drinking water were used to evaluate surface waters. These standards are listed in Table 3-11.

As mentioned earlier, there are no perennial streams in the project area. The chemistry of ephemeral streams is not known; even during sampling in 1995, a fairly wet year, all drainages were dry. Slough Creek, to the west of the project area, was sampled by USGS personnel in 1954 and found to contain very high concentrations of total dissolved solids, sulfate, and chloride.

There are no springs or seeps within 2.25 miles of the proposed pit. Springs within 3 miles of the proposed pit were sampled by WESTEC (1996a). The results of these analyses are shown in Table 3-12 and are shown in Appendix B on Map B-1 and Figure B-1. Of the constituents measured, all concentrations were below drinking water standards, except for the selenium concentration in Spring #3 and the iron concentration in Spring #8. All of the aforementioned springs and seeps are located at least 2.5 miles from the project site, and are upgradient (south) of the site.

3.4.1.2 Groundwater

Several hydrogeological investigations have been conducted within the Diamond Valley Ground Water Basin. These studies include an investigation of surface and groundwater conditions and quality, both regionally and within the project area, and modeling of the effects of groundwater withdrawal on water levels in the Ruby Hill Project area (WESTEC 1996a, b, and c); investigation of the hydrogeology of Diamond Valley (Harrill and Lamke 1968) and the Ruby Hill Project area (Canonie Environmental 1994); investigation of the chemistry of the proposed pit waste rock (Scanlan Engineering 1994a; WESTEC 1996d); investigation of the hydrogeology at the proposed mine water supply wells (Scanlan Engineering 1994b); and an investigation of water-level changes in Diamond Valley (Arteaga et al. 1995). These investigations have defined the hydrogeologic and geochemical conditions within the Diamond Valley Hydrographic Basin and beneath the Ruby Hill Project area. Table 3-13 presents a summary of the transmissivities and hydraulic conductivities of the units present within the Ruby Hill project area.

Groundwater recharge, storage, and flow depend on geological conditions. Within the Ruby Hill project area and Diamond Valley, groundwater occurs in both alluvium and bedrock aquifers. In the alluvium, groundwater recharge, flow, storage, and discharge are controlled by the permeability of the unconsolidated sediments. In the bedrock, porosity, permeability, and structure (i.e., faults and fractures) control the recharge, flow, storage,

Table 3-11

Water Quality Criteria and Standards for Nevada

Parameter[2]	Drinking Water Standards[1]			Nevada Agriculture	
	EPA Primary	EPA Secondary	Nevada	Irrigation	Stock Water
Arsenic	0.05	--	0.05	0.10	0.20
Aluminum	--	0.05 to 0.20	--	----------	----------
Barium	2.0	2.0	2.0	----------	----------
Beryllium	0.004	--	0	0.100	----------
Cadmium	0.005	--	0.005	0.01	0.05
Chloride	--	250	250 (400)[3]	----------	1500
Chromium	0.10	---	0.10	0.10	1.0
Copper	--[4]	1.0	--	0.20	0.50
Cyanide	0.20	--	0.20	----------	----------
Fluoride	4.0	2.0	--	1.0	2.0
Iron	--	0.30	--	5.0	----------
Lead	--[4]	--	0.05	----------	----------
Magnesium	--	150	--	----------	----------
Manganese	--	0.05	--	0.20	----------
Mercury	0.002	--	0.002	----------	0.01
Nickel	0.10	--	0.0134	0.20	----------
Nitrate (as N)	10	---	10	----------	100
pH	--	6.5 - 8.5	5.0-9.0	4.5 - 9.0	5.0 - 9.0
Selenium	0.05	--	0.05	0.02	0.05
Sulfate	--	250	250 (500)[3]	----------	----------
TDS	--	500	500 (1,000)[3]	----------	3000
Thallium	0.002	--	0.013	----------	----------
Zinc	--	5.0	--	2.0	25

[1]The more stringent of EPA and Nevada drinking water standards for each parameter is applicable in Nevada.

[2]Units are mg/l unless noted. SU = standard units; TDS = Total dissolved solids.

[3]Indicates numbers in ( ) are mandatory secondary standards for public water systems

[4]Action level for copper is 1.3 mg/l; action level for lead is 0.015 mg/l.

Source: Nevada (1995) LCB File No. R128-95, amendment to NAC 445.144; U.S. EPA Drinking Water Regulations and Health Advisories, February 1996.

Table 3-12

Surface Water Chemistry in Diamond Valley

Sample Id / Unit	Location	Date	pH (pH units)	TDS (mg/l)	SiO2 (mg/l)	Fe (mg/l)	Ca (mg/l)	Mg (mg/l)	Na (mg/l)	K (mg/l)	CO3 (mg/l CO3)	HCO3 (mg/l HCO3)	SO4 (mg/l)	Cl (mg/l)	NO3 (mg/l)	F (mg/l)
Water Quality Standard			<6.5, >8.5 [1]	500[2]-1000[3]		0.3[1]		150[1]					250[2]-500[3]	250[2]-400[3]	10[2]	2.0[1]-4.0[4]
springs (d)	T19N R53E S.25	5/7/58	7.6	303	39	0	69	10	15	1.2	0	242	41	6.7	1.5	0.4
Slough Creek	T20N R52E S.26	4/10/54	8.3	3440	21	0.06	41	94	1020	98	35	834	918	800	0.08	1.0
spring (db)	T23N R54E S.03	5/17/66	7.8	358	19	0.01	73	22	23	5.1	0	318	51	6.5	1.1	0.4
spring (ca)	T24N R52E S.23	4/16/63	7.6	330	30	0	55	21	30	6	0	288	33	17	0.6	0.5
Spring #1	T19N R53E S.13	12/5/84	n/a	n/a	36	0.10	41.0	13.0	15	4.0	n/a	n/a	n/a	n/a	n/a	n/a
Spring #2	T19N R53E S.23	12/5/84	n/a	n/a	13	0.00	79	13	10	1	n/a	n/a	n/a	n/a	n/a	n/a
Spring #3	T19N R53E S.25	12/5/84	n/a	n/a	13	0.00	114	23	15	2	n/a	n/a	n/a	n/a	n/a	n/a
Spring #3	T19N R53E S.25	7/29/89	7.48	412	16	0.00	103	23	10	2	n/a	452	59	8	2.1	0.19
Spring #4	T20N R53E S.25	12/5/84	n/a	n/a	11	0.00	113	28	8	1	n/a	n/a	n/a	n/a	n/a	n/a
Spring #5	T19N R53E S.24	12/5/84	n/a	n/a	36	0.00	32	14	13	3	n/a	n/a	n/a	n/a	n/a	n/a
Spring #6	T19N R54E S.19	12/5/84	n/a	n/a	54	0.00	20	8	16	4	n/a	n/a	n/a	n/a	n/a	n/a
Spring #7	T19N R53E S.13	12/5/84	n/a	n/a	43	0.19	16	6	9	4	n/a	n/a	n/a	n/a	n/a	n/a
Spring #8	T19N R53E S.13	12/5/84	n/a	n/a	15	0.47	71	13	13	3	n/a	n/a	n/a	n/a	n/a	n/a
Spring #9	T19N R53E S.13	12/5/84	n/a	n/a	32	0.00	67	25	26	6	n/a	n/a	n/a	n/a	n/a	n/a
SPLE #8	T19N R53E	1/13/72	8.29	286	n/a	0.01	63	16	n/a	n/a	n/a	285	n/a	9	3.4	0.12
Sheriff's office spring		10/18/8	n/a	n/a	30	0.01	60	26	17	4	n/a	n/a	n/a	n/a	n/a	n/a
Sheriff's office spring		10/24/8	n/a	n/a	30	0.00	78	20	17	4	n/a	n/a	n/a	n/a	n/a	n/a
Eureka Co. Mtn. spring		1/10/95	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.132

Sample Id / Unit	Location	Date	B (mg/l)	As (mg/l)	Ba (mg/l)	Cd (mg/l)	Cr (mg/l)	Cu (mg/l)	Pb (mg/l)	Mn (mg/l)	Hg (mg/l)	Se (mg/l)	Ag (mg/l)	Zn (mg/l)	conductivity (umhos/cm)
Water Quality Standard				0.05[2]	2[2]	0.005[2]	0.1[2]	1.0[3]	0.05[2]	0.05[3]	0.002[2]	0.05[2]	0.1[3]	5.0[1]	
springs (d)	T19N R53E S.25	5/7/58	0.10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	476
Slough Creek	T20N R52E S.26	4/10/54	1.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5370
spring (db)	T23N R54E S.03	5/17/66	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	583
spring (ca)	T24N R52E S.23	4/16/63	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	529
Spring #1	T19N R53E S.13	12/5/84	0.0	n/a	0.09	n/a	n/a	0.00	n/a	0.00	n/a	0.006	n/a	0.00	n/a
Spring #2	T19N R53E S.23	12/5/84	0.0	n/a	0.15	n/a	n/a	0.00	n/a	0.00	n/a	0.003	n/a	0.00	n/a
Spring #3	T19N R53E S.25	12/5/84	0.0	n/a	0.06	n/a	n/a	0.00	n/a	0.00	n/a	0.053	n/a	0.01	n/a
Spring #3	T19N R53E S.25	7/29/89	0.0	<0.003	0.08	<0.001	<0.005	0.00	<0.005	0.00	<0.0005	0.021	<0.005	0.00	680
Spring #4	T20N R53E S.25	12/5/84	0.0	n/a	0.06	n/a	n/a	0.00	n/a	0.00	n/a	0.014	n/a	0.01	n/a
Spring #5	T19N R53E S.24	12/5/84	0.0	n/a	0.10	n/a	n/a	0.00	n/a	0.00	n/a	0.004	n/a	0.00	n/a
Spring #6	T19N R54E S.19	12/5/84	0.0	n/a	0.09	n/a	n/a	0.00	n/a	0.00	n/a	<0.0025	n/a	0.00	n/a
Spring #7	T19N R53E S.13	12/5/84	0.0	n/a	0.06	n/a	n/a	0.00	n/a	0.02	n/a	<0.0025	n/a	0.01	n/a
Spring #8	T19N R53E S.13	12/5/84	0.0	n/a	0.07	n/a	n/a	0.00	n/a	0.00	n/a	<0.0025	n/a	0.01	n/a
Spring #9	T19N R53E S.13	12/5/84	0.0	n/a	0.16	n/a	n/a	0.00	n/a	0.00	n/a	0.004	n/a	0.01	n/a
SPLE #8	T19N R53E	1/13/72	n/a	NEG	n/a	n/a	n/a	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sheriff's office spring		10/18/84	0.0	n/a	0.11	n/a	n/a	0.02	n/a	0.00	n/a	0.021	n/a	0.10	n/a
Sheriff's office spring		10/24/84	0.0	n/a	0.10	n/a	n/a	0.00	n/a	0.00	n/a	0.023	n/a	0.06	n/a
Eureka Co. Mtn. spring		1/10/95	n/a	n/a	0.12	<0.005	0.01	n/a	n/a	n/a	<0.0002	0.009	n/a	n/a	n/a

n/a = not available

[1]Federal secondary water quality standard.

[2]Nevada primary water quality standard.

[3]Nevada secondary enforceable water quality standard.

[4]Federal primary water quality standard.

Bold indicates values that exceed drinking water standards.

Table 3-13

Hydrogeological Data for Units in the Ruby Hill Project Area

Test Holes	Unit	Type of Test	Transmissivity (gpd/ft)	Hydraulic Conductivity (feet/second)	Source
Fad Shaft	Eldorado Dolomite	Pumping	24,000		Nolan 1962
HRH-444 (P)	Bullwhacker	Slug	NA	3.4×10^{-8}	WESTEC 1996a
WB-01 (U)	Bullwhacker[1]	Constant Head	NA	1.3×10^{-6}	WESTEC 1996c
WB-03 (U)	Bullwhacker[1]	Constant Head	NA	9.8×10^{-5}	WESTEC 1996c
WB-06 (P)	Bullwhacker[1]	Falling Head	NA	9.8×10^{-6}	WESTEC 1996c
WB-07 (P)	Bullwhacker[1]	Falling Head	NA	6.6×10^{-6}	WESTEC 1996c
HRH-286 (P)	Goodwin	Slug	NA	1.3×10^{-5}	WESTEC 1996a
HRH-1141 (P)	Goodwin	Slug	NA	2.2×10^{-6}	WESTEC 1996a
HRH-1142 (P)	Goodwin	Slug	NA	6.6×10^{-6}	WESTEC 1996a
HRH-1144 (P)	Goodwin	Slug	NA	2.4×10^{-6}	WESTEC 1996a
North Collingwood Well (W)	Alluvium	Pumping	90,000	NA	Scanlan 1994
Old South Collingwood Well (W)	Alluvium	Pumping	470,000	NA	Scanlan 1994

[1]Unsaturated

Notes: P = Piezometer
U = Uncased Corehole
W = Well

and discharge of groundwater. The lithology and structure beneath the project area are complex, as described in Section 3.2, Geology and Minerals.

Groundwater within the basin generally flows toward a valley-fill reservoir located in the North Diamond Subarea. Regional groundwater level contours from 1950, before extensive aquifer pumping began, are shown on Map 3-5. This reservoir is approximately 45 miles long, 6 to 12 miles wide, and consists of alluvial and playa deposits (Harrill and Lamke 1968). Groundwater within the basin flows both in the alluvium and the bedrock. In the northern part of Diamond Valley, springs are warm and groundwater is considered to be deep-circulating and fault controlled (Harrill and Lamke 1968). Artesian conditions were encountered by Harrill and Lamke (1968) in most of the irrigation wells in the North Diamond Subarea, and springs and flowing wells are common along the west side of the North Diamond Subarea. In the South Diamond Subarea, artesian conditions occur where silt and clay form overlying confining lenses. These lenses are most common along the eastern side of the valley, but also are present in other areas (Harrill and Lamke 1968).

The groundwater system in the Ruby Hill project area is part of the regional Diamond Valley Hydrographic Basin. Groundwater in the project area generally flows toward the center of Diamond Valley. Within the eastern portion of the project area, groundwater flows to the northwest; in the western portion, it flows to the northeast; and in the center, it flows to the north. Groundwater occurs in alluvium at the northwestern portion of the project area and within bedrock beneath the proposed pit and mine facilities (WESTEC 1996a), which are located in the northeastern part of the project area.

<u>Basement Bedrock</u>

Paleozoic sedimentary rocks and Mesozoic granitic rocks form the basement assemblages throughout the region. These rocks are exposed in the Prospect Ridge and underlie the volcanic and alluvial deposits in Diamond Valley. A detailed stratigraphic column is presented in Table 3-7 (see Section 3.2, Geology and Minerals). Paleozoic rocks consist of highly folded thrust sheets composed of multiple formations. The granitic rocks include a quartz diorite plug and a quartz porphyry in the form of sills and dikes. The Paleozoic rocks have been intruded by a series of granitic plutons.

Groundwater within the basement rocks is generally stored and transmitted through a system of interconnected fractures or fracture networks and is possibly stored and transmitted through solution caverns and channels. Because of the broad variation of rock types and the complex pattern of fracturing, the hydraulic properties of the bedrock units are probably highly variable.

The hydrogeology of the early Paleozoic rock units is poorly understood. The Prospect Mountain Quartzite has been found to be poorly permeable (Nolan 1962), but it may have secondary permeability from extensive fracturing. The Pioche Shale is commonly folded, faulted, and sheared and is relatively impermeable (Canonie Environmental 1994). Studies of the Fad Shaft, located south of the project site, found an extensive aquifer in the Eldorado Dolomite. These studies determined that the Eldorado Dolomite has a transmissivity of 24,000 gallons per day per foot (gpd/ft) and a storage coefficient of 0.00067 at the Fad Shaft (Nolan 1962).

Past mining operations have shown that the Geddes Limestone can yield large quantities of water (Canonie Environmental 1994). The Secret Canyon Shale is often folded, faulted, and sheared and is relatively impermeable. During the sinking of the Fad Shaft, the Secret Canyon Shale did not produce much water (Canonie Environmental 1994). The Hamburg Dolomite is extensively fractured and may be permeable if solution caverns or channels are present.

At the Ruby Hill project area, the following Paleozoic basements units are present: the Dunderburg Shale, the Windfall Formation, and the Pogonip Group. Younger units in the project area include Tertiary volcanics, Tertiary and Quaternary volcanics, and alluvium.

The Dunderburg Shale is a brown shale that is interbedded with thin limestone nodules and is 250 feet thick in some areas (Nolan 1962). The formation is highly deformed, folded, and faulted, and its thickness can vary considerably. The Dunderburg Shale is probably an aquiclude; however, depending on the degree of fracturing and folding, the shale may allow storage and transmission of water.

The Windfall Formation is subdivided into the Catlin and Bullwhacker Members. The Catlin Member is composed of interbedded massive limestones with some cherty zones and platy, sandy limestones, and is approximately 250 feet thick (Nolan 1962). The Bullwhacker Member conformably overlies the Catlin Member and is a sandy limestone that is approximately 400 feet thick, thinly bedded, and platy. One aquifer test (i.e., slug) by WESTEC (1996a) of Piezometer HRH-444 completed in the Bullwhacker Member indicates that the formation has a hydraulic conductivity of 3.4×10^{-8} feet per second (ft/sec) near the north end of the proposed pit. Two constant and two falling head tests of unsaturated Bullwhacker Limestone beneath the proposed heap leach and process facility indicate an average hydraulic conductivity of 2.9×10^{-5} ft/sec. Both of these members are comprised mainly of limestone and thus may contain solution caverns or channels.

The Pogonip Group is made up of three formations: the Goodwin, Ninemile, and Antelope Valley Formations. The Goodwin Limestone is the oldest of the formations and is the main ore producing layer for the proposed Ruby Hill Mine. The Goodwin Limestone is a massively bedded, fine to medium grained limestone containing grey and white chert, and is approximately 1,000 feet thick (WESTEC 1996d). Four aquifer tests (i.e., slug) by WESTEC (1996a) of piezometers (HRH -286, -1141, -1142, -1144) completed in the Goodwin Formation indicate that the formation has an average hydraulic conductivity of 6.1×10^{-6} ft/sec below the proposed pit. The Ninemile Formation is composed of a fine to very fine grained limestone, with thin shaly beds in the middle of the formation. It is approximately 250 to 400 feet thick, and has some minor local mineralization (WESTEC 1996d). Exploration drilling at the proposed pit indicates that little of the Ninemile Formation is present above the Goodwin Formation. Lost drilling fluid circulation during exploration within the Ninemile Formation is thought to be the result of caverns, solution channels, or fractures (Canonie Environmental 1994). If these lost circulation zones are interconnected by fractures or solution channels, transmissivities would be expected to be high. The shaly nature of the middle part of the Ninemile Formation could act as an aquitard, depending on fracturing and dissolution, either confining or perching water. The Antelope Valley Formation is at the top of the Pogonip Group, but is not found in the pit area. The Antelope Valley Formation is similar to the Goodwin Limestone, in that it is a massively bedded limestone; however, chert is less significant in the Antelope Valley Formation. Low water production during mineral exploration below the water table indicates that this formation probably has a low permeability in the area of the proposed pit (Canonie Environmental 1994).

An intrusive igneous quartz porphyry is present south of the proposed pit within the project area. Intrusive igneous rocks have little primary permeability but may have secondary fracture permeability.

__Tertiary Volcanics__

Tertiary volcanics in Diamond Valley consist of a layer of rhyolite that is approximately 100 feet thick. The rhyolite flows and dikes appear to be Oligocene to Miocene in age (Nolan 1962) and have virtually no primary porosity, but may transmit minor quantities of water through faults, fractures, and weathering (Harrill and Lamke 1968). Piezometer HRH-1205 (P-1), completed in the volcanics near the south end of the proposed pit, took more than 36 hours to recharge any water (WESTEC 1996a), indicating that the transmissivity is low.

__Tertiary - Quaternary Volcanics__

In the late Tertiary to Quaternary periods, a series of silicic pyroclastic rocks, predominantly rhyolite tuff, and a series of andesitic and basaltic flows were deposited. These tuff usually have little interstitial porosity (Harrill and Lamke 1968). A layer of welded tuff has been described in the sequence and would be denser than the rest of the layer (Nolan 1962). The entire tuff sequence has a measured thickness of up to 400 feet. The andesitic and basaltic lavas overlying the rhyolite tuff are as thick as 700 feet. These flows are similar hydrogeologically to the rhyolite tuffs but are chemically very different due to the high amounts of iron and magnesium they contain.

Quaternary Alluvium

Diamond Valley is a fault-bounded basin with mountain ranges on either side. The basin is filled with detritus derived from the ranges. This unconsolidated sediment consists of silt, sand, gravel, cobbles, and boulders and was deposited by alluvial fans, intermittent streams, and a rare lake. These deposits increase in thickness from the mountain fronts to the center of the valley, where they are as thick as 7,500 feet (Harrill and Lamke 1968). In the area of the proposed project, the alluvium is approximately 500 feet. The three wells located on the Collingwood Ranch, in the northern part of the project area, are completed in alluvium. Aquifer testing of two of these wells indicates that transmissivities range from 90,000 to 480,000 gpd/ft (Scanlan Engineering 1994b). Short-term aquifer testing in other parts of Diamond Valley indicate that transmissivities in the alluvial aquifer range from 27,000 to 250,000 gpd/ft (Harrill and Lamke 1968). Calculations by WESTEC (1996a) indicate that the alluvial aquifer in southern Diamond Valley is probably unconfined. In addition, review of well logs for Sections 28, 29, 30, and 32 of T20N, R53E indicate that no extensive clay layers exist, which could indicate a confined aquifer (WESTEC 1996a).

Fault Zones

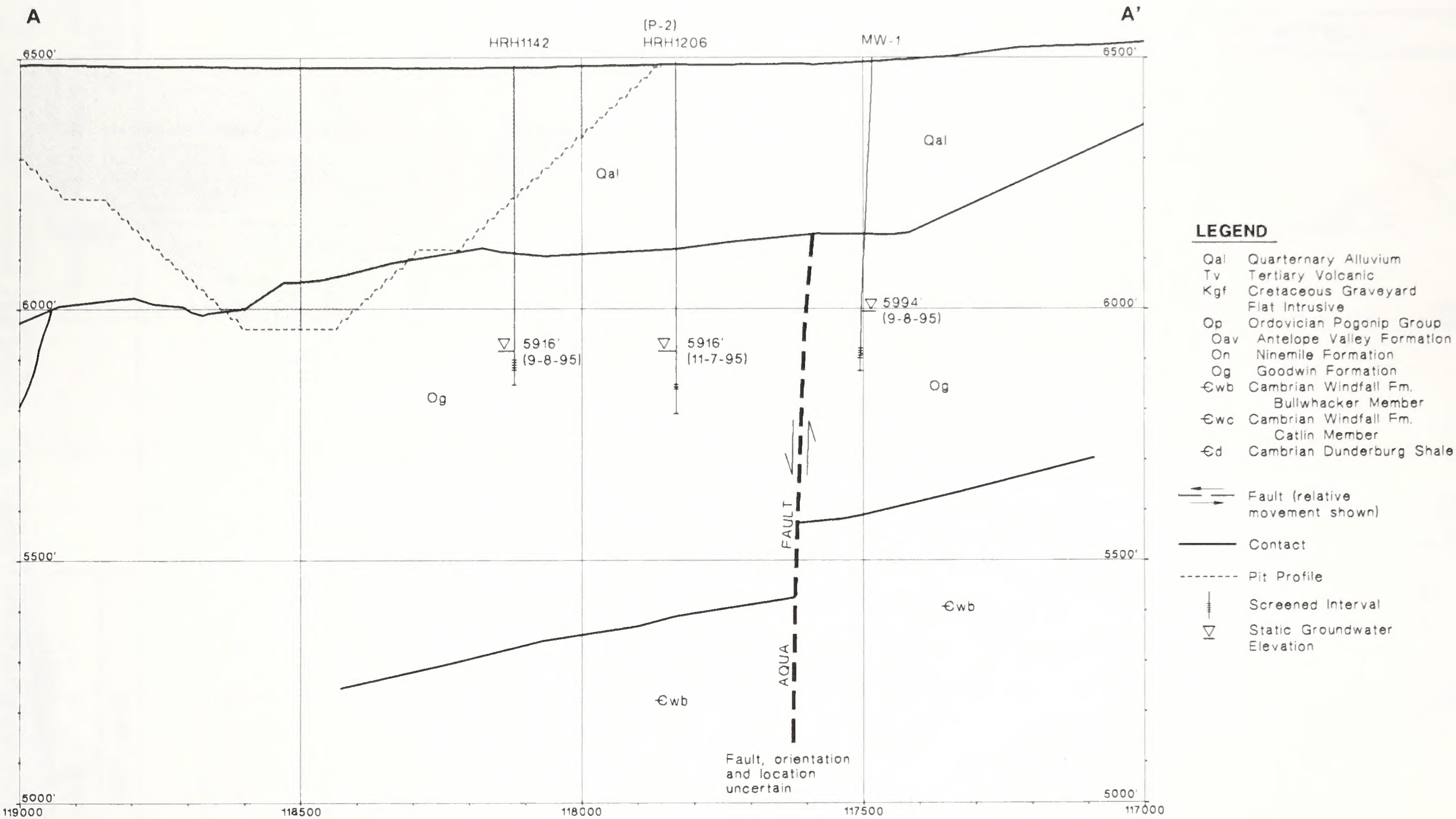
Faults can act as either barriers or conduits to groundwater flow. The faulting influence on groundwater flow is dependent on the physical and lithological characteristics of the rock. Faulting of softer, less competent rocks can form crushed and pulverized rock (fault gouge), which would act as a barrier to groundwater flow. Mineralization along faults also can reduce or prevent the transmission of water. Faulting of harder, more competent rock can create conduits that allow higher groundwater flow and storage than surrounding unfaulted rock.

Faults in the Ruby Hill project area can act as barriers to groundwater movement, as shown by the Locan, Richmond, and Fad Shafts. The Locan and Richmond Shafts are located at the southern part of the Ruby Hill Project area. Both of these shafts were relatively dry until intersecting the Ruby Hill Fault; these shafts then encountered large amounts of water. The Fad Shaft, also located in the southern part of the project area, encountered large quantities of water when intersecting an unnamed fault (Nolan 1962). Two faults outside of the proposed pit act as barriers to groundwater movement as shown by water levels in wells and piezometers completed on both sides of these faults. Both of these faults, the Aqua fault, and the Xenophonl Graveyard Fault, and the corresponding water levels on both sides are shown on Map 3-7 and Figures 3-5 and 3-6, respectively.

Water Levels

The Diamond Valley groundwater level contours for 1950 are shown on Map 3-5. These contours are based on work done by Harrill and Lamke (1968) and represent groundwater conditions before the beginning of extensive pumping. Development and extensive pumping from 1950 through 1990 has caused a decline in groundwater levels of approximately 50 feet in the South Diamond Subarea; in 1990, groundwater levels in the developed part of the South Diamond Subarea were declining at a rate of 1.5 to 2.5 feet per year (Arteaga et al. 1995).

The Ruby Hill project area groundwater potentiometric (level that water would rise in a well) surface elevations (above mean sea level) for 1995 are shown on Map 3-8. Below the proposed heap leach facilities, process facilities, pit, and waste rock dump, the permanent groundwater table occurs in bedrock (from water level measurements, well and piezometer drilling logs by WESTEC 1996a, 1996c). At the southern and western parts of the project area, the bedrock aquifer begins a transition to the alluvial aquifer.



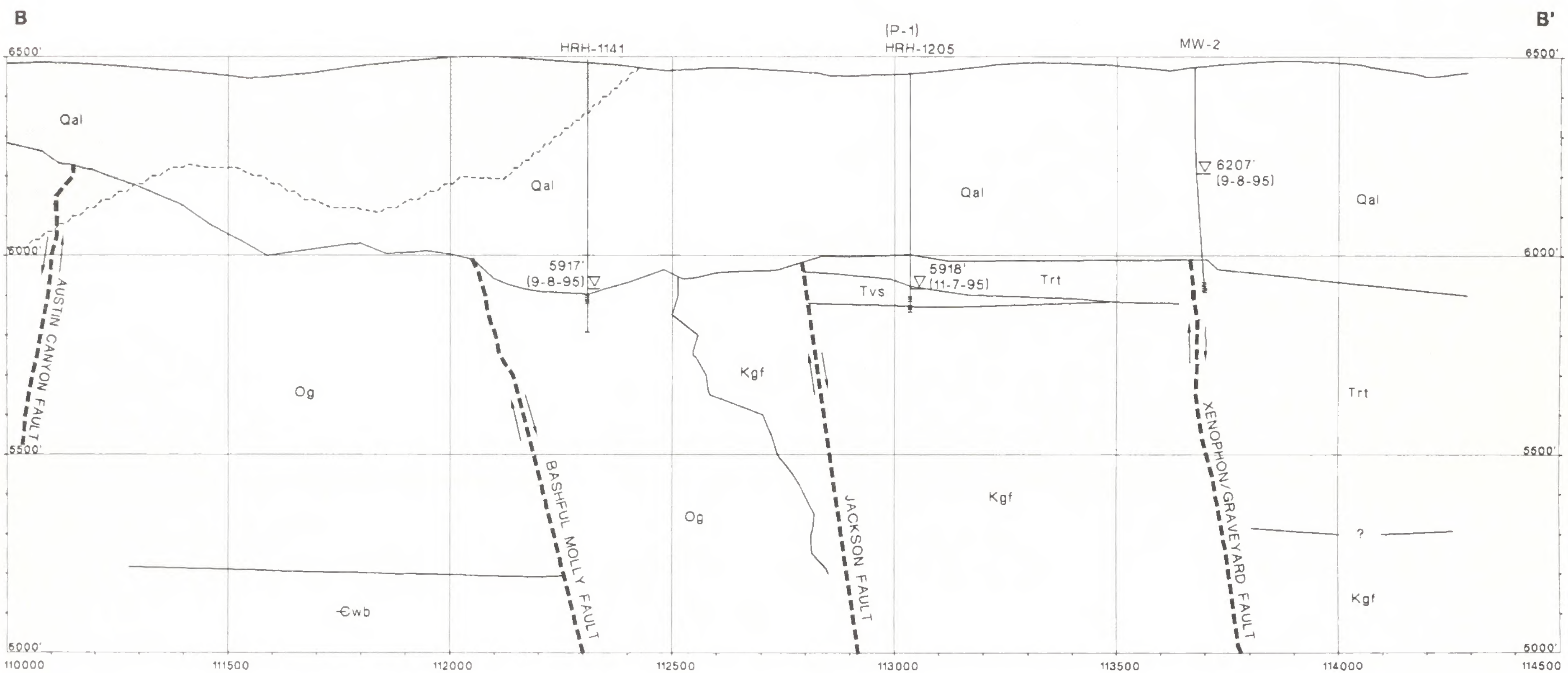
200 100 0 200

FEET

(SOURCE: WESTEC 1996a)

RUBY HILL PROJECT

FIGURE 3-5
GEOLOGIC
CROSS-SECTION A-A'



LEGEND

Qal	Quarternary Alluvium	Op	Ordovician Pogonip Group
Trt	Tertiary Rhyolitic Tuff	Oav	Antelope Valley Formation
Tvs	Tuffaceous (volcanic) Sediments (could be downhole contamination or older alluvium)	On	Ninemile Formation
Kgf	Cretaceous Graveyard Flat Intrusive	Og	Goodwin Formation
		€wb	Cambrian Windfall Fm. Bullwhacker Member

Fault (relative movement shown)
Contact
Pit Profile
Screened Interval
Static Groundwater Elevation

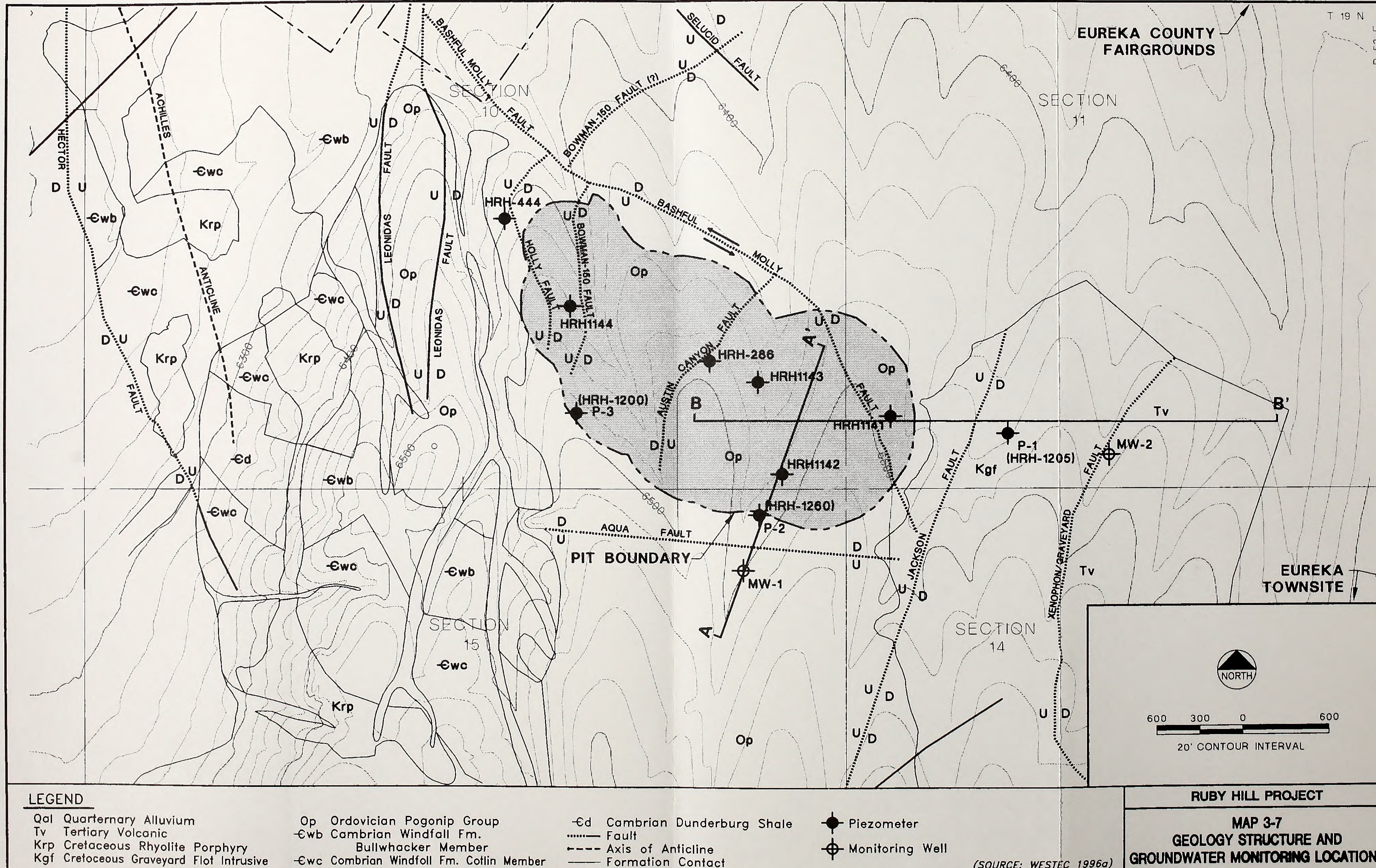
NORTH

0 400 800
FEET

(SOURCE: WESTEC 1996a)

RUBY HILL PROJECT

FIGURE 3-6
GEOLOGIC
CROSS-SECTION B-B'



T 19 N
R 53 E
EUREKA COUNTY FAIRGROUNDS
SECTION 10
SECTION 11
SECTION 14
SECTION 15
BASHFUL MOLLY FAULT
SELUCID FAULT
BOWMAN-150 FAULT (?)
BOWMAN-150 FAULT
ACHILLES ANTICLINE
HECTOR FAULT
LEONIDAS FAULT
MOLLY FAULT
AUSTIN CANYON FAULT
AQUA FAULT
JACKSON FAULT
XENOPHON/GRAVEYARD FAULT
PIT BOUNDARY
HRH-444
HRH1144
HRH-286
HRH1143
(HRH-1200) P-3
HRH1141
HRH1142
(HRH-1260) P-2
P-1 (HRH-1205)
MW-1
MW-2
A
A'
B
B'
Op
Ꞓwb
Ꞓwc
Krp
Ꞓd
Kgf
Tv
6400
6500
EUREKA TOWNSITE
NORTH
600 300 0 600
20' CONTOUR INTERVAL
LEGEND
Qal Quarternary Alluvium
Tv Tertiary Volcanic
Krp Cretaceous Rhyolite Porphyry
Kgf Cretoceous Graveyard Flot Intrusive
Op Ordovician Pogonip Group
Ꞓwb Cambrian Windfall Fm. Bullwhacker Member
Ꞓwc Combrian Windfoll Fm. Cotlin Member
Ꞓd Cambrian Dunderburg Shale
Fault
Axis of Anticline
Formation Contact
Piezometer
Monitoring Well
(SOURCE: WESTEC 1996a)
RUBY HILL PROJECT
MAP 3-7
GEOLOGY STRUCTURE AND GROUNDWATER MONITORING LOCATIONS

The communication between the bedrock and alluvial aquifers is not well understood at this site; but, is expected to be low based on work done in other hydrogeologically similar valleys (i.e., Huntington, Newark, and Long) ***(Eakin 1960 and 1961)***. Between 1950 and 1966, groundwater levels south of Highway 50 declined 0 to 5 feet, and water levels north of Highway 50 declined 5 to 10 feet (WESTEC 1996a; Harrill and Lamke 1968). The potentiometric surface of groundwater below the proposed pit and within the project area was determined by measurement of four monitoring wells, nine piezometers, and two irrigation wells. The potentiometric surface elevation for the project area monitoring points are presented in Table B-1 in Appendix B, and the locations of the monitoring points are shown on Map B-2 in Appendix B. Potentiometric surface elevations beneath the proposed pit range from approximately 5,900 to 5,918 feet above mean sea level. Potentiometric surface elevations near the proposed pit to the south and southeast (upgradient) are higher than those below the proposed pit and range from approximately 6,000 to 6,200 feet above mean sea level. One water level measured in 1950 and presented by Harrill and Lamke (1968), indicates that the water elevation in the Old Holly Well was approximately 5930 feet above mean sea level. The Old Holly Well was located in the NE quarter of the NW quarter of Section 8, Township 19 North, Range 53 east. This well was destroyed between 1950 and 1966 and it is not known if the well was screened in bedrock, alluvium or a combination of both. Faults bounding the proposed pit on the south and southeast control groundwater movement and cause a very steep groundwater gradient outside of the proposed pit. Map 3-7 is a view of the geology, structure, and groundwater monitoring locations at and near the proposed pit. Figures 3-5 and 3-6 are cross-sections through the south and southeast end of the proposed pit and show the geology, structure, potentiometric surface, monitoring points, and proposed pit outline.

Aquifer Recharge and Discharge

Recharge to the regional groundwater basin occurs principally from infiltration of precipitation within the valley and surrounding mountains. Infiltration of surface flow from Devils Gate and subsurface inflow from Devils Gate and Garden Valley also contribute to groundwater in the Diamond Valley Basin. Harrill and Lamke (1968) estimate recharge to Diamond Valley to be approximately 30,000 acre-feet per year from precipitation and interbasin flow.

Recharge to the alluvial aquifer in the northern portion of the project area is principally from precipitation and infiltration of water from ephemeral streams carrying snowmelt. Recharge to the bedrock aquifer below the proposed pit and associated facilities is derived from infiltration of precipitation and snowmelt into bedrock outcrops and fractures in these outcrops. The bedrock aquifer also probably contributes some recharge to the alluvial aquifer.

Water in the aquifers in the Diamond Valley Basin are discharged by pumping for agricultural and domestic purposes, evaporation, evapotranspiration by natural vegetation, and spring discharge. The largest discharge is from groundwater pumping for irrigation. Arteaga et al. (1995) estimate that 64,000 acre-feet of groundwater was removed from the South Diamond Subarea for irrigation in 1990.

Well Inventory

Fifty-three water supply wells are located within a 5-mile radius of the proposed mine facilities (WESTEC 1996c). Wells that are within approximately 2 miles of the Homestake North and South Wells are listed on Table 3-14 and shown on Map 3-9. All but one of the wells listed on Table 3-14 are between 150 and 510 feet deep, and all but one of these wells are completed in alluvial deposits. Homestake currently owns water rights to allow pumping of 1,110 acre-feet per year (688 gpm) (WESTEC 1996a). Homestake purchased the water rights from the Collingwood Ranch, which had previously used the water rights for irrigation.

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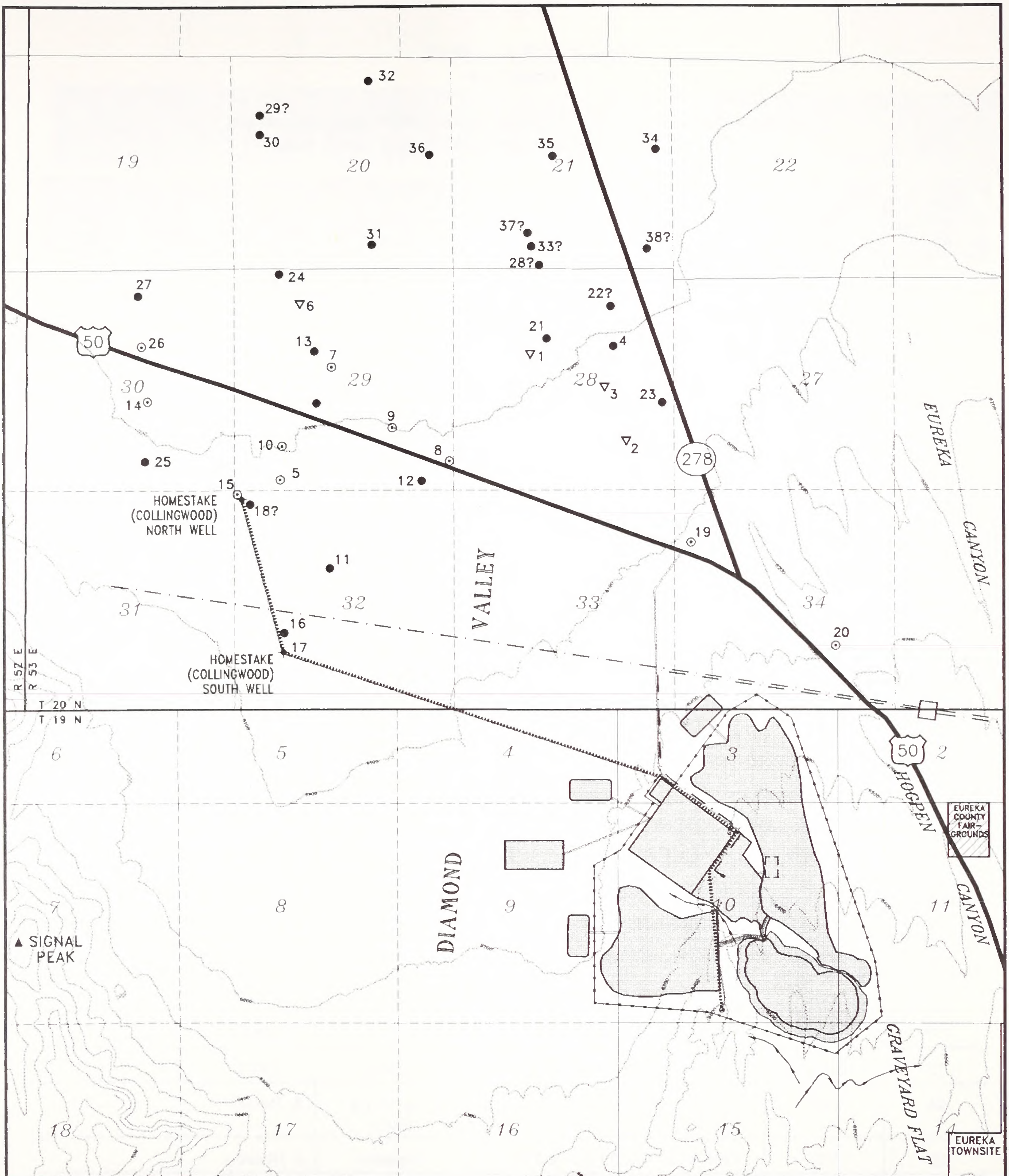
COLLINGWOOD NORTH WELL CERT. #7519
COLLINGWOOD SOUTH WELL CERT. #7025
EXISTING POWER LINE
OVERHEAD POWER LINE
MAIN ACCESS ROAD
GROWTH MEDIUM STOCKPILE
POWER TRANSFER STATION
FRESH WATER PIPELINE (UNDERGROUND)
PROPOSED MW-5
MW-4
MW-3
EAST WASTE ROCK DUMP
SOLUTION OVERFLOW PONDS
HEAP LEACH PAD
SOIL BORROW SOURCE
SOLID WASTE LANDFILL
EUREKA COUNTY FAIR-GROUNDS
DIVERSION CHANNEL
ORE AND SOLUTION PROCESSING AREA/ OFFICE/PARKING/ TRUCK SHOP/ WAREHOUSE/FUEL STORAGE AREA
WEST WASTE ROCK DUMP
PERIMETER FENCE
OPEN PIT
HRH-444
HRH-1144
HRH-286
HRH-1143
HRH-1200
HRH-1141
HRH-1142
HRH-1205
HRH-1206
MW-2
MW-1
SAFETY BERM SETBACK
FRESH WATER AND FIRE WATER TANK
EUREKA TOWNSITE
5800
5900
6000
6100
6200
T 20 N
T 19 N
R 53 E
SECTION 31
SECTION 32
SECTION 33
SECTION 34
SECTION 35
SECTION 2
SECTION 3
SECTION 4
SECTION 5
SECTION 8
SECTION 9
SECTION 11
SECTION 14
SECTION 15
SECTION 16
SECTION 17
50
278
101
LEGEND:
MONITORING WELL
PIEZOMETER
AREA OF OPERATION
PERIMETER FENCE
EXISTING PAVED ROADS
ACCESS ROADS
WATER PIPELINE
OVERHEAD POWERLINE
STORM DIVERSION CHANNELS
GROUNDWATER ELEVATIONS (FEET MSL)
NORTH
0
1750
FEET
(SOURCE: WESTEC 1996a)
RUBY HILL PROJECT
MAP 3-8
GROUNDWATER ELEVATIONS IN THE PROJECT AREA



LEGEND:

- ⊙ DOMESTIC WELL
- ● IRRIGATION WELL
- ▽ MUNICIPAL AND INDUSTRIAL WELL

NORTH

0 3200 6400
FEET

(SOURCES: WESTEC 1996c; NEVADA DIVISION OF WATER RESOURCES 1996)

RUBY HILL PROJECT

MAP 3-9
WELLS WITHIN APPROXIMATELY 2 MILES OF THE HOMESTAKE NORTH AND SOUTH WELLS

Table 3-14

Domestic, Municipal, and Irrigation Wells Within Approximately a 2-Mile Radius of the Homestake North and South Wells

Map Location No.	Log Number	Location	Use	Owner[1]
1	40673	T20N,R53E,SEC28,NW1/4,SE1/4	Municipal	Eureka County Public Works
2	30802	T20N,R53E,SEC28,SE1/4,SE1/4	Municipal	Eureka County
3	26764	T20N,R53E,SEC28	Irrigation	M.Van Vliet & Sons, Inc.
4	24650	T20N,R53E,SEC28,NE1/4,SE1/4	Domestic	M.Van Vliet & Sons, inc.
5	36686	T20N,R53E,SEC29,SW1/4,SW1/4	Domestic	D. Rubio
6	36685	T20N,R53E,SEC29,NW1/4,NE1/4	Industrial	G.P. Construction
7	34955	T20N,R53E,SEC29,NW1/4,SE1/4	Domestic	E. Taylor
8	24652	T20N,R53E,SEC29,SE1/4,SE1/4	Domestic	E. Rasmussen
9	24651	T20N,R53E,SEC29	Domestic	G. Garnventa
10	23818	T20N,R53E,SEC29,SW1/4,SW1/4	Domestic	R. Rowley
11	6942	T20N,R53E,SEC32,NW1/4,SE1/4	Irrigation	J. Minoletti
12	22922	T20N,R53E,SEC29	Domestic	G. Oliver
13	10323	T20N,R53E,SEC29,NW1/4,SW1/4	Irrigation	A. Peters
14	23722	T20N,R53E,SEC30,SE1/4,NW1/4	Domestic	J. Ithurralde
15	15107	T20N,R53E,SEC32,NW1/4,NW1/4	Domestic	R. Collingwood
16	32069	T20N,R53E,SEC32,SW1/4,SW1/4	Irrigation	Homestake Mining Co.
17	7301	T20N,R53E,SEC32,SW1/4,SW1/4	Irrigation	Homestake Mining Co.
18	9244	T20N,R53E,SEC32,NW1/4,NW1/4	Irrigation	Homestake Mining Co.
19	---	T20N,R53E,SEC34,NW1/4	Domestic	D. Sharrow
20	26765	T20N,R53E,SEC34,SE1/4	Domestic	Helds 1/4 Ranch
21	8589	T20N,R53E,SEC28,NW1/4,SE1/4	Irrigation	L. Bishop
22[3]	6522	T20N,R53E,SEC28,NE1/4	Irrigation	L. Bishop
23	8618	T20N,R53E,SEC28,SE1/4	Irrigation	A. Peters
24	7465	T20N,R53E,SEC29,NW1/4	Irrigation & Stock	A. Peters
25	7352	T20N,R53E,SEC30,SE1/4,SW1/4	Irrigation	J. Hanson
26	6027	T20N,R53E,SEC30,NE1/4,SW1/4	Irrigation & Domestic	J. Hanson

Table 3-14 (Continued)

Map Location No.	Log Number	Location	Use	Owner[1]
27	6644	T20N,R53E,SEC30,NE1/4,NW1/4	Irrigation	J. Hanson
28[2,3]	6713	T20N,R53E,SEC21,SW1/4,SE1/4	Irrigation	Bishop, Edwin C.
29[2,3]	7464	T20N,R53E,SEC20,LT131/4,1/4	Irrigation	Black, Marlene; Black, Wilbur E.
30[2]	7465	T20N,R53E,SEC20,NW1/4,SW1/4	Irrigation & Domestic	Black, Marlene; Black, Wilbur E.
31[2]	7517	T20N,R53E,SEC20,SE1/4,SW1/4	Irrigation	Black, Marlene; Black, Wilbur E.
32[2]	22217	T20N,R53E,SEC20,NE1/4,NW1/4	Irrigation	Vogelsmeier, Versea
33[2,3]	6798	T20N,R53E,SEC21,SW1/4,SE1/4	Irrigation	Bishop, Edwin C.
34[2]	6503	T20N,R53E,SEC21,NE1/4,SE1/4	Irrigation	Morrison, Alberta J.; Morrison, Donald E.
35[2]	6958	T20N,R53E,SEC21,NW1/4,SE1/4	Irrigation	Bishop, Edwin C.
36[2]	7576	T20N,R53E,SEC20,NE1/4,SE1/4	Irrigation	Black, Marlene; Black, Wilbur E.
37[2,3]	6794	T20N,R53E,SEC21,SW1/4,SE1/4	Irrigation	Bishop, Leta B.
38[2,3]	8556	T20N,R53E,SEC21,C211/4,1/4	Irrigation	Bishop, Edwin C.

[1]Owner of well when first recorded,with the State of Neveda.

[2]From Nevada Department of Water Resources 1996.

[3]Owner or location uncertain.

Source: WESTEC 1996c.

Groundwater Quality

Groundwater quality data for Diamond Valley are summarized in Table 3-15 and are shown on Map B-1 and Figure B-1 in Appendix B. Harrill and Lamke (1968) found that the regional groundwater chemistry in Diamond Valley varies as the groundwater migrates from recharge areas in the mountains to discharge areas in the northern part of the valley. In general, calcium, magnesium, and bicarbonate are the major ions near the recharge areas. In discharge areas, sodium, potassium, chloride, and sulfate are dominant, and evapotranspiration causes concentrations of dissolved solids to increase (Harrill and Lamke 1968). The Nevada Bureau of Health Protection Services has adopted Federal primary and secondary standards for groundwater used for human consumption. These levels are listed in Table 3-15.

More recently, the groundwater near the Ruby Hill project area has been studied by Canonie Environmental (1994) and WESTEC (1996a). These reports include domestic wells, all completed in alluvium, in the vicinity of the Ruby Hill project area. WESTEC sampled four monitoring wells completed in bedrock within the limits of the proposed mining area. Two of these wells are located upgradient of the proposed mine pit, while two are located downgradient - one below the proposed leach pad and one below the proposed waste rock dump. Canonie Environmental (1994) also presented chemistry of samples from drill holes in the project area. Water from the Fad and Holly Shafts, which were completed in the bedrock aquifers in the foothills south of Diamond Valley in the late 1940s and early 1950s, also were sampled.

Canonie Environmental (1994) found that the water chemistry of bedrock and alluvial aquifers were very similar, and concluded that the two aquifers are part of the same hydrologic system. Map B-3 in Appendix B supports this conclusion; bicarbonate is the major anion for all but two samples, and calcium tends to be the predominate cation. ***Wells located in areas of discharge within Diamond Valley that are affected by evaporation do not fit this pattern (i.e.,*** two wells north of the project area and Well MW-1).

Most of the samples analyzed contained concentrations of constituents below drinking water standards, with some exceptions. Well MW-1 had a pH of 9.06, which is higher than the drinking water standard of 8.5; this well also contained an elevated concentration of arsenic (average 0.78 milligrams per liter [mg/L]). Most domestic wells contain nitrate concentrations higher than the drinking water standard (10 mg/L). These high concentrations (10.9 to 235 mg/L) are most likely related to nearby septic leach fields***, cropland (agricultural fertilizer),*** and/or livestock areas. The Melka Well, located east of the project area, had an average arsenic concentration of 0.1 mg/L (drinking water standard is 0.05 mg/L).

3.4.2 Environmental Consequences

The primary water quality issues include: 1) acid generation from overburden materials and waste rock materials; 2) mobilization of dissolved constituents from overburden, waste rock, and pit wall rock materials; and 3) mobilization of dissolved constituents from heap leach facilities and spent ore (heap leach residue material).

Environmental impacts to water resources were judged to be significant if the Proposed Action or selected alternative could potentially result in the following:

- Degradation of surface water quality constituents based on Nevada water quality standards for appropriate or designated beneficial uses.
- Degradation of groundwater quality constituents based on Nevada water quality standards for drinking and agricultural use.
- Withdrawal of groundwater for the proposed process facilities adversely affects water levels in nearby wells (drawdown exceeds 10 feet) and/or flow from springs and perennial streams.
- The formation of a pit lake with degraded water quality.

Table 3-15

Groundwater Chemistry in Diamond Valley

Sample ID Unit	Location	Date	Aquifer	pH pH units	TDS mg/l	SiO2 mg/l	Fe mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	CO3 mg/l CO3	HCO3 mg/l HCO3	SO4 mg/l	Cl mg/l
Water Quality Standard				<6.5, >8.5[1]	500[2]-1000[3]		0.3[1]		150[1]					250[2]-500[3]	250[2]-400[3]
Harrill & Lamke (1968)															
in project area															
Fad Shaft (bd) *	T19N R53E S.15	1/21/53	bedrock	7.8	267	11	0.02	52	26	8.3	1.4	0	238	38	10
near project area															
well (cc)	T20N R53E S.17	5/5/66		7.8	475	28	0.01	72	25	62	8.2	0	398	52	31
well (ad)	T20N R53E S.21	5/9/66		7.6	302	39	0	51	20	17	5.1	0	220	45	14
well (ab)	T21N R53E S.03	7/11/66		7.8	500	44	0	63	13	85	8.8	0	302	76	60
well (cb)	T21N R53E S.05	5/18/66		7.8	478	42	0.01	66	25	60	8.8	0	312	71	50
well (da)	T21N R53E S.13	5/17/66		7.5	257	28	0	46	16	17	2.2	0	207	39	6.0
well (cc)	T21N R53E S.28	5/17/66		7.8	444	38	0	74	25	43	6.8	0	368	45	30
well (da)	T21N R53E S.33	7/11/66		7.8	549	37	0	78	26	73	12	0	406	68	54
well (ac)	T21N R53E S.36	5/20/66		7.7	242	16	0.01	57	10	13	1.2	0	204	34	8
far from project area															
shallow well (aa)	T22N R53E S.27	5/17/66		8.1	854	11	0.18	46	21	224	22	0	354	173	180
shallow well (cc)	T22N R53E S.30	5/17/66		8.6	371	8.4	0.01	21	17	88	16	8	262	34	48
well (ab)	T22N R54E S.34	3/10/54		7.4	458	37	0.13	78	36	27	5.5	0	356	77	16
well (ca)	T23N R52E S.13	5/5/66		8.3	346	26	0.01	41	27	39	8.2	4	264	45	25
well (dd)	T23N R53E S.34	5/17/66		7.9	718	15	0.02	26	22	216	26	0	374	5	220
well (ac)	T24N R53E S.06	5/5/66		8.0	276	25	0	51	20	15	3.4	0	255	25	10
WESTEC (1996)															
MW-1	T19N R53E S.15	9/22/95	bedrock	n/a	440	27.3	<0.017	33.3	8.85	150	6.21	109.2	93	67.7	30.2
MW-1	T19N R53E S.15	10/26/95	bedrock	9.06	320	23.2	<0.017	40.3	13.3	65.0	3.09	40.8	151	31.8	30.2
MW-1	T19N R53E S.15	1/09/96	bedrock	8.85#	277	n/a	<0.024	46.2	15.4	36.2	2.65			28.0	31.6
MW-2	T19N R53E S.11	9/21/95	bedrock	7.61	274	73.1	0.145	26.9	11.8	28.6	8.49	0	176	26.2	4.9
MW-2	T19N R53E S.11	10/25/95	bedrock	7.86#	264	73.3	0.049	27.9	12.0	28.0	8.36	0	176	23.2	4.8
MW-2	T19N R53E S.11	1/08/96	bedrock	7.86	253	n/a	<0.024	28.0	12.0	26.1	8.74			24.1	5.0
MW-3	T19N R53E S.03	9/21/95	bedrock	7.76	369	12.7	0.042	35.5	48.2	32.6	3.18	0	324	55.2	6.2
MW-3	T19N R53E S.03	10/25/95	bedrock	7.78	345	12.6	<0.017	32.9	47.0	31.1	2.25	0	319	52.5	6.1
MW-3 (dup.)	T19N R53E S.03	10/25/95	bedrock	n/a	344	12.7	<0.017	33.3	47.7	31.6	2.30	0	318	53.0	6.1
MW-3	T19N R53E S.03	1/08/96	bedrock	7.90#	274	n/a	<0.024	32.1	46.6	29.5	2.66			54.9	6.4
MW-4	T19N R53E S.03	9/22/95	bedrock	n/a	313	26.1	<0.017	36.2	19.4	48.2	3.01	0	179	49.2	34.3
MW-4	T19N R53E S.03	10/26/95	bedrock	8.08	306	25.4	<0.017	37.2	20.0	38.9	2.08	0	178	35.5	35.5
MW-4	T19N R53E S.03	1/09/96	bedrock	7.73#	285	n/a	<0.024	37.9	20.0	33.7	3.29			30.7	37.1
Fad Shaft	T19N R53E S.22	9/22/95	bedrock	n/a	281	12.8	<0.017	60.2	28.2	10.9	1.13	0	257	49.6	10.8
Fad Shaft	T19N R53E S.22	10/26/95	bedrock	7.65	308	13.0	<0.017	60.1	28.7	11.5	1.50	0	256	48.7	11.0
Fad Shaft	T19N R53E S.22	1/18/94	bedrock	7.74	280	n/a	0.19	56	27	8.9	2.4	0	256	46	10
Collingwood N. well	T20N R53E S.32 NWNW	7/11/94	Quat. alluvium	7.75	219	n/a	0.03	41	21	7.3	1.4	0	233	17	5
Collingwood Old S. well	T20N R53E S.32 SWSW	7/20/94	Quat. alluvium	7.69	246	n/a	0.06	44	23	7.8	1.7	0	213	17	13
Rubio	T20N R53E S.29	10/7/77	Quat.	7.68	249	n/a	0.02	39	21	16	2	0	193	17	20
J. Minoletti	T20N R53E S.32	10/15/88	Quat.	7.92	573	n/a	0.38	86	43	20	2	0	188	17	n/a
J. Minoletti	T20N R53E S.32	2/29/88	Quat.	7.85	400	n/a	0.03	64	33	12	2	0	202	18	27

Table 3-15 (Continued)

Sample ID Unit	Location	Date	Aquifer	pH pH units	TDS mg/l	SiO2 mg/l	Fe mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	CO3 mg/l CO3	HCO3 mg/l HCO3	SO4 mg/l	Cl mg/l
Water Quality Standard				<6.5, >8.5[1]	500[2]-1000[3]		0.3[1]		150[1]					250[2]-500[3]	250[2]-400[3]
S. Oliver	T20N R53E S.29	2/29/88	Quat.	8.06	205	n/a	0.04	26	12	19	4	0	151	17	10
D. Sharrow	T20N R53E S.34	2/29/88	Quat.	7.87	231	n/a	0.02	39	17	12	4	0	198	23	8
L. Melka	T19N R53E S.14	9/7/86	Quat.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a
B. Melka	T19N R53E S.14	3/10/87	Quat.	7.39	896	n/a	0.01	143	48	65	11	0	478	165	75
B. Melka	T19N R53E S.14	3/30/83	Quat.	7.54	885	n/a	0.03	140	48	56	11	0	485	160	81
Canonie (1994)															
HRH-458 @ 985' **		5/28/94		7.98	234	n/a	n/a	47	16	11	1.6	n/a	204	33	15
HRH-386 @ 925' **		5/18/94		8.03	326	n/a	n/a	54	22	14	1.7	n/a	257	41	13
HRH-251 @ 780-790' **		5/19/94		8.27	188	n/a	n/a	38	14	11	2.2	n/a	151	12	22
HRH-512 **		5/11/94		8.22	264	n/a	n/a	39	20	15	3.2	n/a	162	21	36
Collingwood N. Well	T20N R53E S.32 NWNW	7/11/94	Quat. alluvium	7.75	219	n/a	0.03	41	21	7.3	1.4	n/a	233	17	5
Fad Shaft	T19N R53E S.22	1/18/94	bedrock	7.74	280	n/a	0.19	56	27	8.9	2.4	n/a	256	46	10
Fad Shaft- 800 tap *	T19N R53E S.22	1/21/53	bedrock	7.80	267	11	0.02	52	n/a	8.3	1.4	n/a	290	38	10
Holly Shaft- W8 *	T19N R53E	6/6/49		n/a	296.8	6.4	0.12	53.2	19.7	1.5	n/a	n/a	301	21.8	28.4

n/a = not available

* = qualitative

** = not filtered; concentrations may be elevated

\# = laboratory pH value

[1]Federal secondary water quality standard.

[2]Nevada primary water quality standard.

[3]Nevada secondary enforceable water quality standard.
Bold indicates values that exceed drinking water standards.

Table 3-15 (Continued)

Sample ID / Unit	Location	Date	NO3 mg/l	F mg/l	B mg/l	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mn mg/l	Hg mg/l	Se mg/l	Ag mg/l	Zn mg/l	conductivity umhos/cm
Water Quality Standard			10[1]	2.0[2]-4.0[3]		0.05[1]	2[1]	0.005[1]	0.1[1]	1.0[2]	0.05[1]	0.05[2]	0.002[1]	0.05[1]	0.1[2]	5.0[4]	
Harrill & Lamke																	
in project area																	
Fad Shaft (bd) *	T19N R53E S.15	1/21/53	2.6	0	0.06	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	467
near project area																	
well (cc)	T20N R53E S.17	5/5/66	0.5	0.5	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	760
well (ad)	T20N R53E S.21	5/9/66	2.7	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	467
well (ab)	T21N R53E S.03	7/11/66	0.8	0.3	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	788
well (cb)	T21N R53E S.05	5/18/66	1.0	0.5	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	758
well (da)	T21N R53E S.13	5/17/66	0.4	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	406
well (cc)	T21N R53E S.28	5/17/66	0.2	0.4	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	709
well (da)	T21N R53E S.33	7/11/66	0.6	0.6	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	878
well (ac)	T21N R53E S.36	5/20/66	2.8	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	400
far from project area																	
shallow well (aa)	T22N R53E S.27	5/17/66	1.9	0.7	0.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1430
shallow well (cc)	T22N R53E S.30	5/17/66	0.6	0.3	0.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	635
well (ab)	T22N R54E S.34	3/10/54	5.5	0.6	0.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	709
well (ca)	T23N R52E S.13	5/5/66	0.6	0.4	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	560
well (dd)	T23N R53E S.34	5/17/66	2.5	0.6	0.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1300
well (ac)	T24N R53E S.06	5/5/66	0.5	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	449
WESTEC (1996)																	
MW-1	T19N R53E S.15	9/22/95	1.98	<0.5	0.06	0.77	0.00	<0.002	0.005	<0.003	<0.001	<0.001	<0.002	<0.041	<0.002	0.03	444
MW-1	T19N R53E S.15	10/26/9	2.23	0.2	0.05	0.79	0.01	<0.002	<0.003	<0.003	<0.001	<0.001	<0.002	<0.041	<0.002	0.01	470
MW-1	T19N R53E S.15	1/09/96	2.35	0.1	0.060	0.682	0.023	<0.002	<0.005	<0.003	<0.001	<0.002	<0.000	<0.001	<0.003	0.04	528
MW-2	T19N R53E S.11	9/21/95	0.46	0.3	0.10	<0.04	0.04	<0.002	0.004	<0.003	0.002	0.008	<0.002	<0.041	<0.002	0.80	234
MW-2	T19N R53E S.11	10/25/9	0.45	0.3	0.110	<0.04	0.05	<0.002	<0.003	<0.003	<0.001	0.005	<0.002	<0.041	<0.002	0.56	323
MW-2	T19N R53E S.11	1/08/96	0.47	0.3	0.112	0.022	0.058	<0.002	<0.005	<0.003	0.002	0.005	<0.000	<0.002	<0.003	0.32	335
MW-3	T19N R53E S.03	9/21/95	0.06	0.2	0.11	<0.04	0.08	<0.002	<0.003	<0.003	0.002	0.003	<0.002	<0.041	<0.002	0.90	403
MW-3	T19N R53E S.03	10/25/9	0.05	0.1	0.10	<0.04	0.06	<0.002	<0.003	<0.003	<0.001	0.001	<0.002	<0.041	<0.002	0.70	508
MW-3 (dup.)	T19N R53E S.03	10/25/9	0.05	0.1	0.10	<0.04	0.07	<0.002	<0.003	<0.003	0.001	0.001	<0.002	<0.041	<0.002	0.71	n/a
MW-3	T19N R53E S.03	1/08/96	0.03	0.1	0.114	0.022	0.068	<0.002	<0.005	<0.003	0.004	0.007	<0.000	<0.001	<0.003	0.58	571
MW-4	T19N R53E S.03	9/22/95	6.41	0.2	0.060	<0.04	0.120	<0.002	0.005	<0.003	0.005	0.002	<0.002	<0.041	<0.002	0.59	403
MW-4	T19N R53E S.03	10/26/9	6.18	0.1	0.06	<0.04	0.12	<0.002	<0.003	<0.003	0.002	0.007	<0.002	<0.041	<0.002	0.71	580
MW-4	T19N R53E S.03	1/09/96	6.44	0.1	0.076	0.007	0.129	<0.002	0.006	0.005	0.008	0.011	<0.000	0.001	0.004	0.94	594
Fad Shaft	T19N R53E S.22	9/22/95	0.88	<0.01	0.040	<0.04	0.10	<0.002	<0.003	<0.003	0.002	<0.001	<0.002	<0.041	<0.002	0.19	410
Fad Shaft	T19N R53E S.22	10/26/9	0.80	<0.1	0.05	<0.04	0.10	<0.002	<0.003	<0.003	0.002	<0.001	<0.002	<0.041	<0.002	0.18	530
Fad Shaft	T19N R53E S.22	1/18/94	0.6	0.1	n/a	0.008	0.1	<0.000	<0.000	<0.02	0.0014	<0.01	<0.000	<0.001	0.000	0.24	n/a
Collingwood N. well	T20N R53E S.32	7/11/94	0.9	0.1	n/a	0.005	0.18	n/a	n/a	<0.02	n/a	<0.01	n/a	n/a	n/a	<0.0	n/a
Collingwood Old S.	T20N R53E S.32	7/20/94	2.2	0.1	n/a	0.005	0.18	n/a	n/a	<0.02	n/a	0.01	n/a	n/a	n/a	<0.0	n/a
Rubio	T20N R53E S.29	10/7/77	20.6	0.14	n/a	0.005	n/a	n/a	n/a	n/a	n/a	0.01	n/a	n/a	n/a	n/a	n/a
J. Minoletti	T20N R53E S.32	10/15/8	235	0.08	n/a	<0.003	n/a	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	0.07	862
J. Minoletti	T20N R53E S.32	2/29/88	123.4	0.09	n/a	<0.003	0.19	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	0.19	658
S. Oliver	T20N R53E S.29	2/29/88	10.9	0.18	n/a	0.012	0.08	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	0.19	324
D. Sharrow	T20N R53E S.34	2/29/88	4.5	0.23	n/a	0.006	0.13	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	0.1	385
L. Melka	T19N R53E S.14	9/7/86	n/a	n/a	n/a	0.13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.014	n/a	n/a	n/a
B. Melka	T19N R53E S.14	3/10/87	53.5	0.26	n/a	0.09	0.08	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	0.22	1320

Table 3-15 (Continued)

Sample ID Unit	Location	Date	NO3 mg/l	F mg/l	B mg/l	As mg/l	Ba mg/l	Cd mg/l	Cr mg/l	Cu mg/l	Pb mg/l	Mn mg/l	Hg mg/l	Se mg/l	Ag mg/l	Zn mg/l	conductivity umhos/cm
Water Quality Standard			10[1]	2.0[2]-4.0[3]		0.05[1]	2[1]	0.005[1]	0.1[1]	1.0[2]	0.05[1]	0.05[2]	0.002[1]	0.05[1]	0.1[2]	5.0[4]	
B. Melka	T19N R53E S.14	3/30/83	41.1	0.26	n/a	0.08	0.08	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a	1.31	n/a
Canonie (1994)																	
HRH-458 @ 985' **		5/28/94	1.0	0.16	n/a	0.017	0.14	<0.01	<0.025	<0.02	<0.1	n/a	<0.000	<0.001	<0.02	0.04	430
HRH-386 @ 925' **		5/18/94	0.9	0.2	n/a	0.024	0.11	<0.01	<0.025	0.02	0.10	n/a	<0.000	<0.001	<0.02	0.22	460
HRH-251 @ 780-790'		5/19/94	4.0	0.2	n/a	0.84	0.87	0.02	<0.025	<0.02	<0.05	n/a	0.0016	<0.001	<0.02	0.04	360
HRH-512 **		5/11/94	4.5	0.1	n/a	0.039	0.23	0.0067	<0.025	<0.02	0.017	n/a	<0.000	0.001	0.000	<0.0	450
Collingwood N. Well	T20N R53E S.32	7/11/94	0.9	0.1	n/a	0.005	0.18	n/a	n/a	<0.02	n/a	<0.01	n/a	n/a	n/a	<0.0	n/a
Fad Shaft	T19N R53E S.22	1/18/94	0.6	0.1	n/a	0.008	0.1	<0.000	<0.05	<0.02	0.0014	0.02	<0.000	<0.001	0.000	0.24	n/a
Fad Shaft- 800 tap *	T19N R53E S.22	1/21/53	2.6	0.0	0.06	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	467
Holly Shaft- W8 *		6/6/49	n/a	n/a	0.15	n/a	n/a	n/a	n/a	0.03	0.03	n/a	n/a	n/a	0.01	0.0	n/a

n/a = not available

* = qualitative

** = not filtered; concentrations may be elevated

= laboratory pH value

[1]Nevada primary water quality standard.

[2]Federal secondary water quality standard.

[3]Federal primary water quality standard.

[4]Nevada secondary enforceable water quality standard.
Bold indicates values that exceed drinking water standards.

3.4.2.1 Proposed Action

Geochemical testing was conducted to assess impacts to both surface water and groundwater quality (WESTEC 1996d). Data evaluated with respect to water quality impacts include: 1) whole rock analyses, 2) static acid/base accounting methods, 3) kinetic test methods, 4) meteoric water mobility procedure testing, and 5) synthetic precipitation leach testing (Environmental Protection Agency Method 1312). The intent of each of these tests is explained in Appendix B, and the results of the tests on alluvium, oxidized limestone, and leach residue are presented in Tables B-2 through B-7. Impacts to water quality were judged to be significant if the proposed facilities or the alternatives could potentially degrade surface or groundwater quality based on applicable Nevada water quality standards. The concentrations of dissolved constituents, listed in Appendix B, Tables B-2 and B-3, in all of the test solutions were generally low and often below detectable levels. In addition, bismuth, cobalt, gallium, lanthanum, lithium, molybdenum, phosphorus, scandium, strontium, tin, titanium, and vanadium were all below detection levels in all the test solutions. In a few cases, test solutions exceeded water quality standards for arsenic, aluminum, and pH. A detailed discussion is provided in Appendix B and in the Groundwater Impacts section.

<u>Surface Water Impacts</u>

Mining operations are not expected to significantly impact surface water resources due to the absence of perennial streams and springs in the Ruby Hill project area. A total of seven intermittent drainages, ***determined by the Corps of Engineers to be non-jurisdictional*** waters of the United States, would be filled or excavated by mine development and operation (Map 3-6). Table 3-16 lists the length, width, and acreages of ***non-jurisdictional*** waters of the United States that would be filled or excavated by various project components. Approximately 0.6 acre of ***non-jurisdictional*** waters of the United States would be affected by the Proposed Action, of which 0.4 acre would be filled and 0.2 acre would be excavated during mine development and operation.

Erosion is a concern for the site due to the high erosion potential of the soils in the site vicinity. Three diversion channels would be constructed upgradient of the facilities to divert potential run-on to the site.

Diversion channels would be designed to divert flows from the 100-year, 24-hour storm event. Runoff would be diverted from all surface disturbances, including roads, through ditches or berms. Storm water diversion terraces, silt fences, gabion sediment traps, grass filter waterways, or straw bale barriers would be used as well for minimizing runoff. Ditches would utilize settling basins, hay bales, or silt fences to control sediment. Culverts would be installed for adequate road drainage as per BLM standards (Homestake 1995a). Revegetation of disturbed areas would be completed as soon as feasibly possible after disturbance to minimize the erosion and sedimentation effects (Homestake 1995a). Effects on surface waters of the Ruby Hill Project would be minimal as a result of effective drainage, erosion, and sedimentation control procedures.

Seven springs and one seep were found between 2.5 and 3.5 miles south and southeast of the proposed pit. All of the springs and the seep occur at elevations above the groundwater elevation in the project area and are upgradient of the proposed pit (WESTEC 1996a). Modeling by WESTEC (1996b) predicts that withdrawal of groundwater from the northern portion of the project area is not expected to affect the flow from the springs or seep. The groundwater withdrawal modeling is explained in further detail in the following section.

Table 3-16

Non-Jurisdictional Waters of the United States (WUS) Affected by the Proposed Action

Mine Facility	Distance (ft)	Average Width of WUS (ft)	Square Feet	Acres
WUS to be Filled				
Safety Berm Setback	931	2	1,862	0.04
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	648	2	1,296	0.03
Waste Rock Dump	6,583	1	6,583	0.15
Main Access Road	50	1	50	<0.01
Growth Medium Stockpiles	1,922	3	5,766	0.13
Haul Road	50	1	50	<0.01
Diversion Channels	20	2	40	<0.01
Subtotal	9,121	--	15,647	0.38
WUS to be Excavated				
Soil Borrow Source	1,888	4	7,552	0.17
TOTAL	11,009	--	23,199	0.55

Groundwater Impacts

The potential for groundwater degradation caused by leaching of arsenic and aluminum is low. Analytical transport modeling using the Horizontal Plane Source model of Gayla (1987) suggests that rain water infiltrating the proposed pit at an estimated rate of 0.7 feet per day and carrying 0.1 mg/L arsenic would not result in arsenic values in exceedence of Nevada Primary Drinking Water Standards at a distance of 1,000 feet downgradient during the first 50 years after mine reclamation. This modeling represents a worst-case scenario, in that it utilized a maximum estimated infiltration rate and a maximum estimated arsenic concentration and assumed both were operative for 50 years. Therefore, it is not considered likely that arsenic values would exceed Nevada Primary Drinking Water Standards at a point of compliance 1,000 feet downgradient from the proposed pit for a period of up to 50 years after mine closure. Although it is possible that arsenic values may exceed standards at some time well beyond 50 years, this is not considered likely based on the Gayla modeling results provided by WESTEC. Aluminum is generally very immobile in soils and aquifer materials. Under equilibrium conditions, aluminum exists as insoluble $Al(OH)_3(s)$ at pH values between approximately 5.0 to 8.0 but becomes more soluble under acidic or basic conditions outside this range. Thus, the likelihood for arsenic and aluminum movement into local groundwater is low. The high pH values associated with several of the chemical extractions are somewhat higher than those for natural groundwaters in the area. Infiltrating surface waters would tend to decrease in pH due to increasing $CO_2(g)$ concentrations below the ground surface. Thus, the higher pH values reported from laboratory experiments may not be representative of actual pH conditions in groundwaters and may have led to an overestimation of aluminum mobility.

Details regarding the design and construction of the heap leach facility are provided in Chapter 2.0 of this EIS and in the Ruby Hill Project Plan of Operations (Homestake 1995a). The heap leach facility would be designed to be a zero-discharge facility with the capacity to contain all process fluids and meteoric waters generated by the 25-year, 24-hour storm event. The system would be designed to contain a 24-hour draindown resulting from power loss. Storm flows from upgradient catchment areas would be routed around the facility by a diversion ditch system that has been designed to pass the 100-year, 24-hour storm event. The leach pad would utilize a composite-lined system with leak detection. A minimum of 24 inches of crushed sand and gravel would be placed over the 80-mil high density polyethylene geomembrane liner. The leach pad also would be equipped with a leak detection/collection system placed under the primary liner beneath the collection pipes in each cell of the leach pad. Leak detection for the leach pad would include separate monitoring systems for each cell of the leach pad. Therefore, contamination of groundwater by leach solution is not anticipated.

Reclamation procedures for the heap leach facility incorporate ore and solution characteristics, site conditions, and climatic conditions (Homestake 1995a). The reclamation phases for the heap leach facility include: heap rinsing; heap regrading, resoiling, and revegetation; rinse solution management; and pond reclamation. A detailed permanent closure plan for the heap leach facilities would be submitted to the Nevada Division of Environmental Protection 2 years prior to closure, as required by Nevada Administrative Code 445.24386 and Nevada Administrative Code 445.14338.

The heap will be rinsed with fresh water until the weak acid dissociable cyanide concentration is 0.2 mg/L or less, a pH of 6.0 to 9.0 is obtained, and the solution meets or exceeds primary drinking water standards. It has been estimated that approximately 1.5 years may be required to completely rinse and drain the approximate 8-million-ton ultimate heap. If neutralization by rinsing does not achieve the required closure criteria, then Homestake would submit a proposal to the Nevada Division of Environmental Protection for an alternative heap leach pad closure method. The heap will be graded to eliminate the benches, to reduce the side slopes to a maximum 3H:1V grade, and to round off the heap edges to more natural contours. A suitable amount of growth media will be placed on the regraded heap, if necessary. The resoiled heap will be scarified and then seeded with a low elevation reclamation seed mix. Regrading and revegetating would inhibit surface ponding and infiltration of meteoric waters, and reduce the erosion potential of the reclaimed pads (Homestake 1995a).

The rinse solution disposal plan combines a "contained" land application system with enhanced evaporative spray nozzles installed on the heap application spray system. This system will include recirculation of rinse solutions back onto the heap to evaporate solutions and assist in revegetation. Evaporative nozzles also may be used on the solution ponds to further accelerate evaporation of solutions. Based on the estimated final rinse water volumes, approximately 2 years will be required to consume all of the rinse water. After the rinse solution is evaporated, the solution pond and storm-event pond will be reclaimed. The pond reclamation plan includes testing pond sediments for hazardous constituents, folding the liners into the pond areas, and backfilling and grading the ponds to provide free drainage and to blend the sites into the adjacent topography. The ponds will be backfilled with the original excavated soil material that will be stockpiled in the pond berms. The sites will be revegetated (Homestake 1995a).

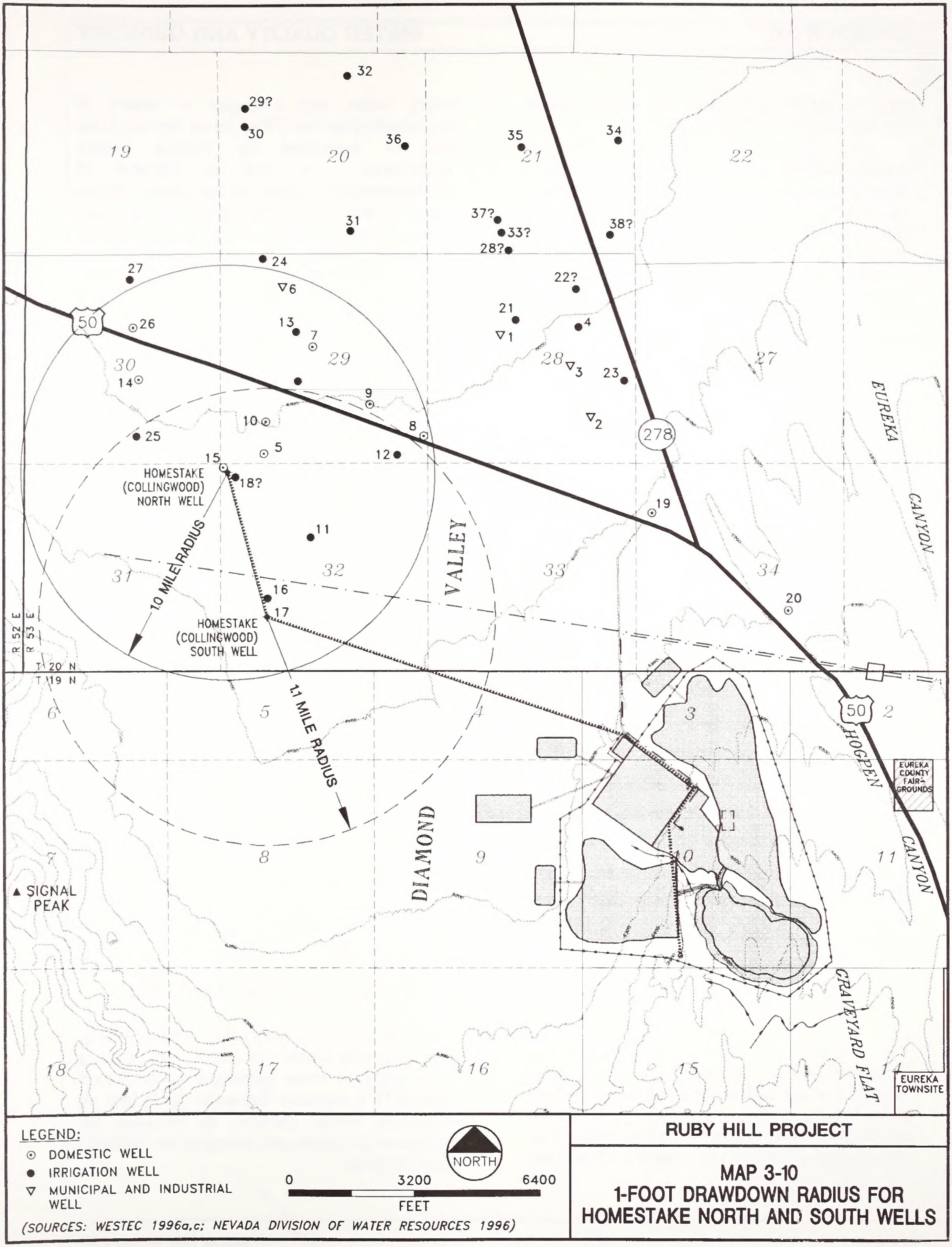
Homestake currently owns water rights in the area totalling 1,110 acre-feet per year (688 gpm). Homestake plans to use approximately 400 acre-feet per year (248 gpm) of groundwater for operations, as described in Section 2.1.8, Water Supply. The maximum pumping rate expected at any time from the water supply wells is 300 gpm. This maximum pumping rate is less than the total historical water right use (688 gpm, by the Collingwood Ranch), assuming that the historical use was at least 44 percent of the total water right. Modeling was done by WESTEC (1996a, b) to predict the drawdown at the water supply wells and surrounding wells. The model used was Quickflow Version 1.19 (Geraghty and Miller 1993), which is a 2-dimensional horizontal flow model based on the Theis equation. ***The modeling was based on a maximum pumping rate of 300 gpm.*** The model was run for 10 years under transient flow conditions to simulate the mine life. Input parameters included the following: a specific yield of 0.125 from Harrill and Lamke (1968); a transmissivity of 150,000 gpd/ft based on the low end of calculated transmissivities from aquifer tests at the Homestake water supply wells (Scanlan Engineering 1994b); a groundwater gradient of *0.05* feet/feet true north, which is based on measurements between the North and South Homestake Wells; and a reference head of 5819.20 feet above mean sea level taken from outside the affected area. Use of the Theis equation requires the following assumptions: Flow is in the range of Darcy's Law; water is released instantly from storage; the aquifer is confined, homogeneous, isotropic, and of infinite extent; the aquifer has a constant thickness and negligible water table slope; the pumping and observation wells fully penetrate the aquifer; and the diameter of the pumping well is very small. Using a confined, full-aquifer penetration model to predict drawdown should overestimate the predicted drawdown; so the actual drawdown should be less than predicted. The predicted radius of influence may extend into the bedrock aquifer to the west of the production wells; if this occurs, the Quickflow model would underestimate the predicted drawdown. Map 3-10 shows the predicted drawdown from Quickflow modeling. The maximum predicted drawdown at the Homestake South Well is 5.50 feet, with the 1-foot drawdown contour approximately 1.1 miles from the well. The maximum predicted drawdown at the Homestake North Well is 5.44 feet, with the 1-foot drawdown contour approximately 1 mile from the well. SMI reviewed the Quickflow input parameters, results and additional sensitivity analyses run by WESTEC and believes that the results are accurate. The predicted 5-foot drawdown contour is less than 0.25 mile from each well (WESTEC 1996c). Since predicted drawdown is less than 10 feet, this impact is not considered significant. Any surface water or groundwater outside the 1-foot drawdown contour is not expected to be impacted.

Pit Lake

The elevation of the groundwater below the proposed pit, determined from water levels in piezometers and wells, ranges from 5,900 to 5,918 feet above mean sea level. Exploration, monitor well, and piezometer drilling beneath and nearby the pit indicates that the permanent water table occurs in bedrock and that the overlying alluvium does not produce free water. During drilling of piezometers HRH-1205 and HRH-1206 air was used as the drilling fluid and airlift tests were performed to determine the first free water (WESTEC 1996a; Homestake 1995b). During drilling of most of the remaining piezometers, drill returns were monitored and airlift tests were performed to determine depth to, and production of, water. Water was not encountered in alluvium during airlift testing and drilling in the area of the proposed pit. The proposed pit bottom elevation is 5,940 feet above mean sea level, which is between 22 and 40 feet above the groundwater surface; therefore, a pit lake is not expected to form.

If groundwater inflow is encountered during mining, and is of sufficient volume that the potential for a pit lake exists, Homestake will prepare a pit lake study. The pit lake study will be used to determine if the pit lake will violate Nevada Division of Environmental Protection regulation NAC 445A.429. This study would address the two main compliance issues of NAC 445A.429 (Gaskin 1996): 1) Would the pit lake degrade groundwater quality, and 2) would the pit lake affect human, avian, or terrestrial life. ***In addition, if groundwater inflow is encountered and the potential for a pit lake exists, an environmental impact statement may be required to evaluate impacts, inform the public, and guide mitigation.***

The following two scenarios could possibly cause a rise in water levels in the bedrock and alluvial aquifers: 1) A decrease in pumping of



RUBY HILL PROJECT

MAP 3-10
1-FOOT DRAWDOWN RADIUS FOR HOMESTAKE NORTH AND SOUTH WELLS

groundwater for agricultural use, and 2) several years of above average precipitation.

During 1990, Artega et al. (1995) estimated that approximately 64,000 acre-feet of groundwater was removed for irrigation while Harrill and Lamke (1968) estimated that approximately 30,000 acre-feet of recharge occur yearly. Irrigation would have to decrease by more than 50 percent (pre-1975 total pumpage) for equilibrium to occur at the present water levels; pumping would have to decrease even more to allow the water table to begin rising. Most of the pumpage currently occurs in the alluvial aquifer. The bedrock aquifer, if affected by pumpage, is probably not affected to the same degree as the alluvial aquifer. Therefore, if pumping were to drastically decrease and water levels were to begin rising in the alluvial aquifer, short-term water levels within the bedrock aquifer would probably not rise. If long-term water levels were to be affected, the amount of rise would be expected to be less than water level increases in the alluvial aquifer.

At 1990 pumping rates, the current average annual precipitation of 12.69 inches per year would have to approximately double to 25.4 inches per year to allow equilibrium to occur at the present water levels. Average annual precipitation would have to more than double to cause water levels to rise in the alluvial aquifer (where most of the pumping occurs). If water levels were to rise, from increased precipitation, more water would be available for evapotranspiration and evaporation (i.e., from ponding, streams, spring discharge, etc.) which would increase the loss of water and require additional precipitation to allow water levels to continue to rise.

3.4.2.2 East Waste Rock Dump Alternative

The majority of impacts resulting from implementation of the East Waste Rock Dump Alternative would be the same as those described for the Proposed Action. Seven ***non-jurisdictional*** waters of the United States would be affected by this alternative (Map 3-11). Table 3-17 lists the length, width, and acreages of waters of ***non-jurisdictional*** the United States that would be filled or excavated by various project components. A total of 0.6 acre of ***non-jurisdictional*** waters of the United States would be affected by this alternative, of which 0.4 acre would be filled and 0.1 acre would be excavated during mine development and operation.

3.4.2.3 West Waste Rock Dump Alternative

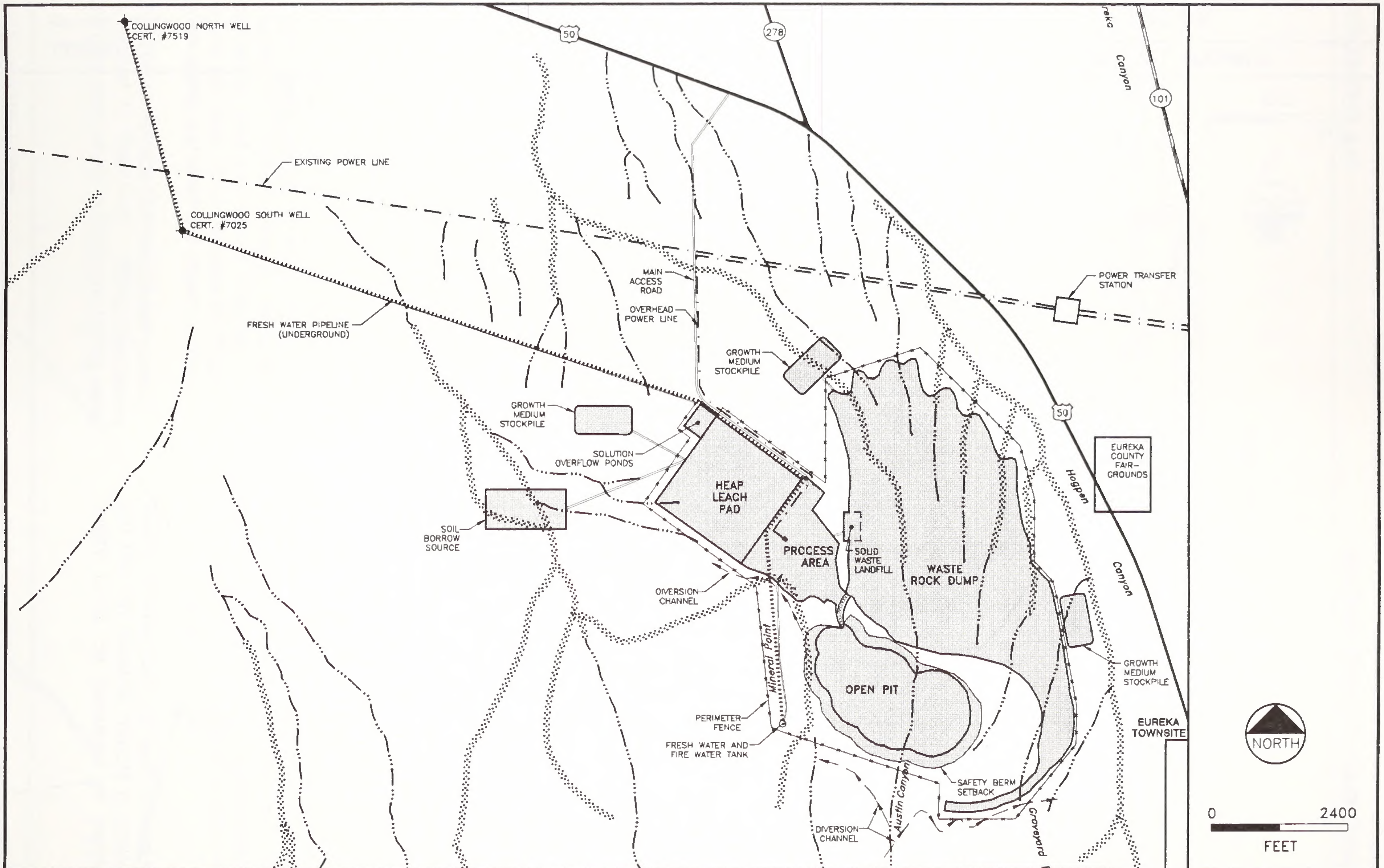
The majority of impacts resulting from implementation of the West Waste Rock Dump Alternative would be the same as those described for the Proposed Action. Six ***non-jurisdictional*** waters of the United States would be affected by this alternative (Map 3-12). Table 3-18 lists the length, width, and acreages of ***non-jurisdictional*** waters of the United States that would be filled or excavated by various project components. A total of 0.5 acre of ***non-jurisdictional*** waters of the United States would be affected by this alternative, of which 0.4 acre would be filled and 0.1 acre would be excavated during mine development and operation.

3.4.2.4 Partial Backfilling Alternative

Partial backfilling of the pit with waste rock may increase the potential chemical impacts to groundwater because the distance to groundwater along which leachable constituents could travel would be lessened, reducing the potential for attenuation. Implementation of this alternative would result in the same impacts to other waters of the United States as described for the Proposed Action.

3.4.2.5 No Action Alternative

Under the No Action Alternative, mining, milling, and processing would not occur. No impacts would occur to either surface or groundwater. However, it is expected that water rights held by Homestake would continue to be used for agricultural purposes and pumping for irrigation would continue.

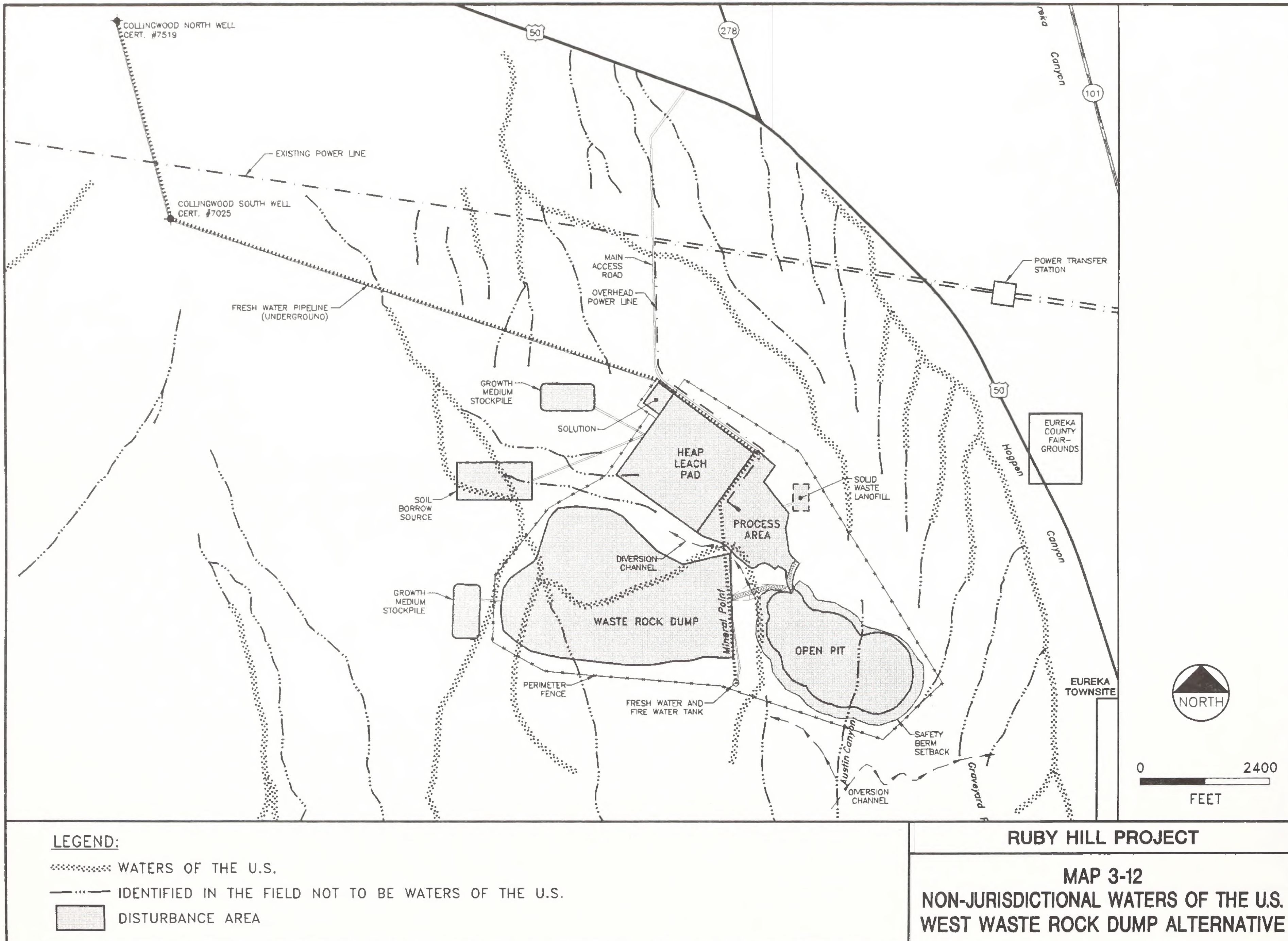


LEGEND:

- WATERS OF THE U.S.
- IDENTIFIED IN THE FIELD NOT TO BE WATERS OF THE U.S.
- DISTURBANCE AREA

RUBY HILL PROJECT

MAP 3-11
NON-JURISDICTIONAL WATERS OF THE U.S.
EAST WASTE ROCK DUMP ALTERNATIVE



MAP 3-12
NON-JURISDICTIONAL WATERS OF THE U.S.
WEST WASTE ROCK DUMP ALTERNATIVE

Table 3-17

Non-Jurisdictional Waters of the United States (WUS)
Affected by the East Waste Rock Dump Alternative

Mine Facility	Distance (ft)	Average Width of WUS (ft)	Square Feet	Acres
WUS to be Filled				
Safety Berm Setback	931	2	1,862	0.04
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	648	2	1,296	0.03
Waste Rock Dump	6,583	1	6,583	0.15
Main Access Road	50	1	50	<0.01
Growth Medium Stockpiles	1,922	3	5,766	0.13
Haul Road	50	1	50	<0.01
Diversion Channels	20	2	40	<0.01
Subtotal	9,121	--	15,647	0.38
WUS to be Excavated				
Soil Borrow Source	1,888	4	7,552	0.17
TOTAL	11,009	--	23,199	0.55

3.4.3 Cumulative Impacts

Mining activity affects water quality by allowing water to come into contact with geologic materials that have been altered by mining processes, or by exposing geologic materials to oxygen which may allow or increase rates of oxidation (if not previously oxidized). Water moving through this disturbed/altered material can then dissolve and/or carry contamination to surface and groundwater supplies. Mining activity affects water quantity by removing water from sources (i.e., aquifers, streams, lakes etc.) for processing, dust suppression, and other mining related activities. The cumulative affects area for water quality and quantity is shown on Map 3-13.

Disturbance acreage from interrelated projects is presented in Table 3-19. Mining disturbance includes open pit and underground mining, waste rock disposal, heap leach ore milling and processing, tailing disposal, and exploration. Past mining disturbance is approximately 26 acres.

Due to the minimal withdrawal of water, the composition of the overburden and waste rock, and the proposed diversions, reclamation plans, and closure plans, cumulative impacts are expected to be minimal. Since there are no perennial streams in the project area, there should be no cumulative impacts to surface water quality or quantity. Past, present, and reasonably foreseeable future actions, and the Proposed Action would result in the filling and excavation of intermittent drainages classified as other waters of the United States.

Testing of waste rock and leach residue indicate that the only possible impacts to groundwater quality could be elevations of arsenic and aluminum levels, and a raising of the pH. Modeling of arsenic indicates that if it were to reach groundwater, dilution within 1,000 feet of the proposed pit would reduce the concentration to below the primary drinking water standard. Aluminum is generally insoluble and probably would not mobilize under the site conditions. pH values would tend to decrease when interacting with infiltrating surface waters. Thus, cumulative impacts from the waste rock and leach residue are not expected to occur.

Maximum drawdown from groundwater withdrawal by the proposed Ruby Hill Mine is predicted to be less than 5.50 feet at the point of withdrawal. Significant (greater than 10 feet of drawdown) cumulative impacts are not expected to result from groundwater withdrawal.

A reasonably foreseeable future action is the East Archimedes Oxide Project, which would expand the proposed pit and waste rock disposal facilities. The East Archimedes Oxide Project may intersect the groundwater table. If it appears that a pit lake would form with this future action, the required geochemistry and groundwater modeling would be performed to assess impacts and any required supplement to this EIS would be completed.

3.4.4 Mitigation and Monitoring

If groundwater inflow is encountered during mining, and is of sufficient volume that the potential for a pit lake exists, Homestake will prepare a pit lake study. The pit lake study will be used to determine if the pit lake will violate Nevada Division of Environmental Protection regulation NAC 445A.429. This study would address the two main compliance issues of NAC 445A.429 (Gaskin 1996): 1) Would the pit lake degrade groundwater quality, and 2) would the pit lake affect human, avian, or terrestrial life. In addition, if groundwater inflow is encountered and the potential for a pit lake exists, an environmental impact statement may be required to evaluate impacts, inform the public, and guide mitigation.

3.4.5 Residual Adverse Impacts

No adverse residual impacts are expected to occur to surface or groundwater quantity or quality. Intermittent drainages classified as other waters of the United States would be filled or excavated as a result of disturbance associated with the Proposed Action.

Table 3-18

Non-Jurisdictional Waters of the United States (WUS) Affected by the West Waste Rock Dump Alternative

Mine Facility	Distance (ft)	Average Width of WUS (ft)	Square Feet	Acres
WUS to be Filled				
Safety Berm Setback	931	2	1,862	0.04
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	648	2	1,296	0.03
Waste Rock Dump	5,082	2	10,164	0.23
Main Access Road	50	1	50	<0.01
Growth Medium Stockpiles	0	0	0	0
Haul Road	50	1	50	<0.01
Diversion Channels	20	2	40	<0.01
Subtotal	6,781	--	13,462	0.33
WUS to be Excavated				
Soil Borrow Source	1,888	4	7,552	0.17
TOTAL	11,009	--	21,014	0.50

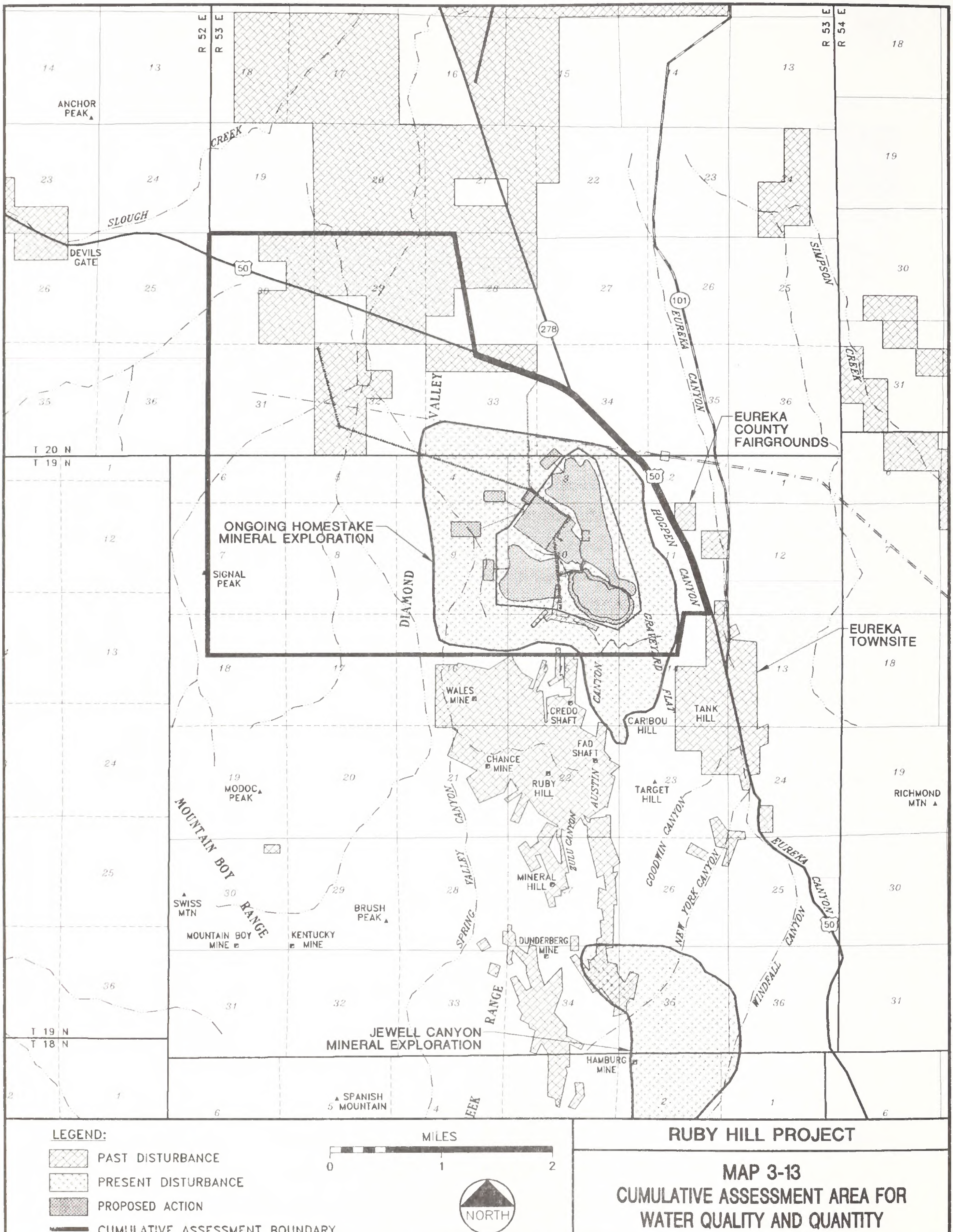
Table 3-19

Disturbance Acreage in the Cumulative Assessment Area for Water Quality and Quantity

	Disturbance Acreage in Cumulative Assessment Area
Past Disturbance	
Mining Activity (Patented Lands)[1]	26
Private Agricultural Development	1,312
Subtotal	1,338
Present Action	
Ongoing Homestake Mineral Exploration	150
Subtotal	150
Reasonably Foreseeable Future Action	
East Archimedes Oxide Project	300
Proposed Action (Ruby Hill Project)	696
Correction Factor[2]	<50>
Total Disturbance	2,134

[1]The majority of historic mining disturbance has occurred on patented lands.

[2]Correction factor used to minimize double-counting of disturbance in exploration areas that subsequently undergo mine development.



RUBY HILL PROJECT

MAP 3-13
CUMULATIVE ASSESSMENT AREA FOR
WATER QUALITY AND QUANTITY

3.5 Soils

3.5.1 Affected Environment

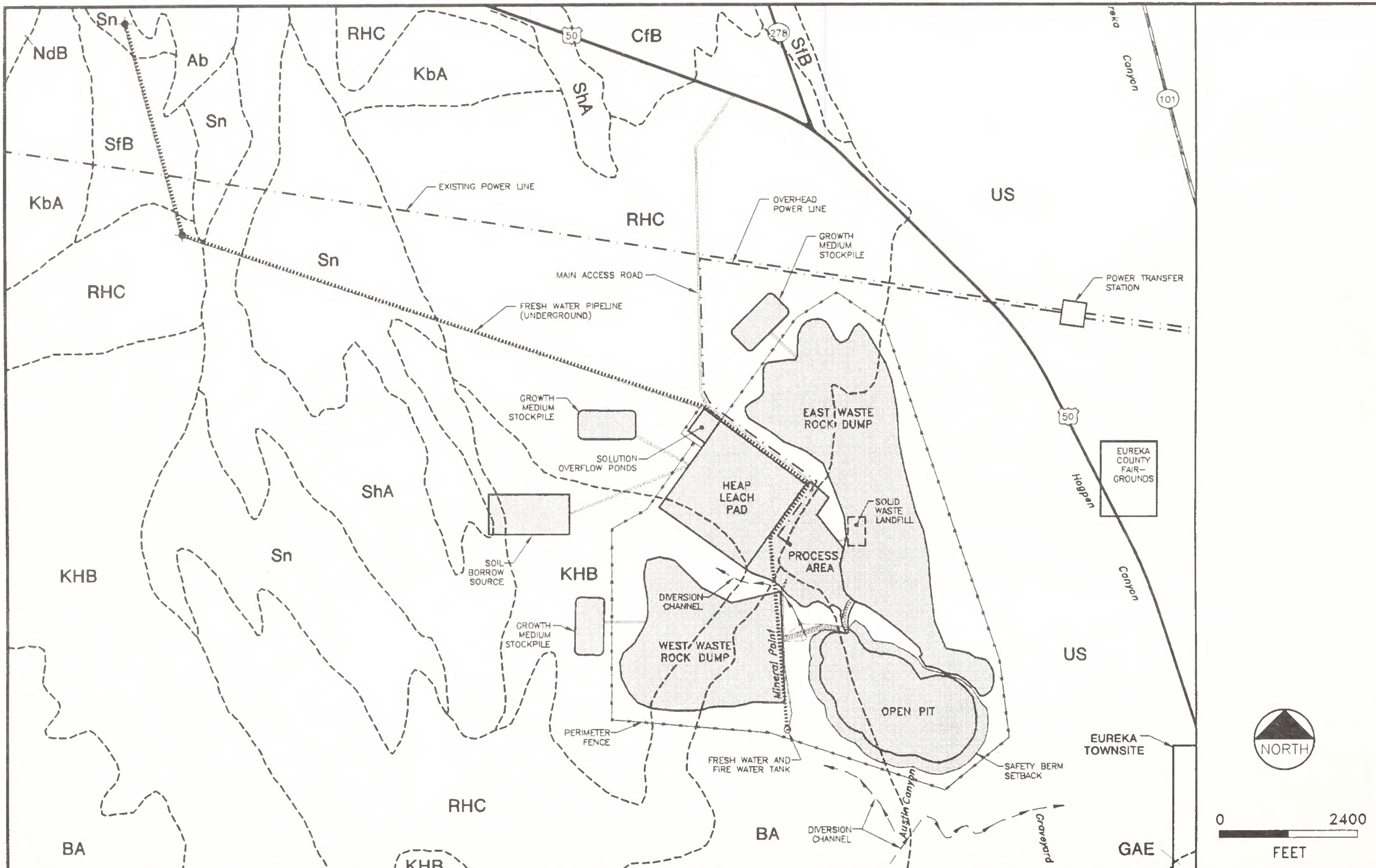
Physiographic features that occur in the project area include alluvial fans, terraces, and an alluvial basin. Alluvial fans and terraces are located at higher elevations within the project area and are positioned between foothills to the south and the Diamond Valley to the west, north, and east. These fans and terraces typically include a mixture of coarse fragments (e.g., gravel and cobble) and several textures of soils (e.g., loam, sandy loam, silt loam). Soils associated with these landforms are gently sloping to steep, shallow to moderately deep, and well drained. A portion of the project area is located in the extreme southern portion of Diamond Valley which is a large alluvial basin. Alluvial basins are characterized by nearly level to moderately sloping, well-drained soils that are moderately deep. Soil textures that predominantly occur in alluvial basins include silt loam, silty clay loam, and sandy loam.

Seven soils occur in the project area, they include the Umil association; Rubyhill fine sandy loam, 2 to 8 percent slopes; Bartine-Overland association; Shipley complex; Kobeh gravelly fine sandy loam, 2 to 4 percent slopes, Shipley silt loam, 0 to 2 percent slopes, and Shipley fine sandy loam, 2 to 4 percent slopes (Natural Resources Conservation Service et al. 1980) (Map 3-14). A summary of the physical characteristics and reclamation suitabilities of these soils is provided in Table 3-20.

The Umil association is the dominant soil that occurs in the project area. Major soils in this association include Umil loam, 2 to 4 percent slopes (60 percent) and Umil cobbly loam, 15 to 50 percent slopes (30 percent). Inclusions of Holtle soils (10 percent) occasionally occur with this association. Umil soils are located on gently sloping, old alluvial fans that are dissected deeply by intermittent drainages and have moderately steep to steep side slopes. These soils consist of well-drained soils that formed in alluvium mainly from limestone, dolomite, and mixed igneous material. The dominant texture of the surface soil and subsoil is loam which is mixed with approximately 10 to 50 percent gravel. The subsoil also is moderately to strongly alkaline. Soil that can be salvaged for reclamation activities includes 11 inches of soil (4 inches of surface soil and 7 inches of subsoil). A white, indurated, silica-lime hardpan is located approximately 11 inches below the soil surface with a thickness of approximately 23 inches. Barren soil is moderately to rapidly eroded by water and moderately to severely eroded by wind.

The Rubyhill fine sandy loam, 2 to 8 percent slopes, also is a major soil present within the project area and accounts for 80 percent of the soil in this map unit. Soils that may be inclusions within this map unit include other Ruby Hill and Ratto soils (20 percent). This soil occurs on old, dissected alluvial fans with gentle to moderate slopes. Ruby Hill soils are considered well-drained soils that formed in alluvium derived from limestone and quartzite. The dominant texture of the surface soil is fine sandy loam and the subsoil is loam or light clay loam. The surface soil is mixed with approximately 5 to 30 percent gravel. Soil that can be salvaged for reclamation activities includes 21 inches of soil (4 inches of surface soil and 17 inches of subsoil). The subsoil consists of 20 to 35 percent gravel and is underlain by a white, indurated, silica-lime duripan that is located approximately 21 inches below the soil surface. This duripan is approximately 29 inches thick and typically occurs 21 to 50 inches from the soil surface. Barren soil is slowly eroded by water and slightly eroded by wind.

The Bartine-Overland association primarily consists of Bartine gravelly loam, 15 to 50 percent slopes (40 percent) and Overland very gravelly loam, 15 to 50 percent slopes (40 percent). Soils that may be included within this map unit include Holtle and Umil soils (10 percent) and rock outcrop (10 percent). These soils are located on north- and south-facing mountainsides and are well-drained. These soils formed from residuum that is mixed with shale, conglomerate, and quartzite. The dominant texture of the surface soil and subsoil is gravelly loam. These soil textures are mixed with 20 percent gravel and 10 percent cobble in the upper 5 inches and 50 to 70 percent coarse fragments in the subsoil. The subsoil is underlain by a limestone bedrock layer that is



LEGEND:

Ab	Alhambra fine sandy loam	KbA	Kobeh sandy loam, 0 to 2% slopes	SfB	Shipley fine sandy loam, 2 to 4% slopes
BA	Bartine – Overland association	KHB	Kobeh gravelly fine sandy loam, 2 to 4% slopes	ShA	Shipley silt loam, 0 to 2% slopes
CfB	Credo fine sandy loam, 2 to 4% slopes	NdB	Noyped loam, 2 to 4% slopes	Sn	Shipley complex
GAE	Gobel gravelly loam, 15 to 30% slopes	RHC	Rubyhill fine sandy loam, 2 to 8% slopes	US	Umil association

RUBY HILL PROJECT

MAP 3-14
SOILS IN THE PROJECT AREA

Table 3-20

Soil Map Unit Characteristics of Soils that are Located in the Project Area

Map Unit Symbol	Map Unit Name	Dominant Soil(s)	Inclusions Within Map Unit	Terrain and Slopes	Parent Material Type	RSD[1] (in.)	Dominant Texture of Suitable Soil and Depth	Erosion Hazard of Barren Surface (Water/Wind)	Limiting Factors
US	Umil association	Umil loam, 2 to 4 percent slopes (60%) and Umil cobbly loam, 15 to 50 percent slopes (30%)	Holtle soils (10%)	Gently sloping old alluvial fans deeply dissected by intermittent drainages; slopes range from 2 to 50 percent	Alluvium derived from limestone, dolomite, and mixed igneous material	11	Loam (11 inches)	Moderate to Rapid/Moderate to Severe	Subsoil consists of 10 to 50 percent gravel and is moderately to strongly alkaline; indurated duripan below 11 inches
RHC	Rubyhill fine sandy loam, 2 to 8 percent slopes	Rubyhill fine sandy loam, 2 to 8 percent slopes (80%)	Other Rubyhill soils and Ratto soils (20%)	Gently sloping to moderately sloping soil on old, dissected alluvial fans	Alluvium derived from limestone and quartzite	21	Fine sandy loam (4 inches) and loam or light clay loam (17 inches)	Slow/Slight	Subsoil consists of 20 to 35 percent gravel; strongly cemented duripan below 21 inches

Table 3-20 (Continued)

Map Unit Symbol	Map Unit Name	Dominant Soil(s)	Inclusions Within Map Unit	Terrain and Slopes	Parent Material Type	RSD[1] (in.)	Dominant Texture of Suitable Soil and Depth	Erosion Hazard of Barren Surface (Water/Wind)	Limiting Factors
BA	Bartine-Overland association	Bartine gravelly loam, 15 to 50 percent slopes (40%) and Overland very gravelly loam, 15 to 50 percent slopes (40%)	Holtle and Umil soils (10%) and rock outcrop (10%)	North- and south-facing mountainsides; slopes range from 15 to 50 percent	Residuum from limestone that is mixed with shale, conglomerate, and quartzite	14	Gravelly loam (14 inches)	Rapid/Moderate to Severe	Subsoil consists of 50 to 70 percent gravel and cobble; limestone bedrock below 31 inches
Sn	Shipley complex	Shipley silt loam, sandy subsoil variant (60%) and Shipley silt loam, 0 to 2 percent slopes (30%)	Alhambra and Kobeh soils (10%)	Alluvial fans with slopes between 0 to 2 percent	Alluvial and lacustrial material	0	NA	Slow/Slight	Surface soils are highly alkaline; very gravelly loamy fine sand below 32 inches
KHB	Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Kobeh gravelly fine sandy loam, 2 to 4 percent slopes (85%)	Shipley, Rubyhill, Nayped, and other Kobeh soils (15%)	Alluvial fans with slopes between 2 to 4 percent	Alluvial material derived from limestone and sandstone	17	Gravelly, fine sandy loam (17 inches)	Slow/Slight	Subsoil consists of 30 to 60 percent gravel and is strongly alkaline
ShA	Shipley silt loam, 0 to 2 percent slopes	Shipley silt loam, 0 to 2 percent slopes (85%)	Alhambra and Kobeh soils (15%)	Irregularly shaped areas within small and medium floodplains; slopes range from 0 to 2 percent	Alluvial and lacustrial material	14	Silt loam (14 inches)	Slow/Slight	Subsoil is strongly alkaline

Table 3-20 (Continued)

Map Unit Symbol	Map Unit Name	Dominant Soil(s)	Inclusions Within Map Unit	Terrain and Slopes	Parent Material Type	RSD[1] (in.)	Dominant Texture of Suitable Soil and Depth	Erosion Hazard of Barren Surface (Water/Wind)	Limiting Factors
SfB	Shipley fine sandy loam, 2 to 4 percent slopes	Shipley fine sandy loam, 2 to 4 percent slopes	Hayeston, Silverado, and other Shipley soils	Lake terraces with slopes between 2 to 4 percent slopes	Mixed alluvium and lacustrine material	14	Silt loam (14 inches)	Slow/Moderate	Subsoil is strongly alkaline

[1]RSD: Recommended Suitable Soil Salvage Depth.

NA = Not applicable.

Source: Natural Resources Conservation Service et al. 1980.

located approximately 31 inches below the soil surface. Soil that can be salvaged for reclamation activities includes the upper 14 inches of soil (5 inches of surface soil and 9 inches of subsoil). Barren soil is rapidly eroded by water and moderately to severely eroded by wind.

The Shipley complex largely consists of Shipley silt loam, sandy subsoil variant, 0 to 2 percent slopes (60 percent) and Shipley silt loam, 0 to 2 percent slopes (30 percent). Soils that may be inclusions within this map unit include Alhambra and Kobeh soils (10 percent). Shipley complex soils are deep, well-drained soils that occur on gentle slopes of alluvial fans and lake terraces. The dominant texture of the surface soil is silt loam and the subsoil consists of silt loam and very gravelly loamy fine sand. This soil should not be salvaged since it is strongly alkaline and contains a high percentage of coarse fragments. Barren soil is slowly eroded by water and slightly eroded by wind.

The Kobeh gravelly fine sandy loam, 2 to 4 percent slopes, is located on medium and large irregularly shaped alluvial fans and accounts for 85 percent of this map unit. Several soils, including Shipley, Rubyhill, Nayped, and other Kobeh soils, comprise 15 percent of this map unit. Kobeh soils are considered excessively drained soils that formed in alluvium primarily derived from limestone and sandstone. The dominant texture of the surface soil is gravelly, fine sandy loam and the subsoil is gravelly, fine sandy loam and gravelly, light sandy loam. The surface soil is mixed with approximately 10 percent gravel. Soil that can be salvaged for reclamation activities includes 17 inches of soil (7 inches of surface soil and 10 inches of subsoil). The portion of the subsoil that is not salvageable contains 30 to 60 percent gravel and is strongly alkaline. Barren soil is slowly eroded by water and slightly eroded by wind.

The Shipley silt loam, 0 to 2 percent slopes, is located on irregularly shaped areas within small and medium floodplains and accounts for 85 percent of this map unit. Several soils, including Alhambra and Kobeh soils, comprise 15 percent of this map unit. Shipley soils are well-drained soils that formed in mixed alluvium and lacustrine material and are located on alluvial fans and lake terraces. The dominant texture of the surface soil is silt loam and the subsoil is very fine sandy loam. Soil that can be salvaged for reclamation activities includes 14 inches of soil (3 inches of surface soil and 11 inches of subsoil). The portion of the subsoil that is not salvageable is strongly alkaline. Barren soil is slowly eroded by water and slightly eroded by wind.

The Shipley fine sandy loam, 2 to 4 percent slopes, occurs on irregularly shaped areas and lake terraces and accounts for 85 percent of this map unit. Several soils, including other Shipley soils and Hayeston and Silverado soils, comprise 15 percent of this map unit. Shipley soils are well-drained soils that formed in mixed alluvium and lacustrine material and are located on alluvial fans and lake terraces. The dominant texture of the surface soil is sandy loam and the subsoil is very fine sandy loam. Soil that can be salvaged for reclamation activities includes 14 inches of soil (3 inches of surface soil and 11 inches of subsoil). The portion of the subsoil that is not salvageable is strongly alkaline. Barren soil is slowly eroded by water and moderately eroded by wind.

3.5.2 Environmental Consequences

Soil reclamation and erosion potential are primary issues considered in the significance criteria for potential impacts to soils. Environmental impacts to soils were considered significant if the Proposed Action or selected alternative would result in the following:

- Major loss of suitable soils or other growth media during salvage, stockpiling, or reclamation activities.
- Erosion of disturbed or reclaimed sites resulting in the filling of sediment control structures.

Growth media within the project area were evaluated for suitability for reclamation use. Threshold values for soils considered poor for reclamation use were based on information provided in the BLM *Solid Minerals Reclamation Handbook H-3042-1* (BLM 1992). The soil parameters and factors to evaluate the suitability of soils for reclamation include:

- Sodium adsorption ratio - 8 to 16 (excess sodium);

- Electrical conductivity - 7 to 15 (excess salt);

- pH - 4.5 to 5 (too acidic) and 8.5 to 9 (too alkaline);

- Soil texture - sandy clay, loamy sand, and silty clay; clay greater than 60 percent is considered unsuitable;

- Coarse fragments - 20 to 40 percent, with greater than 40 percent considered unsuitable.

Soils that exhibited a poor rating were considered unsuitable for salvage and reclamation. Poorly rated materials have such severe problems that revegetation and stabilization are very difficult and costly. Soil reapplication with better suited growth media is necessary to establish and maintain vegetative growth.

3.5.2.1 Proposed Action

Potential impacts to soil resources include accelerated soil erosion rates and loss of productivity as a result of mining and reclamation activities. Potential soil erosion rates and off-site sedimentation impacts associated with the Proposed Action or Alternatives would be reduced or avoided with the implementation of interim and concurrent reclamation activities described in Section 2.1.15, Reclamation Plan.

Accelerated soil erosion rates may occur during mine operation due to removal and trampling of vegetation, surface soil disturbance, soil compaction, and salvaging and reclamation activities. Plant cover provided by vegetation in the project area would be removed and trampled during mine operation thereby increasing the potential for accelerated erosion rates. Surface disturbances and soil compaction resulting from vehicle use along miscellaneous access roads would reduce the water infiltration rate of soils potentially increasing runoff. Soil salvaging activities would include the stripping of surface and subsurface soil suitable for reclamation activities and the transportation and placement of these soils in growth media stockpiles.

Reclamation activities would include grading of slopes, possible re-application of growth media, and revegetation for a majority of project components. Pending the outcome of test plots, growth media would be reapplied, if necessary, to the waste rock dumps, ore and solution processing area, heap leach pad, main access road, diversion channels, and solution overflow ponds. Growth media present along the main access road, haul road, diversion channels, and solution overflow ponds would be salvaged and used to construct safety berms, ditches, and impoundments instead of being salvaged, transported, and stored at the growth media stockpiles.

Soil productivity may decrease as a result of mine operations since growth media (i.e., salvageable surface and subsurface soil) would be mixed during salvaging and stockpiling activities. Surface soils typically have a higher organic matter content and contain higher nutrient levels than subsurface soils. Soil biological activity (especially with the micorrhizae-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. If growth media were placed over waste rock, the character and texture of the original soils would be altered.

Surface and subsurface soils would be removed from the soil borrow source area and used to construct the foundation for the leach pad. After the soil had been removed, growth media would not be reapplied. The soil borrow source area would be reclaimed.

The Proposed Action would disturb 696 acres of soils, of which 113 acres would be subjected to compaction and 583 acres would be stripped and stockpiled for future reclamation activities. A total of 1,214,655 cubic yards of growth media would be salvaged and stockpiled for future reclamation activities (Table 3-21). Growth media would be used to reclaim 608 acres of disturbed land which would allow the potential application of 14 inches of growth media during reclamation activities.

Soils that would not be stripped during mine development and operation occur in the safety berm setback area and growth media stockpile

Table 3-21

Growth Media Available for Salvage - Proposed Action

Mine Component	Soil Mapping Unit	Acres	RSD[1]	Soil Volume[2]
Open Pit	US BA	70.2 17.8	11 14	103,855 33,599
Subtotal		88.0		137,454
Safety Berm Setback	--	34.0	0[3]	0[3]
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	US	35.2	11	52,076
	RHC	14.2	21	40,091
	BA	7.6	14	14,346
Subtotal		57.0		106,513
Waste Rock Dumps	US	140.2	11	208,094
	RHC	105.1	21	296,732
	BA	39.5	14	74,560
	KHB	52.2	17	119,587
Subtotal		337.0		698,973
Heap Leach Pad/Solution Overflow Ponds	RHC	73.0	21	206,103
	KHB	11.0	17	25,200
Subtotal		84.0		231,303
Fresh Water Pipeline	--	8.0	0[3]	0[3]
Haul Roads	BA	4.0	14	7,744
Overhead Power Line	--	3.0	0[3]	0[3]
Main Access Road	RHC	9.0	21	25,410
Miscellaneous Access Roads	--	3.0	0[3]	0[3]
Growth Medium Stockpiles	--	45.0	0[3]	0[3]
Subtotal		69.0		33,154
Diversion Channels	US	1.6	11	2,367
	BA	1.9	14	3,586
	RHC	0.3	21	847
	KHB	0.2	17	458
Subtotal		4.0		7,258
Soil Borrow Source	--	23.0	0[4]	0[4]
Total				1,214,655

[1]RSD = recommended soil salvage depth in inches.

[2]Soil Volume = Soil volume in cubic yards, rounded to the nearest cubic yard.

[3]Soil would not be salvaged beneath the growth medium stockpiles, or along the miscellaneous access roads, fresh water pipeline, and overhead power line.

[4]Soil removed from the soil borrow source area would be used as the soil-based foundation for the heap leach pad and would not be used for reclamation.

areas and along the fresh water pipeline, overhead powerline, and miscellaneous access roads. The miscellaneous access roads include undeveloped roads located along the fresh water pipeline and to the growth media stockpiles and soil borrow source area. Soils present in these areas would be compacted by vehicles and heavy equipment during mine development and operation.

Soils would be stripped from the mine pit, ore and solution processing area, waste rock dump, heap leach pad/solution overflow ponds, haul road, main access road, and diversion channels. Impacts to soils would occur during mine development and operation. Soils would be stripped from their original locations, transported to stockpile locations, and dumped. After growth media salvaging was completed, the growth media stockpiles would be reclaimed and sedimentation collection structures would be constructed alongthe periphery of each stockpile to reduce soil erosion. The slopes of the growth media stockpiles would be approximately 3H:1V although some of the slopes may be at 1.5 to 1 (i.e., angle of repose).

Stockpiled soils would have higher than normal erosion rates until successful revegetation has occurred. Successful revegetation of the stockpiles is anticipated to occur approximately 3 years after reseeding. At this time, plant cover would be sufficient to substantially decrease soil erosion. The sedimentation control structures would collect eroded soil from the stockpiles and eliminate the potential for off-site transportation of soil by water and sedimentation effects to intermittent drainages. Soil erosion caused by wind would be limited by the successful reclamation of the stockpiles. However, soils would be subjected to higher than normal soil erosion rates from wind for 3 years after reseeding due to the low plant cover.

Reclamation activities would take place along the periphery of the waste rock dump concurrently with mine operation. The waste rock slopes would be graded to 3H:1V slopes before the reapplication of growth media. Growth media would be susceptible to wind and water erosion until revegetation efforts have provided adequate plant cover to reduce erosion potential. Sedimentation control structures would collect eroded soils from the waste rock dumps and eliminate the potential for off-site transportation of soil by water and sedimentation effects to intermittent drainages.

3.5.2.2 East Waste Rock Dump Alternative

General impacts to soils are the same as those described for the Proposed Action. Implementation of this alternative would disturb 715 acres of soils or 19 acres more than the Proposed Action. Approximately 113 acres would be subjected to compaction and 602 acres would be stripped and stockpiled within the disturbance area and used for future reclamation activities. A total of 1,042,413 cubic yards of growth media would be salvaged and stockpiled for future reclamation activities (Table 3-22). Growth media would be used to reclaim 627 acres of disturbed land which would allow the potential application of 12 inches of growth media during reclamation activities.

3.5.2.3 West Waste Rock Dump Alternative

General impacts to soils are the same as those described for the Proposed Action. Implementation of this alternative would disturb *577* acres of soils or ***119*** acres fewer than the Proposed Action. Approximately 113 acres would be subjected to compaction and 460 acres would be stripped and stockpiled within the disturbance area and used for future reclamation activities. A total of 1,010,814 cubic yards of growth media would be salvaged and stockpiled for future reclamation activities (Table 3-23). Growth media would be used to reclaim 485 acres of disturbed land which would allow the potential application of 16 inches of growth during reclamation activities.

Table 3-22

Growth Media Available for Salvage - East Waste Rock Dump Alternative

Mine Component	Soil Mapping Unit	Acres	RSD[1]	Soil Volume[2]
Open Pit	US	70.2	11	103,855
	BA	17.8	14	33,599
Subtotal		88.0		137,454
Safety Berm Setback	--	34.0	0[3]	0[3]
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	US	35.2	11	52,076
	RHC	14.2	21	40,091
	BA	7.6	14	14,346
Subtotal		57.0		106,513
Waste Rock Dumps	US	358.6	11	530,522
	RHC	1.4	21	3,953
Subtotal		360.0		534,475
Heap Leach Pad/Solution Overflow Ponds	RHC	73.0	21	206,103
	KHB	11.0	17	25,200
Subtotal		84.0		231,303
Fresh Water Pipeline	--	8.0	0[3]	0[3]
Overhead Power Line	--	--	0[3]	0[3]
Main Access Road	RHC	9.0	21	25,410
Miscellaneous Access Roads	--	3.0	0[3]	0[3]
Growth Medium Stockpiles	--	45.0	0[3]	0[3]
Subtotal		65.0		25,410
Diversion Channels	US	1.6	11	2,367
	BA	1.9	14	3,586
	RHC	0.3	21	847
	KHB	0.2	17	458
Subtotal		4.0		7,258
Soil Borrow Source	--	23.0	0[4]	0[4]
Total				1,042,413

[1]RSD = recommended soil salvage depth in inches.

[2]Soil Volume = Soil volume in cubic yards, rounded to the nearest cubic yard.

[3]Soil would not be salvaged beneath the growth medium stockpiles, or along the miscellaneous access roads, fresh water pipeline, and overhead power line.

[4]Soil removed from the soil borrow source area would be used as the soil-based foundation for the heap leach pad and would not be used for reclamation.

Table 3-23

Growth Media Available for Salvage - West Waste Rock Dump Alternative

Mine Component	Soil Mapping Unit	Acres	RSD[1]	Soil Volume[2]
Open Pit	US BA	70.2 17.8	11 14	103,855 33,599
Subtotal		88.0		137,454
Safety Berm Setback	--	34.0	0[3]	0[3]
Ore and Solution Processing Area/Office/Parking/Truck Shop/Warehouse/Fuel Storage Area	US	35.2	11	52,076
	RHC	14.2	21	40,091
	BA	7.6	14	14,346
Subtotal		57.0		106,513
Waste Rock Dumps	US	0	11	0
	RHC	37.8	21	109,771
	BA	39.1	14	75,698
	KHB	137.1	17	309,663
Subtotal		214.0		495,132
Heap Leach Pad/Solution Overflow Ponds	RHC	73.0	21	206,103
	KHB	11.0	17	25,200
Subtotal		84.0		231,303
Fresh Water Pipeline	--	8.0	0[3]	0[3]
Haul Roads	BA	4.0	14	7,744
Overhead Power Line	--	--	0[3]	0[3]
Main Access Road	RHC	9.0	21	25,410
Miscellaneous Access Roads	--	3.0	0[3]	0[3]
Growth Medium Stockpiles	--	45.0	0[3]	0[3]
Subtotal		69.0		33,154
Diversion Channels	US	1.6	11	2,367
	BA	1.9	14	3,586
	RHC	0.3	21	847
	KHB	0.2	17	458
Subtotal		4.0		7,258
Soil Borrow Source	--	23.0	0[4]	0[4]
Total				1,010,814

[1]RSD = recommended soil salvage depth in inches.

[2]Soil Volume = Soil volume in cubic yards, rounded to the nearest cubic yard.

[3]Soil would not be salvaged beneath the growth medium stockpiles, or along the miscellaneous access roads, fresh water pipeline, and overhead power line.

[4]Soil removed from the soil borrow source area would be used as the soil-based foundation for the heap leach pad and would not be used for reclamation.

3.5.2.4 Partial Backfilling Alternative

Implementation of this alternative would result in the same soil disturbance acreage as described for the Proposed Action. An additional 6.4 acres of soil would be reclaimed under this alternative.

3.5.2.5 No Action Alternative

The additional disturbance of soils associated with the Proposed Action would not occur with the No Action Alternative. Soil impacts would be limited to ongoing, permitted mining and exploration activities.

3.5.3 Cumulative Impacts

The cumulative assessment area for soil resources includes the 14,659-acre Ruby Hill grazing allotment and 2,165 acres of patented lands that occur within the general Ruby Hill grazing allotment boundary (Table 3-24, Map 3-15). Therefore, the cumulative assessment area includes 16,824 acres.

Past disturbances within the Ruby Hill grazing allotment boundary include approximately 2,165 acres that were disturbed during previous mining activities. This disturbance accounts for approximately 13 percent of the cumulative assessment area. Present disturbances within the cumulative assessment area would disturb approximately *617* acres or approximately 4 percent of the allotment. Mine development and operation activities associated with the Proposed Action would result in the disturbance of 689 acres of soils or 4 percent of the cumulative assessment area. Disturbance of soil resources resulting from reasonably foreseeable future disturbances is projected to be approximately 325 acres or 2 percent of the cumulative assessment area.

A total of *3,721* acres of surface disturbance would result from past, present, proposed mining activities, and other reasonably foreseeable future disturbances in the cumulative assessment area which represents approximately 22 percent of the cumulative assessment area.

3.5.4 Mitigation and Monitoring

Mitigation measures and monitoring would not be needed since the reclamation activities included as part of the Proposed Action would substantially reduce potential impacts to soil resources.

3.5.5 Residual Adverse Impacts

Residual impacts to soils would include the disturbance and reduced productivity of 696 acres of soils.

Table 3-24

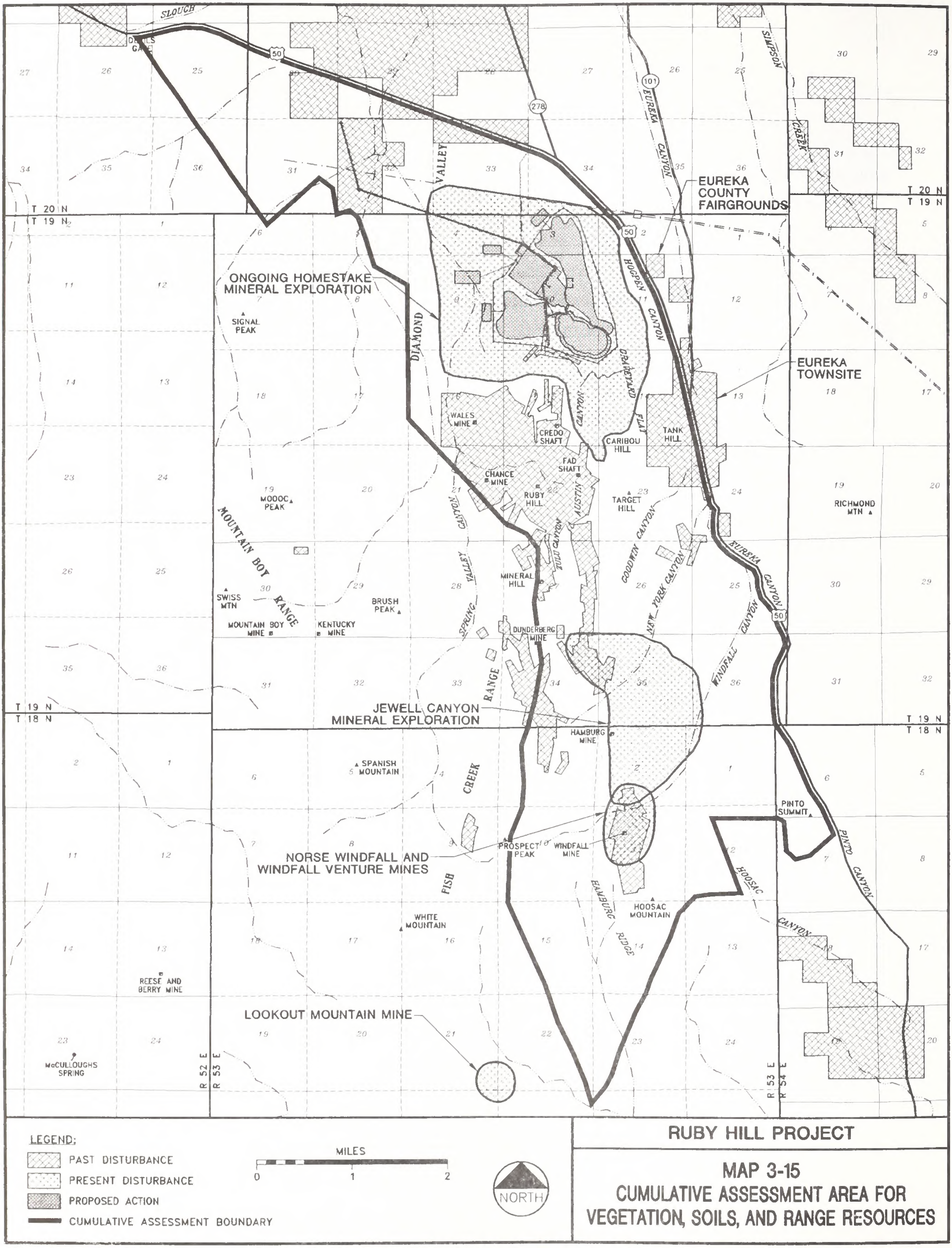
Disturbance Acreage in the Ruby Hill Grazing Allotment

	Disturbance Acreage Cumulative Effects Area
Past Disturbance	
Mining Activity (Patented Lands)[1]	2,165
Eureka Town Site	0
Eureka County Fairgrounds	0
Private Agricultural Development	0
Subtotal	2,165
Present Disturbances	
Norse Windfall Mine	220
Windfall Venture Mine	150
Ongoing Homestake Mineral Exploration	164
Other Mineral Exploration	65
Jewell Canyon Mineral Exploration	18
Subtotal	*617*
Reasonably Foreseeable Future Disturbances	
East Archimedes Oxide Project	300
Tonkin Springs Mine	0[2]
Atlas Mine	0[2]
Other Mineral Exploration	25
Subtotal	325
Proposed Action (Ruby Hill Project)	689
Correction Factor[3]	<75>
Total Disturbance	*3,721*

[1]The majority of historic mining disturbance has occurred on patented lands.

[2]Surface disturbance would occur in previously disturbed area.

[3]Correction factor used to minimize double-counting of disturbance in exploration areas that subsequently undergo mine development.



RUBY HILL PROJECT

MAP 3-15
CUMULATIVE ASSESSMENT AREA FOR VEGETATION, SOILS, AND RANGE RESOURCES

3.6 Vegetation Resources

3.6.1 Affected Environment

The project area is located in the Central Great Basin floristic region of the intermountain physiographic region (Cronquist et al. 1972). This floristic region is characterized by mountain ranges trending north and south with large, extensive valleys located between the mountain ranges. Vegetation types that occur along the mountain ranges include coniferous forest and piñon-juniper woodland; vegetation types that occur at lower elevations include juniper woodland, sagebrush scrub, saltbush scrub, and grassland. The project area is located in a transitional zone between piñon-juniper woodland, juniper woodland, and sagebrush scrub. Site-specific vegetation studies were conducted in the project vicinity during 1994 and 1995 (WESTEC 1994, 1995a). These studies included the delineation of plant communities based on aerial photograph interpretation and on-site vegetation surveys. Vegetation sampling was completed at representative sites within these plant communities to determine plant composition and to estimate foliar cover, forage production, and other vegetative parameters.

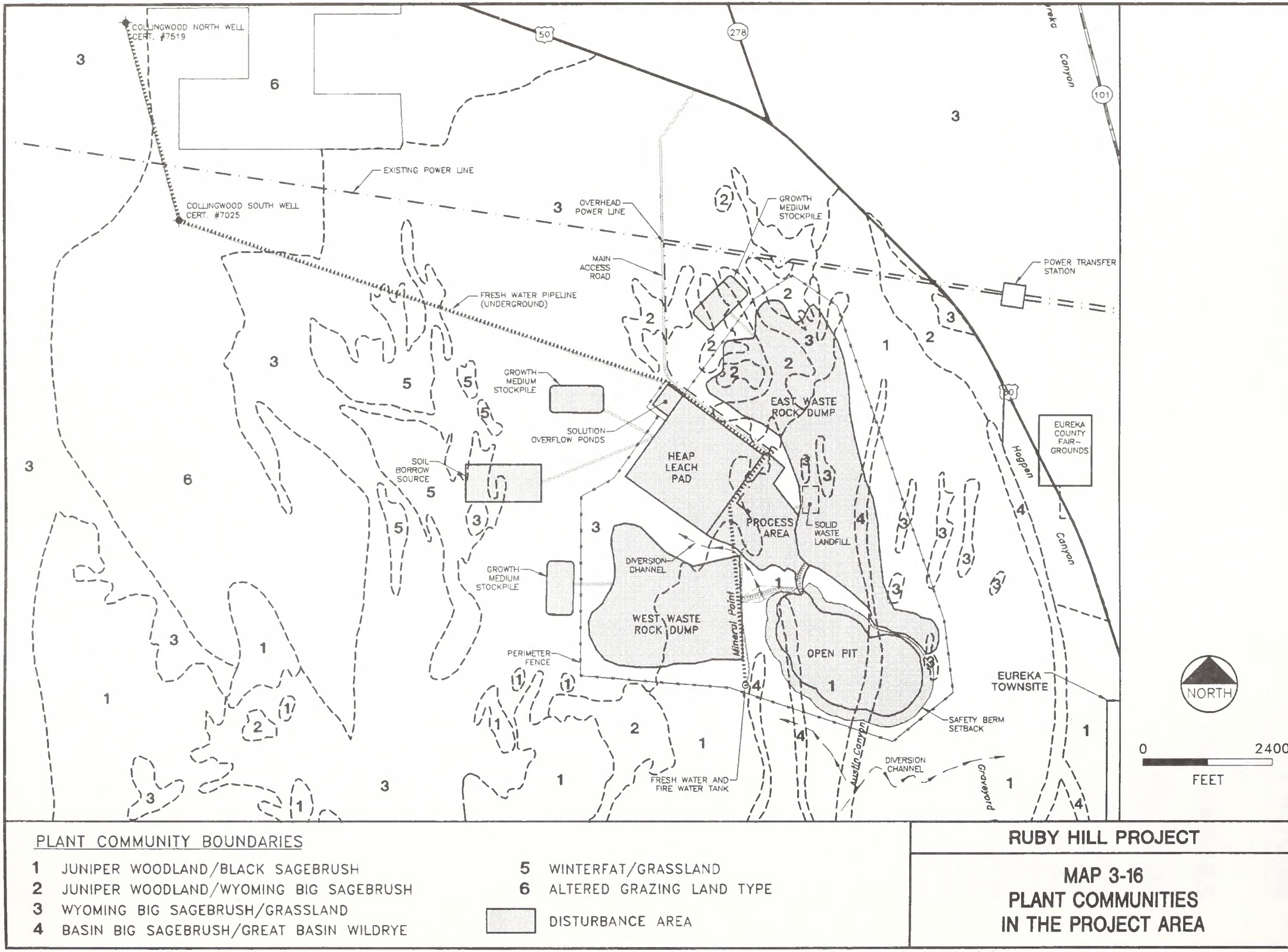
Six plant communities are located in the project area, including juniper woodland/black sagebrush, Wyoming big sagebrush/grassland, juniper woodland/Wyoming big sagebrush, Basin big sagebrush/Great Basin wildrye, winterfat grassland, and altered grazing land type (Map 3-16). The juniper woodland/black sagebrush, Wyoming big sagebrush/grassland, and juniper woodland/Wyoming big sagebrush communities are the dominant plant communities that occur in the project area. These communities are interspersed within the project area and the distribution of these communities is directly related to subtle differences in landscape position, soil texture and moisture, and aspect.

The juniper woodland/black sagebrush community is the most prevalent community in the project area. This community occurs on gently sloping, old alluvial fans that are dissected by intermittent drainages and have gentle to moderately steep side slopes. Soils that support this plant community include Umil association, Ruby Hill fine sandy loam, and Bartine-Overland association soils. This community is characterized by a dominant overstory consisting of Utah juniper, singleleaf piñon, and bitterbrush and a subdominant understory consisting of black sagebrush, king sandwort, Hood's phlox, desert elkweed, squirreltail, Sandberg's bluegrass, and Indian ricegrass. The average foliar cover for this community is approximately 24 percent (range 18 to 35 percent) and the estimated annual forage production is 671 pounds per acre.

The juniper woodland/Wyoming big sagebrush community also occurs on gently sloping, old, alluvial fans that are dissected by intermittent drainages and have gentle to moderately steep side slopes. Soils that support this plant community include Umil association and Ruby Hill fine sandy loam soils. This community includes a dominant overstory consisting of Utah juniper and Wyoming big sagebrush and a subdominant understory consisting of Hood's phlox, Watson's cryptantha, squirreltail, Sandberg's bluegrass, and Great Basin wildrye. The average foliar cover for this community is approximately 20 percent (range: 8 to 32 percent) and the estimated annual forage production is 367 pounds per acre.

The Wyoming big sagebrush/grassland community also occurs on gently sloping, old alluvial fans that are dissected by intermittent drainages and have gentle to moderately steep side slopes. Soils that support this plant community include Umil association and Ruby Hill fine sandy loam soils. This community is characterized by a dominant overstory consisting of Wyoming big sagebrush and a subdominant understory consisting of Hood's phlox, Mojave prickly pear, squirreltail, and Sandberg's bluegrass. The average foliar cover for this community is approximately 32 percent (range: 27 to 42) and the estimated annual forage production is 1,272 pounds per acre.

The basin big sagebrush/Great Basin wildrye community is located in intermittent drainage bottoms within the project area. Intermittent drainage bottoms in the project area have moderately deep to deep soils with slopes that



MAP 3-16
PLANT COMMUNITIES IN THE PROJECT AREA

range from 0 to 2 percent. Surface and subsurface soils primarily include silty loam, sandy loam, and loamy sand textures. This community experiences intermittent flooding during periods of runoff resulting from heavy precipitation events and snowmelt. This community includes a dominant overstory consisting of basin big sagebrush and green rabbitbrush and a subdominant understory consisting of Great Basin wildrye and cheatgrass. The average foliar cover for this community is approximately 40 percent (range: 34 to 50) and the estimated annual forage production is 1,271 pounds per acre.

The winterfat/grassland community occurs on gently sloping, alluvial fans that are dissected by intermittent drainages. The soil that supports this plant community is the Ruby Hill fine sandy loam soil. This community is characterized by a dominant overstory consisting of Wyoming big sagebrush and a subdominant understory consisting of Hood's phlox, Mojave prickly pear, squirreltail, and Sandberg's bluegrass. The average foliar cover for this community is approximately 32 percent (range: 27 to 42) and the estimated annual forage production is 1,272 pounds per acre.

The altered grazing land type consists of cultivated cropland and previously altered rangeland. This community type is located in the extreme southern portion of the Diamond Valley which is a large alluvial basin. This community includes slopes that range from 0 to 2 percent and deep soils. Soils in this area are associated with the Shipley complex. Cultivated cropland is tilled annually and is used for the production of small grains (e.g., oats). The vegetative structure of the altered rangeland predominantly consists of various grasses and forbs and small populations of shrubs. Dominant forb and grass species include Mojave prickly pear, cheatgrass, squirreltail, and Sandberg's bluegrass. The majority of the shrubs were removed in this area to improve forage production for livestock grazing. The average foliar cover for this community is approximately 23 percent (range: 19 to 35 percent) and the estimated annual forage production is 675 pounds per acre.

These plant communities roughly correspond to the range sites described by the Natural Resources Conservation Service. Descriptions of the range sites are provided in Section 3.8, Range Resources.

3.6.2 Environmental Consequences

Environmental impacts to vegetation were considered significant if the Proposed Action or selected alternative could result in the following:

- Removal or disturbance of unique plant communities (i.e., wetlands and riparian areas) that provide outstanding habitat value for wildlife.

3.6.2.1 Proposed Action

Mine development and operation would disturb or remove 696 acres of vegetation (Table 3-25). The juniper woodland/black sagebrush and Wyoming big sagebrush communities are the predominant plant communities that occur within the project area. Mine development and operation would remove or disturb approximately 596 acres of juniper woodland/black sagebrush/grassland and Wyoming big sagebrush vegetation which represents 86 percent of the vegetation present in the project area. Mine development and operation also would disturb or remove approximately 100 acres of vegetation associated with the four remaining plant communities within the project area.

Mine development and operation would result in the conversion of tree- and shrub-dominated communities and to grass/forb-dominated communities. Approximately 375 acres of juniper woodland/black sagebrush and juniper woodland/Wyoming big sagebrush would be removed as a result of mine development and operation. The majority of trees that occur in these woodlands are predominantly mature Utah junipers. Mature singleleaf piñon and immature Utah juniper and singleleaf piñon trees also occur in the project area. Mature Utah junipers and singleleaf piñon are approximately 25 to 100 years old.

Table 3-25

Acres of Vegetation Disturbed or Removed by the Proposed Action

	Plant Communities[1]						
Mine Component	JW/BS	JW/WBS	WBS/G	BBS/GBW	W/G	AGLT	Total Acreage
Open Pit	72.0	0	0	16.0	0	0	88.0
Safety Berm Setback	27.0	0	1.6	5.4	0	0	34.0
Ore and Solution Processing Area/ Office/Parking/Truck Shop/Warehouse/ Fuel Storage Area	44.0	0	13.0	0	0	0	57.0
Waste Rock Dump	165.1	43.8	114.6	13.5	0	0	337.0
Heap Leach Pad/Solution Overflow Ponds	4.2	0	79.8	0	0	0	84.0
Fresh Water Pipeline	1.6	0	4.8	0	0	1.6	8.0
Haul Roads	4.0	0	0	0	0	0	4.0
Overhead Power Line[2]	--	--	--	--	--	--	--
Main Access Road	0	1.1	7.9	0	0	0	9.0
Miscellaneous Access Roads	0.4	0.4	1.8	0	0	0.4	3.0
Growth Medium Stockpiles	0	8.6	36.4	0	0	0	45.0
Diversion Channels	3.2	0	0.3	0.5	0	0	4.0
Soil Borrow Source	0	0	14.4	0	8.6	0	23.0
Total	321.5	53.9	274.6	35.4	8.6	2.0	696.0

[1]Plant communities include:

JW/BS = Juniper woodland/black sagebrush.
JW/WBS = Juniper woodland/Wyoming big sagebrush.
WBS/G = Wyoming big sagebrush/grassland.
BBS/GBW = Basin big sagebrush/Great Basin wildrye.
W/G = Winterfat/grassland.
AGLT = Altered grazing land type.

[2]Minimal disturbance to vegetation would occur since an existing road in an established power line corridor would be used during construction and the remainder of the power line would be constructed in the main access road disturbance area.

The Wyoming big sagebrush/grassland, basin big sagebrush/Great Basin wildrye, and winterfat/grassland communities are dominated by mature shrubs which are approximately 15 to 50 years old. Mine development and operation would remove approximately 319 acres of shrub-dominated communities. The removal of mature trees and shrubs would be a long-term impact since it would take approximately 25 to 50 years after reclamation to establish mature Utah juniper and singleleaf piñon trees and approximately 15 to 20 years after reclamation to establish mature shrubs in the project area.

Reclamation would be completed for 608 acres or 87 percent of the total disturbance area (Section 2.1.15, Reclamation Plan). After mine operation, the 88-acre mine pit is the only project component that would not be reclaimed. Successful revegetation of disturbed land is anticipated to occur approximately 3 to 5 years after reclamation. Reclamation activities would consist of the grading of final slopes; ripping of compacted soil; potential reapplication of growth media; and broadcasting of seed. ***Seed mixtures developed from the test plot program*** would be used for revegetation activities. In addition, trial planting of Utah juniper and singleleaf piñon seedlings would be planted along the northern and eastern portions of the East Waste Rock Dump embankment to provide structural and species diversity to the reclaimed plant communities (Section 2.1.15.9, Facility Reclamation). After 3 to 5 years, the reclaimed plant communities would likely consist of adequate herbaceous plant cover and diversity to substantially reduce the potential for soil erosion and provide forage for use by livestock and wildlife.

Trial plantings of Utah juniper and singleleaf piñon seedlings would be conducted. Planting densities for the trial planting would be higher than the average tree density to account for potential seedling mortalities. Bitterbush and serviceberry seed collection would occur in the project vicinity and subsequent planting would occur along the waste rock dump faces and other areas to be reclaimed. The success of seedling establishment would be evaluated on an annual basis, and appropriate adjustments would be made to improve the probability of future seedling establishment.

No riparian areas or wetlands occur within the project area. Therefore, impacts to riparian areas or wetlands would not occur as a result of mine development or operation. Mine development and operation would result in the filling and excavation waters of the United States (i.e., small, intermittent drainages) which only support upland vegetation. Impacts to waters of the United States are described in Section 3.4, Water Quality and Quantity.

Vegetation would be removed from the ore and solution processing area, waste rock dumps, heap leach pad, main access road, haul road, diversion channels, soil borrow source, and rights-of-way associated with the water pipeline. Vegetation at the growth media stockpile and safety berm sites would be buried by growth media. Vegetation present along the miscellaneous access roads and maintenance roads adjacent to the water pipeline and overhead powerline would be disturbed. Disturbance activities include the trampling of vegetation resulting from vehicles and heavy machinery.

Homestake's weed control program would substantially reduce the potential for noxious weed establishment in the project area (Section 2.1.15.7, Weed Control). However, minor populations of weedy annual species, such as halogeton, white top, cheatgrass, bur buttercup, knapweed, and Russian thistle, may become established in localized areas for short periods of time. Weedy species rapidly invade disturbed areas and initially hinder the establishment of more desirable perennial grasses and forbs by competing with them for moisture during the initial years following disturbance or seeding.

3.6.2.2 East Waste Rock Dump Alternative

General impacts to vegetation are the same as those described for the Proposed Action. Mine development and operation would disturb and remove 715 acres of vegetation or 19 acres more than the Proposed Action (Map 3-17; Table 3-26.

PLANT COMMUNITY BOUNDARIES

1 JUNIPER WOODLAND/BLACK SAGEBRUSH
2 JUNIPER WOODLAND/WYOMING BIG SAGEBRUSH
3 WYOMING BIG SAGEBRUSH/GRASSLAND
4 BASIN BIG SAGEBRUSH/GREAT BASIN WILDRYE
5 WINTERFAT/GRASSLAND
6 ALTERED GRAZING LAND TYPE

DISTURBANCE AREA

RUBY HILL PROJECT

MAP 3-17
PLANT COMMUNITIES
EAST WASTE ROCK DUMP ALTERNATIVE

Table 3-26

Acres of Vegetation Disturbed or Removed by the East Waste Rock Dump Alternative

Mine Component	Plant Communities[1] JW/BS	JW/WBS	WBS/G	BBS/GBW	W/G	AGLT	Total Acreage
Open Pit	72.0	0	0	16.0	0	0	88.0
Safety Berm Setback	27.0	0	1.6	5.4	0	0	34.0
Ore and Solution Processing Area/Office/Parking/ Truck Shop/ Warehouse/Fuel Storage Area	44.0	0	13.0	0	0	0	57.0
Waste Rock Dump	301.3	4.3	38.9	15.5	0	0	360.0
Heap Leach Pad/Solution Overflow Ponds	4.2	0	79.8	0	0	0	84.0
Fresh Water Pipeline	1.6	0	4.8	0	0	1.6	8.0
Overhead Power Line[2]	--	--	--	--	--	--	--
Main Access Road	0	1.1	7.9	0	0	0	9.0
Miscellaneous Access Roads	0.4	0.4	1.8	0	0	0.4	3.0
Growth Medium Stockpiles	12.9	9.7	22.4	0	0	0	45.0
Diversion Channels	3.2	0	0.3	0.5	0	0	4.0
Soil Borrow Source	0	0	14.4	0	8.6	0	23.0
Total	466.6	15.5	184.9	37.4	8.6	2.0	715.0

[1]Plant communities include:

JW/BS	=	Juniper woodland/black sagebrush.
JW/WBS	=	Juniper woodland/Wyoming big sagebrush.
WBS/G	=	Wyoming big sagebrush/grassland.
BBS/GBW	=	Basin big sagebrush/Great Basin wildrye.
W/G	=	Winterfat/grassland.
AGLT	=	Altered grazing land type.

[2]Minimal disturbance to vegetation would occur since an existing road in an established power line corridor would be used during construction and the remainder of the power line would be constructed in the main access road disturbance area.

Approximately 482 acres of juniper woodland/black sagebrush and juniper woodland/Wyoming big sagebrush would be removed as a result of mine development and operation. Mine development and operation would remove approximately 231 acres of shrub-dominated communities. Reclamation would be completed for 627 acres or 88 percent of the total disturbance area. Riparian or wetland areas would not be impacted by mine development and operation.

3.6.2.3 West Waste Rock Dump Alternative

General impacts to vegetation are the same as those described for the Proposed Action. Mine development and operation would disturb and remove ***577*** acres of vegetation or ***119*** acres less than the Proposed Action (Map 3-18; Table 3-27). Approximately 217 acres of juniper woodland/black sagebrush and juniper woodland/Wyoming big sagebrush would be removed as a result of mine development and operation. Mine development and operation would remove approximately 354 acres of shrub-dominated communities. Reclamation would be completed for 485 acres or 85 percent of the total disturbance area. Riparian or wetland areas would not be impacted by mine development and operation.

3.6.2.4 Partial Backfilling Alternative

Implementation of this alternative would result in the same vegetation impact acreage as described for the Proposed Action. However, approximately 6 acres of the mine pit would be reclaimed as a result of the backfilling of 3 million tons of waste rock material into the mine pit. Therefore, implementation of this alternative would result in the revegetation of approximately 614 acres of disturbed land.

3.6.2.5 No Action Alternative

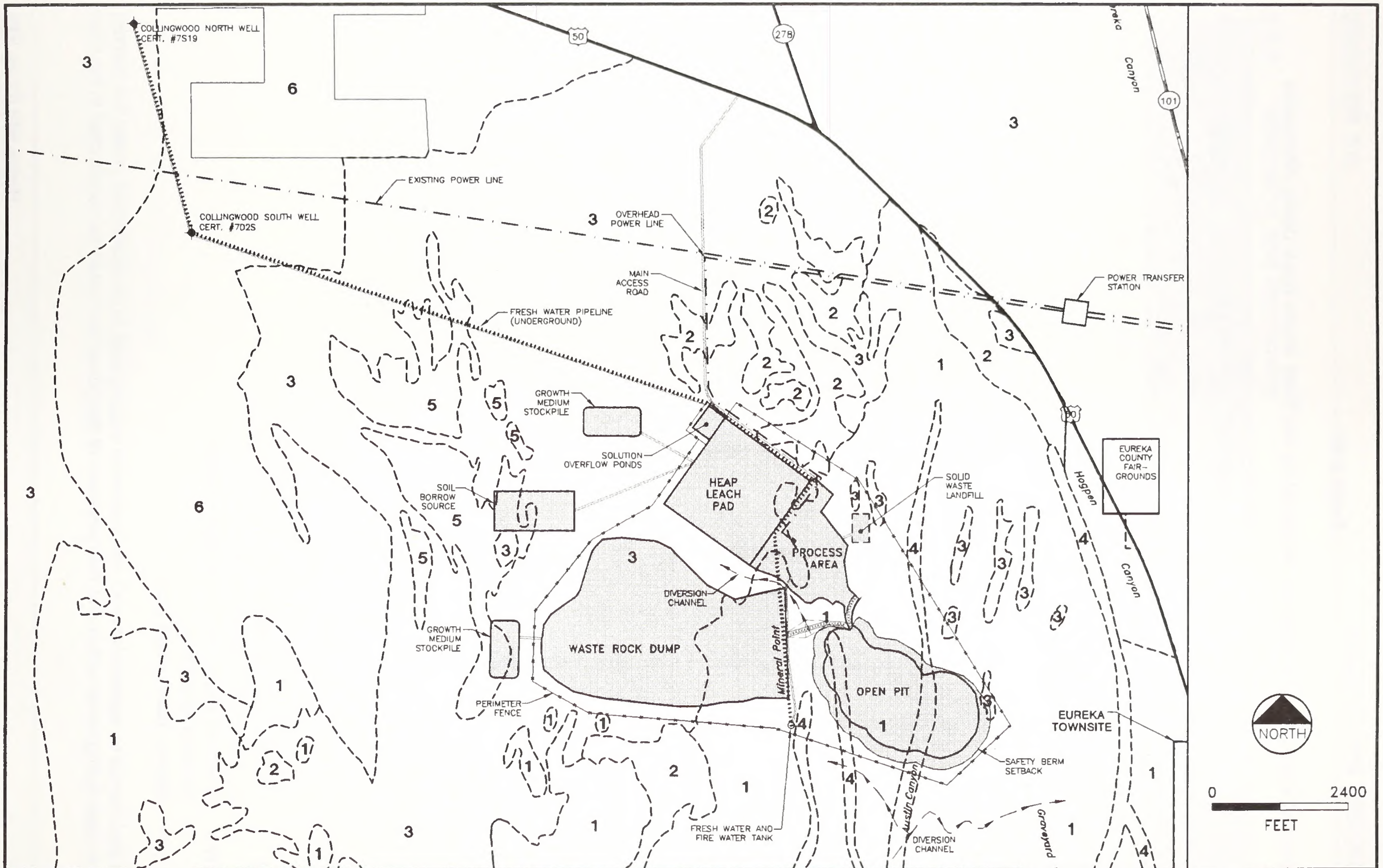
The additional disturbance of vegetation associated with the Proposed Action would not occur with the No Action Alternative. Vegetation impacts would be to limited ongoing, permitted mining and exploration activities.

3.6.3 Cumulative Impacts

The cumulative assessment area for vegetation resources includes the 14,659-acre Ruby Hill grazing allotment and 2,165 acres of patented lands that occur within the general Ruby Hill grazing allotment boundary (Map 3-15; Table 3-24). Therefore, the cumulative assessment area includes 16,824 acres.

Past disturbances within the Ruby Hill grazing allotment boundary include approximately 2,165 acres that were disturbed during previous mining activities. This disturbance accounts for approximately 13 percent of the cumulative assessment area. Present disturbances within the cumulative assessment area would disturb or remove vegetation on approximately ***617*** acres or 4 percent of the cumulative assessment area. Mine development and operation activities associated with the Proposed Action would result in the disturbance or removal of 689 acres of vegetation or 4 percent of the cumulative assessment area. Disturbance of vegetation resulting from reasonably foreseeable future disturbances is projected to be approximately 325 acres or 2 percent of the cumulative assessment area.

A total of ***3,721*** acres of surface disturbance would result from past, present, proposed mining activities, and other reasonably foreseeable future disturbances in the cumulative assessment area which represents approximately 22 percent of the cumulative assessment area. The loss of vegetation during development operation activities would result in the loss of livestock and wildlife forage and protective cover for wildlife. The loss of mature trees and shrubs would be minimal relative to the total acreage of piñon-juniper woodland and shrub-dominated communities that occur in the cumulative assessment area.



PLANT COMMUNITY BOUNDARIES

1 JUNIPER WOODLAND/BLACK SAGEBRUSH
2 JUNIPER WOODLAND/WYOMING BIG SAGEBRUSH
3 WYOMING BIG SAGEBRUSH/GRASSLAND
4 BASIN BIG SAGEBRUSH/GREAT BASIN WILDRYE
5 WINTERFAT/GRASSLAND
6 ALTERED GRAZING LAND TYPE
DISTURBANCE AREA

RUBY HILL PROJECT

MAP 3-18
PLANT COMMUNITIES
WEST WASTE ROCK DUMP ALTERNATIVE

Table 3-27

Acres of Vegetation Disturbed or Removed by the West Waste Rock Dump Alternative

	Plant Communities[1]						
Mine Component	JW/BS	JW/WBS	WBS/G	BBS/GBW	W/G	AGLT	Total Acreage
Open Pit	72.0	0	0	16.0	0	0	88.0
Safety Berm Setback	27.0	0	1.6	5.4	0	0	34.0
Ore and Solution Processing Area/ Office/Parking/ Truck Shop/ Warehouse/Fuel Storage Area	44.0	0	13.0	0	0	0	57.0
Waste Rock Dump	58.8	0	155.2	0	0	0	214.0
Heap Leach Pad/ Solution Overflow Ponds	4.2	0	79.8	0	0	0	84.0
Fresh Water Pipeline	1.6	0	4.8	0	0	1.6	8.0
Haul Roads	4.0	0	0	0	0	0	4.0
Overhead Power Line[2]	--	--	--	--	--	--	--
Main Access Road	0	1.1	7.9	0	0	0	9.0
Miscellaneous Access Roads	0.4	0.4	1.8	0	0	0.4	3.0
Growth Medium Stockpiles	0	0	32.8	0	12.2	0	45.0
Diversion Channels	3.2	0	0.3	0.5	0	0	4.0
Soil Borrow Source	0	0	14.4	0	8.6	0	23.0
Solid Waste Landfill							4.0
Total	215.2	1.5	311.6	21.9	20.8	2.0	577.0

[1]Plant communities include:

JW/BS = Juniper woodland/black sagebrush.
JW/WBS = Juniper woodland/Wyoming big sagebrush.
WBS/G = Wyoming big sagebrush/grassland.
BBS/GBW = Basin big sagebrush/Great Basin wildrye.
W/G = Winterfat/grassland.
AGLT = Altered grazing land type.

[2]Minimal disturbance to vegetation would occur since an existing road in an established power line corridor would be used during construction and the remainder of the power line would be constructed in the main

3.6.4 Mitigation and Monitoring

Mitigation measures and monitoring would not be needed since the reclamation activities are included as part of the Proposed Action and would substantially reduce potential impacts to vegetation resources.

3.6.5 Residual Adverse Impacts

Residual impacts to vegetation include the removal or disturbance of 696 acres of vegetation and change in vegetation composition (i.e., tree and shrub-dominated communities to grass- and forb-dominated communities) as a result of mine development and operation. In addition, vegetation would be permanently lost from the 88-acre mine pit area.

3.7 Woodland Products

3.7.1 Affected Environment

The majority of the forest resources occurring in the Battle Mountain District, including the project area, are comprised of the piñon-juniper woodland type with occasional mountain mahogany. The timber resource in the project area is currently used for Christmas tree, fence post, fuel wood cutting, and the harvesting of piñon nuts. Demand for woodland product harvesting in the ***region*** is high because woodstoves heat many homes in the town of Eureka. An estimated 600,000 acres of piñon-juniper woodlands is classified as forest available for woodlands products management within the planning area. Of this, less than 120,000 acres is accessible for woodland harvest (BLM 1986a).

The BLM's Resource Management Plan recognizes that woodland areas may be cleared as a result of actions that would result in increased benefit to other resource values (BLM 1986a). Clearing of woodlands for the construction of a mine operation (such as the Proposed Action) would meet this criteria.

The majority of forested land that occurs within the project area consists of piñon pine *(Pinus monophylla)* and Utah juniper *(Juniperus osteosperma)* woodlands. These woodlands are a component of the piñon pine and Utah juniper woodland/black sagebrush vegetation community that occurs at elevations ranging between 6,200 feet above mean sea level in the northern portion of the project area, to 7,200 feet above mean sea level south of the project area.

As part of baseline data collection efforts for this Environmental Impact Statement, WESTEC performed a woodland inventory of forested portions of the project area that would be disturbed by the Proposed Action. The objective of the woodland inventory was to estimate the volume (in cubic feet) of wood resources potentially lost as a result of implementation of the Proposed Action.

In the project site, Utah juniper is the dominant woodland overstory species at lower elevations; piñon pine is the dominant woodland overstory species at higher elevations. ***The BLM has estimated that Utah juniper in the project area yield an average of 43 fence posts per acre.*** Table 3-28 summarizes the estimated volume of *other* woodland species within these two portions of the site,

Table 3-28

Number and Volume of Woodland Species on Project Site

Species	Relative Elevation of Project Site	Number ≥4 Feet in Height Per Acre	Total Number Per Acre	Volume[1] (cubic feet/acre)
Piñon pine	Lower half	2	3	3.48
	Higher half	35[2]	122	70.77
Mountain mahogany	Higher half	1	1	0.36

[1]Volume given only for trees greater than or equal to 4 feet in height and 4 inches diameter at the root collar.

[2]Ten fewer piñon (or 25) per acre are greater than or equal to 6 feet in height within the higher half of the site, whereas one less of this height class was found to be within the lower half.

based on the WESTEC inventory. These woodlands are considered currently accessible as a result of the numerous access roads within the project area.

Exploratory drilling performed by Homestake within the project site and vicinity has, to date, resulted in the disturbance of approximately 164 acres (Table 2-9). Of that disturbance, it is estimated that approximately 25 percent, or 41 acres, of the woodland vegetative community has been disturbed. Assuming half of this disturbance has occurred with the lower elevation, juniper-dominated woodlands and half within the higher elevation, piñon-dominated woodlands, and using the number and volume of woodland species from Table 3-28, exploration activities to date have resulted in the removal of ***1,763*** Utah juniper, 2,563 piñon pine, and 21 mountain mahogany. This equates into a removal of approximately 4,169 cubic feet of juniper, 1,522 cubic feet of piñon, and 7 cubic feet of mahogany.

3.7.2 Environmental Consequences

Environmental impacts to the availability of woodland products would be considered significant if the Proposed Action or selected alternative would:

- Remove 1 percent or more of the accessible harvest base from production of woodland products within the BLM's planning area.
- Prevent the BLM from meeting public demand for woodland products harvested from public lands in the Eureka area.

3.7.2.1 Proposed Action

The Proposed Action would result in the long-term loss of productivity on approximately 370 acres of accessible public woodlands. This figure is based on projected mine disturbance within both juniper woodland/black sagebrush and juniper woodland/Wyoming big sagebrush plant communities (Table 3-25) after subtracting 4 acres of private land located largely within the former plant community. The primary woodland impact would result from the construction of the open pit and the East Waste Rock Dump. This short-term loss and long-term change in vegetation, however, represents less than 1 percent of the manageable woodland in the planning area, and therefore would not constitute a significant impact to the availability of woodland products.

Construction of the proposed Ruby Hill Mine would remove an estimated 107 cords of fuelwood from the project site, and approximately ***15,910*** juniper fence posts. This estimate assumes that the projected disturbance occurs equally within both juniper-dominated and piñon-dominated vegetation communities and that only junipers greater than or equal to 4 feet in height are capable of being harvested for fence posts. Approximately ***2,035*** standing Christmas trees would be removed during construction of the Proposed Action. It is assumed that there would have been an ingrowth of an equal number of piñon pines and junipers every 5 to 7 years; consequently, there would be a ***maximum*** productivity loss of between: ***10,175 and 14,245*** Christmas trees over 35 years (i.e., the estimated average age of a ***4- to*** 6-foot Christmas tree), or 535 and 749 cords of fuel wood, and ***79,550 and 111,370*** juniper fence posts. ***Approximately 4,810 standing piñon pine trees greater than or equal to 6 feet in height also would be removed during construction. For these trees,*** an annual production of 5 pounds of piñon nuts per tree each 5 to 7 years is assumed. The removal of these trees (assuming none were harvested for fuel wood) would represent approximately 3,436 to 4,810 pounds of piñon nuts on an annual basis (4,810 trees x 5 pounds of nuts per tree/5 to 7 years). Therefore, over the 7.5-year life of the mine plus the 35 years that an equivalent rate of pine nut production would be achieved (piñons reaching 6 feet in height), the Proposed Action would result in the productivity loss of between 146,030 and 204,425 pounds of harvestable piñon nuts. ***These figures represent maximal harvest per tree, and would be significantly less during drought years.***

The woodland products, and their future potential for growth, if removed through implementation of the Proposed Action would not be available for harvest and residents in the Eureka townsite area would be required to seek other public lands to fulfill their woodland product needs, thereby increasing harvest pressures elsewhere. The long-term change in vegetation and loss of woodland product productivity, however, would not result in significant impacts because the Proposed Action is located within an area where abundant piñon-juniper woodlands exist on public lands accessible for woodland harvest.

Trial plantings of juniper and piñon seedlings along the slopes of the waste rock dump as part of Proposed Action reclamation procedures should ensure a more rapid recovery of woodland vegetation in this portion of the project site. Other portions of the project area, with the exception of the open pit, are proposed to be reclaimed with grass and shrub seed mixes. Consequently, the amount of time before these areas would be capable of supporting productive woodland vegetation would be much longer and on the order of 75 to 100 years. The open pit area would represent an approximately 88-acre area where the potential for the regeneration of woody species would never be realized.

3.7.2.2 East Waste Rock Dump Alternative

The East Waste Rock Dump Alternative would result in the loss of productivity on approximately 480 acres of accessible public woodlands, as defined in Section 3.7.2.1, Proposed Action. As with the Proposed Action, the primary woodland impact would result from the construction of the open pit and the waste rock dump, and would not constitute a significant impact to the availability of woodland products.

Using the same assumptions detailed in Section 3.7.2.1, Proposed Action, construction under this alternative would remove an estimated 139 cords of fuelwood from the project site or, alternatively, ***2,640*** Christmas trees, and approximately ***20,640*** juniper fence posts. A total long-term productivity loss of between 695 and 973 cords of wood, ***13,200*** and ***18,480*** Christmas trees, or between 189,422 and 265,200 pounds of pine nuts (4,457 to 6,240 pounds per year for 42.5 years), and ***103,200 to 144,480*** juniper posts also has been estimated. The remainder of impacts to the availability of woodland products are as described for the Proposed Action.

3.7.2.3 West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative would result in the loss of productivity on approximately 210 acres of accessible public woodlands, as defined in Section 3.7.2.1, Proposed Action. As with the Proposed Action, the primary woodland impact would result from the construction of the open pit and the waste rock dump, and would not constitute a significant impact to the availability of woodland products.

Using the same assumptions detailed in Section 3.7.2.1, Proposed Action, construction under this alternative would remove an estimated 61 cords of fuelwood or, alternatively, ***1,155*** Christmas trees, and approximately ***9,030*** juniper fence posts. A total long-term productivity loss of between 305 and 427 cords of wood, ***5,775*** and ***8,085*** Christmas trees, or between 82,875 and 116,025 pounds of pine nuts (1,950 to 2,730 pounds per year for 42.5 years), and ***45,150 to 63,210*** juniper posts also has been estimated. The remainder of impacts to the availability of woodland products are as described for the Proposed Action.

3.7.2.4 Partial Backfilling Alternative

The alternative to Partially Backfill the Pit would have no impact on the availability of woodland products beyond those discussed for the Proposed Action. Since public access to the pit would be restricted indefinitely, any woodland vegetation that could grow within the partially backfilled portion of the pit would not be available for harvest.

3.7.2.5 No Action Alternative

Under the No Action Alternative, disturbance associated with the Proposed Action and the anticipated loss of woodland products would not occur. Public lands within the project site would continue to be available for the harvest of woodland products by area residents.

3.7.3 Cumulative Impacts

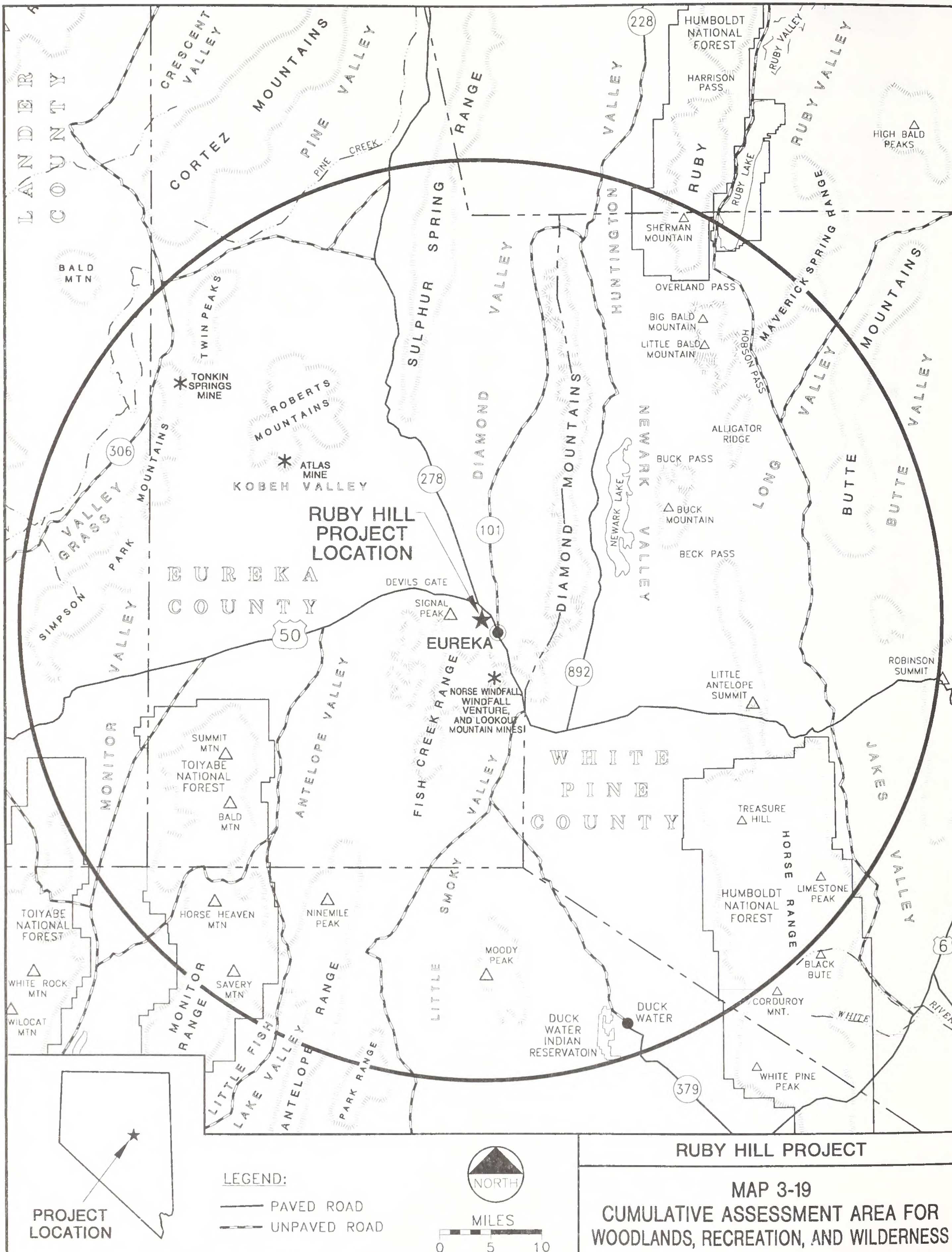
The area of analysis for cumulative effects to woodland products is defined as the area within a 45-mile radius of the Eureka townsite (i.e., the area within an approximate 1-hour drive from this population center (Map 3-19). Cumulative projects within the region would result in an additional loss of woodland products from public lands (i.e., fuel wood, Christmas trees, juniper fence posts, and piñon nuts). The extent that cumulative development projects have, or would, impact known woodland resources cannot be quantified. It can be assumed, however, that cumulative development alone has resulted in the removal of 1 percent or more of the 120,000 acres of accessible harvest base from production of woodland products within the planning area (first significance criteria, Section 3.7.2, Environmental Consequences). As such, the Proposed Action or selected alternative would add cumulatively to this impact. However, given current low levels of population and low demand regionally for piñon-juniper woodland products, current and future demand by Eureka area residents would continue to be met by the relatively large amount of public lands that remain available for woodland harvest.

3.7.4 Mitigation and Monitoring

No adverse impacts that warrant mitigation have been identified as a result of the Proposed Action or the alternatives; therefore, mitigative and monitoring requirements are not necessary.

3.7.5 Residual Adverse Impacts

Assuming that reclamation efforts were capable of re-establishing native woodland species at approximately their current densities on the project site over the long-term (i.e., around 100 years), a net loss of approximately 88 acres of piñon-dominated woodlands would remain as a result of un-reclaimed open pit. This would represent a loss of woodland productivity of 40 cords of fuel wood, or alternatively, ***880*** Christmas trees or 15,430 to 21,600 pounds of pine nuts, and approximately ***3,784*** juniper fence posts every 60 years.



RUBY HILL PROJECT

MAP 3-19
CUMULATIVE ASSESSMENT AREA FOR WOODLANDS, RECREATION, AND WILDERNESS

3.8 Range Resources

3.8.1 Affected Environment

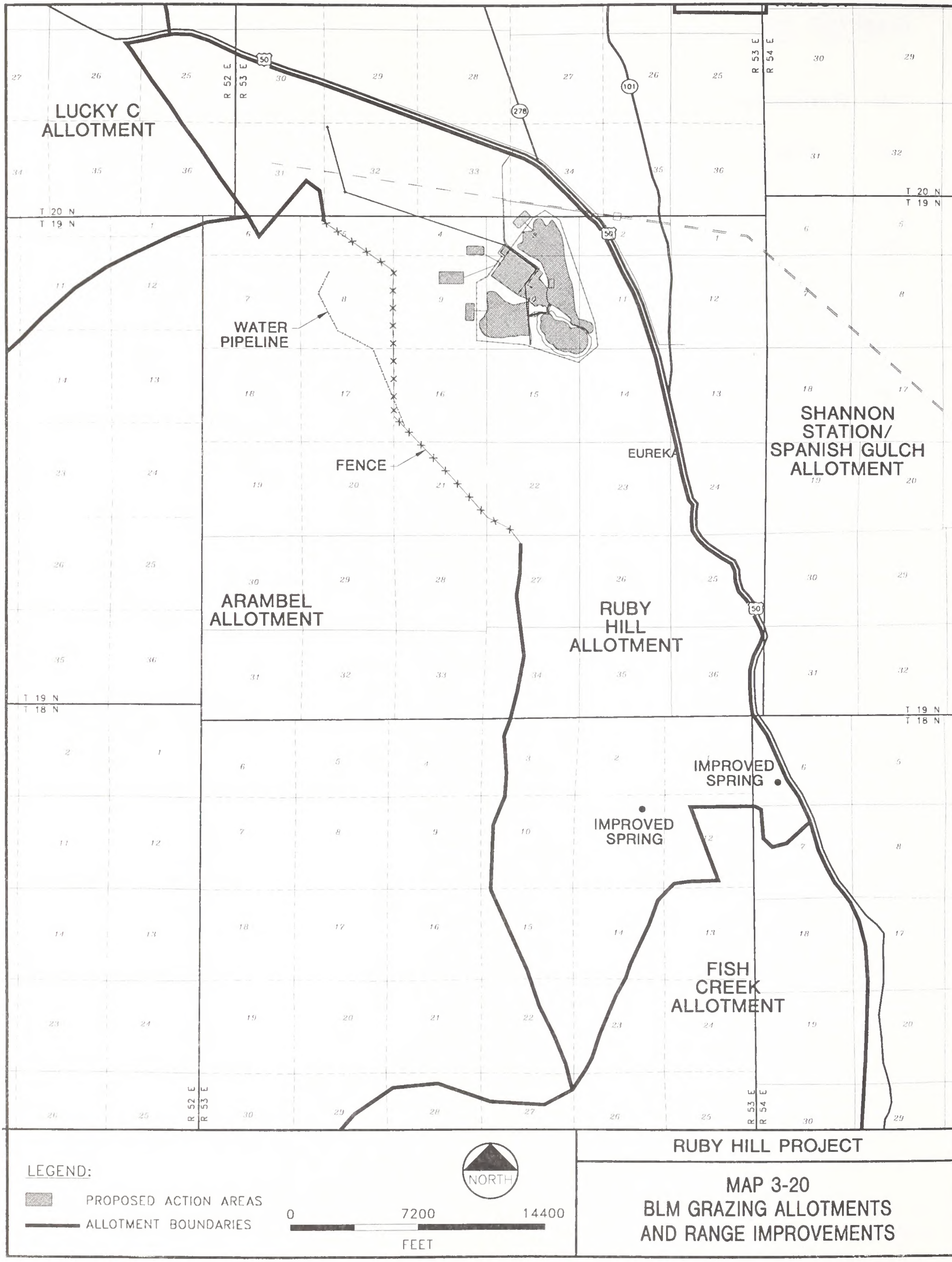
The project area is open to livestock grazing and is located in the Ruby Hill grazing allotment (Map 3-20). This allotment is bounded by the Fish Creek allotment to the south, Arambel and Lucky C allotments to the west, and the Shannon Station/Spanish Gulch allotment to the north and east. The Ruby Hill Allotment includes 14,659 acres of public land including the extreme southern portion of Diamond Valley and the northern portion of the Fish Creek Range. The allotment is approximately 3 miles wide extending east to west and 14 miles extending north to south. The Ruby Hill Allotment is classified as an "M" (maintain) category allotment. An "M" classification indicates the objective is to maintain current satisfactory conditions. 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.

The Ruby Hill allotment is leased by one permittee. The permittee exclusively grazes sheep within the allotment. The current active grazing preference (i.e., allowable animal unit months) for the Ruby Hill allotment includes 1,424 animal unit months of which 1,149 and 275 animal unit months were originally designated for sheep and cattle, respectively. The terms and conditions of the grazing lease allow the lessee to utilize 275 animal unit months for sheep grazing instead of cattle grazing. Current sheep grazing operations within the allotment include approximately 1,200 ewe/lamb pairs (i.e., ewe with 1 or 2 lambs) grazing for 5 months (i.e., May through September) or the equivalent of 1,200 animal unit months. Therefore, current sheep grazing operations are 224 animal unit months less than the active grazing preference (i.e., 1,424 animal units months). Rangeland in the project vicinity is grazed once during the growing season for approximately 3 to 5 days during early May (Larralde 1996). The average stocking rate for the entire allotment is 10.3 acres per animal unit month.

The allotment includes few range improvement facilities or developed areas (i.e., improved springs, stock ponds, water troughs, fences, and cattle guards) that enhance grazing activities. One water pipeline and two improved springs are located in the allotment (Map 3-20); the water pipeline is located approximately 1.1 miles to the west and the two springs are located approximately 4.3 miles to the southeast of the project area. Range improvement facilities or developed areas do not occur in the project area. Livestock mortalities resulting from traffic accidents have not been reported in the project area (Larralde 1996).

An ecological site inventory was conducted for several plant communities located within the project area, they include the juniper woodland/black sagebrush, juniper woodland/Wyoming big sagebrush, Wyoming big sagebrush/grassland, basin big sagebrush/Great Basin wildrye, and winterfat/grassland communities. Range sites (i.e., ecological sites) are ecologic units that are differentiated by soil, vegetation, and climatic factors which directly influence forage production. The ecological site inventory was conducted for two range sites within the project area including the calcareous loam, 10- to 14-inch precipitation zone (28BY094) and shallow calcareous loam, 10- to 14-inch precipitation zone (28BY006) sites. The juniper woodland/Wyoming big sagebrush, Wyoming big sagebrush/grassland, and winterfat/grassland communities are associated with the calcareous loam, 10- to 14-inch precipitation zone range site, and the juniper woodland/black sagebrush and basin big sagebrush/Great Basin wildrye communities are associated with the shallow calcareous loam, 10- to 14-inch precipitation zone range site. Forage production estimates for each native plant community include the following:

- Juniper woodland/black sagebrush - 671 pounds/acre;
- Juniper woodland/Wyoming big sagebrush - 367 pounds/acre;



RUBY HILL PROJECT

MAP 3-20
BLM GRAZING ALLOTMENTS
AND RANGE IMPROVEMENTS

- Wyoming big sagebrush/grassland - 1,272 pounds/acre;
- Basin big sagebrush/Great Basin wildrye - 1,271 pounds/acre; and
- Winterfat/grassland - 823 pounds/acre.

3.8.2 Environmental Consequences

Environmental impacts to range resources were considered significant if the Proposed Action or selected alternative could result in any of the following:

- Excessive grazing pressures on local plant communities or areas (greater than 100 acres) that would lead to irreparable degradation to the range resource in terms of plant community composition or productivity.
- Loss of forage or grazing area leading to a permanent reduction of 10 percent or greater in the allowable animal unit months for the permittee within the affected allotment.
- Increased operational costs for any current grazing permittee exceeding 100 percent of their grazing lease cost.

3.8.2.1 Proposed Action

During mine development, a perimeter fence would be constructed in a general area which includes the waste rock dump, open pit and safety berm setback area, ore and solution processing area, heap leach pad, and solution overflow ponds (Map 2-2). This fenced area would include approximately 880 acres of vegetation, of which 605 acres of vegetation would be removed and 275 acres of vegetation would be undisturbed during mine development and operation. The construction of this fence would exclude livestock grazing during mine operation and reclamation. In addition, approximately 92 acres of vegetation located outside the fenced area would be removed or disturbed in various mine component areas including the soil borrow source, growth media stockpiles, fresh water pipeline, main access road, miscellaneous access roads, and diversion channels. Therefore, a total of 972 acres of vegetation would be unavailable for livestock grazing during mine operation, of which 965 acres are administered by the BLM and 7 acres are located on private land.

Mine development and operation would result in the temporary loss of animal unit months. Table 3-29 presents the number of animal unit months that would be temporarily lost on BLM-administered and private land according to plant community and range site. A total of 82 animal unit months would be temporarily lost during mine operation which would reduce the active grazing preference within the Ruby Hill grazing allotment to 1,342 animal unit months; the current active grazing preference is 1,424 animal unit months for the entire allotment. The temporary loss of 82 animal unit months within the grazing allotment represents less than 6 percent of the active grazing preference.

Current sheep grazing operations are currently using 1,200 animal unit months or 224 animal unit months less than the active grazing preference of 1,424 animal unit months. Therefore, the temporary loss of 82 animal unit months during mine development and operation would not affect current grazing operations within the Ruby Hill grazing allotment.

The majority of disturbed land (approximately 608 acres) within the project area would be reclaimed (Section 2.1.15, Reclamation Plan), of which 574 acres would be available for future grazing. A perimeter fence would be constructed after mine operation around the mine pit and safety berm setback area. This 122-acre fenced area would exclude livestock from grazing the area. Successful revegetation of disturbed lands would increase plant cover and provide an adequate amount of forage to recover the 62 of the 82 animal unit months lost during mine development. Livestock grazing may be resumed after re-established vegetation is capable of supporting grazing (i.e., three to five growing seasons after final revegetation).

The active grazing preference would be permanently reduced by 20 animal unit months to

Table 3-29

Forage Production and Animal Unit Months Temporarily Lost - Proposed Action

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
BLM-Administered Land							
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	467.9	63	29,478	17,689	22
Juniper woodland/ Wyoming big sagebrush	Rubyhill fine sandy loam, 2 to 8 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	69.7	118	8,225	4,935	6
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	376.1	71	26,703	16,021	20
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	44.2	972	42,962	25,777	32

Table 3-29 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Winterfat/grassland	Rubyhill fine sandy loam, 2 to 8 percent slopes, Kobeh gravelly fine sandy loam, 2 to 4 percent slopes, and Shipley complex	Calcareous loam, 10- to 14-inch precipitation zone	7.1	411	2,918	1,751	2
Subtotal			965.0	---	110,286	66,173	82
Private Land							
Altered grazing land type	Shipley complex, Shipley silt loam, 0 to 2 percent slopes, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Shipley fine sandy loam, 2 to 4 percent slopes	NA	5.3	---	---	---	---
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	1.1	63	69	41	<1
Wyoming big sagebrush/grassland	Shipley complex and Shipley fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	0.5	71	36	22	<1

Table 3-29 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Basin big sagebrush/Great Basin wildrye	Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	0.1	972	97	58	<1
Subtotal			7.0	---	202	121	<1
TOTAL			972.0	---	110,488	66,294	82

[1]Area excluded from grazing is the acreage located inside the perimeter fence.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months temporarily lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

NA = Not Applicable.

1,404 animal unit months which could limit future expansion of the current grazing operation (Table 3-30). The permanent loss of 20 animal unit months would not be considered a significant adverse impact since this loss represents less than 1 percent of the active grazing preference.

Reduction in the available range on the allotment is not expected to cause degradation of the vegetation resource since the current use of the area is already below permit limits. The reduced number of animal unit months would be considered during the formal allotment evaluation process. Removal of rangeland from the grazing allotment could direct the remaining livestock use into smaller portions of the allotments and access to the northern portion of the allotment may be slightly constricted due to the construction of the fence that would encompass the mine area.

No impacts to existing range improvements are anticipated since all current improvements lie outside of the area of direct impact. The two springs within the Ruby Hill allotment would not experience reduced water flows since no impacts to groundwater quantity are anticipated.

3.8.2.2 East Waste Rock Dump Alternative

The fenced area for this alternative would include approximately 847 acres of vegetation, of which 624 acres would be removed and 223 acres of vegetation would be undisturbed during mine development and operation. In addition, approximately 91 acres located outside the perimeter fence would be disturbed by mine development and operation. Therefore, a total of 938 acres of vegetation would be unavailable for livestock grazing during mine operation, of which 934 acres are administered by the BLM and 4 acres are private land. A total of 80 animal unit months would be temporarily lost during mine operation which would reduce the active grazing preference within the Ruby Hill allotment to 1,344 animal unit months (Table 3-31). The active grazing preference would be permanently reduced by 20 animal unit months to 1,404 animal unit months which is the same as the Proposed Action (Table 3-32). The loss of 20 animal unit months would not be considered a significant adverse impact since this loss represents less than 1 percent of the active grazing preference.

No impacts to range improvements would occur with the implementation of this alternative.

3.8.2.3 West Waste Rock Dump Alternative

The fenced area for this alternative would include approximately 720 acres of vegetation, of which 482 acres would be removed and 238 acres of vegetation would be undisturbed during mine development and operation. In addition, approximately 91 acres located outside the perimeter fence would be disturbed by mine development and operation. Therefore, a total of 811 acres of vegetation would be unavailable for livestock grazing during mine operation, of which 804 acres are administered by the BLM and 7 acres are private land. A total of 70 animal unit months would be temporarily lost during mine operation which would reduce the active grazing preference within the Ruby Hill allotment to 1,354 animal unit months (Table 3-33). The active grazing preference would be permanently reduced by 20 animal unit months to 1,404 animal unit months which is the same as the Proposed Action (Table 3-34). The loss of 20 animal unit months would not be considered a significant adverse impact since this loss represents less than 1 percent of the active grazing preference.

No impacts to range improvements would occur with the implementation of this alternative.

3.8.2.4 Partial Backfilling Alternative

Implementation of this alternative would affect range resources to the same extent as the Proposed Action since the disturbance acreages would be identical.

Table 3-30

Forage Production and Animal Units Months Permanently Lost - Proposed Action

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Permanently Lost[4]
Juniper woodland/black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	99.0	63	6,237	3,742	4
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	1.6	71	114	68	<1
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	21.4	972	20,801	12,481	16
TOTAL			122.0	---	27,152	16,241	20

[1]Area excluded from grazing is the acreage located inside the perimeter fence for the pit and safety berm setback area.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months permanently lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

Table 3-31

Forage Production and Animal Unit Months Temporarily Lost - East Waste Rock Dump Alternative

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
BLM-Administered Land							
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	624.7	63	39,356	23,614	30
Juniper woodland/ Wyoming big sagebrush	Rubyhill fine sandy loam, 2 to 8 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	45.1	118	5,322	3,193	3
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	212.5	71	15,088	9,053	11
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	44.8	972	43,546	26,127	33

Table 3-31 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Winterfat/grassland	Rubyhill fine sandy loam, 2 to 8 percent slopes, Kobeh gravelly fine sandy loam, 2 to 4 percent slopes, and Shipley complex	Calcareous loam, 10- to 14-inch precipitation zone	8.6	411	3,535	2,121	3
Subtotal			934.0	---	106,847	64,108	80
Private Land							
Altered grazing land type	Shipley complex, Shipley silt loam, 0 to 2 percent slopes, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Shipley fine sandy loam, 2 to 4 percent slopes	NA	3.0	---	---	---	---
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	0.6	63	38	23	<1
Wyoming big sagebrush/grassland	Shipley complex and Shipley fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	0.3	71	21	13	<1

Table 3-31 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Basin big sagebrush/Great Basin wildrye	Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	0.1	972	97	58	<1
Subtotal			4.0	---	156	94	<1
TOTAL			938.0	---	107,003	64,202	80

[1]Area excluded from grazing is the acreage located inside the perimeter fence.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months temporarily lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

NA = Not Applicable.

Table 3-32

Forage Production and Animal Units Months Permanently Lost - East Waste Rock Dump Alternative

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Permanently Lost[4]
Juniper woodland/black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	99.9	63	6,294	3,776	5
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	1.5	71	107	64	<1
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	20.6	972	20,023	12,014	15
TOTAL			122.0	---	26,424	15,854	20

[1]Area excluded from grazing is the acreage located inside the perimeter fence for the pit and safety berm setback area.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months permanently lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

Table 3-33

Forage Production and Animal Unit Months Temporarily Lost - West Waste Rock Dump Alternative

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
BLM-Administered Land							
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	350.9	63	22,107	13,264	17
Juniper woodland/ Wyoming big sagebrush	Rubyhill fine sandy loam, 2 to 8 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	6.8	118	802	481	<1
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	393.3	71	27,924	16,754	21
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	34.0	972	33,048	19,829	25

Table 3-33 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Winterfat/grassland	Rubyhill fine sandy loam, 2 to 8 percent slopes, Kobeh gravelly fine sandy loam, 2 to 4 percent slopes, and Shipley complex	Calcareous loam, 10- to 14-inch precipitation zone	19.0	411	7,809	4,685	6
Subtotal			804.0	---	91,690	55,013	70
Private Land							
Altered grazing land type	Shipley complex, Shipley silt loam, 0 to 2 percent slopes, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Shipley fine sandy loam, 2 to 4 percent slopes	NA	5.3	---	---	---	---
Juniper woodland/ black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	1.1	63	69	41	<1
Wyoming big sagebrush/grassland	Shipley complex and Shipley fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	0.5	71	36	22	<1

Table 3-33 (Continued)

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Temporarily Lost[4]
Basin big sagebrush/Great Basin wildrye	Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	0.1	972	97	58	<1
Subtotal			7.0	---	202	157	<1
TOTAL			811.0	---	91,892	55,170	70

[1]Area excluded from grazing is the acreage located inside the perimeter fence.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months temporarily lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

NA = Not Applicable.

Table 3-34

Forage Production and Animal Units Months Permanently Lost - Proposed Action

Plant Community	Soil Type(s)	Range Site	Area Excluded From Grazing (ac)[1]	Forage Production[2] (lbs/ac/yr)	Total Forage Production (lbs/yr)	Adjusted Total Forage Production (lbs/yr)[3]	Number of AUMs Permanently Lost[4]
Juniper woodland/black sagebrush	Umil association, Bartine-Overland association, and Rubyhill fine sandy loam, 2 to 8 percent slopes	Shallow calcareous loam, 10- to 14-inch precipitation zone	104.0	63	6,552	3,931	5
Wyoming big sagebrush/grassland	Umil association, Bartine-Overland association, Rubyhill fine sandy loam, 2 to 8 percent slopes, and Kobeh gravelly fine sandy loam, 2 to 4 percent slopes	Calcareous loam, 10- to 14-inch precipitation zone	1.6	71	114	68	<1
Basin big sagebrush/Great Basin wildrye	Umil association and Bartine-Overland association	Shallow calcareous loam, 10- to 14-inch precipitation zone	21.4	972	20,801	12,481	16
TOTAL			127.0	---	27,467	16,480	21

[1]Area excluded from grazing is the acreage located inside the perimeter fence for the pit and safety berm setback area.

[2]Forage production/ac/yr = Air dry forage weight of grasses and forbs produced per acre and year.

[3]Adjusted Total Forage Production = Total Forage Production multiplied by 0.6 (i.e., allowable utilization rate of vegetation is 60 percent or 0.6).

[4]Number of animal unit months permanently lost = Adjusted total forage production divided by 800 (i.e., lbs of air dry forage required to support 1 animal unit month).

3.8.2.5 No Action Alternative

Under the No Action Alternative, impacts to range resources would not occur from development and operation of the Proposed Action. Presently permitted mine and mineral exploration projects within the Ruby Hill grazing allotment would result in the disturbance of ***617*** acres and temporary loss of ***60*** animal unit months, based on a average stocking rate of 10.3 acres per animal unit month. Assuming that approximately 85 percent (***524*** acres) of land disturbed by these present actions would be successfully reclaimed, the permanent disturbance area would be reduced to ***93*** acres or less than 1 percent of the allotment. Disturbances resulting from present actions would result in the permanent loss of ***9*** animal unit months or less than 1 percent of the active grazing preference.

3.8.3 Cumulative Impacts

The cumulative assessment area for range resources is the 14,659-acre Ruby Hill grazing allotment which excludes the mine disturbances on patented lands (i.e., 2,165 acres) (Map 3-15; Table 3-24).

Present actions within the Ruby Hill allotment would disturb approximately ***617*** acres or approximately ***4*** percent of the allotment and temporarily remove ***60*** animal unit months from use, assuming an average stocking rate of 10.3 acres per animal unit month. Assuming that approximately 85 percent (***524*** acres) of land disturbed by these present actions would be successfully reclaimed, the permanent disturbance area would be reduced to ***93*** acres or less than 1 percent of the allotment. Disturbances resulting from present actions would result in the permanent loss of ***9*** animal unit months or less than 1 percent of the active grazing preference.

Mine development and operation activities associated with the Proposed Action would result in the temporary and permanent loss of animal unit months. A total of 965 acres of vegetation located on BLM-administered land and 7 acres vegetation located on private land would not be available for livestock grazing. A total of 82 animal unit months would be temporarily lost during mine operation which would reduce the active grazing preference within the Ruby Hill grazing allotment to 1,342 animal unit months; the current active grazing preference is 1,424 animal unit months for the entire allotment. The temporary loss of 82 animal unit months within the grazing allotment represents less than 6 percent of the active grazing preference. A total of 122 acres of disturbed land would be unavailable for grazing. Mine closure would result in the permanent loss of 20 animal unit months which represents less than 2 percent of the active grazing preference.

Disturbance from reasonably foreseeable future actions is projected to be approximately 325 acres or 2 percent of the Ruby Hill allotment. Approximately 32 animal unit months would be temporarily lost by future disturbance within the planning period until the disturbed area was reclaimed. Approximately 8 animal unit months would be permanently lost due to the potential development of the East Archimedes Oxide Project. Approximately 24 animal unit months would be recovered, after reclamation has been completed for other mineral exploration activities.

A combined total of ***1,556*** acres of surface disturbance would result from past, present, proposed mining activities, and other reasonably foreseeable future actions in the cumulative ***assessment*** area. This represents approximately 11 percent of the total land available for grazing in the Ruby Hill grazing allotment. Approximately ***1,216*** of the ***1,556*** acres (574 acres-Proposed Action, ***617*** acres-Present Actions, and 25 acres-reasonably foreseeable future actions) of the total disturbance area for interrelated projects would be reclaimed and available for livestock grazing after reclamation. Approximately ***151*** animal unit months would be temporarily lost which is approximately ***11*** percent of the active grazing preference. A total of ***33*** animal unit months would be permanently lost which is approximately ***2*** percent of the current active grazing preference.

3.8.4 Mitigation and Monitoring

No mitigation measures for range resources are recommended under the alternatives since no significant impacts are anticipated.

3.8.5 Residual Adverse Impacts

Residual impacts for range resources would include the temporary loss of approximately 82 animal unit months and permanent loss of 20 animal unit months.

3.9 Wildlife and Fisheries Resources

3.9.1 Affected Environment

As discussed in Section 3.6, Vegetation Resources, the project area occurs within the transitional zone between piñon-juniper woodlands along the foothills of the Diamond Mountains and the lower elevation sagebrush scrub located in Diamond Valley. A total of six vegetation or habitat types were delineated for the project area (WESTEC 1994). These six habitat types, combining a number of plant communities include: juniper woodland/black sagebrush, Wyoming big sagebrush/grassland, juniper woodland/ Wyoming big sagebrush, Basin big sagebrush/Great Basin wildrye, winterfat/grassland, and altered grazing land type. Juniper woodland/black sagebrush is the most common vegetation community within the project area. A variety of terrestrial wildlife species are associated with all of these upland communities, with increased species composition occurring in areas exhibiting greater vegetative structure and soil moisture, such as the Basin big sagebrush/Great Basin wildrye community found along the intermittent drainages that bisect the project area.

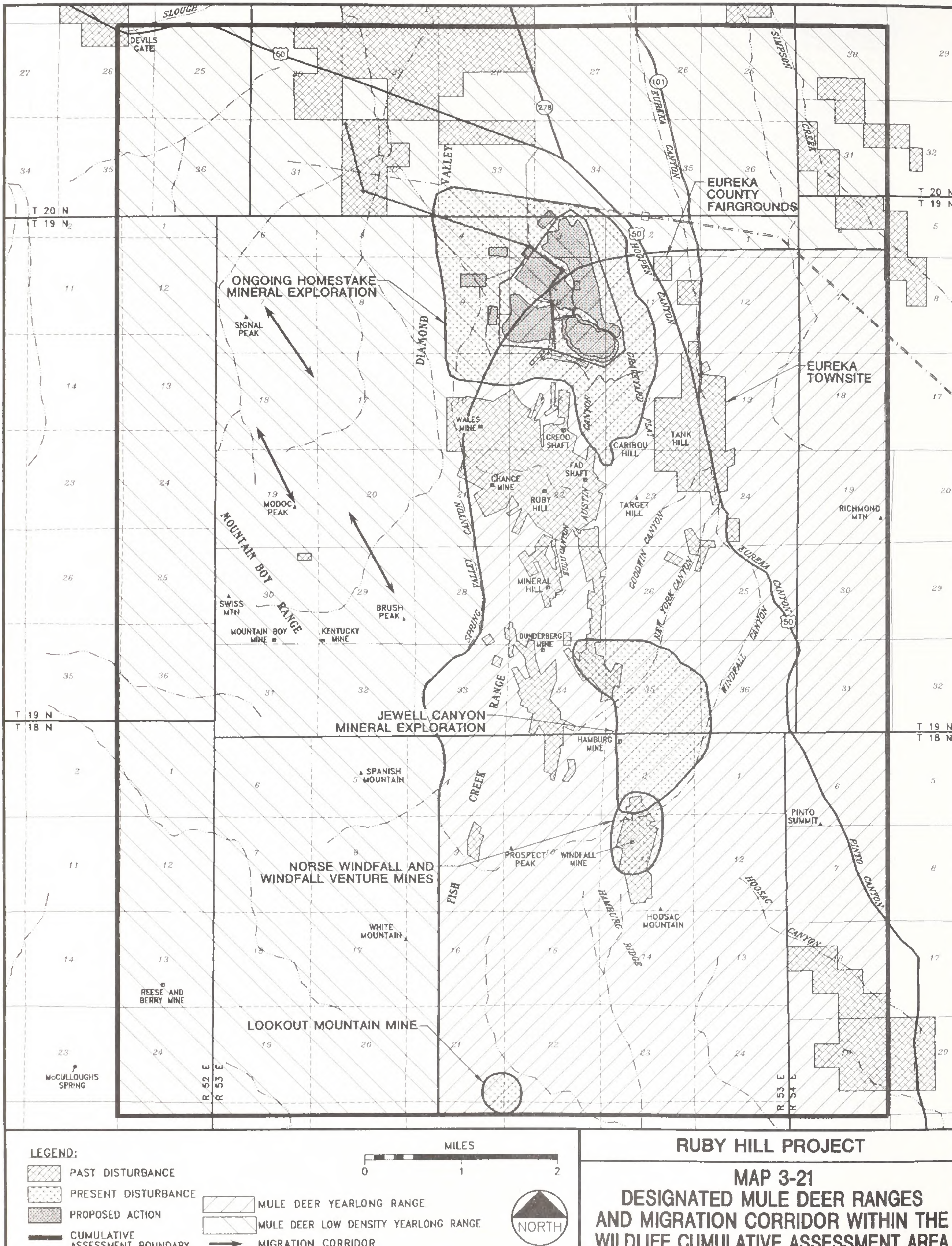
Available water for wildlife consumption is limiting in the project region. Water sources in the vicinity of the project, particularly those that maintain open water and a multi-story canopy, support a greater diversity and population density of wildlife species than any other habitat type occurring in the region. Currently, no open water areas or riparian habitat occur in the immediate project area.

Baseline descriptions of both resident and migratory wildlife include species that have either been documented in the project and cumulative effects areas or those that may occur in the areas, based on relative habitat associations. Baseline surveys were conducted in 1995 within the project area (Brown 1996), which were based on information compiled in 1994 (WESTEC 1994). The 1995 studies included: 1) a breeding bird survey that also recorded migratory songbirds; 2) habitat delineation and relative abundance estimates for the pygmy rabbit within proposed disturbance areas; and 3) surveys of existing mine adits and shafts within 0.25 mile of the proposed disturbance areas for evidence of bat use. Survey specifics pertaining to sensitive wildlife resources are discussed further in Section 3.11, Special Status Species.

3.9.1.1 Game Species

Mule deer are the primary big game species in the project region. Range conditions and population numbers within Management Area 14 (Units 141 through 145) for Eureka County improved in 1995, due to mild winter temperatures and increased available forage. Overall, the limiting factor for mule deer within Management Area 14 is the quantity and quality of available summer range. However, water is the primary limiting factor for mule deer in the immediate project area (Nevada Division of Wildlife 1995). Water availability, forage quality, cover, and weather patterns would typically determine the level of use and movement of deer through an area. Although deer occur throughout the project area, the lack of open or free water near the project site limits deer numbers. Map 3-21 presents the designated mule deer ranges and migration corridor located in the project area and cumulative effects area. Mule deer year-long range extends south and east from Mineral Point. Low-density year-long range encompasses the remainder of the area. The project site is located predominantly within mule deer year-long range, with a portion occurring in the designated low-density range (Podborny 1996).

The mule deer year-long range is part of the Diamond Mountains/Fish Creek Range herd area. This designated range includes deer fawning areas, summer range, and winter range. Summer use depends on water availability relative to forage and cover. Although deer fawning occurs throughout, no specific fawning sites have been documented for the project area or the cumulative effects area. Winter use in the project vicinity fluctuates with winter weather. In severe winters, deer would move out of the project area and surrounding vicinity into ranges that can support



RUBY HILL PROJECT

MAP 3-21
DESIGNATED MULE DEER RANGES AND MIGRATION CORRIDOR WITHIN THE WILDLIFE CUMULATIVE ASSESSMENT AREA

more animals under harsh conditions. Mule deer sporadically occupy the low-density year-long range, concentrating in the area during drought periods to take advantage of the alfalfa fields and residential areas that may provide additional forage and water (Podborny 1996). A prominent mule deer migration corridor is located west of the project area and is discussed further in Section 3.9.3, Cumulative Impacts.

The mountain lion also is classified as a big game species. The Nevada Division of Wildlife is currently developing a lion management plan for Nevada (Podborny 1995). Mountain lions typically occupy the higher elevations surrounding the project area but move down into the lower elevations following the resident mule deer populations. This species would infrequently visit the project area (Podborny 1996).

The pygmy rabbit is a game species that has been documented in the project area. Although the pygmy rabbit is considered a game species in Nevada, it also is a BLM Sensitive Species and is discussed in detail in Section 3.10, Special Status Species.

Furbearers (such as bobcat and gray fox) may occur in the project area and cumulative effects area. Other predators include the coyote, badger, long-tailed weasel, spotted skunk, and striped skunk (Podborny 1996).

Upland game birds may occupy portions of the project area, although habitat is limited. Characteristic species for the project area would include sage grouse, California quail, and mourning dove. Sage grouse generally occupy upland shrub communities, breeding on open leks (or strutting grounds) and nesting and brooding in upland areas and meadows in proximity to water. One historic sage grouse lek is located approximately 1 mile west of the project area within southern Diamond Valley (Podborny 1995). The lek was active in 1989, 1990, 1991, and 1992. No sign of use was recorded by the Nevada Division of Wildlife in 1993 and 1995 (Podborny 1996). Grouse could nest in the upland habitat of the project area, but the lack of water sources would limit the use by brooding birds. California quail and mourning dove have been reported in the project area, but California quail are considered infrequent, and no known nest sites have been identified for either species (Podborny 1996).

Due to the lack of appropriate habitat, no waterfowl or shorebird concentrations are likely in either the project area or in the cumulative effects area. Individuals may use isolated farm ponds and open water areas throughout Diamond Valley and the surrounding areas.

3.9.1.2 Nongame Species

Nongame species are widely distributed, occupying a variety of habitat types and elevations. Nongame mammals would include the least chipmunk, golden-mantled ground squirrel, Belding's ground squirrel, Townsend's ground squirrel, and pocket gopher (Podborny 1996). Rodent populations within Diamond Valley to the north of the project area support a large number of predators, including both resident and migratory raptor species, as is apparent with the number of active nest sites in and around Diamond Valley. Although these populations and affiliations have historically occurred in Diamond Valley and surrounding areas, the rodent populations have increased dramatically from past and present agricultural activities.

Other important nongame species include several bat species. Existing shafts, adits, and other underground openings support both breeding and hibernating bat species. These underground openings also may provide habitat for a variety of reptiles, amphibians, and birds. Field surveys for bats were conducted between August 31 and September 4, 1995, and January 6 and 7, 1996, to record any sign of bat use and presence (Brown 1996). Survey emphasis was placed on documenting bat concentrations, such as nursery colonies and hibernacula, and determining the potential presence of the Townsend's big-eared bat (***Corynorhinus*** *townsendii*) and any of the *Myotis* species. Bats that potentially occur in the vicinity of the project are listed in Table 3-35. Since many of the bats identified for this project are currently BLM Sensitive Species, the survey methods, area examined, and results are

Table 3-35

Bat Species Potentially Occurring in the Project Vicinity

Common Name	Scientific Name	Federal Status
Townsend's big-eared bat[1]	*Corynorhinus* (= *Plecotus*) *townsendii*	BLM
Small-footed myotis[1]	*Myotis ciliolabrum*	BLM
Long-legged myotis	*Myotis volans*	BLM
Long-eared myotis	*Myotis evotis*	BLM
Fringed myotis	*Myotis thysanodes*	BLM
Yuma myotis	*Myotis yumanensis*	BLM
California myotis	*Myotis californicus*	NA[2]
Little brown bat	*Myotis lucifugus*	NA
Western pipistrelle	*Pipistrellus hesperus*	NA
Big brown bat	*Eptesicus fuscus*	NA
Pallid bat	*Antrozous pallidus*	NA

[1]Species found during the 1995 and 1996 surveys (Brown 1996).

[2]NA = not applicable.

presented in detail in Section 3.10, Special Status Species.

Nongame birds encompass a wide variety of passerine and raptor species. Passerines or perching birds are numerous and occupy the entire range of habitats that occur within the project area. Breeding bird surveys were conducted June 5 to 9, 1995, within the project area. A total of 37 avian species were observed and recorded and are presented in Table 3-36. As shown, a number of these species are associated with a variety of habitat types, and many occur within the project area and project vicinity year-round. Additional resident raptors include the golden eagle, great-horned owl, and barn owl. The bald eagle and rough-legged hawk also winter throughout Diamond Valley (Podborny 1996). The 1995 field surveys documented a number of raptor nests, including five active and five inactive ferruginous hawk nests in the project area. The Nevada Division of Wildlife also has recorded additional raptor nesting (Lamp 1996). Details on sensitive breeding birds, such as the ferruginous hawk, northern goshawk, burrowing owl, and loggerhead shrike, are discussed further in Section 3.10, Special Status Species. Data on other raptor nesting are presented below.

One active red-tailed hawk nest (with young) was recorded in 1995 approximately 1.5 miles from the project area. Historically, two additional red-tailed hawk nests or occupied territories were documented immediately adjacent and within 0.5 mile of the project area (Lamp 1996). The observed presence and behavior of two red-tailed hawks during the 1995 surveys inferred an additional occupied territory and possible nest site. These observations were recorded in the project area, indicating that a nest site could occur within the proposed disturbance areas. None of the documented red-tailed hawk nests occur within the proposed disturbance areas for the Proposed Action.

A prairie falcon eyrie was located during the 1994 Phase 1 studies about 1.5 miles from the project area. This nest site was occupied and reportedly

Table 3-36

Inventory of Breeding Bird Species Within the Project Area

Common Name	Scientific Name	Habitat Type[1]	Relative Abundance[2]
Turkey vulture	*Cathartes aura*	JW/WBS, WBS/G, AGLT[3]	L
Northern harrier[4]	*Circus cyaneus*	JW/BS, WBS/G	L
Red-tailed hawk[4]	*Buteo jamaicensis*	LS/G, MMS, JW/WBS, WBS/G, AGLT[3]	L
Ferruginous hawk[4]	*Buteo regalis*	JW/WBS, WBS/G, AGLT	M
American kestrel[4]	*Falco sparverius*	JW/BS, JW/WBS, WBS/G	M
Prairie falcon[4]	*Falco mexicanus*	LS/G, MMS, JW/BS, WBS/G, AGLT[3]	L
California quail[4]	*Callipepla californica*	AGLT[3]	L
Common nighthawk[4]	*Chordeiles minor*	JW/BS, AGLT[3]	H
Northern flicker[4]	*Colaptes auratus*	JW/WBS	M
Western kingbird	*Tyrannus verticalis*	AGLT[3]	L
Gray flycatcher	*Empidonax wrightii*	MMS, BBS/GBW, PPJW/MM, JW/BS, JW/WBS, WBS/G, AGLT[3]	H
Mourning dove	*Zenaida macroura*	JW/BS	L
Horned lark[4]	*Eremophila alpestris*	WBS/G, W/G, AGLT[3]	H
Scrub jay[4]	*Aphelocoma coerulescens*	MMS, JW/BS	M
Pinyon jay[4]	*Gymnorhinus cyanocephalus*	JW/BS, JW/WBS, WBS/G	M
Common raven[4]	*Corvus corax*	LS/G, MMS, PPJW/MM, JW/BS, JW/WBS, WBS/G	M
Mountain chickadee[4]	*Parus gambeli*	MMS, PPJW/MM, JW/BS	M
Rock wren	*Salpinctes obsoletus*	LS/G, PPJW/MM	L
Blue-gray gnatcatcher	*Polioptila caerulea*	MMS, JW/WBS, WBS/G	M
Mountain bluebird	*Sialia currucoides*	PPJW/MM, WBS/G, AGLT[3]	M
Loggerhead shrike[4]	*Lanius ludovicianus*	JW/BS, JW/WBS	L
Sage thrasher	*Oreoscoptes montanus*	WBS/G, AGLT[3]	H
Solitary vireo	*Vireo solitarius*	PPJW/MM	L
Yellow-rumped warbler	*Dendroica coronata*	PPJW/MM, JW/WBS	M

Table 3-36 (Continued)

Common Name	Scientific Name	Habitat Type[1]	Relative Abundance[2]
Black-throated gray warbler	*Dendroica nignescens*	PPJW/MM, JW/BS	M
Black-headed grosbeak	*Pheuticus melanocephalus*	MMS, JW/BS	L
Green-tailed towhee	*Pipilo chlorurus*	MMS, PPJW/MM	H
Rufous-sided towhee[4]	*Pipilo erythrophthalmus*	MMS, PPJW/MM, JW/BS	M
Vesper sparrow	*Pooecetes gramineus*	MMS, WBS/G, AGLT	M
Lark sparrow	*Chondestes grammacus*	AGLT[3]	H
Sage sparrow	*Amphispiza belli*	WBS/G, AGLT	M
Chipping sparrow	*Spizella passerina*	PPJW/MM	M
Brewer's sparrow	*Spizella breweri*	MMS, JW/BS, JW/WBS, WBS/G, W/G	H
Western meadowlark[4]	*Sturnella neglecta*	AGLT[3]	M
Brown-headed cowbird	*Molothrus ater*	MMS, PPJW/MM, AGLT[3]	L
Western tanager	*Piranga ludoviciana*	JW/WBS	L
Cassin's finch[4]	*Carpodacus cassinii*	PPJW/MM	L

[1]**Habitat Type:**

LS/G	=	low sagebrush/grassland
MMS	=	mixed mountain shrub
BBS/GBW	=	Basin big sagebrush/Great Basin wildrye
PPJW/MM	=	piñon pine and juniper woodland/mountain mahogany
JW/BS	=	juniper woodland/black sagebrush
JW/WBS	=	juniper woodland/Wyoming big sagebrush
WBS/G	=	Wyoming big sagebrush/grassland
W/G	=	winterfat/grassland
AGLT	=	altered grazing land type

[2]**Relative Abundance:** relative incidence of individuals within identified habitats. L = Low; M = Moderate; H = High

[3]AGLT - altered grazing land type including cultivated land.

[4]Species that occur in the project area or project vicinity year-round.

active in 1994, but not in 1995. Additional prairie falcon activity was observed in the vicinity of the project, encompassing Caribou Hill and agricultural fields to the northwest of the Proposed Action (WESTEC 1994). The Nevada Division of Wildlife also documented an historical prairie falcon eyrie northwest and adjacent to the cumulative effects area (Lamp 1996).

An inactive nest that had likely been occupied by great-horned owls was recorded in a juniper tree within the project area. However, no recent sign of bird use was observed during the 1995 surveys. The specific locations of these historic and active nest sites have not been disclosed in this EIS to ensure the protection of the nests and the breeding birds associated with these sites.

Other nongame species in the project area would include common reptiles such as the western fence lizard, Great Basin skink, desert horned lizard, Great Basin rattlesnake, and sagebrush lizard. Amphibian presence would be limited in the project area, due to the lack of water sources. However, amphibians occur throughout the project region, according to habitat associations.

3.9.2 Environmental Consequences

Environmental impacts to wildlife and fisheries resources would be significant if the Proposed Action or its alternatives resulted in the following:

- Impacts to riparian habitat if riparian vegetation were adversely affected or lost by implementation of the Proposed Action, resulting in habitat degradation for wildlife resources.

- Impacts to mule deer if crucial seasonal ranges decreased 10 percent or more within the Proposed Action area or the cumulative effects area.

- Impacts to mule deer if seasonal migration corridors were disrupted, resulting in vehicle mortalities causing population declines below the Nevada Division of Wildlife's management goals and objectives.

- Impacts to mule deer if habitat fragmentation within the cumulative effects area prevented viable reproduction and wintering activities within the respective ranges.

- Impacts to breeding sage grouse from mine development, resulting in lek abandonment.

- Impacts to wintering birds, breeding birds, and their habitat, resulting in population declines and violations to the Migratory Bird Treaty Act.

- Impacts to fisheries if mine dewatering results in a decreased perennial flows within the cumulative effects area.

- Impacts to resident and migratory wildlife if the Proposed Action were to result in either acute or chronic toxicity (e.g., mortality, impaired reproduction, reduced growth or fitness) from contamination of water resources.

- Impacts to important wildlife species from a hazardous materials spill into a sensitive resource (e.g., stream or river channel) along the transportation route, resulting in increased mortalities, reproductive loss, or habitat loss.

3.9.2.1 Proposed Action

The development and operation of the Proposed Action would result in both direct and indirect impacts to terrestrial wildlife resources. No impacts to aquatic species or fisheries would occur, due to the lack of suitable habitat (perennial water sources) in the project area. The degree of impacts to terrestrial species and their associated upland habitats depends on the temporal and spatial relationships of these resources with the proposed project components. Effects may be particularly prominent for species closely associated with the piñon-juniper and sagebrush transitional zone that would be impacted by the Proposed Action. The habitat mosaic and increased edge effect present along the foothill region in the project area support a greater number of species than either of the individual habitat types.

Overall impacts to wildlife would include the direct effects from habitat loss, increased habitat fragmentation, animal mortality, and animal displacement. Indirect effects would include increased noise, additional human presence, and the potential for increased vehicle-related mortalities. Habitat loss would affect forage availability, escape and thermal cover, and breeding areas for certain wildlife species. Mine development would result in the loss of less mobile species and displace animals from the project area into adjacent habitats, which are assumed to be at or near their carrying capacities. Therefore, displaced animals, which would increase intraspecific competition, would be assumed to be lost from the population. Wildlife species primarily impacted by displacement from the project would include those typically dependent on the transitional zone between the higher elevational piñon-juniper and low elevation sagebrush. Habitat loss and animal displacement would be more apparent within the undisturbed habitats in the project area versus those that have been previously disturbed in the cumulative effects area, which is discussed further below in Section 3.9.3, Cumulative Impacts.

Habitat Loss

Implementation of the Proposed Action would result in the direct loss of 696 acres of native vegetation; (see Table *3-25*). Of the 696 total acres disturbed by the Proposed Action, 608 acres would be reclaimed, leaving 88 acres not reclaimed for post-mining use. The loss of the 608 acres would be considered a short-term impact during the life of the project, until final site reclamation is completed. The 88 unreclaimed acres would be considered a long-term and permanent habitat loss. ***Of the 696 acres of native habitat disturbed, the loss of 321.5 acres of juniper woodland/black sagebrush, 53.9 acres of juniper woodland/Wyoming big sagebrush, 274.6 acres of Wyoming big sagebrush/grassland, and 35.4 acres of Basin big sagebrush/Great Basin wildrye would be considered a long-term loss of woody habitat for wildlife cover, foraging, and breeding use.*** The use of piñon pine and Utah juniper seedlings would aid in reclamation of woody species, improving planting success and decreasing the time to maturity. ***It is currently estimated that pinon-juniper would require approximately 40 to 60 years to reach maturity with the use of the seedlings during mine reclamation activities. Given a natural seed source for sagebrush within the surrounding areas, sagebrush regeneration for young plants should occur within 5 to 10 years after mine closure and final reclamation efforts. It is likely that sagebrush would require up to 20 to 30 years to reach maturity.***

Impacts to big game habitat would be limited to mule deer and mountain lion. The project would remove an estimated 375 acres of mule deer year-long range and 321 acres of low-density year-long range (see Map 3-21). Project development would affect the habitats within these designated seasonal ranges for the life of the project. Habitats would not be re-established until final reclamation is completed, which would be long-term for certain plant species, such as piñon pine and Utah juniper. No mule deer seasonal ranges designated as crucial by the Nevada Division of Wildlife would be impacted by the Proposed Action. Impacts to mountain lions would be the loss of mule deer habitat, which would indirectly affect mountain lion distribution.

No riparian vegetation would be impacted by the Proposed Action. Therefore, no adverse effects to riparian habitat or associated wildlife species would occur.

Animal Loss and Displacement

Direct animal mortalities during project construction and operation would occur with less mobile or burrowing species (e.g., bird nestlings, reptiles, small mammals). As discussed above, the more mobile species (medium-sized mammals, adult birds, and big game animals) would be displaced from the disturbance area, increasing the competition in adjacent habitats and effectively eliminating the animals from the population. This loss would occur for the life of the project, until reclamation is achieved and woody plant species have re-established. Habitat fragmentation also would occur for the life of the project, resulting in decreased values for surrounding areas. This issue is addressed in greater detail in Section 3.9.3, Cumulative Impacts.

The reduction in hunting or foraging territories for area raptors and mammalian predators would not likely be significant. Although the common predator and prey species have historically occupied the project region, the primary prey base for these animal groups is closely associated with the agricultural lands presently occurring in Diamond Valley. The lands that would be removed by the Proposed Action do not support the large numbers of small mammals that are typically associated with these agricultural areas and are key to supporting many predator species. Further effects to area predators from the Proposed Action are specifically discussed below for raptors species in Section 3.10, Special Status Species.

Nesting Birds

The most prominent impacts from the proposed Ruby Hill Project would be the short- and long-term impacts to nesting birds, particularly raptors. The most important raptor that would be affected is the ferruginous hawk. Impacts to this species would be significant, which is discussed in detail in Section 3.10, Special Status Species. Other avian species that could be impacted would include potentially nesting red-tailed hawks and nesting passerines that use the sagebrush and piñon-juniper vegetation, concentrating along the edge interface between the two habitat types. In the event that project development were to occur during the breeding season (March through July), construction activities could result in the loss of eggs or young. However, impacts to nesting birds would depend on the nest location relative to the proposed disturbance areas, the phase of the breeding period, and the duration of the anticipated disturbance. Loss of or disturbance to an active nest site would adversely affect breeding birds, potentially resulting in nest abandonment, loss of territory, and loss of productivity for that breeding season, which is in violation of the Migratory Bird Treaty Act. The loss of an active red-tailed hawk or passerine nest site would significantly impact the specific breeding pair affected by the Proposed Action, but it would not significantly affect the local avian population.

Placement of new distribution lines is often a wildlife concern. However, operation of the proposed power distribution line would pose a low electrocution threat to area raptors. Homestake has committed to constructing the distribution line structures to minimize the potential for raptor electrocutions. This commitment is presented in Section 2.1.14.5, Wildlife and Livestock Protection. In addition, potential avian line strike hazards would be considered low to negligible. Collision potential is typically dependent on variables, such as the location of high-use habitats (e.g., nesting, foraging, roosting), line orientation to flight patterns and movement corridors, species composition, visibility, and line design (Beaulaurier et al. 1982; Anderson 1978). Based on area topography and vegetation relative to the proposed distribution line orientation, no adverse effects to avian species in the project vicinity would be expected from the operation of the distribution line.

Potential effects to upland game birds from mine development are expected to be low. The lack of known breeding sites (e.g., sage grouse leks) and water sources that would support brooding birds limit the overall habitat quality for sage grouse, mourning dove, and California quail. In addition, Homestake has committed to placing anti-perching features on the distribution line structures to discourage raptor perching. This measure would prevent increased predation on nesting sage grouse from the placement of the distribution line, minimizing the potential for decreased reproductive success (Section 2.1.14.5, Wildlife and Livestock Protection).

Human Effects

Impacts to high-profile species in the project vicinity from increased human presence would be proportional to the size of the construction and operational work force, land use and recreational demands, and other development and associated activities in the region. An increase in the recreational uses of the area surrounding the Ruby Hill Project from anticipated increases in human presence and local human population would likely increase the demand on area hunting. This increased use would likely result in low to moderate impacts to big game animals and low impacts to upland game birds within the project vicinity. Other effects from increased human presence and access into the project vicinity would include increased illegal hunting, animal harassment, off-road vehicle use, and noise. Poaching is often the greatest adverse impact to wildlife from increased human presence (Streeter et al. 1979), particularly for big game species. However, other high-profile species are often harassed, including large raptors (e.g., eagles and buteos), predators (e.g., coyote), and roosting bats in caves and mine workings.

Two factors would combine to help minimize these affects from increased human presence in the project area. First, the location of the Proposed Action is in close proximity to the town of Eureka and historical mines used since the late 1800s. Second, Homestake has committed to develop an environmental awareness course for employee orientation (see Section 2.1.14.14, Employee Environmental Education Program). This program would be required for all construction and operational personnel to inform them of applicable Federal and state laws, caution against animal harassment, and develop an awareness of and sensitivity to wildlife issues and concerns specific to the project area.

The wildlife analysis examined potential noise impacts from mine construction and operation. Common animal responses to increased noise are either area avoidance or accommodation. Except at extreme levels, the more secretive animals may coexist with noise sources, whereas, other species would avoid the vicinity of the source until the source dropped to an acceptable level for that species. Noise disturbances are particularly detrimental to species that rely on vocal or auditory cues for communication or orientation (e.g., birds, bats) or during breeding periods for specific species (e.g., ferruginous hawk). Abrupt and intermittent noises (e.g., blasting, sirens) are less likely to be accommodated than the more steady and continuous noises (e.g., traffic, equipment). Based on the current baseline data available for the project area, two groups of animals could be significantly impacted by mine noise. These groups include bat and raptor species (particularly the Townsend's big-eared bat, small-footed myotis, and the ferruginous hawk). Detailed impact analyses for these species are presented in Section 3.10, Special Status Species.

Development of the proposed mine components, including access roads, would not intersect with the mule deer migration corridor located to the west of the project area. Therefore, no impacts to deer movement between seasonal ranges would occur from the Proposed Action.

The potential for increased wildlife mortalities from vehicles along the mine access roads and adjacent highway is expected to be negligible. Construction personnel would total 150 to 175 employees for approximately 1.5 years. Operational personnel would be 100 to 140 employees. Although the number of personnel traveling to and from the site would be a substantial increase over current use levels, vehicle-related mortalities would likely be limited, due to the relatively short access road into the mine and the proximity of U.S. Highway 50 to the project area.

<u>Water Quality and Water Quantity</u>

Sodium cyanide is lethal to wildlife and has often been the cause of mine-related mortalities in the United States gold mining industry. From 1986 through 1993, songbirds comprised an average of 31 percent of the total wildlife mortalities reported at Nevada mines. In 1994, songbirds represented 37 percent of all reported wildlife mortalities, but during the first two quarters of 1995, rodents exceeded other animal groups with 57 percent of the 232 total mortalities reported for this period. Overall, reported wildlife mortalities have been decreasing at Nevada mining operations since the mid-1980s (King 1995). Information provided by the Nevada Division of Wildlife indicates that certain bat species exhibit a delayed influence from cyanide poisoning. These recent study results suggest that an increased number of bats may be affected by cyanide solutions than previously thought, and individuals may be succumbing to cyanide poisoning away from mine areas. Therefore, these mortalities would be less likely to be found and reported.

Homestake has committed to containing the cyanide process solution in closed, metal tanks (see Section 2.1.14.5, Wildlife and Livestock Protection). Both, the solution tanks and process plant would be constructed with secondary containment that would drain to a solution overflow pond (see Section 2.1.7.1, Solution Processing). In addition, an event pond would be constructed adjacent to the solution overflow pond to contain flow from a 25-year/24-hour storm event in addition to 110 percent of the largest process tank (550,000 gallons). According to the Nevada Division of Wildlife's permitting requirements, if a mine has an overflow pond that contains cyanide solution 2 days out of 5, then either exclusion devices are required or the mine must neutralize the cyanide immediately (Lamp 1995). Homestake has committed to fencing the entire solution overflow and event pond area to prevent wildlife access. Because the solution overflow pond may contain cyanide solution from surges in the mining operation, Homestake also has committed to using wildlife exclusion devices (e.g., netting or floating material) on the solution pond to prevent bird and bat access to the solution water. No additional exclusion devices are currently planned for the storm event pond. Piping the solution from the heap leach pads, rather than transporting the material in open channels, would prevent wildlife access to the solution. The company also has committed to using emitters on the heap leach pad and monitoring the potential pooling of the cyanide solution on top of the pad. Under the terms of the state's Industrial Artificial Pond Permit, open solutions lethal to wildlife are not permitted. Therefore, in the event of pooling, Homestake would implement a plan to eliminate cyanide solution pooling (see Section 2.1.14.5, Wildlife and Livestock Protection).

Based on Homestake's committed protection measures, potential impacts to wildlife resources from cyanide ingestion would be low. These measures have been developed in accordance with the BLM's cyanide management policy and the Nevada Division of Wildlife's Industrial Artificial Pond Permit. Homestake would be required to report all wildlife mortalities to the BLM and Nevada Division of Wildlife, as required by the Federal and state approval and permitting processes.

The EIS analysis examined the potential short- and long-term effects to both water quality and water quantity for wildlife resources. It was determined that the Proposed Action would not result in adverse impacts from degraded water quality or decreased water availability. As discussed in Section 3.4, Water Quality and Quantity, the groundwater analysis predicts that the mine pit would not intersect with groundwater. No pit lake would eventually form upon mine closure; therefore, no acute or chronic toxicity issues have been identified for this project. In addition, no dewatering activities are anticipated, so effects to naturally occurring seeps and springs located within the region would not be expected.

<u>Hazardous Materials Spill</u>

The probability of a hazardous materials spill (e.g., sodium cyanide, sodium hydroxide, diesel fuel) into a sensitive resource along the transportation route is discussed in Section 3.17, Hazardous Materials and Wastes. The analysis of the potential effects to wildlife resources from a toxic release was based on this discussion. The sensitive receptors identified along Highway 278 include the Humboldt River, Pine Creek, Pine Meadows, their associated riparian zones, and the wildlife species dependent upon them. A total of 10 miles of wetland areas would be crossed by the proposed transportation corridor.

As discussed in Section 3.17, Hazardous Materials and Wastes, the number of sodium cyanide, sodium hydroxide, and diesel fuel releases over the 7-year project operation (excluding the reclamation period) and would be about 0.03. Although this spill probability is low, the EIS developed a spill scenario that addressed the potential release of these three hazardous materials into a perennial stream supporting prominent riparian vegetation.

If a large amount of sodium hydroxide or sodium cyanide were spilled into a perennial stream or wetland along the highway, wildlife habitat would be lost and mortalities would occur to the aquatic and terrestrial organisms that came into contact with the materials. Exposure to sodium hydroxide would result in caustic reactions (burns, mortalities) to plants and animals. Cyanide exposure would result in direct mortality, as discussed above for the project area. If a spill into a perennial channel or wetland occurred during the spring and early summer, avian ground nesters would be directly affected, resulting in potential loss of adult birds, eggs, nestlings, or nest sites along the channel perimeter. Other vertebrate and invertebrate species that rely on the riparian habitat for feeding and cover also could be impacted. These losses could, in turn, affect prey availability, indirectly impacting more upland species. During the winter period, animal mortalities would be primarily limited to aquatic organisms and wintering birds. More mobile species would be able to avoid the contaminants, until final cleanup had been completed, although cyanide-contaminated water may remain at lethal levels downstream of a spill that may not be detected and avoided by animals. These direct and indirect impacts would continue until final cleanup of the contaminated soil, water, and vegetation.

A spill of diesel fuel into a riparian system would result in a longer-term impact to natural resources. Hydrocarbon contamination would affect both aquatic and terrestrial organisms. Direct impacts could include loss of both plants and animals that come into contact with the fuel. Diesel contamination would affect the exposed vegetation for the long-term, decreasing the amount of cover and forage potential for wildlife dependent on the riparian system. Indirect effects (loss of nest site) could reduce the annual productivity of that species for that year.

Overall, the level of impact to a riparian system from a hazardous release in terms of duration and length of stream reach 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. Effects from a hazardous spill 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.

3.9.2.2 East Waste Rock Dump Alternative

Overall impacts from implementation of the East Waste Rock Dump Alternative would parallel those described for the Proposed Action. Short-term habitat loss would total 482.1 acres of woodland communities and approximately 231 acres of shrubland communities. Long-term habitat loss would total 72 acres of woodland and 16 acres of shurblands. However, the long-term, permanent disturbance to wildlife habitat would be the same as the Proposed Action. Approximately 475 acres of year-long range and 240 acres of low-density year-long range would not be available for mule deer use. Anticipated impacts to the ferruginous hawk, pygmy rabbit, and sensitive bat species that occur in the project area would differ for the East Waste Rock Dump Alternative. These effects are discussed in detail in Section 3.10, Special Status Species.

3.9.2.3 West Waste Rock Dump Alternative

Impacts from the West Waste Rock Dump Alternative would parallel those described for the Proposed Action. Short-term habitat loss would total approximatley 217 acres of woodlands and approximately 354 acres of shrublands. Long-term habitat loss would be the same as the East Waste Rock Dump Alternative, 72 acres of woodlands and 16 acres of shrublands. The long-term, permanent disturbance to wildlife habitat would be the same as for the Proposed Action. This alternative would remove about 313 acres of mule deer year-long range and 264 acres of low-density year-long range. As discussed for the East Waste Rock Dump Alternative, proposed impacts to the ferruginous hawk, pygmy rabbit, and sensitive bat species would differ for the West Waste Rock Dump Alternative than those discussed for the Proposed Action. These effects are discussed in detail in Section 3.10, Special Status Species.

3.9.2.4 Partial Backfilling Alternative

The Partial Pit Backfill Alternative would result in the same amount of disturbance to wildlife habitat that would be affected by the Proposed Action. However, partial backfilling would reclaim approximately an additional 6 acres. Therefore, the amount of long-term disturbance to wildlife habitat would be approximately 6 acres less than that of the Proposed Action, but the vegetation species composition would be the same. Other impacts identified for the Proposed Action would be the same for the Partial Pit Backfill Alternative.

3.9.2.5 No Action Alternative

Under the No Action Alternative, approximately 696 acres of native wildlife habitat would not be disturbed or lost, as for the Proposed Action. Habitat fragmentation and animal displacement would not occur, retaining the current habitat mosaic. No impacts to nesting birds, including raptors and passerines would occur. Noise levels and human presence would remain the same as current levels. The increased potential for a hazardous materials release or spill along the transportation route would not occur. Anticipated cumulative effects from past, present, and future mining would be minimized under this alternative.

3.9.3 Cumulative Impacts

The cumulative effects area analyzed for wildlife resources encompasses an expanded region surrounding the Ruby Hill project area (see Map 3-21, generated for mule deer ranges). The cumulative effects area typically varies with the resource, its associated habitat types, issue sensitivity, and the animal's mobility. For wildlife resources, the cumulative analysis focused on the historic mining activities in the region combined with current mining exploration programs and limited livestock grazing. The Eureka Mining District has produced lead, silver, and gold from the late 1800s, resulting in a large number of scattered mine shafts, adits, and other components associated with hard rock mining.

Additional habitat types that occur within the cumulative effects area beyond that found in the project area include low sagebrush/grassland, mixed mountain shrub, piñon pine and juniper woodland/mountain mahogany, and higher elevation conifers and deciduous communities. Four improved springs occur in the cumulative effects area identified for wildlife resources.

Map 3-21 indicates the designated mule deer ranges and migration corridor located within the cumulative effects area. Deer year-long range extends throughout the project area to the southeast of the mine, encompassing the majority of the historic mining lands located south of the project area. Low-density year-long range for mule deer extends to the northwest into Diamond Valley. An important migration corridor commonly used by mule deer for seasonal movements between ranges extends along the western portion of the cumulative effects area through the Mountain Boy Range and Big Reilley Canyon into Spring Valley. Deer follow the migration corridor from north to south during fall migration, returning north along the same route in the spring. November is the primary migration period during the fall, with deer commonly using Big Reilley Canyon and Little Reilley Canyon as a transition zone for a month or more before continuing south to their winter range (Podborny 1996).

Additional game birds that occur in the cumulative effects area include the chukar and blue grouse. Chukar are typically found along grassy slopes and canyon areas; blue grouse occupy the upper portions of Windfall Canyon south of Eureka and along Prospect Peak (Podborny 1996).

A number of additional raptor nests have been documented within the cumulative effects area. As the habitat changes into the higher elevations along Ruby Hill, other nest substrates become available, increasing the diversity of raptor species. The majority of these species are addressed in Section 3.10, Special Status Species.

Other game and nongame wildlife species found in the cumulative effects area would parallel those discussed for the Proposed Action.

The primary interrelated projects applicable to wildlife resources would be the historical mining that has occurred in the Ruby Hill Project area since the late 1800s; present mining and exploration activities, including the current exploration in the Jewell Canyon area; and the possible future East Archimedes Oxide Project. Livestock grazing, agricultural activities, and residential growth of the town of Eureka also have cumulatively affected area wildlife and habitat availability.

The cumulative impact analysis focused on the regional resources and how they may be susceptible to the cumulative actions identified for this project. The analysis assumed that: 1) human use of the cumulative effects area would continue to increase with or without implementation of the Proposed Action, 2) wildlife habitats are currently at their respective carrying capacities, and 3) the overall region has been previously affected by the historic and current mining activities. No impacts to perennial flow or aquatic resources were identified within the cumulative effects area, since no adverse effects to water resources would result from implementation of the Proposed Action. In addition, wildlife species associated with the higher elevations in the cumulative effects area were not addressed for the cumulative impact analysis. Since these species would not be impacted by the Proposed Action, no cumulative effects would be applicable.

Cumulative effects to wildlife resources would be directly related to total habitat loss, fragmentation, and animal displacement that have primarily resulted from historic mining activities in the Eureka area. Combined with these past effects, these resource issues also would be affected by the present and planned mining exploration activities, including the Jewell Canyon Mineral Exploration project, Norse Windfall Mine, Windfall Venture Mine, Lookout Mountain Mine, other ongoing mineral exploration, and the possible future East Archimedes Oxide Project. Wildlife most susceptible to these cumulative effects would be nesting raptors in the cumulative effects area, since encroaching human activities along the foothills of the Diamond Mountains have resulted in bird displacement and habitat fragmentation in areas that may be at their relative carrying capacity for these resident species. Many of the local wildlife populations (e.g., mule deer) that occur in the cumulative effects area would continue to occupy their respective ranges and breed successfully, although population numbers may decrease relative to the amount of cumulative habitat loss and disturbance from the incremental development.

As discussed in Section 3.9.2.1, Proposed Action, the proximity of the Proposed Action to the town of Eureka, historic mining areas, and ongoing ranching and farming affects wildlife habitat value and availability in the project vicinity. The incremental loss of habitat from the historic mining operations has resulted in increasing habitat fragmentation and displacement, forcing animals into smaller patches and limited distributions. Historic mining disturbance within the cumulative effects area is estimated to approach 2,165 total acres. The Proposed Action would add 696 acres to this disturbance, in addition to the 1,656 acres of past disturbance from agricultural development, 577 acres from Eureka Town and County development, and 677 acres from present mining operations, including the Jewell Canyon exploration activities. The possible future East Archimedes Oxide Project would disturb an additional 300 acres, and other future mineral exploration activities would be expected to remove a total of 50 acres. With the exploration correction factor, it is estimated that a total of 100 acres would be disturbed by the past, present, and reasonably foreseeable future interrelated projects (see Table 2-9).

A portion of the present and reasonably foreseeable actions would be eventually reclaimed. Subsequent reclamation would restore the habitats to a certain extent. The reclaimed areas would still be capable of supporting wildlife use, but species' composition and densities would change.

Overall cumulative impacts from the interrelated projects would parallel those discussed for the Proposed Action. The increased number of roads from mine exploration, particularly those for the Jewell Canyon Project, would improve access into more remote areas. The work forces associated with mining construction and operation would increase traffic levels in the region, in addition to increasing the employees' exposure to the area. This exposure would typically result in additional human use of the region, increasing pressure on resident wildlife populations. Certain resources are more susceptible to impacts than others, such as riparian zones, seeps and springs, seasonal ranges, movement corridors, and active breeding sites (e.g., leks, raptor nests, brooding habitat). As stated for the Proposed Action, impacts to high-profile species are proportional to the increase in human presence, land use and recreational demands, and other regional development. The location of these natural resources, relative to the duration of the human disturbance, is pertinent to the degree or level of anticipated cumulative impacts. Effects from the Proposed Action and interrelated projects would add to overall habitat fragmentation, animal displacement, and avian nesting within the cumulative effects area. However, significant impacts to wildlife resources would be limited to the effects to nesting raptors, specifically ferruginous hawks, which are discussed further in Section 3.9.3, Cumulative Impacts.

Potential future impacts from the implementation of the East Archimedes Oxide Project could expand into dewatering effects to area seeps and springs. However, these possible impacts would be examined in future environmental analyses. No cumulative effects would be anticipated from the future Tonkin Springs Mine and Atlas Mine, due to the location of these projects relative to the Proposed Action.

The long-term loss of mule deer year-long range from the Proposed Action would be compounded by the cumulative loss of habitat from historic mining activities, livestock grazing and agricultural development, and both current and future exploration activities, including the ongoing Jewell Canyon mineral exploration and the planned East Archimedes Oxide Project. It is estimated that approximately 3,377 acres of year-long habitat and 511 acres of low-density year-long habitat would be cumulatively affected by the Proposed Action and other interrelated projects. This estimated acreage loss excludes the residential and commercial development associated with the town of Eureka and the private agricultural development. Impacts to mule deer focuses on the incremental disturbance to native communities from past, present, and future mining activities; although, all of these activities would cumulatively affect the resident population.

Although habitat loss would result in decreased forage and cover availability for mule deer and other game species, the past, present, and future mining activities, including exploration, may be considered a greater level of impact to the local population. Mining exploration activities in the cumulative effects area would predominantly result in increased habitat fragmentation, edge, and human access. As discussed for the Proposed Action, increased access would in turn increase the relative hunting pressure on mule deer. Also, additional hunting pressure would likely occur in the cumulative effects area for upland game birds, such as sage grouse, chukar, and mourning dove. However, no significant impacts to species' breeding activities or habitat would be anticipated. Although both blue grouse and chukar occur in the cumulative effects area, no cumulative impacts are discussed for these species, since no impacts to these two game species would occur from implementation of the Proposed Action.

Biodiversity

Land management agencies have begun to emphasize potential effects to the biological diversity or "biodiversity" of ecosystems and landscapes. Cumulative analyses generally provide a broader base to conduct these analyses, focusing on the condition of the plant and animal communities' genetic, compositional, structural, and functional diversity. Biodiversity is a difficult concept to incorporate into management decisions, but it focuses on native species or communities deemed rare or underrepresented within an ecological landscape. Managing for maximum species' diversity may actually decrease the natural biodiversity. For example, increasing the "edge" in an area 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. 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. If effects on biodiversity are to be adequately assessed, the analysis of impacts to the biological system must be conducted on an ecosystem or regional scale, taking into account cumulative effects.

For the Ruby Hill Project cumulative effects area, it has been assumed that species that typically depend on relatively undisturbed or under-represented habitats would have been previously displaced by past and present activities occurring within the region. The resulting or current species occupying these previously disturbed areas possibly exhibit higher species richness or diversity, but they likely maintain a lower biodiversity. Therefore, the analysis infers that the amount of past and present activities and associated habitat disturbance in the cumulative effects area, including the surrounding community of Eureka, has resulted in decreased structural, compositional, and functional diversity for terrestrial wildlife species. It is unknown what the consequences to the genetic diversity of the regional ecosystem may be from the past and present activities. The implementation of the Proposed Action would incrementally add to this loss of diversity.

3.9.4 Mitigation and Monitoring

Issue: Disturbance of breeding raptors within 0.5 mile of the proposed project development areas.

Measure 1: In the event that project initiation would occur during the nesting season for raptors (March 15 through July 15), a raptor survey would be conducted prior to disturbance to determine if any breeding raptors or active nest sites occurred within 0.5 mile of the proposed disturbance areas. If occupied territories or active nest sites were located, the BLM and Nevada Division of Wildlife would be contacted. Appropriate mitigation measures would be developed ***with the agencies***, which could include nest avoidance, establishing buffer areas during nesting, moving the nest site, or erecting new nest platforms. ***Any subsequent mitigation measures would be conducted in accordance with the guidelines established by the Migratory Bird Treaty Act.***

Effectiveness: Raptor surveys would identify any breeding activity that could be disturbed by mining activities. Additional protection measures, if needed, would minimize the loss of annual productivity for the breeding birds.

Application: This measure would apply to the Proposed Action and all project alternatives, except for the No Action Alternative.

Issue: Loss of migratory birds, nests, or young due to project implementation.

Measure 2: Removal of ***all native habitat on*** undisturbed lands in the Proposed Action area would be prohibited between April 15 through July 15 to protect nesting birds, particularly neotropical migrants attempting to nest in the project area. ***Should removal of native vegetation need to occur during this period, Homestake would coordinate with the BLM and Nevada Division of Wildlife to implement*** a mitigation option to this constructional constraint period, which would include breeding bird surveys. Breeding bird surveys could be conducted within the proposed disturbance areas during the breeding season and prior to site disturbance to document any occupied territories or active nest sites that would be affected by project implementation. Homestake would then coordinate with the BLM and Nevada Division of Wildlife to develop appropriate mitigation measures in accordance with the Migratory Bird Treaty Act, which would depend on the species potentially affected, nest location, topography, and season.

Effectiveness: Constructional constraint periods for removal of ***undisturbed native*** vegetation would minimize the direct loss of resident and migratory birds. Breeding bird surveys would identify any sensitive areas that should be avoided during site development during the breeding season.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

3.9.5 Residual Adverse Impacts

Residual effects to wildlife resources from the Proposed Action would include the short-term loss of 608 acres and long-term loss of 88 acres of native habitat. Other residual impacts would include the displacement of mule deer, nesting raptors (e.g., red-tailed hawk, ferruginous hawk), and other wildlife (e.g., pygmy rabbit, passerine birds, bat species). Increased human presence would continue to affect legal and illegal hunting levels, animal harassment, and off-road vehicle use. The potential for an accidental spill or release of hazardous materials (e.g., sodium cyanide, diesel fuel) into a sensitive resource along the transportation corridor would remain for the life of the project.

3.10 Special Status Species

3.10.1 Affected Environment

Federal and state agencies have identified several sensitive wildlife species that may occur in the project area and cumulative effects area. In addition, baseline surveys have been conducted in the project area and project vicinity for special status species, including Federally listed, Federal candidate, and BLM sensitive species(WESTEC 1995). Table 3-37 lists the species that were analyzed for this project.

In accordance with the Endangered Species Act of 1973, as amended, the lead agency (BLM) in coordination with the U.S. Fish and Wildlife Service must ensure that any action that they authorize, fund, or carry out would not adversely affect a Federally listed threatened or endangered species. The BLM has been under informal consultation with the U.S. Fish and Wildlife Service, as outlined by Section 7 of the Act. It also is the BLM's current policy that Federal candidate species be managed to prevent a future Federal listing as threatened or endangered. The U.S. Fish and Wildlife Service has revised the Federal candidate species list, omitting the category 2 listing and developing a "candidate" list only. This Notice of Review was published in the Federal Register on February 28, 1996. The Nevada BLM subsequently developed interim guidelines on March 20, 1996, for the protection and conservation of these category 1 and category 2 species that have historically been protected as BLM Special Status Species. Therefore, all former category 1 and category 2 species in Nevada that are not included in the U.S. Fish and Wildlife Service's new candidate listing are currently incorporated into the Nevada BLM Sensitive Species List. The following discussion summarizes known data for the sensitive wildlife species initially identified for the Proposed Action by the applicable agencies.

<u>Birds</u>

The American peregrine falcon is currently listed as endangered, but has been proposed to be Federally delisted (Craig 1995). The arctic peregrine falcon has been delisted; however, migrants are still protected under the similarity of appearance provision of the Endangered Species Act and the Migratory Bird Treaty Act. Nesting peregrine falcons prefer cliffs in proximity to water and typically forage in riparian zones where avian prey species (e.g., passerines, shorebirds) are abundant (U.S. Fish and Wildlife Service 1984). Studies in Colorado have reported that peregrines may travel up to 31 miles from occupied eyries to obtain prey (Craig 1994). No peregrine eyries are known to occur in the vicinity of the project. The Diamond Mountains have been identified as potential release sites for young peregrine falcons; however, this release program has been temporarily halted (Podborny 1996), due to a reduction in Federal funding. Therefore, peregrine use of the project and cumulative effects areas would be limited to migrating birds.

The U.S. Fish and Wildlife Service recently downlisted the bald eagle to Federally threatened from endangered status (U.S. Fish and Wildlife Service 1995). No bald eagle nesting has been recorded in Nevada within the last century; however, migrating eagles do move through the state, and wintering birds would occur within the appropriate winter habitats from December through March. These habitats for wintering birds generally include open water and upland habitats for foraging. In addition to open water, other important habitat components for wintering eagles include suitable trees for diurnal perching and night roosting (Terres 1991; U.S. Fish and Wildlife Service 1986). The closest known, historic bald eagle roost site occurs over 15 miles northeast of the project area along the western edge of Newark Valley. Eagle presence in the project area would be infrequent, and typically limited to foraging, which has been documented in Diamond Valley. Although migrants may use the project area, foraging activities in Diamond Valley and the surrounding foothill region would primarily be by wintering birds. Bald eagle use would be considered moderate along portions of the transportation corridor to the mine area. Wintering birds could roost and forage along stream reaches crossed by Highway 278, particularly along the Humboldt River.

The ferruginous hawk is a common breeder in this area of Nevada. This species typically nests on trees, promontory points, rocky outcrops, cut

Table 3-37

Special Status Wildlife Species Identified for the Ruby Hill Project

Common Name	Scientific Name	Federal Status[1]	Occurrence in the Project Area and Vicinity[2]
BIRDS			
American peregrine falcon	*Falco peregrinus anatum*	E[3]	M
Bald eagle	*Haliaeetus leucocephalus*	T	W, M
Ferruginous hawk	*Buteo regalis*	BLM	R
Northern goshawk	*Accipiter gentilis*	BLM	R - V
Burrowing owl	*Athene cunicularia*	BLM	R - V
Loggerhead shrike	*Lanius ludovicianus*	BLM	R
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	BLM	N/A
MAMMALS			
Pygmy rabbit	*Brachylagus idahoensis*	BLM	R
Small-footed myotis	*Myotis ciliolabrum*	BLM	W
Long-eared myotis	*Myotis evotis*	BLM	U
Fringed myotis	*Myotis thysanodes*	BLM	U
Long-legged myotis	*Myotis volans*	BLM	U
Yuma myotis	*Myotis yumanensis*	BLM	U
Pale Townsend's big-eared bat[5]	*Corynorhinus townsendii pallescens*	BLM	R[4]
Pacific Townsend's big-eared bat	*Corynorhinus townsendii townsendii*	BLM	R[4]
Spotted bat	*Euderma maculatum*	BLM	U
AMPHIBIANS			
Spotted frog	*Rana pretiosa*	C	U

Table 3-37 (Continued)

Common Name	Scientific Name	Federal Status[1]	Occurrence in the Project Area and Vicinity[2]
PLANTS			
Nevada willowherb	*Epilobium nevadense*	BLM	U
Scorpion or freckled milkvetch	*Astragalus ientiginosus var. scorpionis*	BLM	U

[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.

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

BLM = BLM Sensitive Species: Previously Federal candidate-category 2 species. Currently protected by the BLM in Nevada under the agency's state guidelines, dated March 20, 1996.

[2]R = Resident: This species has been documented in the project area; animals may be found residing in the area year round.

R-V = Resident in Vicinity: This species has been documented in the project vicinity, which includes habitats surrounding the project area.

W = Winters: This species winters in the vicinity of the project area.

M = Migrates: This species is known to migrate through the project area.

U = Unknown: It is currently unknown whether this species occurs in the study area or vicinity; however, appropriate habitat is present.

N/A = Not Applicable: This species does not occur in this area of Nevada.

[3]Currently proposed to be delisted; final decision is pending.

[4]*Plecotus townsendii* was confirmed hibernating in the project area. It is unknown at this time which subspecies was observed. As stated below, both subspecies could occur in this area of Nevada.

[5]Taxa known to occur in Nevada, but ommitted in error from the historical range listed in the U.S. Fish and Wildlife Service's 1994 Animal Notice of Review.

banks, or on the ground (Terres 1991). Preferred breeding habitat is scattered juniper trees at the interface between piñon-juniper and desert shrub communities that overlook broad valleys (Herron et al. 1985). This preferred habitat is definitively represented along the southern portion of Diamond Valley in the project area. The ferruginous hawk's primary prey species in this area of Nevada include ground squirrels, particularly the Townsend's ground squirrel, and black-tailed jackrabbits. Nestlings generally fledge by early to mid-July, as the ground squirrels enter aestivation, and breeding birds would typically move out of the area by August.

Since ground squirrels, rabbits, and pocket gophers are prevalent throughout Diamond Valley (see Section 3.9.1 of Wildlife and Fisheries Resources) and the transitional zone between the piñon-juniper and sagebrush habitats provide good to excellent nesting habitat, ferruginous hawk nesting is extensive throughout southern Diamond Valley into the foothill region. A total of 16 historic nests or ferruginous hawk territories have been documented within 2 miles of the project area (Lamp 1996; WESTEC 1996a), with all but 4 of these nests located within the cumulative effects area. These nests occur in the transitional zone between the piñon-juniper uplands and the valley shrublands.

The 1995 field surveys documented both active and inactive ferruginous hawk nest sites in and near the project area. Five active and five inactive nests were recorded during the 1995 breeding season. Four of the five active nests were located in proximity to inactive nests, suggesting alternative nesting sites. Alternative nest sites are common for ferruginous hawks (Herron et al. 1985), with birds often maintaining one or more alternative nests. Therefore, it is assumed a total of five ferruginous hawk territories occur in and adjacent to the project area, if the population is at carrying capacity.

Three of these five territories contained active nests in the project area. One active nest was located within 500 feet of the proposed access road into the mine. Two alternative nest sites were recorded within 0.5 mile of this active nest. These alternative nest sites are located approximately 200 feet from the access road and 500 feet from the proposed powerline right-of-way. A second active ferruginous hawk nest occurred about 400 feet from the access road and 300 feet from the water line. One alternative nest site was associated with this active nest, which occurred 200 feet from the pipeline ROW. The third active ferruginous hawk nest was recorded along the edge of the proposed location for the western waste dump. No inactive nest was associated with this location. As discussed for general raptor nests in Section 3.9.1 of Wildlife and Fisheries Resources, the exact locations of these nests would not be disclosed to protect the breeding birds associated with these sites.

The northern goshawk is an uncommon forest species that is a year-long resident, breeding in the mountains and wintering in the lower foothills and valleys (Herron et al. 1985). In Nevada, this species is generally associated with aspen riparian habitat. One historic goshawk nest or breeding territory has been documented near the project vicinity. This nest/territory is located approximately 2.5 miles east of the project area (Lamp 1996). Surprisingly, this area was located at a lower elevation and more open habitat than typically occupied by nesting goshawks. The current status of this historic site is unknown.

The burrowing owl is an uncommon summer migrant that breeds in portions of Nevada. It is dependent on abandoned mammal burrows for nesting, typically foraging in open grasslands and sagebrush habitats. This owl feeds on insects and small rodents, with some reptiles, amphibians, and small birds taken (Terres 1991). The burrowing owl is known to nest in the project vicinity. One active nest has been documented about 6 miles northeast of the project area (Lamp 1996), and additional owl observations have been reported northwest and north of the project. Suitable habitat (i.e., sagebrush/grassland communities and agricultural lands) located within the project area was surveyed during the 1995 field studies. No burrowing owls or associated sign were observed during these surveys. A number of mammal burrows were located within the suitable habitat, but no burrows exhibited sign of recent owl occupation.

The loggerhead shrike is typically found in open grasslands and shrublands, with some occurring in piñon-juniper woodlands. Nesting birds often use isolated trees or large shrubs and also may use vegetative stringers of greasewood for breeding and nesting (Andrews and Righter 1992). The shrub communities within the project area are representative of the shrub habitat commonly used by nesting shrikes. Several loggerhead shrikes were recorded in the shrub habitat located west of the project area.

The Columbian sharp-tailed grouse is not known to occur in Eureka County. It is currently believed to be extirpated from this area of Nevada (Podborny 1996).

Mammals

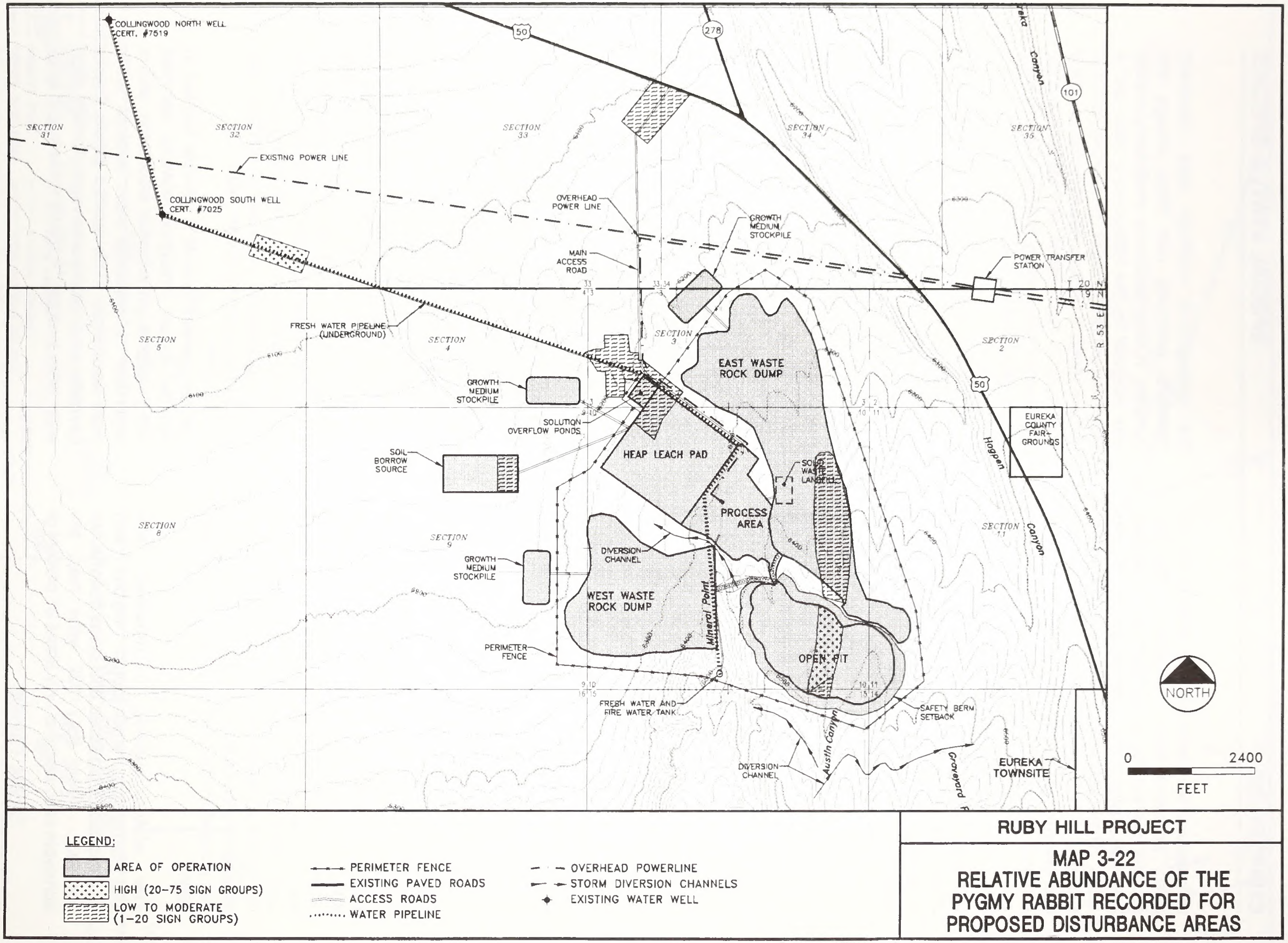
The pygmy rabbit is distributed throughout the northern Great Basin. Habitat requirements for these small, burrowing rabbits include dense stands of big sagebrush or bitterbrush for both food and cover (Green and Flinders 1980) and deep, friable soils for their burrows (Wilde 1978). The species has an irregular distribution, limited to suitable stands of sagebrush and rabbitbrush (Dobler and Dixon 1990), often along riparian areas or alluvial fans. Sagebrush is important forage for this rabbit and is consumed year-round. In Nevada, the pygmy rabbit also is considered a game species.

The 1995 field studies examined the potential presence, relative abundance, and overall distribution of the pygmy rabbit in the project area (WESTEC 1994, 1995a). The survey areas focused on habitats with a substantial sagebrush component. Pygmy rabbit sign was recorded along transects within the appropriate habitat types, providing estimates of relative abundance. Sign included pellet groups, burrows, and dusting areas. The relative abundance of pygmy rabbits was categorized into none, low to moderate, and high for the project area. Map 3-22 presents the results from these surveys, indicating 1 to 20 sign groups for low to moderate abundance and greater than 20 sign groups for high abundance. Survey transects were only conducted within portions of the proposed disturbance areas. The proposed location for the West Waste Rock Dump has not been examined for pygmy rabbit sign. Therefore, the abundance and distribution of pygmy rabbits shown on Map 3-22 are only representative of the habitats that would be disturbed or removed by the Proposed Action with the exception of this waste rock facility.

The 1995 field surveys found that pygmy rabbits were associated with vegetation communities that contained both Basin big sagebrush and Wyoming big sagebrush. Pygmy rabbit sign predominantly occurred in shallow, ephemeral drainages with tall, dense stands of sagebrush. The high relative abundance of rabbits was found primarily in areas with soft, friable soils, and low to moderate abundance was found more in the harder, rocky substrates. However, the height and density of the sagebrush appeared to be the same for both areas containing pygmy rabbit sign.

Federal and state agencies identified the following sensitive bat species as potentially occupying the appropriate habitat types in and near the project area. Rock outcrops, caves, mine shafts and adits, cliffs, trees, and buildings could provide day roost sites; caves and mines may be used for hibernacula or maternity roosts. As discussed in Section 3.9, Wildlife and Fisheries Resources, two bat surveys have been conducted to determine the potential presence of the following bat species, emphasizing the Townsend's big-eared bat (*Plecotus townsendii*) and *Myotis* species. Summer surveys were conducted from August 31 through September 4, 1995; winter surveys for bat hibernacula were conducted January 6 and 7, 1996 (Brown 1996).

Bat surveys focused on existing mine components (e.g., shafts, adits) in and near the proposed disturbance areas. A 1922 mine map indicated that the Holly, Williamsburg, Bullwhacker, and Silver West mines are connected and would, therefore, be considered one complex for bat use (Brown 1996). The mine workings examined included four openings associated with the Bullwhacker complex, three entrances at the Silver West mine, two Williamsburg shafts, five Holly shafts and declines, and the Holly extension shaft. Accessible mines were entered during the day to record any sign of bat occupancy. However, many of these mines were so complex or dangerous that they were not



COLLINGWOOD NORTH WELL CERT. #7519
COLLINGWOOD SOUTH WELL CERT. #7025
EXISTING POWER LINE
FRESH WATER PIPELINE (UNDERGROUND)
OVERHEAD POWER LINE
MAIN ACCESS ROAD
GROWTH MEDIUM STOCKPILE
POWER TRANSFER STATION
EAST WASTE ROCK DUMP
HEAP LEACH PAD
PROCESS AREA
SOLID WASTE LANDFILL
SOLUTION OVERFLOW PONDS
SOIL BORROW SOURCE
DIVERSION CHANNEL
WEST WASTE ROCK DUMP
Mineral Point
OPEN PIT
PERIMETER FENCE
FRESH WATER AND FIRE WATER TANK
SAFETY BERM SETBACK
Austin Canyon
Graveyard
EUREKA TOWNSITE
EUREKA COUNTY FAIR-GROUNDS
Hogpen Canyon
Eureka Canyon
SECTION 31
SECTION 32
SECTION 33
SECTION 34
SECTION 35
SECTION 5
SECTION 4
SECTION 3
SECTION 2
SECTION 8
SECTION 9
SECTION 11
T 20 N
T 19 N
R 53 E
50
278
101
NORTH
0
2400
FEET
LEGEND:
AREA OF OPERATION
HIGH (20–75 SIGN GROUPS)
LOW TO MODERATE (1–20 SIGN GROUPS)
PERIMETER FENCE
EXISTING PAVED ROADS
ACCESS ROADS
WATER PIPELINE
OVERHEAD POWERLINE
STORM DIVERSION CHANNELS
EXISTING WATER WELL
RUBY HILL PROJECT
MAP 3-22
RELATIVE ABUNDANCE OF THE PYGMY RABBIT RECORDED FOR PROPOSED DISTURBANCE AREAS

fully accessible. Workings not entered due to safety concerns were monitored during the summer surveys for a minimum of 90 minutes after dark, using night vision equipment (Brown 1996). These survey locations are presented on Map 3-23. All of the mine openings monitored for bat emergence during the summer surveys exhibited bat activity.

Table 3-38 provides the results of the summer and winter bat surveys in the project area. However, since limited mine access only allowed surveying a small portion (less than 20 percent) of potentially available bat habitat in the mine complexes examined, additional bats and possibly other species would occupy the shafts and adits located in the project area. The survey results in Table 3-38 did determine the presence of two BLM sensitive bat species and documented both nursery colonies and hibernacula (Brown 1996).

During the summer surveys, the Townsend's big-eared bat was recorded exiting all but the Holly complex, and a *Myotis* species (likely the small-footed myotis) was observed exiting all but the Williamsburg shaft (Brown 1996). A maternity colony of the small-footed myotis was documented in the Bullwhacker complex, and one potential colony was located in the Holly Mine (due to the number of bats exiting the underground openings). Because the Bullwhacker, Williamsburg, Silver West, and Holly Mine complexes are interconnected, it is likely that breeding bats use these extensive mining components during the summer season (Brown 1996). Only a few Townsend's big-eared bats were observed exiting the Bullwhacker complex, Silver West mine, Williamsburg shaft, and Holly extension. These bats were likely males roosting alone or in small colonies during the summer, although no bats were captured to verify this assumption (Brown 1996). In addition, the workings around the Cyanide Shaft area are apparently used by the Townsend's big-eared bat, as indicated by the 1996 summer survey (Brown 1996).

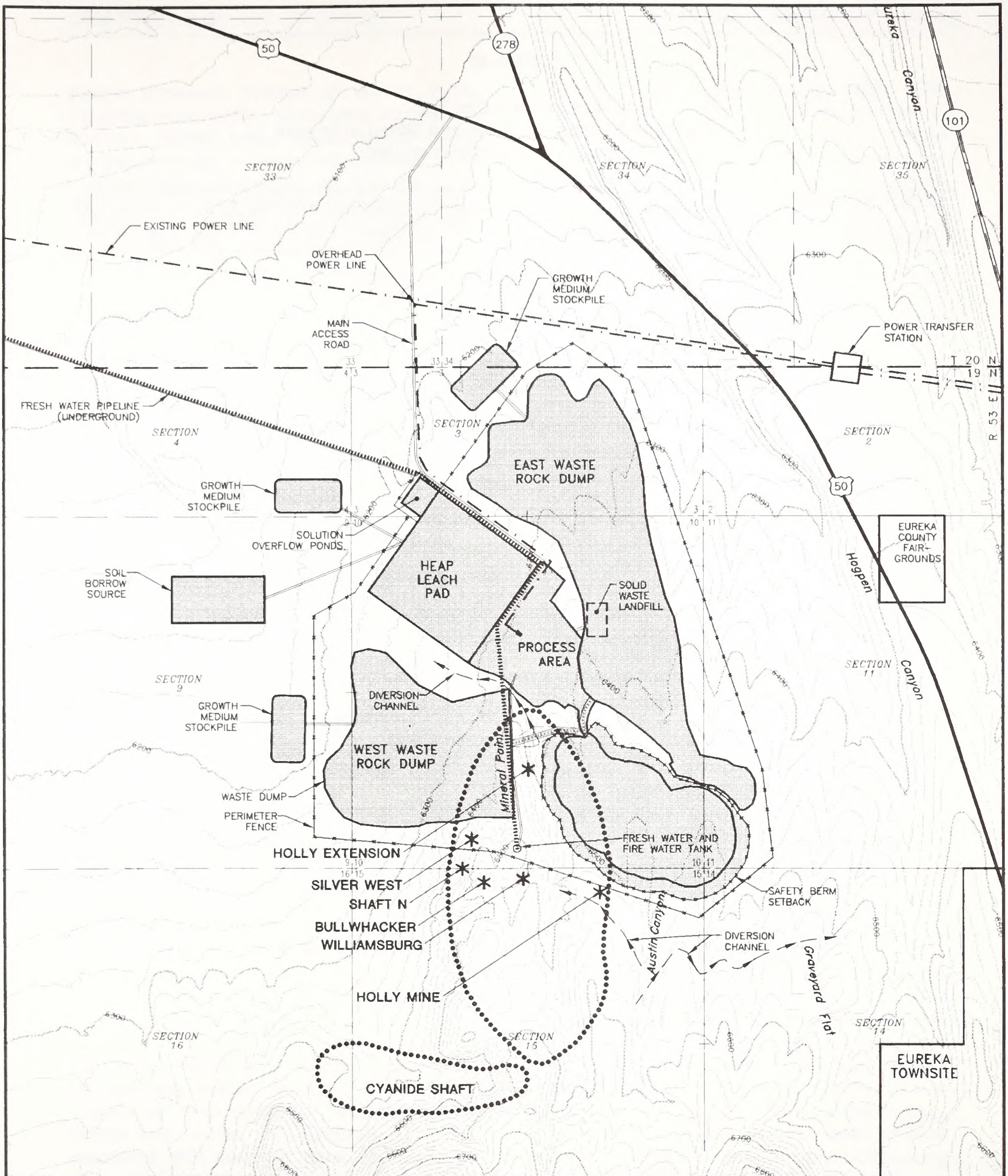
The winter surveys documented over 100 hibernating small-footed myotis and 10 Townsend's big-eared bats in the Bullwhacker complex. From the 1922 mine map, the surveyors estimated that only about 20 percent of the underground workings were examined; therefore, additional bats likely occupy this complex. A hibernaculum for small-footed myotis was recorded for the Williamsburg mine, and a hibernaculum likely occurs in the Holly complex (Brown 1996). It became apparent that air flow is important, if not critical to hibernating bats, between the Williamsburg, Bullwhacker, and Holly complexes (Bradley 1996; Brown 1996).

No other bat species were positively identified from the field surveys, although they may seasonally use these underground workings. No bat sign was observed in the Helen shaft, and no bats exited the T. L. workings, when monitored. During these seasonal surveys, a majority of the underground workings associated with these mines were not accessible. It is currently assumed that a number of breeding and hibernating bats may occupy these mine complexes during the summer and winter seasons (Brown 1996).

The following background information on sensitive bats was summarized, using a variety of sources, including the *Bats of Nevada* (no date) and *General Life History of Nevada Bats* (no date). Scientific names are provided in Table 3-37.

The small-footed myotis is a summer resident in Great Basin desert, shrub-steppe, and woodlands, with occasional reports in montane forests. It inhabits rocky areas and forages for insects in clearings, near rocks, and over forests. It is known to hibernate in caves and mines, and summer roosts have been recorded in buildings and mines, under tree bark, and beneath rocks. Few data exist on its reproductive biology (Arizona Game and Fish Department 1993; Colorado Division of Wildlife 1984; Fitzgerald et al. 1994). It is thought that maternity colonies contain 20 or fewer females with young, although the numbers in the Bullwhacker complex may exceed this estimate (Brown 1996).

The long-eared myotis is a summer resident in montane forests throughout Nevada, occupies mid-elevational piñon-juniper woodlands, and is dependent on perennial water sources within these woodlands. This species gleans insects (primarily small moths) over vegetation and open water while foraging. It roosts solitary or in small



LEGEND:

- GENERAL SURVEY AREA
- SURVEY SITES
- AREA OF OPERATION
- PERIMETER FENCE
- EXISTING PAVED ROADS
- ACCESS ROADS
- HAUL ROADS
- WATER PIPELINE
- OVERHEAD POWERLINE
- STORM DIVERSION CHANNELS

NORTH

0 2000

FEET

RUBY HILL PROJECT

MAP 3-23
BAT
SURVEY AREAS

Table 3-38

Sensitive Bat Species
Survey Results for Existing Mines and Mine Complexes
Summer of 1995 and Winter of 1996[1]

Name	Number of Openings Examined	Results of Summer Surveys	Results of Winter Surveys
Bullwhacker complex	4	Townsend's big-eared bats out flights; Small-footed myotis maternity colony[2]	Hibernaculum for small-footed myotis and Townsend's big-eared bat[3]
Silver West	3	Townsend's big-eared bat out flights; *Myotis* flights	No bat sign observed within accessible portions of mine
Williamsburg	2	Townsend's big-eared bat out flights	Hibernaculum for small-footed myotis
Holly complex	5	*Myotis* out flights	Hibernaculum for small-footed myotis
Holly extension	1	Townsend's big-eared bat out flights	Not accessible
Shaft N	1	Not surveyed	No bat sign observed within accessible portions of the mine
Cyanicle complex	3	Observed Townsend's big-eared bats	Not surveyed

[1]Summer surveys were conducted August 31 through September 4, 1995; winter surveys were conducted January 6 and 7, 1996. These survey results only provide data for accessible mine areas, comprising a small portion of available bat habitat.

[2]This maternity colony is associated with the extensive mine complex connecting the Silver West, Bullwhacker, Williamsburg, and Holly Mines.

[3]Due to the connected nature of the mine workings, it is likely that the small-footed myotis and Townsend's big-eared bat hibernate in other mine complexes.

Source: WESTEC 1995a; Brown 1996.

groups (Colorado Division of Wildlife 1984; Fitzgerald et al. 1994). Roost sites encompass buildings, hollow trees, caves, mines, rocky crevices, and other underground openings. Little is known about this species' use of hibernacula, but caves and mine adits and shafts support wintering bats, in addition to providing habitat for breeding populations. Lactating females were captured in a 1994 summer survey near Mt. Hamilton in the White Mountains, located east of the project area (Brown 1996; Manning and Jones 1989).

The fringed myotis is a summer resident in the Great Basin and has been reported in woodlands throughout the state. It occupies habitats ranging between desert scrub communities to higher elevation woodlands. In Nevada, piñon woodland is one of the most commonly used plant communities. This species gleans small insects (mainly moths) from foliage during foraging. Nursery colonies and hibernacula are often located in mines, caves, and buildings. Roosts may be in caves, rock crevices, mines, and buildings. Males typically roost singly (Colorado Division of Wildlife 1984). This species is susceptible to human disturbance, particularly during the breeding season (Arizona Game and Fish Department 1993). The fringed myotis also was captured in the White Mountains to the east during the 1994 surveys (Brown 1996).

The long-legged myotis is a summer resident from Great Basin woodlands to montane forests. This species gleans insects above woodlands, over ponds, and along riparian corridors (Colorado Division of Wildlife 1984). Individuals typically day roost singly or in small groups in buildings, rock crevices, and loose tree bark. Night roosts and hibernacula are often in caves and mines (Colorado Division of Wildlife 1984; Warner and Czaplewski 1984).

The Yuma myotis is a summer resident of southern and western Nevada. This species' typically occupies grasslands, woodlands, and riparian communities. It's distribution is closely associated with perennial water sources. The Yuma myotis forages on small insects, often over water (Findley et al. 1975; Hoffmeister 1986). Yuma myotis have been recently documented near Battle Mountain, establishing this bat species within the project region (Bradley 1996). This species is known to roost in large numbers in mines, caves, buildings, and under bridges (Hoffmeister 1986). The Yuma myotis does not tolerate disturbance of nursery colonies; disturbance of these sites during the breeding season can result in colony abandonment.

The Townsend's big-eared bat is a year-round resident in Nevada, preferring caves, mines, and buildings that maintain stable temperatures and air flow for nursery colonies, bachelor roosts, and hibernacula (Colorado Division of Wildlife 1984). The Townsend's big-eared bat occupies habitats ranging among desert, piñon-juniper, other coniferous forests, broadleaf or deciduous forests, shrublands, and grasslands. This species gleans insects from foliage while foraging and roosts both singly and in colonies (Colorado Division of Wildlife 1984). This bat is highly susceptible to disturbance during hibernation; mortalities may result from as few as one disturbance during this critical period (Fitzgerald et al. 1994; Brown 1996). Two subspecies are known to occur in Nevada, including the Pacific subspecies (*C. t. townsendii*) and the pale subspecies (*C. t. pallescens*). *C. t. pallescens* was incorrectly omitted from the historical range listed in the U.S. Fish and Wildlife Service's 1994 Animal Notice of Review and has, therefore, been reported as not occurring in Nevada. This error should be corrected in subsequent Federal Register Notices. Presently, there is a debate as to the validity of any subspecific variation in *Corynorhinus* in the western United States. Genetic studies are currently being conducted (Brown 1996).

The spotted bat is rare throughout the western United States. Although limited data are currently available on this species, the spotted bat is thought to occupy cold deserts and submontane zones, using hibernacula that maintain a constant temperature from September to May rather than migrate (Dalton et al. 1990). It is also 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).

Amphibians

One Federal candidate amphibian was identified for the Ruby Hill Project, the spotted frog. Since the spotted frog is a Federal candidate species, Federal listing is anticipated. This species typically occupies open perennial water, breeding in the surrounding ephemeral pools, and also is dependent on perennial springs for hibernation (Ports 1995). No habitat for this amphibian occurs within the project area and it is unlikely that it is present.

Plants

An occurrence of Nevada willowherb was identified in the Diamond Mountains of Eureka County, approximately 35 miles north of the project area. Nevada willowherb occurs on limestone soils, talus, cliffs, and rock outcrops, with slopes of varying steepness from 5 to 45 percent. Most recorded occurrences for the species are found at elevations ranging from 7,000 to 9,200 feet above mean sea level. However, one location for the species was recorded at 6,000 feet in the Clover Mountains in Lincoln County, Nevada. Plants associated with Nevada willowherb include piñon pine, ponderosa pine, and Clokey's wavy-leaf paintbrush. Several of these associated species have been identified at the lower elevations in the Ruby Hill project area at approximately 6,200 to 7,200 feet.

A population of freckled or scorpion milkvetch has been identified in the Monitor Range, about 30 miles southwest of the project area. This species is found primarily on limestone or limey clay soils from the upper edge of the sagebrush vegetation zone to near timberline, and has been recorded at elevations from 7,000 to 11,000 feet above mean sea level. Potential habitat for freckled milkvetch was delineated within the highest elevations of the Ruby Hill Project at approximately 6,800 to 7,250 feet above mean sea level. Known plant associates include mountain sagebrush, piñon pine, Utah juniper, and quaking aspen. Several of these species have been identified as occurring at 6,800 to 7,250 feet in the Ruby Hill area. The Nevada rare plant committee has recommended that the species be removed from the list of candidates for possible listing since it is widespread and not uncommon throughout Nevada (BLM 1996).

Habitat for both plant species was identified in Sections 3, 10, 11, 15, 14, 22, and 23, T19N, R53E of the project area. WESTEC conducted surveys in these areas for the two BLM sensitive plant species in August 1995 when both species would have been in flower and readily identifiable. The survey also was conducted during a year of above average precipitation, when conditions for plant germination and flowering would have been optimal. Neither of the two species was located during the survey.

Nevada state law (NRS 527.060 -.120) prohibits the destruction or removal of all cacti and yucca species "...without written permission from the legal owner or his duly authorized agent, specifying locality by legal land description and number of plants to be removed or possessed." The removal and shipment of these species for commercial purposes also is regulated under these statutes. The removal or destruction of cactus species found in the project area would be subject to written authorization from the BLM.

3.10.2 Environmental Consequences

Environmental impacts to special status species would be significant if the Proposed Action or its alternatives resulted in the following:

- Impacts to colonies of sensitive bat species in and near the Proposed Action, resulting in increased mortalities or the loss or abandonment of the communal roost site (e.g., hibernacula, maternity roosts, bachelor roosts).
- Impacts to nesting ferruginous hawks from disturbance during the breeding season, loss of occupied or active nest sites, or nest abandonment.
- Impacts to species Federally listed as threatened or endangered if the Proposed Action were to cause a "take" of the species, in accordance with the Endangered Species Act, including loss of designated critical habitat.

- Impacts to Federal candidate species (e.g., spotted frog) if the Proposed Action were to result in an adverse trend toward listing the species as Federally threatened or endangered.
- Impacts to BLM sensitive species, if the Proposed Action were to result in adverse impacts to individuals or populations, contributing to the need to classify the species as a candidate for Federal listing.

3.10.2.1 Proposed Action

The impact analysis for sensitive wildlife resources focuses on the species identified in Section 3.10.1, Affected Environment, addressing only the applicable project components for each species discussed. No adverse effects to aquatic species would occur from the Proposed Action, since no perennial sources occur in the project area, and the intermittent and ephemeral drainages do not support important amphibians that have been identified for this project. Direct and indirect impacts to terrestrial species associated specifically with these drainages are discussed below for the pygmy rabbit.

Birds

No impacts to the peregrine falcon would be anticipated from the Proposed Action. No active eyries occur near the project area, no riparian habitat that may support falcon prey would be impacted by the Proposed Action, and migrating birds would be infrequent through the project vicinity.

No impacts to wintering or migrating bald eagles would be expected from mine development. Birds may forage in Diamond Valley, and the surrounding foothills, but anticipated effects from mine development would not be expected to impact foraging individuals. Potential effects to wintering bald eagles from a hazardous materials spill along the transportation corridor would be limited to the riparian corridors that are located downstream of the Highway 278 crossings and that also support wintering eagles. The probability of a spill into one of these riparian drainages is discussed for general wildlife in Section 3.6.2.1, of Vegetation Resources, and is based on the spill scenario presented in Section 3.17.2 of Hazardous Materials and Waste. Although the probability of a spill is very low (particularly for a drainage known to support eagles), a large sodium hydroxide, sodium cyanide, or diesel fuel release into a perennial drainage used by wintering eagles could remove potential prey and prevent foraging eagles from using the area until final remediation. If this event were to occur, it would result in an insignificant, short-term loss foraging habitat for wintering bald eagles along the specific channel reach impacted by the release. No additional impacts to wintering eagles would be expected, since contaminated animals (e.g., fish, waterfowl) would be removed from the area by the spill response team, and the presence of the emergency personnel would prevent wintering birds from using the area for foraging activities until the area had been remediated. Possible interruption of eagle foraging would depend on the amount of the release, period of the year, buffering capacity of the water, groundwater and surface water recharges, remediation time, and the ultimate effects to aquatic and terrestrial organisms.

Significant adverse effects to the ferruginous hawk would occur from implementation of the Proposed Action. The 1995 field surveys documented three active and three inactive nests that occur less than 0.25 mile of the proposed disturbance areas. Based on survey observations and nest proximity, it is assumed that these six nest sites comprise three breeding territories. Of these six ferruginous hawk nests, none would be directly removed by the Proposed Action. However, all six could be indirectly affected, if occupied by breeding birds.

Ferruginous hawks are highly susceptible to disturbance, particularly human-oriented activities, during the courtship and incubation periods. Nest abandonment is common during these periods, if breeding birds are disturbed. Due to the proximity of these nest sites to the Proposed Action and its ancillary facilities, it has been determined that the construction and operational activities associated with the Ruby Hill Project would result in ferruginous hawk nest and territory abandonment. Since hawks frequently use alternative nest sites, it is assumed that the three ferruginous hawk territories containing the six nest sites would be lost. These losses would be considered a significant impact to this species.

The additional two active and two inactive nest sites located approximately 1 and 1.5 miles to the west of the proposed disturbance area also could be indirectly affected by the Proposed Action. Although these four nest sites occur outside of the zone likely impacted by mine noise and traffic, these nests could be impacted by human harassment, due to increased access and human presence in the vicinity of the nests, as discussed for other high-profile species in Section 3.9, Wildlife and Fisheries Resources. In addition, the Proposed Action would directly impact the availability of foraging habitat for breeding birds that may occupy these territories located outside of the mine area. However, this loss of potential foraging habitat would not be considered significant, due to the availability of adjacent lands.

Upon final reclamation after mine closure, the native habitats would be restored. Piñon-juniper could require up to 50 years to re-establish in the area. Ferruginous hawks would likely reinhabit the project area upon establishment of mature piñon-juniper trees along the transitional foothill zone.

No impacts to the northern goshawk would be anticipated from the Proposed Action. Although this species historically occurred within 3 miles of the proposed disturbance areas and individuals may infrequently fly over the project area, the vegetation in the project area is neither appropriate for goshawk nesting nor is it optimal for species' foraging.

Burrowing owls have been documented nesting approximately 6 miles northeast of the project area (see Section 3.10.1, Affected Environment). Although no occupied burrows or owl sign were recorded during the 1995 field surveys, the shrubland vegetation that would be disturbed by the Proposed Action is suitable for supporting breeding and foraging birds. Based on the 1995 surveys, no direct impacts to this species have been identified. However, potential indirect impacts could occur from the removal of approximately 283 acres of the sagebrush/grassland and winterfat/grassland communities from proposed mine development. This habitat loss would be for the life of the mine (short-term), but it would not be considered significant to the local burrowing owl population, due to the relatively abundant grassland and shrubland habitats available to the north in Diamond Valley. Burrowing owls could inhabit the project area following mine reclamation (long-term).

Anticipated impacts to the loggerhead shrike would include both loss of nesting habitat and the potential loss of nests, eggs, or young. Individuals were documented to the west of the project area during the 1995 field surveys, and nesting shrikes could occur within the proposed disturbance areas. The loss of active nest sites would significantly impact the breeding shrikes in the disturbance area, but would not significantly affect the local populations, as discussed for general passerines in Section 3.9.2 of Wildlife and Fisheries Resources. Therefore, these effects would not contribute toward listing the species as Federally threatened or endangered. Loggerhead shrikes would likely reinhabit the project area in the long-term, as native shrubs begin to reinvade the reclaimed areas.

No impacts to the Columbian sharp-tailed grouse would result from the Proposed Action. This species does not occur in or near the project area.

__Mammals__

The pygmy rabbit would be adversely affected by the Proposed Action. As discussed in Section 3.10.1, Affected Environment, this species is known to occur in the proposed disturbance areas. Based on the 1995 survey results, a minimum of approximately 11 acres of habitat exhibiting high relative abundance of pygmy rabbits and approximately 50 total acres of habitat of low to moderate relative abundance would be removed by the Proposed Action. Potential pygmy rabbit habitat removed by the proposed western waste rock dump has not been examined to determine relative habitat quality. Table 3-39 identifies the acreage estimates per mine component that would be disturbed as they apply to the relative abundance calculations determined by the 1995 field surveys. Individual rabbits

Table 3-39

Acres of Occupied Pygmy Rabbit Habitat That Would be Affected by the Proposed Action[1]

Mine Component	High Relative Abundance (acres)	Low to Moderate Relative Abundance (acres)
Access Road (50-foot right-of-way)	0	2.4
Water Pipeline and Access Road (20-foot right-of-way)	0.5	0.3
Soil Borrow Source	0	4.8
Heap Leach Pad	0	12.0
East Waste Rock Dump	0	21.3
Mine Pit	10.4	1.5
Total	10.9	42.3

[1]The proposed area for the western waste rock dump has not been surveyed to determine relative habit quality for the pygmy rabbit.

would likely be lost during project construction. This habitat loss and effects to individual rabbits would be considered minor to moderate. The pygmy rabbit is classified as a game species in Nevada. The loss of individual rabbits from the development of the Proposed Action would not significantly impact the local population. The loss of habitats exhibiting low-density sign also would be considered minor. However, the loss of 14 acres of Basin big sagebrush/Great Basin wildrye located along the Austin Canyon intermittent drainage would be removed by proposed mine pit development and considered a moderate impact. This habitat type exhibited high relative abundance of this rabbit species, and optimal habitat for the pygmy rabbit is limited in the project vicinity. In summary, these effects would not contribute to the species' decline or its listing as Federally threatened or endangered. Pygmy rabbits would likely reinhabit the project area after about 30 years, upon the ultimate establishment of big sagebrush along area drainages.

Of the sensitive bat species identified for the Ruby Hill Project, both the small-footed myotis and the Townsend's big-eared bat have been documented as occurring year-round in the project area (Brown 1996). Based on available habitat, other bat species also likely occur. Implementation of the Proposed Action could adversely affect local bat species, possibly impacting bat hibernacula, maternity roosts, and bachelor roosts. No direct impacts to the existing shafts or adits occupied by bats would occur from the Proposed Action; however, indirect effects could result from blasting activities occurring in the proposed mine pit. Blasting could adversely impact bats three ways: 1) noise and vibrations could disturb roosting bats, 2) vibrations could compromise the integrity of the shafts and adits near the mine pit, and 3) shifting of the underground structures could interrupt the air flow critical to hibernacula. Potential impacts would be more likely to occur in the Holly mine and Holly extension, due to their close proximity to the proposed mine pit and western waste rock dump, respectively. The Holly complex exhibited signs of questionable structural integrity during the field surveys. However, since the Bullwhacker, Williamsburg, Silver West, and Holly complexes are all interconnected, one could infer that at a minimum the air flow could be affected between all of these mines.

In the event that mine blasting resulted in increased noise or vibrations, impacts to bats could vary, depending on the season, extent of the disturbance, and species affected. If hibernating bats were disturbed, bat mortalities could result from the expenditure of their energy reserves necessary to survive the winter. The Townsend's big-eared bat is particularly sensitive to disturbances at their roost sites (Fitzgerald et al. 1994). This species' population decline in the western United States has been primarily attributed to loss of roost habitat and may readily abandon a roost site, if disturbed. Blasting also could result in actual loss of roosting sites from mine collapse. Air flow into hibernacula is often critical to bat survival, since this maintains the optimal environment for hibernating bats. If vibrations were to interrupt air flow in adjacent roosting colonies, bat mortality or abandonment may result. Based on existing data, hibernacula for the Townsend's big-eared bat and small-footed myotis and nursery colonies for the small-footed myotis may be adversely affected. Loss of bat nursery colonies or hibernacula from mine development, whether it would be from disturbance, habitat loss, or indirect mortalities would be considered a significant, adverse impact to the local bat population.

Amphibians

No impacts to the spotted frog would be anticipated from the Proposed Action. No potential habitat occurs in the project area or would be affected by the proposed project disturbance, and it is unlikely that this species occurs in the vicinity of the project.

Plants

No documented populations of special status plant species have been located in the project area and no direct or indirect impacts to special status plant species are anticipated.

3.10.2.2 East Waste Rock Dump Alternative

Overall impacts from implementation of the East Waste Rock Dump Alternative would parallel those described for the Proposed Action. Those impacts different than the Proposed Action are discussed further. Habitat disturbance under this alternative would be 19 acres greater than for the Proposed Action, resulting in additional habitat loss for sensitive species, such as the burrowing owl and loggerhead shrike. Anticipated impacts to the ferruginous hawk would be less than those discussed for the Proposed Action, since the existing nest locations would be located farther from the planned mine development areas. However, this alternative also would likely result in nest abandonment, due to the indirect effects from mine development and operation. Impacts to the pygmy rabbit would likely be less under this alternative, since the entire disturbance area has been surveyed for pygmy rabbit sign, and low value habitat is associated with the portions of the eastern waste rock dump that are not part of the Proposed Action. Anticipated impacts to sensitive bat species also would be less for the East Waste Rock Dump Alternative, relative to those identified for the Proposed Action. The consolidation of the waste rock dump facility would aid in minimizing indirect impacts to the Holly complex, particularly the Holly extension, which is located to the west of the proposed open pit.

3.10.2.3 West Waste Rock Dump Alternative

Impacts from the West Waste Rock Dump Alternative also would parallel those described for the Proposed Action. However, overall habitat disturbance would be 119 acres less than for the Proposed Action. Impacts to the ferruginous hawk, pygmy rabbit, and sensitive bat species would be the same as those described for the Proposed Action. The location of the waste rock dump magnifies the impacts to these species, as discussed for the Proposed Action, which would result in a greater level of impact, when compared to the East Waste Rock Dump Alternative.

3.10.2.4 Partial Backfilling Alternative

The Partial Pit Backfill Alternative would result in the same amount of habitat disturbance to sensitive species in the project area (e.g., loggerhead shrike, pygmy rabbit, burrowing owl) as the Proposed Action. Partial backfilling would reclaim approximately an additional 6 acres of vegetation. Other potential impacts from this alternative would be the same as those discussed for the Proposed Action.

Since no populations of special status plant species have been identified in the proposed project area and since this alternative would result in the same disturbance as the Proposed Action, effects would be identical to the Proposed Action, and no direct or indirect impacts to special status plant species would be anticipated.

3.10.2.5 No Action Alternative

Under the No Action Alternative, no temporary impacts to bald eagle foraging would occur from a potential hazardous materials spill into a riparian drainages crossed by the proposed transportation corridor. No significant impacts to nesting ferruginous hawks would occur, maintaining the three established breeding territories in the project area. No habitat loss for the burrowing owl or loggerhead shrike would occur; no potential shrike nest sites would be removed or disturbed. No habitat loss for the pygmy rabbit would result. Potential impacts to roosting bats from noise, decreased air flow into hibernacula, or loss of roost site integrity would not occur.

Under the No Action Alternative, no impacts to sensitive plant species would be expected.

3.10.3 Cumulative Impacts

The cumulative analysis area for special status species is the same as that identified for general wildlife species.

Interrelated projects applicable to sensitive wildlife species would be the same as that discussed for general wildlife in Section 3.9.3 of Wildlife and Fisheries Resources.

No direct cumulative impacts were identified for the majority of the special status species identified for the project. It is likely that the burrowing owl, loggerhead shrike, and pygmy rabbit would be cumulatively affected by the past, present, and reasonably foreseeable future actions. However, it is impossible to quantify these impacts, since all three species occur sporadically throughout the region.

As discussed under existing environment, a large number of historic ferruginous hawk nests have been documented in the cumulative effects area, totalling 12 nests or territories that have been recorded as occupied or active (Lamp 1996). It is assumed that several of these nests are likely alternative sites for resident ferruginous hawks. The past and present mining activities have not significantly affected the habitat availability for this species, since much of this historic and ongoing activities are located to the south in the higher elevation piñon-juniper woodland. The optimal nesting habitat for the ferruginous hawk is located along the lower foothill region in the transitional zone between the piñon-juniper and sagebrush habitats. Cumulative effects to this species would likely be associated with ongoing exploration activities, livestock grazing, and the Proposed Action.

The presence of the historic mining has likely improved the habitat for roosting bats. As the natural habitats have decreased for these sensitive bat species throughout the western United States, bats have moved into abandoned underground mine workings for roost sites. Potential cumulative impacts to bats would primarily involve the ongoing mining activities in the cumulative effects area. Exploration activities may result in disturbance to roost sites either through direct impacts from noise, vibrations, and human presence or through indirect effects from future mining development.

Habitat for two sensitive plant species, the Nevada willowherb and the scorpion milkvetch, occur within the cumulative effects area. Based upon U.S. Fish and Wildlife Service and Nevada Natural Heritage Program data, populations of both species occur within 35 miles of the project area. Surveys of potential habitat conducted in the Proposed Action area did not identify populations of these sensitive species, and it is unlikely that they occur in this area (BLM 1996). Consultation with the U.S. Fish and Wildlife Service by the BLM indicated that there would be little effect to the scorpion milkvetch's survival, due to exploration activities in the Jewell Canyon mineral exploration area, and surveys would not be required in this area.

3.10.4 Mitigation and Monitoring

Issue: Loss of active and inactive ferruginous hawk nest sites and disturbance of breeding ferruginous hawks within 0.5 mile of the proposed development areas.

Measure 1: Homestake *is* coordinating with the BLM and Nevada Division of Wildlife to mitigate the long-term loss of the three ferruginous hawk territories, including six nest sites, from mine development. A number of studies have been conducted in Utah, Colorado, and Wyoming (Apple 1995; Call and Tigner, No Date; Craig 1996; Hallowed 1996; Holmes 1994; Olendorff 1993; Schmutz et al. 1984; Stalmaster 1988, 1996; Stroh and Dabbs 1996; White and Thurow 1985) that have moved active and inactive ferruginous hawk nests and erected artificial structures for hawk use. Many of these studies documented high success rates for ferruginous hawk nesting on the relocated nests or artificial structures.

Based on these studies, *a total of six artificial nest structures will be erected to the west of the mine area on BLM-managed land, and four of the six natural nests that would be indirectly impacted by the Proposed Action will be removed in early 1997, prior to the ferruginous hawk breeding season. The locations chosen for the six nest structures were determined, based on the extent of the existing breeding territories, proximity to disturbance areas, topography, existing vegetation (i.e., interface between the pinon-juniper and sagebrush grassland habitats), view of adjacent foraging habitats, and proximity to other ferruginous hawk territories.*

Artificial nest structures were determined to be a better mitigation option, as opposed to constructing nest platforms in existing trees, since suitable juniper trees were limited within the three breeding territories that were located an appropriate distance (minimum of 2,000 feet) from proposed disturbance areas. In addition, artificial structures are more stable in the long term than topped junipers, and structures can provide attractive nest sites to hawks. Ferruginous hawks have successfully nested on artificial structures (Schmutz et al. 1984; Stalmaster 1988; Olendorff 1993), particularly in habitats with an adequate prey base.

Nest construction is following methods outlined in Olendorff (1993), Apple (1995), and Call and Tigner (no date). Nest placement will parallel the orientation, aspect, and appearance of those removed from the project area. Nest placement also has taken into account that ferruginous hawks typically require larger buffer areas during periods of low prey availability (White and Thurow 1985).

Homestake proposes to monitor the artificial nest structures and the remaining natural nest sites (including the two territories, encompassing four nest sites, located outside of the projected area of disturbance) for 5 consecutive years, beginning with the 1997 breeding season (March through August). In addition to recording any hawk activity associated with the six artificial nest structures and five remaining natural nest sites, monitoring also will include general searches within the project area to determine if breeding ferruginous hawks have established new natural nests in the vicinity of the mine. If nest sites remain active or occupied during the first 5 years, this would suggest that the hawks have adapted to project activities and further monitoring would cease. Information pertaining to hawk occupancy or nest failure would be *coordinated with the BLM and* reported annually to *both* the BLM and Nevada Division of Wildlife.

Effectiveness: Because the adjacent habitat already may be at carrying capacity for nesting ferruginous hawks, it is unknown whether *developing new nest sites will* be successful. However, other studies conducted in the Great Basin and Rocky Mountains have reported high breeding success, particularly along the edge of sagebrush/grassland communities. Because nest site availability may be a limiting factor for breeding ferruginous hawk populations within the transitional zone of the foothill region, the use of artificial nest structures placed further into native shrub and grasslands could improve the availability of suitable nesting habitat (Stalmaster 1988), allowing the displaced birds to move into unoccupied breeding territories, mitigating the loss of the active nest sites from mine development. Additional information on methodology for nest relocation, artificial nest site placement, and site monitoring is available for review through (Apple 1995; Call and Tigner, No

Date; Craig 1996; Hallowed 1996; Holmes 1994; Olendorff 1993; Schmutz et al. 1984; Stalmaster 1988, 1996; Stroh and Dabbs 1996; White and Thurow 1985). Olendorff (1993) provides a detailed description of the ferruginous hawk, including a number of management recommendations for nesting birds.

Application: This measure would apply to the Proposed Action and all project alternatives, except for the No Action Alternative.

Issue: Indirect effects to bat hibernacula, nursery colonies, or other roosting concentrations due to mine development.

Measure 2: *Homestake has coordinated with the BLM, Nevada Division of Wildlife, and Great Basin bat experts to identify shafts and adits that would likely support roosting bats both within and outside of the zone of impacts identified for the Proposed Action. Based on field surveys conducted in August and September 1995 and January 1996, additional surveys and exclusions were conducted in August and September 1996. The purpose was to identify mine workings that likely support roosting bats and exclude bats from the underground workings that would likely be impacted by the Proposed Action, as discussed in Section 3.10.2.1 of the Draft EIS. A number of openings associated with the Holly Mine and Holly Extension were sealed with chain-link fencing and 1-inch chicken wire to allow bat egress and discourage bats from reentering the mine shafts and adits that may be impacted by the project. This wire placement also maintains air circulation that is often critical to supporting the appropriate climate for specific roost sites connected with these sealed underground openings. This approach theorized that bats would then relocate to other underground openings prior to the winter hibernation period.*

Short-term management would include maintaining a double layer of wire covering for the two shafts located at the base or toe of the Holly Waste Rock Dump during the life of the mine and the wire currently sealing the drift between the Holly and Bullwhacker Mines, 430 feet below the ground surface. Following mine closure, these workings may be re-opened, and the wire covering could be removed to allow bats to reoccupy the roost sites, since they represent high quality habitat for the Myotis and Corynorhinus that occur in the area. All other openings that were sealed with wire during these exclusion activities are not considered high value habitat and will be permanently sealed during the fall of 1996 to prevent entry of hibernating bats.

Bat gates would be installed over two specific mine entrances into the historic Bullwhacker Mine. This measure would ensure public safety, while securing habitat for bats roosting in the Bullwhacker and associated workings and providing habitat to bats that may have been displaced from the Holly Complex prior to sealing. It is recommended that the exclusion devices be designed to not impede air flow into the shafts and adits, such as with approved bat gates, and to install a door in a minimum of one of the gates to allow researchers to enter the underground openings for subsequent population surveys. Homestake would coordinate with the BLM, Nevada Division of Wildlife, Nevada Division of Minerals, and the bat specialists to identify the specific openings to place the gates, when these gates should be installed, and how additional monitoring surveys or inventories should be conducted.

Effectiveness: *Excluding bats during the life of the project from existing underground workings that may be either directly or indirectly impacted by mine development and operation would prevent adverse impacts to resident bat populations during this period, since it is assumed that individuals associated with the affected shafts and adits would relocate to other roost sites in the project vicinity. Also, maintaining the air flow between these underground workings that will continue to support roosting bats would ensure that the associated climate in these roosts will remain constant after sealing the adjacent areas. The eventual reopening of these temporarily sealed shafts and adits would allow the bats to reoccupy these roost sites, following mine closure and reclamation.* Preventing human access into existing mine shafts and adits that support roosting bats would ensure the long-term protection of the roost sites and minimize the amount of potential disturbance of sensitive bat concentrations, such as those found in winter hibernacula and nursery colonies. It is important that the preservation sites are located in areas that would not likely be developed in the future. Coordinating with agency officials regarding bat exclusion would prevent significant impacts to bat concentrations that may be affected by mine development.

Application: This measure would apply to the Proposed Action and all project alternatives, except for the No Action Alternative.

3.10.5 Residual Adverse Impacts

No residual impacts would occur to Federally listed species identified for this project. Residual effects applicable to BLM sensitive species would be limited to displacement of the ferruginous hawk; short- and long-term habitat loss for the burrowing owl, loggerhead shrike, and pygmy rabbit; and potential loss of bat hibernacula and maternity roosts.

3.11 Land Use Authorizations and Access

3.11.1 Affected Environment

3.11.1.1 Land Use Authorizations

Approximately 81 percent of Eureka County is under Federal custodianship. The two major Federal resource agencies having land management responsibilities in the County are the BLM and the U.S. Forest Service. Forest Service-managed lands are confined to the Toiyabe National Forest in southwestern Eureka County. Lands administered by the BLM comprise the majority of public lands in the County (approximately 75 percent, or 2,021,141 acres). Private lands comprise approximately 19 percent of Eureka County and are used mostly as rangeland and for the production of hay and alfalfa (Eureka County Economic Development Council 1995).

Diamond Valley, to the north of the project area, contains numerous agricultural enterprises that rely on groundwater for the irrigation of alfalfa and barley. The closest residence west of the project area is located on the Minoletti Ranch, approximately 1.5 miles to the northwest. Several homes also exist in this area on the south side of U.S. Highway 50. Immediately west of the Minoletti Ranch is the Collingwood Ranch, which formerly was used for the production of alfalfa; all but 5 acres of the ranch have been purchased by Homestake Mining Company. Oats are currently produced on the ranch.

Land use within the project area consists primarily of livestock grazing, mineral exploration, and dispersed recreational use. Public and private land ownership status in the vicinity of the study area are shown in Map 2-1. The project area is located almost entirely on public lands administered by the BLM. Private lands within the project area are owned by Homestake Mining Company.

The project area is located approximately 1 mile northwest of the town of Eureka. Eureka, the County Seat, is the largest of three towns in Eureka County with a population of approximately 900 in the community and surrounding area. The other two towns, Beowawe and Cresent Valley, are sparsely populated and are located in the northern portion of the county (Eureka County Economic Development Council 1995). U.S. Highway 50 passes through Eureka, and runs to the east and north of the project area.

Livestock grazing occurs throughout the region on private and public lands (see Section 3.8, Range Resources). The project area is located immediately north of the historic Ruby Hill Mine within the Eureka Mining District. This district has been mined intermittently for gold, silver, and lead since the 1860s. The project area contains numerous shafts, waste rock piles, and several headframes. Gold and silver mining operations ceased in the area in 1959. In the 1960s, the Ruby Hill Mining Company staked claims in the project area. Homestake Mining Company signed an exploratory lease agreement with the Ruby Hill Mining Company in 1992 to fund a drilling program. Exploratory drilling has occurred since 1992, and is evident by the presence of numerous dirt roads and drilling pads throughout the project area.

An existing 230-kV transmission line is located within a utility corridor that passes along the northern perimeter of the project area and roughly parallels U.S. Highway 50 to the west; a power transfer station is located across the highway, less than 1 mile to the northeast. Other rights-of-way within the project area include a buried water pipeline that lies along the eastern perimeter of the project area within Hogpen Canyon. This pipeline serves the town of Eureka, and continues in a southerly direction to the town water storage tank located on Tank Hill. A booster pump station for this waterline is located in the center of Section 11 (Township 19 North, Range 53 East). Table 3-40 summarizes existing rights-of-way within the project area. The entire project area occurs within an area indicated on plat maps maintained by the BLM as having potential for oil, gas, and geothermal leasing.

The Gold Bar Mine, operated by Atlas Gold Mining, Inc., is located approximately 25 miles northwest of the project area in the Roberts Mountains. This mine is currently under reclamation.

Table 3-40

Rights-of-Way Within the Homestake Ruby Hill Project Area

Serial Number	Type of Land Use	Location	Width (feet)
Nev 06317	U.S. Highway 50	T20N, R53E; Sec 28, 33, 34	400
N-54498	Access Road	T20N, R53E; Sec 28, 33	66
N-5253	Powerline	T20N, R53E; Sec 31, 32, 33, 34	125
N-48618	Pipeline	T20N, R53E; Sec 33, 34; T19N, R53E; Sec 2, 3, 11, 14	50
N-5638	Powerline	T19N, R53E; Sec 2, 11, 14	25
N-50847	Powerline	T19N, R53E; Sec 11	25
N-48618	Pipeline Pump Station	T19N, R53E; Sec 11	---
N-51905	Powerline	T19N, R53E; Sec 11	25
N-60359	Access Road	T19N, R53E; Sec 14	30
N-37190	Buried Telephone Line	T20N, R53E; Sec 34, 35 T19N, R53E; Sec 2, 11	10
CC-21890	State Route 278	T20N, R53E; Sec 34	400
Nev 067106	State Route 101	T20N, R53E; Sec 35	20

3.11.1.2 Relevant Plans and Policies

Eureka County currently has no zoning ordinance to guide development of private lands within the county. The Eureka County 1973 General Plan contains a description of local land uses, restrictions to development, and recommendations for future land use planning. The county's Overall Economic Development Plan, approved by the County Commissioners in 1995, was developed in order to broaden the economic development of the county. It contains recommendations for the planning of land uses and designates the project area as being within land class "C", Open Space and Appropriate Uses, which includes mining, recreational use, limited grazing, and watershed protection measures.

The County, in cooperation with the Nevada Division of State Lands, has adopted a *Policy Plan for Public Lands* within its jurisdiction (Eureka County 1985). This plan was developed in response to Nevada Senate Bill 40, which directs the State Land Use Planning Agency to work with local planning entities to prepare local plans and policy statements regarding the use of federal lands in Nevada. Policies contained within the Plan include promoting expansion of mining operations/areas, and promoting opportunities for local economic development through the disposal of select public lands within the county.

Public lands under BLM jurisdiction are managed for the multiple uses of recreation, range, forestry, mineral extraction, watershed, fish and wildlife habitat, wilderness, and natural, scenic, scientific, and historical values. The project area is contained entirely within BLM's Battle Mountain District. The current operational land use plan for this region is the 1986 Shoshone-Eureka Resource Management Plan. This plan covers BLM-administered lands in parts of Lander, Eureka, and Nye counties. Land use planning maps generated by the BLM as part of the Resource Management Plan process indicate that the Proposed Action is located within an area identified as containing prospectively valuable oil and gas deposits. In addition, parts of the Proposed Action are on lands identified by the Resource Management Plan as suitable for disposal, based on needs for recreation or other public purposes, community expansion, economic development, agriculture, and the creation of block-ownership patterns. These lands are shown in Map 3-24 and could allow for future expansion of the Eureka townsite. Eureka County's *Policy Plan for Public Lands* (1995) encourages the orderly disposal of these public lands in order to provide maximum public benefit.

3.11.1.3 Access

Primary access within Eureka County is furnished by U.S. Highway 50, state highways, county roads, and public access roads. The majority of the public lands are accessible to the general public via one of these roads.

There are many routes to access public lands near the project area. Access to the project area is currently provided via U.S. Highway 50, State Route 278, and publicly-maintained roads in the vicinity of Eureka. Highway 50 is the primary east-west highway in central Nevada and connects the Eureka townsite with Ely and destinations farther east, and Carson City and destinations farther to the west. State Route 278 is the primary north-south link in Eureka County and intersects Highway 50 north of Eureka, and Interstate 80 at Carlin (Elko County). Both highways are paved, lightly traveled two-lane roads. Access to the project site is currently provided via two routes: either from Ruby Hill Avenue through the western portion of Eureka, or from a series of unimproved roads through public lands off Highway 50 to the north of the project area.

3.11.2 Environmental Consequences

The Proposed Action or selected alternative could affect land use authorizations and access both directly and indirectly. Direct effects may include the termination or modification of authorized land uses, rights-of-way or access routes in the study area. Indirect impacts may occur as a result of altered access to areas adjacent to or within proximity to the mine site(s). Indirect effects also would result if the Proposed Action or selected alternative stimulated or encouraged the development of land uses not presently anticipated, or conversely, precluded other planned or proposed uses.

Environmental impacts to land use authorizations and access would be considered significant if the Proposed Action or selected alternative could result in the following:

- Incompatibility or inconsistency with land use plans, regulations, or policies adopted by local, state, or federal governments.
- Changes to land use patterns that would threaten the economic viability of existing private enterprises (e.g., agricultural) or authorized uses of public lands (e.g., grazing).
- The establishment of land use(s) generally considered as incompatible with existing land use authorizations.
- Elimination or severe restriction of access to isolated parcels of private land or to public lands that are known to be used in support of private enterprises or are considered critical for established recreational activities.

3.11.2.1 Proposed Action

Land Use

The Proposed Action would occur on both public and private lands. As currently planned, total new disturbance would be approximately 689 acres on public land and 7 acres on private land, resulting in a total project disturbance of approximately 696 acres (see Table 2-1). Thus, construction of the pit, waste rock dumps, and the heap leach areas would require use of public lands administered by the BLM. Mining activities on private lands are consistent with land use designations of the Eureka County Overall Economic Development Plan. However, a portion of the Proposed Action would occur on lands identified in the BLM's Resource Management Plan as suitable for disposal. The identification of lands suitable for disposal is based on potential future needs of recreation or other public purposes, community expansion, economic development, agriculture, and the creation of blocked ownership patterns (BLM 1986a). During the life of the mine, a total of approximately

213 acres within the fenced mine area would not be available for disposal. This impact would be considered significant, according to the first criterion listed above; specifically, the use of these disposal lands for mining purposes would be inconsistent with the intent of the Resource Management Plan. Even after project reclamation, use of this land would be limited, and disposal would likely only meet needs of recreation and/or the creation of blocked ownership patterns, as the land would not be available for community expansion, economic development, or agriculture. However, it is unlikely that the impacted disposal lands could ever have been used for these purposes, given their distance from the current townsite and highway and their limited agricultural potential. Although the Proposed Action would be located on public lands identified for disposal, no adverse impact would be expected to the future growth of the Eureka township as approximately 2,230 acres of public lands identified as suitable for disposal exist adjacent to the current town boundary, and an area immediately north of town has been identified by the County as the highest priority for annexation. Further, the Proposed Action would serve to stimulate growth within other undeveloped portions of the township (see Section 3.15.2 of Social and Economic Values).

Homestake has submitted an application for a mining patent of public lands affected by the Proposed Action. If a mining patent were issued, ownership of these parcels would be transferred to Homestake with accompanying surface and/or subsurface development rights. Congress has ordered a temporary moratorium on the approval of all public land patents while it considers legislation to reform issuance of Federal land patents.

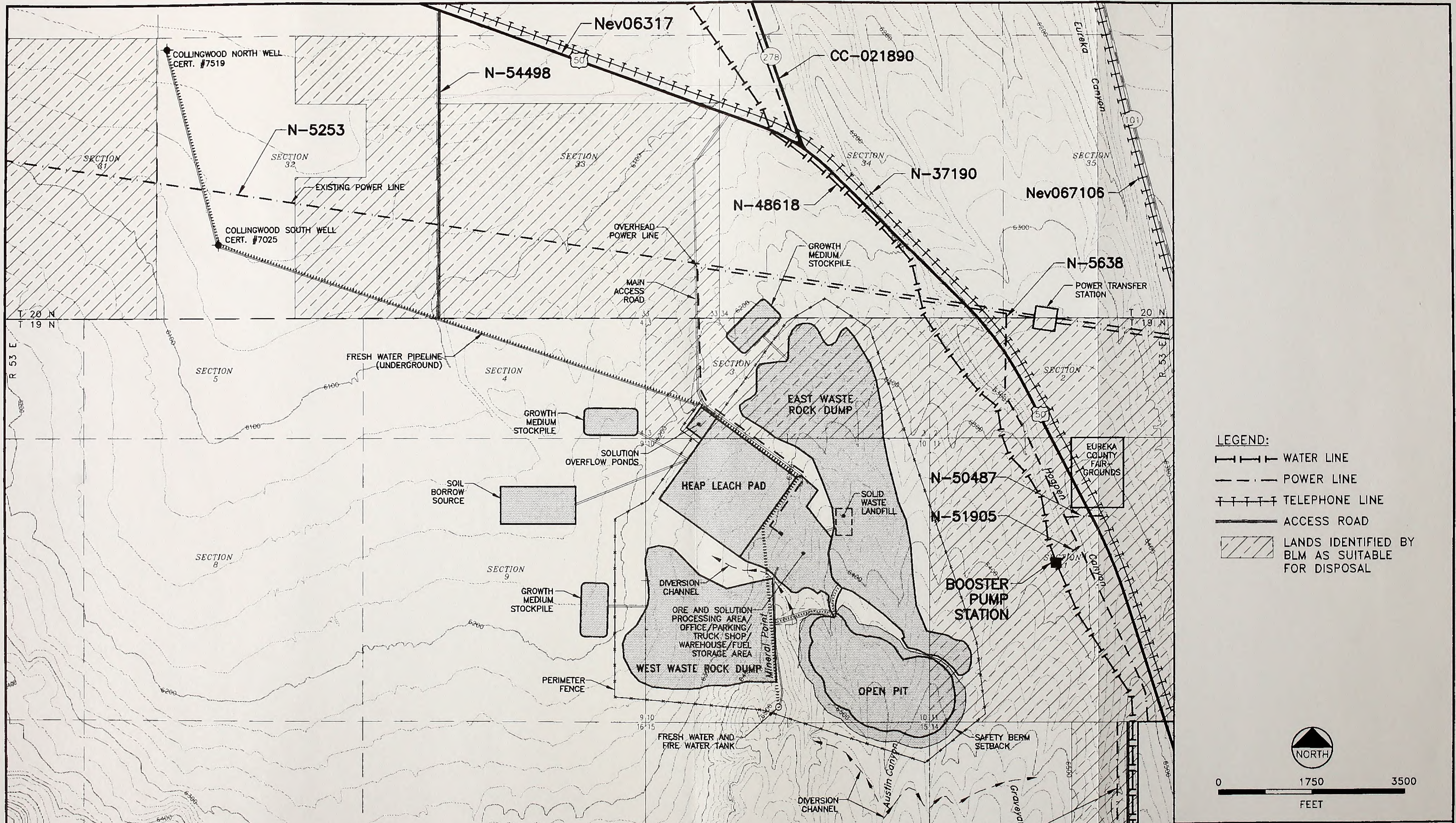
The Proposed Action generally would preclude any public use of the affected lands for the life of the mine. For both safety and security reasons, public access to the active mining and processing areas would be precluded to the maximum extent permitted by law during the life of mining. The entire area of operations, including haul roads, would be enclosed within a range control fence and would not be accessible to the general public.

The Proposed Action would result in the removal of approximately 972 acres of currently available public rangeland in the Ruby Hill Grazing Allotment as a result of the construction of fences around the open pit, waste rock dump, leach pad, and ancillary facilities on public lands. The projected loss of animal unit months during mine operations and after the reclamation period is not expected to adversely affect the lessee (see Section 3.8.2.1 of Range Resources).

Land use in the Eureka townsite would not be directly affected by the Proposed Action during construction and operations. The Proposed Action would, however, generate a demand for additional housing units in the Eureka area. This demand would require the development of additional residential uses within the townsite (see Section 3.15, Social and Economic Values). Employment and population growth also would stimulate commercial development in Eureka. Such development could occur in Eureka's historic business district, though building sites are scarce along the main street. Consequently, the added demand also could trigger nonresidential development elsewhere along the U.S. Highway 50 corridor, particularly north of town in an area near the fairgrounds. The area is serviceable by the town's utility systems. The County is seeking to acquire the property from the BLM, which has classified it as available for disposal to accommodate community expansion. The Proposed Action's impact on public services and utilities also is discussed in Section 3.15, Social and Economic Values.

<u>Rights-of-Way</u>

Rights-of-way necessary to support operation of the Proposed Action consist of a powerline and a water pipeline. A new overhead powerline would be constructed to service the Ruby Hill Mine. This powerline would parallel the existing powerline from the substation to the mine access road and would require a right-of-way width of 25 feet. The location of the local substation and the proposed powerline alignment are shown on Map 2-2. The powerline would cross U.S. Highway 50 immediately south of the crossing of the existing 230-kV powerline. Construction of a buried freshwater supply line from Homestake's Collingwood Ranch would require a ***20-foot*** wide



RUBY HILL PROJECT

MAP 3-24
RIGHTS-OF-WAY AND DISPOSAL LANDS
PROPOSED ACTION

right-of-way through public lands for approximately 1.6 miles; 15 feet of this right-of-way would be required for an access road. A separate right-of-way would not be required for construction of the access road, as this facility would be permitted as part of the overall Proposed Action; however, an encroachment permit from the Nevada Department of Transportation would likely be required.

Construction within the new rights-of-way would not be expected to adversely affect existing land use authorizations or existing rights-of-way. No known sensitive resources would be directly impacted by construction within the two proposed rights-of-way. However, a portion of the Old Lincoln Highway, located immediately east of the proposed access road, could be affected by powerline construction; the significance of this potential historical resource has yet to be determined. Further, cultural resource clearance has not been granted for the portion of the proposed powerline alignment east of Highway 50 (see Section 3.14.2.1 of Cultural Heritage). Cultural resource clearance has been completed for the water line as it is below the 6,200 elevation. Rights-of-way for both the proposed water supply line and powerline lie within several hundred feet of active and inactive ferruginous and red-tailed hawk nest. Consequently, construction within these rights-of-way could indirectly impact use of these nests. This potential impact has been identified as significant and adverse (see Section 3.10.2 of Special Status Species).

<u>Access</u>

Project access would be from U.S. Highway 50, approximately 0.3 mile west of the intersection with State Route 278 (see Map 2-2). This access location was chosen by Homestake in order to minimize the amount of heavy truck and vehicular traffic that would be required to pass through the town of Eureka, since most mine deliveries are expected to arrive via either Highway 50 from the west or State Route 278 from the north.

The Proposed Action is not expected have an adverse impact on access to public and private lands in the study area. The publically-maintained road that traverses Hogpen Canyon would remain open to the public.

A security gate at the main entrance to the mine area would prevent unauthorized public access. Though direct access through the proposed Ruby Hill Project would be eliminated, alternate routes to public and private lands in the mine vicinity would be available.

<u>Closure/Reclamation</u>

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 open pit, all other areas would be reshaped and revegetated, and public access would be established.

Safety berms, a barbed-wire fence, and warning signs would be placed around the perimeter of the pit to prevent public access. Reseeding would increase vegetative cover and make the area suitable for livestock grazing. Livestock grazing may be resumed after re-established vegetation is capable of supporting grazing, as determined by the BLM.

3.11.2.2 East Waste Rock Dump Alternative

The East Waste Rock Dump Alternative would result in a total new disturbance of approximately 715 acres, of which 711 acres would be located on public lands. Impacts of this alternative to land use authorizations and access would be similar to those described for the Proposed Action. As with the Proposed Action, a portion of this alternative would occur on lands identified by the BLM as suitable for disposal (Map 3-25). A total of approximately 338 acres within the fenced mining area would be unavailable for disposal during the life of the mine. This impact would be considered significant and adverse according to the first criterion listed in Section 3.11.2, Environmental Consequences.

The East Waste Rock Dump Alternative would result in the removal of approximately 938 acres of currently available public rangeland in the Ruby Hill Grazing Allotment. Impacts to the lessee from the projected loss in animal-unit-months is described in Section 3.8.2.2 of Range Resources.

A growth media stockpile is proposed to be located within Hogpen Canyon immediately east of the waste rock dump. Homestake would construct the stockpile to avoid disruption of access to the existing road and the underground water supply pipeline that serves the town of Eureka.

3.11.2.3 West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative would result in a total new disturbance of approximately 577 acres, of which 570 acres would be located on public lands. Impacts of this alternative to land use authorizations and access would be similar to those described for the Proposed Action. As with the Proposed Action, a portion of this alternative would occur on lands identified by the BLM as suitable for disposal (Map 3-26). A total of approximately 42 acres within the fenced mining area would be unavailable for disposal during the life of the mine. This impact would be considered significant and adverse according to the first criterion listed in Section 3.11.2, Environmental Consequences.

The West Waste Rock Dump Alternative would result in the removal of approximately 811 acres of currently available public rangeland in the Ruby Hill Grazing Allotment. Impacts to the lessee from the projected loss in animal-unit-months is described in Section 3.8.2.3 of Range Resources.

3.11.2.4 Partial Backfilling Alternative

The alternative to Partially Backfill the Pit would have no impact on land use authorizations and access within the project area beyond those impacts discussed for the Proposed Action.

3.11.2.5 No Action Alternative

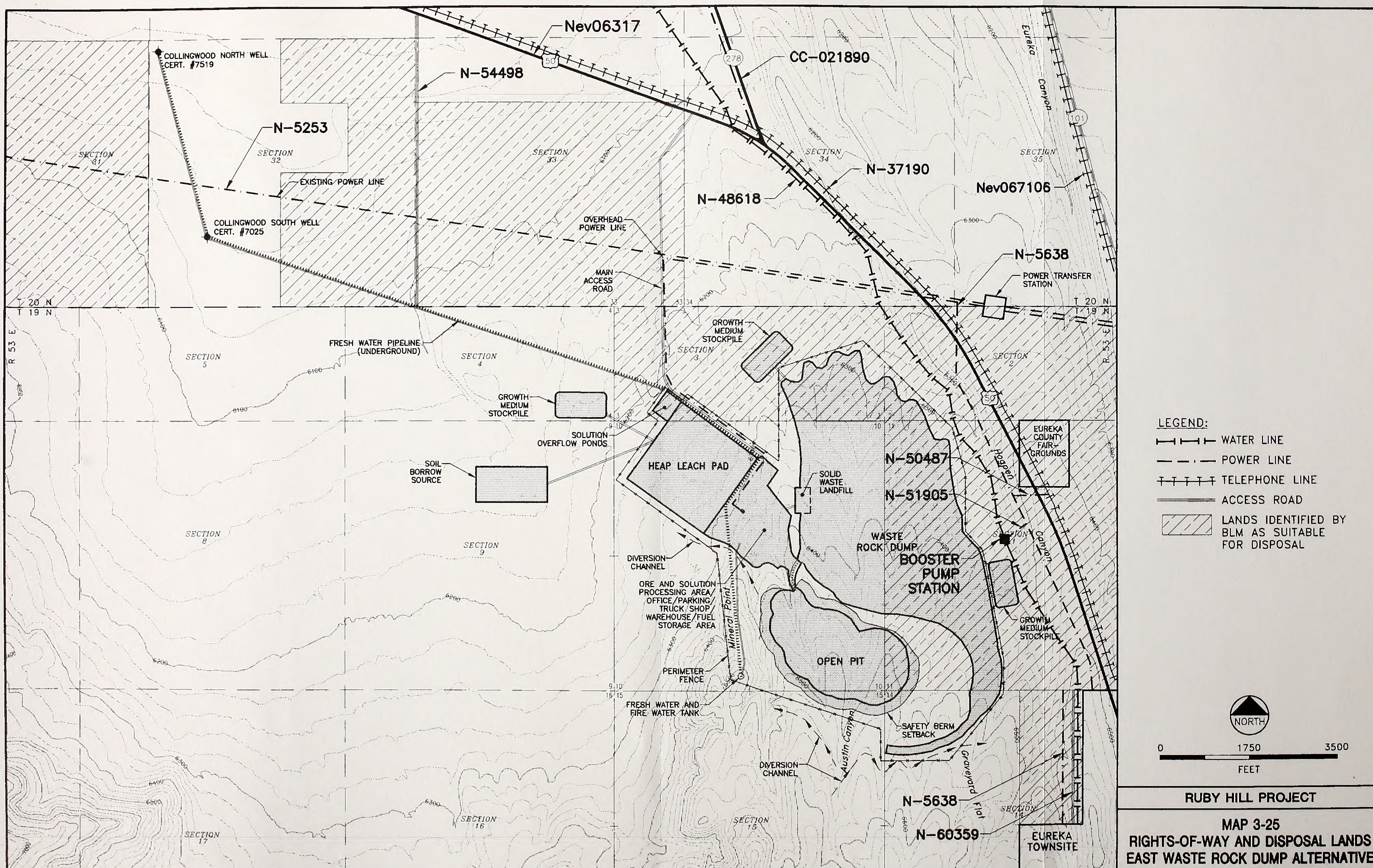
Under the No Action Alternative, additional disturbance to lands within the project area would not occur. Access to the project area would be preserved, and the existing land uses would be maintained, including grazing on the Ruby Hill Allotment. Lands identified as suitable for disposal by the BLM would not be affected.

3.11.3 Cumulative Impacts

The area of analysis for cumulative effects to land use authorizations and access is shown in Map 3-27. This area incorporates the entire Ruby Hill Mine project area (as defined by Homestake Mine Company's Project Legal Description) and all public lands in the vicinity of the Eureka townsite identified as suitable for disposal by the BLM. Direct or indirect adverse impacts to land use authorizations and access identified as a result of the Proposed Action are limited to disturbance of public lands identified as suitable for disposal and the disruption of grazing on the Ruby Hill Allotment. Of all the cumulative development projects listed in Table 2-6, only the East Archimedes Oxide Project and ongoing mineral exploration by Homestake Mining Company have the potential to disturb additional public lands in the Eureka townsite vicinity identified by the BLM as suitable for disposal. Specifically, the East Archimedes Oxide Project would disturb approximately 300 acres, the majority of which have been identified as suitable for disposal. An estimated 20 percent of the ongoing mineral exploration has or would occur within public lands suitable for disposal. While the former project would preclude most uses of the disposal lands during and after its projected life, exploration activities alone would not be expected to preclude future uses of disposal lands for recreation, other public purposes, community expansion, economic development, agriculture, or the creation of blocked-ownership patterns.

Cumulative development projects are expected to affect approximately 1,000 acres within the Ruby Hill Grazing Allotment, although disturbance associated with exploration activities would be only temporary in nature. These impacts are described in Section 3.8.3 of Range Resources.

Demands for additional housing and commercial development in and around Eureka would be higher if other mining production activities were initiated during the life-of-project. Such development would increase the acreage of lands devoted to such uses, but would not constitute a cumulative impact on land use.



Nev06317
CC-021890
N-54498
COLLINGWOOD NORTH WELL CERT. #7519
N-5253
SECTION 31
SECTION 32
SECTION 33
SECTION 34
SECTION 35
N-37190
Nev067106
EXISTING POWER LINE
N-48618
COLLINGWOOD SOUTH WELL CERT. #7025
OVERHEAD POWER LINE
N-5638
MAIN ACCESS ROAD
POWER TRANSFER STATION
T 20 N
T 19 N
R 53 E
GROWTH MEDIUM STOCKPILE
FRESH WATER PIPELINE (UNDERGROUND)
SECTION 5
SECTION 4
SECTION 3
SECTION 2
SOLUTION OVERFLOW PONDS
HEAP LEACH PAD
SOIL BORROW SOURCE
SOLID WASTE LANDFILL
N-50487
N-51905
EUREKA COUNTY FAIR-GROUNDS
WASTE ROCK DUMP
BOOSTER PUMP STATION
SECTION 8
SECTION 9
DIVERSION CHANNEL
ORE AND SOLUTION PROCESSING AREA/ OFFICE/PARKING/ TRUCK SHOP/ WAREHOUSE/FUEL STORAGE AREA
Mineral Point
OPEN PIT
PERIMETER FENCE
FRESH WATER AND FIRE WATER TANK
SAFETY BERM SETBACK
Austin Canyon
Graveyard Flat
Hogpen Canyon
Eureka Canyon
N-5638
N-60359
SECTION 14
SECTION 15
SECTION 16
SECTION 17
EUREKA TOWNSITE
LEGEND:
WATER LINE
POWER LINE
TELEPHONE LINE
ACCESS ROAD
LANDS IDENTIFIED BY BLM AS SUITABLE FOR DISPOSAL
NORTH
0
1750
3500
FEET
RUBY HILL PROJECT
MAP 3-25
RIGHTS-OF-WAY AND DISPOSAL LANDS
EAST WASTE ROCK DUMP ALTERNATIVE

3.11.4 Mitigation and Monitoring

Land use mitigation relates primarily to range management, as the impacts resulting from an inconsistency with established land use plans cannot be mitigated. Section 3.8.4 of Range Resources, discusses mitigation measures that would be implemented under the Proposed Action and alternatives to alleviate problems associated with grazing distribution.

Issue: The open pit would be 0.7 mile from the town of Eureka and could pose a safety hazard to adults and children who may be using Public Land between the town and mine.

Measure 1: Homestake would install a chain-link security fence around the ultimate perimeter of the pit following pre-stripping activities. The design for the fence would be developed in consultation with the BLM. At mine closure, the fence would be left in place and the safety berm (as described in Section 3.11.2.1) would be constructed outside the chain-link fence.

Effectiveness: The combination of the range control fence around the entire mine area (see Section 2.1.11) and the security fence around the pit area would help prevent public access and improve public safety during mine operation. Following mine closure and determination of successful reclamation, the range control fence would be removed. During this time, the safety berm around the pit would be constructed. The combination of the newly constructed safety berm and the previously constructed chain-link security fence around the pit would help prevent public access and improve public safety after mine closure. However, none of these control devices would be completely effective in eliminating unauthorized access to potentially hazardous areas.

Application: This measure would be applied to the Proposed Action and all alternatives, with the exception of the No Action Alternative.

3.11.5 Residual Adverse Impacts

Residual impacts to land use authorizations relate primarily to the success of the reclamation efforts. If, upon project completion, the affected land area were reclaimed such that former land uses could be reinstated, residual adverse effects would be minimal. However, if reclamation were unsuccessful, residual land use effects could occur. The Proposed Action would conflict conceptually with the BLM Resource Management Plan in that lands identified as suitable for disposal for public purposes would be permanently altered.

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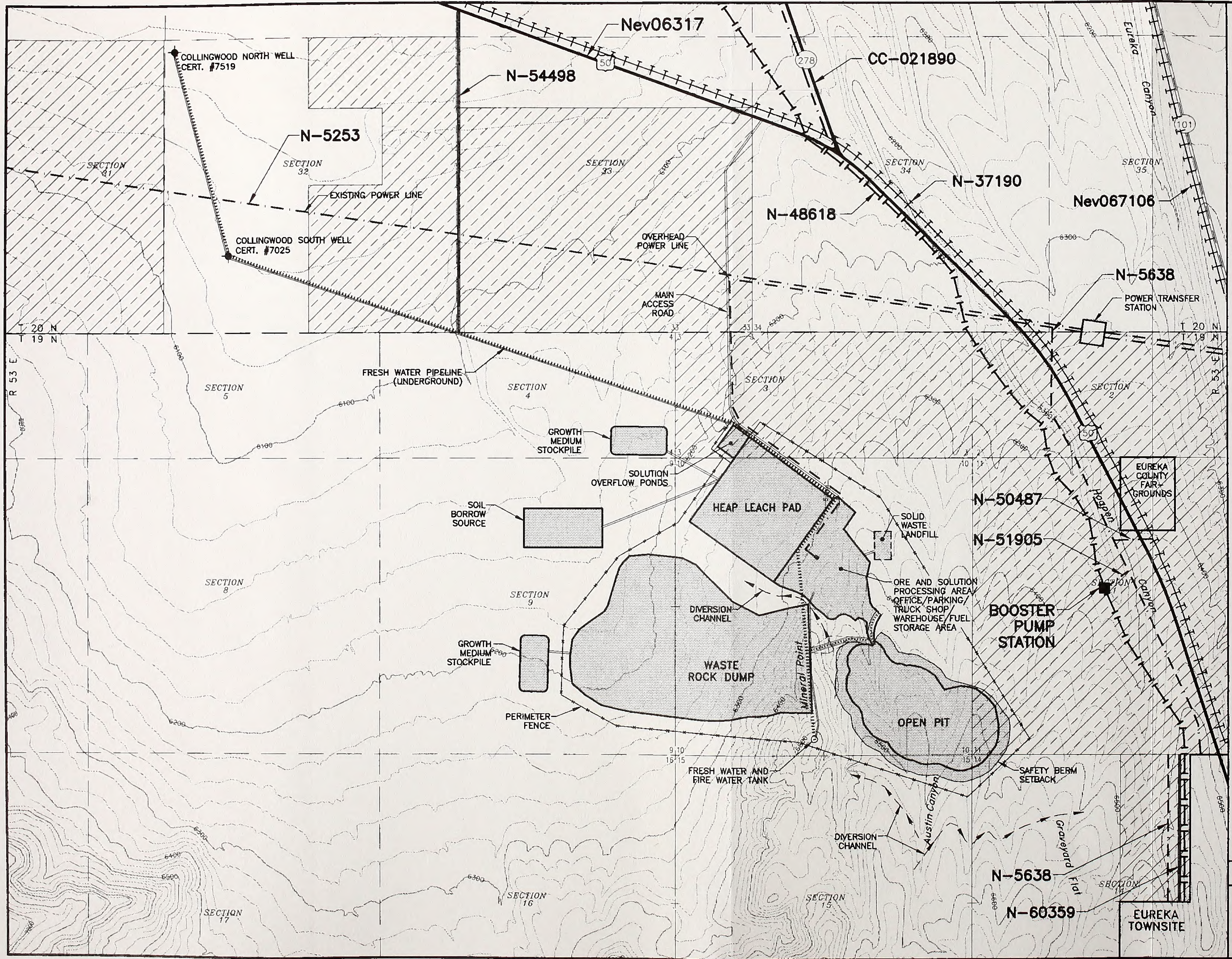
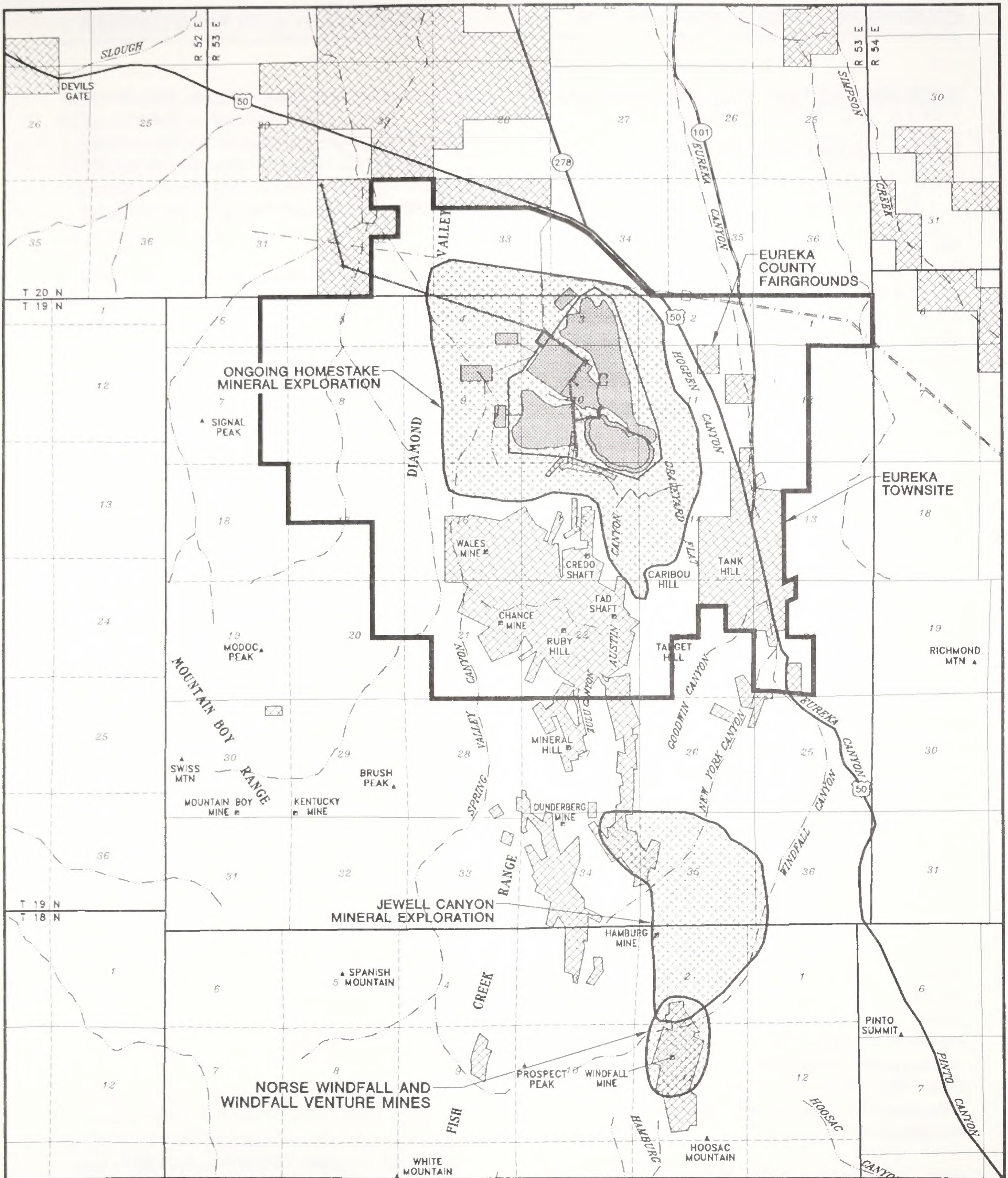


RUBY HILL PROJECT

MAP 3-26
RIGHTS-OF-WAY AND DISPOSAL LANDS
WEST WASTE ROCK DUMP ALTERNATIVE



RUBY HILL PROJECT

MAP 3-27
CUMULATIVE ASSESSMENT AREA FOR LAND USE AUTHORIZATION AND ACCESS

3.12 Recreation and Wilderness

3.12.1 Affected Environment

3.12.1.1 Recreation

The Nevada Statewide Comprehensive Outdoor Recreation Plan reports that recreational opportunities in Eureka County are very limited, and that local demand for hunting, fishing, and golf is very high. However, hunting is the only activity that is readily available. The Statewide Comprehensive Outdoor Recreation Plan also has identified an increasing demand among county residents for a reservoir with a campground and picnic area, and a golf course. The Plan also reports that increasing numbers of Las Vegas area residents are traveling to Eureka, Lincoln, and White Pine counties to enjoy uncrowded conditions for their outdoor recreational activities (Nevada Division of State Parks 1992).

Dispersed outdoor recreation is the predominant type of recreation in the region. Dispersed recreational activities in the project area occur mostly in the Simpson Mountain Range and Diamond Mountains located west and east of the project area, respectively, and include hunting, hiking, backpacking, horseback riding, mountain biking, cross-country skiing, snowmobiling, camping, picnicking, sightseeing, rockhounding, photography, and off-road vehicle use. There are no off-road vehicle use restrictions within the BLM's Battle Mountain District except within Wilderness Study Areas where motorized vehicle use is limited to existing travel routes (BLM 1983).

The region provides hunting opportunities for a variety of game animals, including mule deer, mountain lion, sage grouse, chuckar, cottontail rabbit, quail, pigeon, dove, and waterfowl. Hunting for big game is regulated through a quota system established by the Nevada Division of Wildlife. The quota system is over-subscribed each year for deer tags because demand far exceeds supply.

Mule deer hunting is the predominant type of hunting in the project area. Hunting statistics compiled by the Nevada Division of Wildlife indicate that 388 deer were harvested in Eureka County during the 1994 season, the lowest harvest since 1977 (Nevada Division of Wildlife 1995). This below average harvest was the result of a low quota established by the Nevada Division of Wildlife because of previous low levels of deer recruitment (i.e., fawn survival rates).

No developed campgrounds or picnic areas exist within Eureka County. The closest developed facility is the Hickison Petroglyph Recreation Area, located along U.S. Highway 50 approximately 40 miles west of the project area. This BLM-administered site contains 16 developed campsites (auto-accessible), two restrooms, picnic facilities and a 0.75-mile interpretive walking trail that features petroglyph carvings left by early inhabitants of the region. The only other recreation site within 50 miles of the project area is the BLM's Tonkin Springs. This undeveloped recreation area, located approximately 35 miles northwest of Eureka, is used mostly by locals and provides opportunities for fishing, primitive camping, and picnicking.

Recreational use within the vicinity of the project area is limited. Dispersed activities that occur on the project site include off-road vehicle use, hunting, and rockhounding.

Developed urban recreational facilities in the town of Eureka include one school play area, a community park, tennis court, indoor swimming pool, football field and track field, two softball/baseball complexes, and an indoor multipurpose gym. The Perdiz Sports Shooting Range facility contains archery, sporting clay, trap, rifle, and pistol ranges. The County Fairgrounds, with a rodeo arena, are located in the town of Eureka (Eureka County Economic Development Council 1995).

3.12.1.2 Wilderness

No designated wilderness areas or Wilderness Study Areas exist within 10 miles of the proposed project area. The closest designated wilderness is the Currant Mountain Wilderness, located in the Humboldt National Forest approximately 45 miles to the southwest. This wilderness is approximately 36,000 acres in size and is jointly administered by the U.S. Forest Service and the

BLM. The closest Wilderness Study Area is the Roberts Mountains Wilderness Study Area, located in central Eureka County, approximately 28 miles northwest of the project area. This Wilderness Study Area, administered by the BLM, is approximately 15,000 acres in size and offers abundant opportunities for sustained high-elevation hiking and horseback riding, hunting, sightseeing, photography, and historical and archaeological study (BLM 1987). This area is presently being managed by the BLM in accordance with the Interim Management Policy and Guidelines for Lands Under Wilderness Review (BLM 1993) in order to prevent impairment of its wilderness values until such time Congress either designates the area (and other Wilderness Study Areas in Nevada) as Wilderness or releases it from the wilderness review process through legislation.

3.12.2 Environmental Consequences

Environmental impacts to recreation and wilderness would be considered significant if the Proposed Action or selected alternative could result in the following:

- Increase total recreation demand in the region (as measured by population change) over baseline conditions if the current supply of recreational opportunities is known to be near or less than current demand.
- Permanently alter land within or adversely affect management of county, state, or national parks, wilderness areas, or wilderness study areas.
- Displace recreational use from an area for which there are no reasonable substitutes as a result of decreases in game population, aesthetic experience, loss of access, or other reasons.

3.12.2.1 Proposed Action

No parks, concentrated recreational use areas, BLM Wilderness Study Areas, designated wilderness areas, or protected natural areas would be directly impacted by the Proposed Action. Implementation of the Proposed Action would withdraw additional lands previously available for dispersed recreationists during construction, operation and reclamation activities. Recreational activities, such as hunting and hobby rock collecting, would be prohibited within the mine site during the life of the project. Use of the mine site would continue to be restricted to off-highway vehicles. Overall, the displacement of dispersed recreationists would be a minimal adverse impact since existing recreational use in the project area is relatively light, and the area has abundant public, open-space lands available for dispersed recreational opportunities. Public access would not be restricted on public roads near the mine site. 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 populations within the project vicinity are expected to be minimal to moderate with implementation of the Proposed Action, while impacts to the availability of upland game species from increased hunting in the region is expected to be minimal (see Section 3.9, Wildlife and Fisheries Resources). Consequently, some reduction to hunting opportunities in the project vicinity is expected. Given the diversity of public lands available locally for hunting, this impact would not be considered adverse.

Developed recreational facilities within the region are not expected to be adversely impacted by an influx in Proposed Action-related construction and operations work forces. Facilities at the Hickison Petroglyph Recreation Area, located approximately 40 miles west of the Ruby Hill Mine, could experience increased use as a result of transient workers camping during the construction period and the addition of new residents to the region during project operations. Other regional recreational facilities such as Tonkin Springs would likely experience increased demand during construction and operations phases.

Recreational facilities located within the Town of Eureka would be able to absorb any extra demand placed on them as a result of the anticipated new residents to the area. However, an increase in demand for indoor men's basketball and other team activities as a result of the Homestake workforce could increase the need for construction of a new multi-purpose gymnasium (Goicoechea 1996).

The Proposed Action would have no direct effect on land or recreational use of the Roberts Mountains Wilderness Study Area. Slight increases in mountain recreation and wilderness use from the Ruby Hill Mine workforce would not adversely affect recreational opportunities or wilderness values in the area.

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 pit, all other facilities would be revegetated and made available for public access. Thus, the potential exists for hunting opportunities to be realized on the mine site by closure and reclamation.

3.12.2.2 East Waste Rock Dump Alternative

This alternative would generate impacts to recreational and wilderness resources identical to those described for the Proposed Action.

3.12.2.3 West Waste Rock Dump Alternative

This alternative would generate impacts to recreational and wilderness resources identical to those described for the Proposed Action.

3.12.2.4 Partial Backfilling Alternative

The alternative to Partially Backfill the Pit would have no impact on recreation or wilderness activities within the region beyond those impacts discussed for the Proposed Action.

3.12.2.5 No Action Alternative

Under the No Action Alternative, disturbance associated with the Proposed Action would not occur and existing dispersed recreational opportunities on the project site (hunting and off-road vehicle use) would continue to be available. Demand for additional developed recreational facilities within the town of Eureka would remain at current levels.

3.12.3 Cumulative Impacts

The area of analysis for cumulative effects to recreation and wilderness resources is defined as the area within a 45-mile radius of the Eureka townsite (i.e., the area within an approximately 1-hour drive from this population center). Past disturbance and present actions have resulted incrementally in the loss of public lands available for dispersed recreational activities and have generated, through an increase in the local population, a growing demand for dispersed and developed recreational opportunities. Cumulative development has adversely impacted both small and big game populations as a result of habitat displacement as well as resulted in increased access to public lands from the construction of roads, which could be considered beneficial to hunting opportunities.

Implementation of the East Archimedes Oxide Project would not be expected to result in cumulative impacts to recreational and wilderness resources since any new workforce expected as a result of this project would be small. Further development at the Atlas and Tonkin Springs mines would result in an increase in the local population, which would in turn result in an increase in recreational demand, should these projects occur during the life of the Proposed Action. The Tonkin Springs recreational site would experience increased demand as a result of the construction and operations work force associated with the Tonkin Springs Mine.

3.12.4 Mitigation and Monitoring

None of the impacts to recreational resources that have been identified *for* the Proposed Action or the alternatives ***were judged to be important enough to warrant mitigation.***

3.12.5 Residual Adverse Impacts

No residual adverse impacts are expected to result from implementation of the Proposed Action or the alternatives.

3.13 Visual Resources

3.13.1 Affected Environment

The objectives of the visual resources investigation were to identify and describe important visual resources that could be affected by the construction and operation of the Proposed Action and related facilities. Important visual resources are defined for this study as visually sensitive use areas where the maintenance of the surrounding visual environment is important to people's enjoyment of using an area, and unique or unusual landscapes having natural scenic value. The study area was defined to include landscapes in which viewers may travel, recreate, or reside where existing views may potentially be affected by the Proposed Action or ancillary facilities.

The visual resource area for the Proposed Action is defined as the viewshed of the project, or the area from which the project can be seen. This viewshed includes an area bounded by mountain ridges on the east, south and west and the topographic rise in the Diamond Valley floor approximately 5.5 miles to the north of the project site. A small ridge on the western edge of Eureka serves to block views of the project area from the townsite, ***with the exception of residences located along the western edge of town that have views of the southern portion of the project area.***

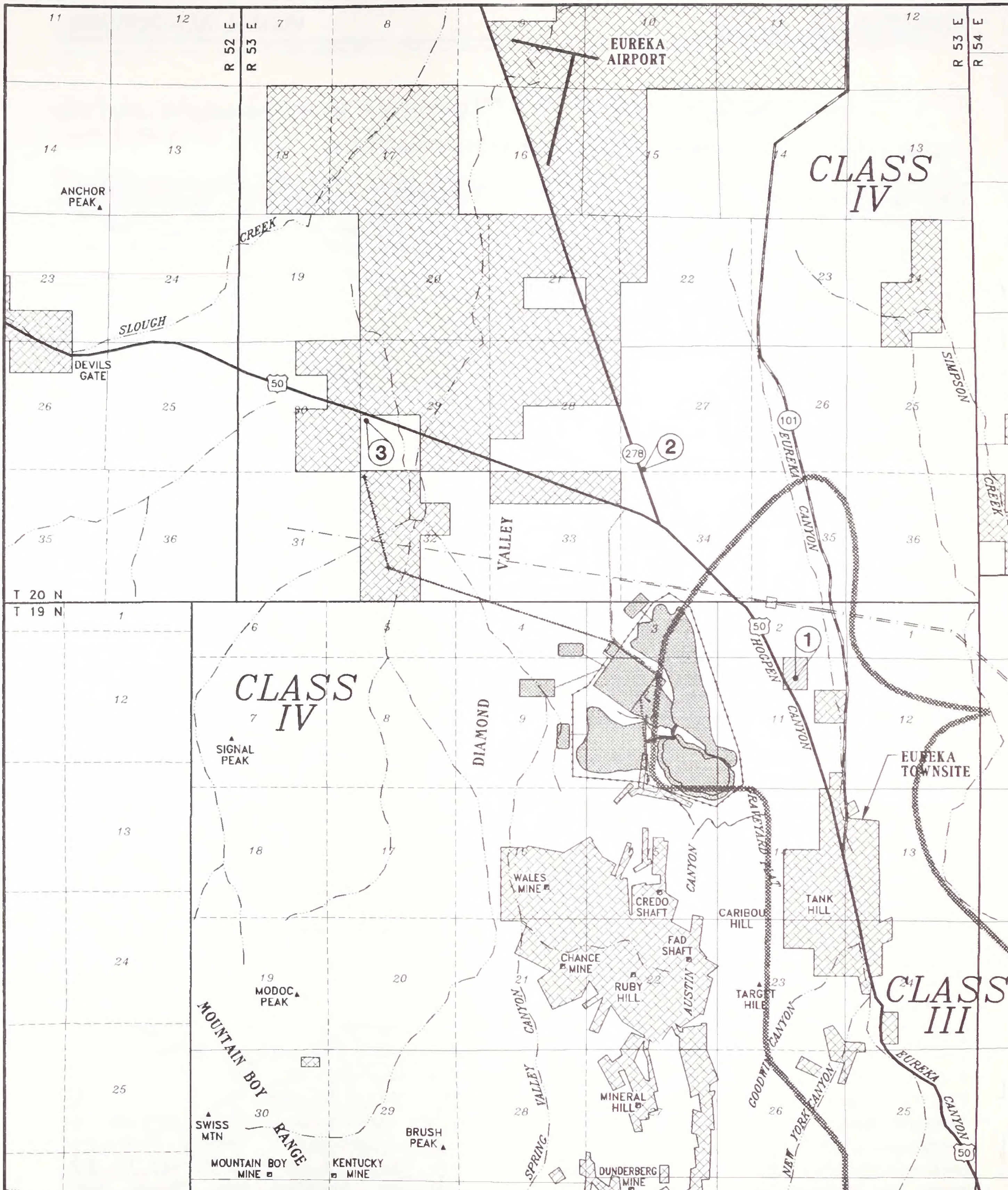
The BLM initiated visual resource management to manage the quality of the landscape by minimizing impacts to visual resources resulting from development activities, while maintaining the effectiveness of all BLM resource programs. In determining visual resource management class designations, the inventory process considers the scenic value of the landscape, viewer sensitivity to the scenery, and the distance of the viewer to the subject landscape. These management classes identify various permissible levels of landscape alteration, while protecting the overall visual quality of the region (BLM 1986b). Management classes are broken down into four levels (Classes I to IV), with Class I designated as most protective of the visual resources. The objectives of these classes vary from very limited management activity to activity that allows major landscape modifications (see Table 3-41).

Landscape character type is a unit of physiographic area having common characteristics of land forms, rock formations, water forms, and vegetation patterns. The study area is located in the Basin and Range Physiographic Province. Lands within the project area are typical of Basin and Range province landscapes within central Nevada with broad, open basins bounded by prominent north-south trending mountain ranges generally covered by piñon-juniper vegetation. This type of landscape allows for long viewing distances. The project area is located at the extreme southern end of a large, alluvial basin (Diamond Valley) and within the undulating foothills of the Fish Creek Range. To the east, the Diamond Mountains rise sharply above the valley and the town of Eureka. Elevation at the site ranges from approximately 6,200 feet to 6,500 feet above mean sea level.

Surface soils and rocks in the area generally range from buff to grayish-tan hues of light-to-medium value. Vegetation, which consists mainly of piñon pine, juniper, shrubs, and sparse grasses, is uneven, with patches of soil exposed from access roads and other disturbances. Vegetation colors in the project area include muted gold, rust, grey-green and medium olive. Structures in the project area vicinity are geometric in form, and are limited to a few wooden headframes and a group of blue-grey corrugated metal buildings located on Ruby Hill.

The project area lies mostly within a Class III visual management landscape (see Map 3-28 and Table 3-41). The western portion of the project area is identified as a Class IV visual management landscape. No Class I and few Class II visual management landscapes exist within the BLM's Battle Mountain District; most of the planning area has been designated as Class IV (BLM 1983).

The project area is located immediately north of gently rolling to hilly terrain which has been disturbed extensively as a result of historical mining activities. This area contains scattered shafts (some with intact headframes) and small waste rock piles. The corrugated metal buildings on Ruby Hill are located approximately 1 mile



LEGEND:

- PRIVATE LAND
- PUBLIC LAND
- PROPOSED ACTION AREAS
- EUREKA COUNTY LAND
- 1 KEY OBSERVATION POINT
- VISUAL RESOURCE MANAGEMENT CLASS

NORTH

0 5500 FEET

RUBY HILL PROJECT

MAP 3-28
VISUAL RESOURCE MANAGEMENT

Table 3-41

BLM Visual Resource Management Classes

Class	Description
I	The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.
II	The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape.
III	The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.
IV	The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Source: BLM 1986b.

south of the project area and are currently in use by Homestake Mining Company. These buildings are features of the local topography and can be observed from many viewpoints in the vicinity.

The project area contains an extensive network of roads and drill pads, a result of recent exploratory drilling. Vegetation in the area is generally dominated by Utah juniper, piñon pine, and bitter brush.

In order to assess the degree of visual contrast that would result from implementation of the Proposed Action, key observation points were selected from which changes to the characteristic landscape could be compared. Key observation points are typically chosen along commonly traveled routes or at other likely observation points (BLM 1986b). For the purposes of this analysis, three key observation points were chosen that provide views toward the project area: 1) the Eureka County Fairgrounds, 2) State Route 278 near the intersection with Highway 50, and 3) U.S. Highway 50 near its intersection with Collingwood Lane (see Map 3-28). Appendix C contains BLM Visual Contrast Rating Worksheets that include descriptions of the existing visual environment as viewed from each of the three key observation points.

Key observation point 1 is located within the Eureka County Fairgrounds, less than 0.5 mile east of the project area. From key observation point 1, views of the project area are to the west, past U.S. Highway 50. The project area is in the foreground/middleground viewing zone and viewed against a backdrop formed by the tree-covered Mountain Boy Range (see Figure 3-7). Scattered piñon pine trees and juniper on the west side of Highway 50 partially obscure views of the project area, which appears as a broad, piñon-juniper covered ridge sloping gently to the north.

Key observation point 2 is located along State Route 278, 0.5 mile north of its intersection with U.S. Highway 50. From this key observation point, the project lies approximately 1.3 miles to the south-southeast in the foreground/middleground viewing zone (see Figure 3-9). The Fish Creek Range and Prospect Peak form a backdrop with uneven/random clusters of piñon-juniper vegetation. The project area is seen as a piñon-juniper covered alluvial bench of dark olive color, gently sloping toward the viewer. Wooden power poles within the utility right-of-way that parallels the northern perimeter of the project area provide the only horizontal elements on the landscape.

Key observation point 3 is located approximately 2 miles northwest of the project area, at the intersection of U.S. Highway 50 and Collingwood Lane. The project area appears in the middleground distance zone against a backdrop that consists of the Diamond Mountains and Prospect Peak (see Figure 3-11). From this vantage point, the project area is viewed as being along an alluvial bench, above the valley floor, and containing patches of piñon-juniper vegetation. Houses along Frontier Road are visible in the foreground, and strips of bare ground, a result of county gravel pits, are visible near the project area.

3.13.2 Environmental Consequences

Visual impacts have been assessed in accordance with standard BLM Visual Resource Management contrast rating principles (BLM 1986b). 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 and alternatives. The degree of contrast is then compared to visual resource management guidelines for the area to determine the level of impact or compatibility. Environmental impacts to visual resources would be considered significant if the Proposed Action or selected alternative could exceed BLM Visual Resource Management objectives for public lands within the project area.

3.13.2.1 Proposed Action

The extent to which the Proposed Action would affect the visual quality depends upon the amount of visual contrast created between the proposed facilities and the existing landscape elements (form, line, color, and texture) and features (land and water surface, vegetation, and structures). The degree of contrast is rated on a standardized Visual Contrast Rating Worksheet for each element and feature (see Appendix C). Management actions that exceed visual management objectives may be required to reduce their overall contrast. Assessing the Proposed Action's contrast in this manner indicates the severity of potential impacts and guides the development of mitigation measures so the Visual Resource Management objectives would be met.

Major mining elements that have potential to contrast with the characteristic landscape include: the open mine pit, waste rock dumps, and heap leach pad; the soil borrow area and growth medium stockpiles; the 250,000-gallon fresh water storage tank; and the truck shop and warehouse, process plant, and the office and parking area.

As shown in Map 3-28, the eastern half of the proposed mine site, which includes the east waste rock dump and open pit, occurs within a Visual Resource Management Class III area. Under Class III guidelines, visual modifications are permitted to attract attention, but not to dominate the view. The remainder of the site occurs within a Class IV area where changes to the landscape are allowed to dominate views and be a major focus of viewer attention.

The waste rock dumps and heap leach pad would be the most visually prominent features of the Proposed Action; the open mine pit would be obscured by these facilities in views from the east, north, and northwest. Natural screening provided by the ridge along the west side of Eureka would shield views of mine elements from the townsite.

The east and west waste rock dumps are proposed to disturb irregularly shaped areas of approximately 217 and 120 acres, respectively (see Map 2-2). Both would reach a maximum height of approximately 260 feet (as measured from their lowest elevations) at the peak of mining operations. The waste rock dumps would be constructed in lifts of approximately 50 feet in height. As described in Section 2.1.4, Waste Rock Dumps, outside slopes of the waste rock dumps on the visually sensitive north and east sides would be simultaneously re-graded to approximately 3H:1V, thereby minimizing the extent of bench-like slopes.

The heap leach pad would require a square footprint of approximately 84 acres. It would be constructed in successive 20- to 25-foot lifts over the life of the mine and would reach a total height of approximately 120 feet. Angle of repose of each ore lift would be approximately 1.4H:1V, resulting in an overall operational slope of approximately 3H:1V.

The following discussion describes in more detail those components of the Proposed Action that would result in changes to the visual landscape as viewed from the three key observation points described in the preceding section. Visual Contrast Rating Worksheets for each of these key observation points can be found in Appendix C.

Figure 3-7 represents the Proposed Action as viewed from key observation point 1 at the mid-point of mining, which is defined here as 3 to 4 years after initial construction. The slopes on the eastern sides of the east waste rock dump are shown in this simulation. Figure 3-8 represents the maximum extent of the waste rock dump at the height of mining operations (defined here as approximately 7.5 years after initial construction). The overall appearance of the dump would somewhat resemble the predominant forms, lines, and textures of landforms found in the characteristic landscape. As with the mid-point of mining scenario, all other project elements would not be visible behind the waste rock dump when viewed from this key observation point. For many years after its construction, the sparsely vegetated waste rock dump would contrast strongly with colors found in the characteristic landscape. The face of the waste rock dump would consist of a mosaic of light to moderately colored hues as a result of the varied origin of the raw rock materials in these slopes. Bright sunlight during the morning and early afternoon would exacerbate these color differences and could create reflective glare from the angular mine rock materials. There also would be a slight texture contrast between the bare surface of the waste rock dump and the vegetation textures and patterns in the natural landscape. Reseeding and trial plantings of piñon pine and juniper seedlings is expected to result in a stippled appearance of vegetation along the face of the waste rock dump for many years.

Changes to the characteristic landscape as a result of the Proposed Action would be noticeable in views from key observation point 2. At the mid-point of mining, major mining elements visible would include the east waste rock dump, leach pad, and portions of the truck shop/warehouse and the process plant (Figure 3-9). At the height of mining, the waste rock dumps and heap leach pad would result in moderate contrasts with existing land forms, and the lack of mature vegetation on these features would result in moderate color contrasts (see Figure 3-10). However, Prospect Peak and the Fish Creek Range would continue to dominate views from this key observation point. Contrasts in line would be considered weak as the proposed facilities somewhat resemble natural lines and textures in the mine vicinity. Outdoor night lighting at the process plant and heap leach pad would attract the attention of south-bound motorists on Highway 278.

Few major contrasts are expected to result from the Proposed Action when viewed from key observation point 3, partially as a result of the longer viewing distance. Major mining elements visible at the mid-point of mining include both waste rock dumps, the leach pad, a small portion of the open pit, the roof of the truck shop/warehouse, and the 250,000-gallon water tank on Mineral Point (Figure 3-11). The Proposed Action is viewed against a backdrop formed by Prospect Peak and the Fish Creek Range. At the height of mining (Figure 3-12), the open pit would no longer be visible as a result of the expanded waste rock dumps and heap leach pad, which would contrast moderately with colors of the characteristic landscape during the life of the Ruby Hill Mine, but only weakly with respect to form and line. At this viewing distance, the texture of these mine elements would appear to blend with that of the characteristic landscape.

Outdoor night lighting at the mine would be visible from residences located along Frontier Road and would attract the attention of east-bound motorists on Highway 50.

Dust plumes originating from the mine area could occasionally be visible for distances of several miles. Dust could be generated as a result of blasting in the pit area, vehicular traffic on haul roads, and by the dumping of waste rock. The creation of large dust plumes would be minimized by wetting blast areas and dirt roads as proposed by Homestake. This requirement is considered adequate to avoid significant impairment of the visual resource.

Overall, the Proposed Action would contrast with the existing forms, lines, and colors of the characteristic landscape. Those portions of the Proposed Action that lie outside the Visual Resource Management Class III area would be consistent with Visual Resource Management Class IV objectives. However, construction of the east waste rock dump, as currently proposed, would not be consistent with Visual Resource Management Class III objectives as a result of its strong contrast in color with the predominant vegetative cover. These impacts would be considered significant and adverse according to the criteria presented in Section 3.13.2, Environmental Consequences; specifically, the proposed waste rock dump would dominate views from key observation point 1.

During mining closure activities, the heap leach pad would be graded to eliminate the benches between lifts, reduce the side slopes to an approximate 3H:1V grade, and to round off the heap edges to approximate more natural contours. Mine access roads would be ripped and reseeded, and buildings and ancillary facilities would be removed and their foundations ripped and reseeded.

Assuming the proposed reclamation program is successful, the visual contrast of the Proposed Action would be reduced over time. Color and texture would blend more with the natural landscape (refer to Figures 3-8, 3-10, and 3-12). Revegetation of the faces of the waste rock dump and the heap leach pad would reduce visual contrasts with surrounding vegetation. Vegetation over the long-term would begin to blend with the color and texture of the existing natural landscape, reducing visual impacts of the Proposed Action over time as viewed from each of the three key observation points.

3.13.2.2 East Waste Rock Dump Alternative

Implementation of the East Waste Rock Dump Alternative would result in greater visual contrasts than those described for the Proposed Action. The largest contrast would result from construction of the waste rock dump, which would reach a maximum height of approximately 260 feet and disturb an area of 360 acres. Construction of the dump and the heap leach pad would occur as described for the Proposed Action. The waste rock dump would dominate the landscape in views from key observation point 1. At full build-out, the waste rock dump would appear as an elongated rectangular mass in the foreground that would break the skyline and dominate views from the County Fairgrounds (see Figures 3-13 and 3-14). It would almost entirely block views of mountain ranges to the west and southwest, with only the uppermost portions remaining visible. As with the Proposed Action, contrasts associated with the sparsely vegetated waste rock dump would remain for many years after its construction. The waste rock dump of this alternative would likely dominate the views from key observation point 2 as a result of the shear mass of the dump and that fact that it intrudes into the skyline (Figures 3-15 and 3-16). Thus, this alternative would not meet visual resource management objectives and as such, would result in a significant adverse impact according to the criteria presented in Section 3.13.2, Environmental Consequences.

As with the Proposed Action, the East Waste Rock Dump Alternative would result in few major contrasts when viewed from key observation point 3 (Figures 3-17 and 3-18). Outdoor night lighting at the mine site would attract attention in views from key observation points 2 and 3. The remainder of impacts to visual resources attributed to this alternative are similar to those described for the Proposed Action.

3.13.2.3 West Waste Rock Dump Alternative

Implementation of the West Waste Rock Dump Alternative would result in the least visual contrast when compared to the Proposed Action and all other project alternatives. Under this alternative, the waste rock dump would disturb an area of approximately 214 acres and reach a maximum height of 300 feet. The location of the dump west of Mineral Point would serve to largely screen it in views from key observation point 1, resulting in a contrast that is considered only moderate with respect to the characteristic landscape. From this viewpoint, the upper high wall of the open pit would be visible as well as the truck shop/warehouse and the water storage tank both during and at the height of mining operations (Figures 3-19 and 3-20). When viewed from key observation point 2, the West Waste Rock Dump Alternative would remain subordinate to views of Prospect Peak and the Fish Creek Range, although mining elements would be visible and would attract the attention of the casual observer (Figures 3-21 and 3-22).

As with the Proposed Action, this alternative would not result in major contrasts when viewed from key observation point 3 (Figures 3-23 and 3-24). The only impact of consequence would be that caused by a lack of mature vegetation on the waste rock dump and the resultant color contrast. This contrast would remain for many years. Outdoor night lighting at the mine would attract attention in views from key observation points 2 and 3. This alternative would meet visual resource management objectives when viewed from each of the three key observation points used in this analysis. Therefore, no significant adverse impacts to visual resources would occur.

3.13.2.4 Partial Backfilling Alternative

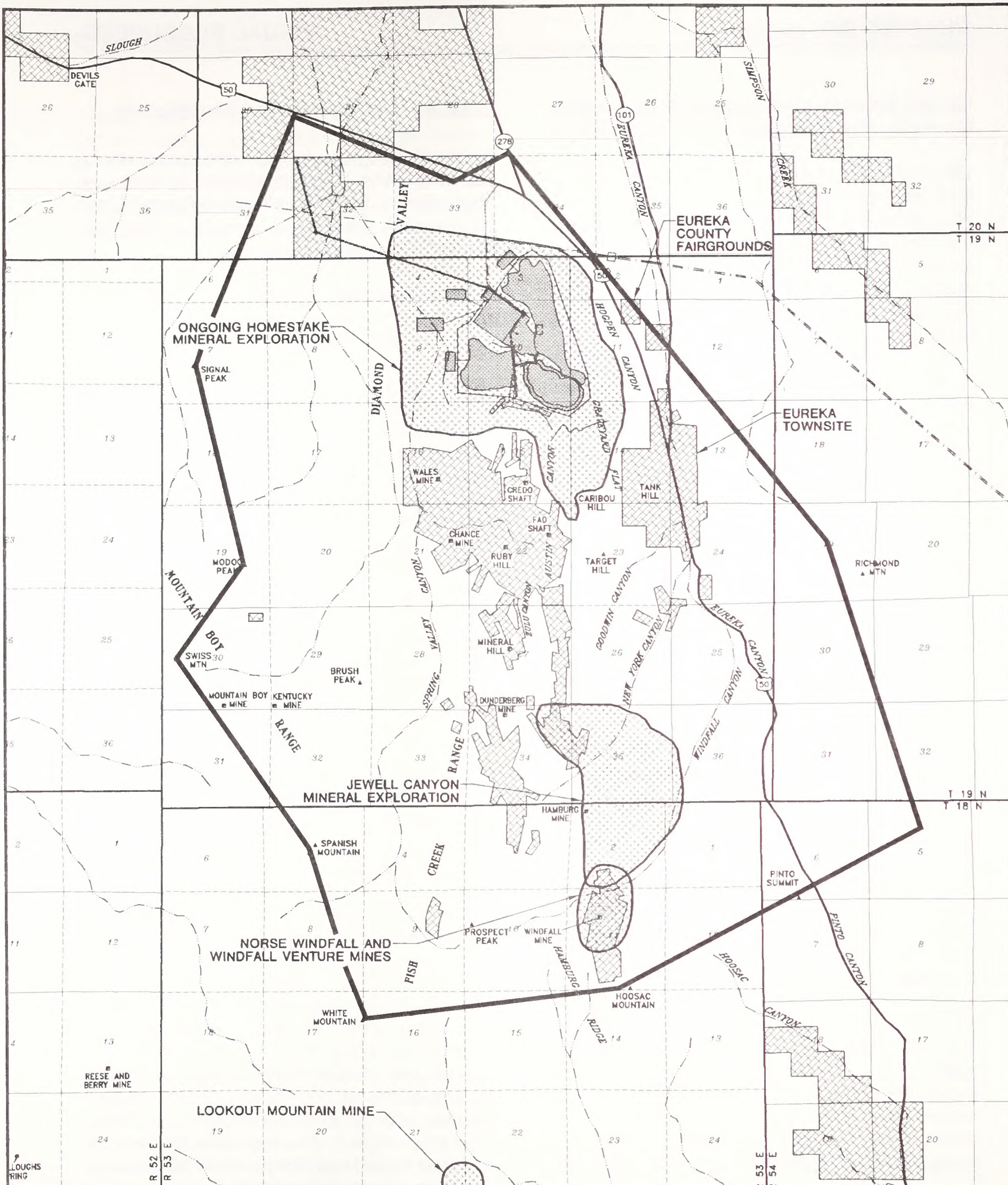
Changes to the characteristic landscape associated with implementation of the alternative to Partially Backfill the Pit would not be noticeably different from those of the Proposed Action. Approximately 3 million tons of waste rock would be returned to the open pit in lieu of adding it to the waste rock dump. However, the amount of waste rock returned to the pit is minor (about 5 percent of the entire volume of the Proposed Action waste rock dump) and would not appreciably reduce contrasts in form, line, and color of the waste rock dump. Further, the partial backfilling of the pit would not result in a reduction of visual impacts since that portion of the pit to be backfilled would not be visible from either of the three key observation points used in the visual analysis.

3.13.2.5 No Action Alternative

Under the No Action Alternative, additional disturbance and the development of an open pit, waste rock dump, heap leach pad and other mining-related facilities would not occur within the project area. The visual environmental would remain essentially unchanged, however, Homestake would be required to reclaim surface disturbances associated with its ongoing exploration program.

3.13.3 Cumulative Impacts

The area for analysis for cumulative effects to visual resources is shown in Map 3-29. This area incorporates the entire viewshed of the Proposed Action area as seen from overlapping 90 degree angles from each of the three key observation points identified in Section 3.13.1, Affected Environment. Past and present activities are encompassed in the description of the affected environment (Section 3.13.1, Affected Environment), leaving only the reasonably foreseeable future actions for consideration in the assessment of cumulative impacts to visual resources. Neither the Tonkin Springs or Atlas mines are located within the cumulative assessment area, as defined above for visual resources (Map 3-29). Further mineral exploration within the cumulative assessment area would not result in significant or long-term visual impact. In addition, the following actions located within the cumulative assessment area would not contribute to cumulative visual resource impacts as these projects would be screened in views from the key observation points by the mountainous topography south of the Proposed Action area: Norse Windfall Mine, Windfall Venture Mine,



LEGEND:

- PAST DISTURBANCE
- PRESENT DISTURBANCE
- PROPOSED ACTION
- CUMULATIVE ASSESSMENT BOUNDARY

MILES 0 1 2

NORTH

RUBY HILL PROJECT

MAP 3-29
CUMULATIVE ASSESSMENT AREA
FOR VISUAL RESOURCES

Lookout Mountain Mine, and the Jewell Canyon Mineral Exploration project.

The only project that has the potential to result in cumulative impacts, when considered in concert with the Proposed Action or alternatives, would be the East Archimedes Oxide Project. This mine expansion would generate a volume of additional waste rock approximately equivalent to that of the Proposed Action (i.e., approximately 60 million tons). It is reasonable to assume that this waste rock would be dumped on public lands in the immediate vicinity of the expanded open pit. It is unlikely that a new waste rock dump, or dumps, would be located closer to either the Town of Eureka or Highway 50 given topographical and political constraints, and the fact that creating a massive dump on any such site (except the area immediately north of the Proposed Action) would conflict with existing Class III visual management objectives for the area (see Map 3-28). The option does exist for Homestake to place a large portion of this waste rock within the location of the currently proposed East Waste Rock Dump. This could be accomplished by either expanding the East Waste Rock Dump, or should the West Waste Rock Dump Alternative be selected, placing the entire volume in this area. Visual impacts resulting from either of these two options would be similar to those described in Section 3.13.2.2, East Waste Rock Dump Alternative, and would conflict with Class III visual resource management objectives.

The waste rock dump(s) proposed as part of the East Archimedes Oxide Project could alternatively be located either west or north of the current Proposed Action area on public lands classified as Class IV, where major modification of the existing landscape is allowed. Disturbances within this classification are allowed to dominate the view and be a major focus of viewer attention (Table 3-41). Consequently, construction of the waste rock dump under this scenario would not exceed visual management objectives for public lands within the cumulative assessment area and, therefore, would not generate cumulative impacts.

3.13.4 Mitigation and Monitoring

Issue: The proposed waste rock dumps would create moderate to high contrasts with forms and lines, and low contrast with textures found in the characteristic landscape, in views from the County Fairgrounds.

Measure 1: Placement of waste rock on the top of the waste rock dumps would be performed to create irregular top surfaces that would reduce the impact of straight line geometrics. Prior to trial planting and seeding, slopes of the waste rock dumps would be ripped along the contours with bulldozers and "moonscaped" to provide relief on the otherwise uniform waste rock faces. ***Plans for placement of rock and moonscaping would be developed on a site-specific basis for the East and West Waste Rock Dumps and would be reviewed with BLM prior to implementation.***

Effectiveness: The creation of an undulating top surface on the waste rock dumps would reduce the impact of straight lines and more closely mimic natural land forms in the mine vicinity. Moonscaping of waste rock slopes would serve to reduce textural contrasts as viewed from all key observation points.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

*Issue: The proposed waste rock dumps would generate moderate to high contrasts with lines and colors found in the characteristic landscape in views from key observation points 1, 2, **and 3**.*

Measure 2: The preponderance of piñon and juniper seedlings to be planted along the waste rock dumps would be placed along west and north facing slopes in a random fashion with clusters that closely mimic woody vegetation patterns of the natural landscape to the degree possible. Evenly spaced plantings of seedlings should be avoided. ***Planting plans for the East and West Waste Rock Dumps would be reviewed with BLM prior to implementation.***

Effectiveness: Placement of piñon and juniper seedlings along north and west slopes of the waste rock dumps at the densities proposed would, over the long-term, reduce color and texture contrasts as viewed from key observation points 1, 2, *and 3*. The clustering and random placement of the seedlings would avoid the creation of man-made lines along the slopes of the waste rock dumps that would likely result should plantings be evenly spaced.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: The East Waste Rock Dump would continue to violate VRM Class III management guidelines during the life of the Proposed Action as a result of its sheer mass (form) when viewed from key observation point 1 and 2.

Measure 3: Approximately 10 million tons of the 35 million tons of waste rock proposed for the East Waste Rock Dump would be placed within the West Waste Rock Dump area instead. This measure would limit the East Waste Rock Dump to 25 million tons and result in a total of 35 million tons of waste rock being placed in the West Waste Rock Dump. The dump footprint would not be reduced, rather the overall dump height would be reduced.

Effectiveness: Placement of 10 million tons less waste rock within the East Waste Rock Dump would result in a dump that is approximately 30 percent smaller in mass than the Proposed Action. The East Waste Rock Dump, however, would still dominate in views from key observation points 1 and 2 and will probably exceed Class III Visual Resource Management objectives, even after the reclamation period.

Application: This measure would apply only to the Proposed Action.

Issue: Outdoor nightlighting of facilities at the proposed mine would attract the attention of south-bound motorists on State Highway 278 and motorists traveling east on U.S. Highway 50.

Measure 4: Outdoor night lighting at the Ruby Hill Mine would be shielded and directed downward where possible.

Effectiveness: Proper shielding and directing of outdoor lights would reduce, but not eliminate, skyward illumination and glare.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Construction of the East Waste Rock Dump would affect the visual quality of the area for residents of Eureka and Diamond Valley, as well as tourists who travel along Highway 50.

Measure 5: Homestake would establish an advisory group of interested parties, to address issues that are of concern to the public. The group would include Homestake, agencies, and citizens. These issues include noise, dust, blasting vibrations, and visual impacts. This group is intended to function as a clearing house for public concerns, so that they can be brought to the attention of Homestake as quickly as possible for corrective actions. Homestake has agreed to work with the group throughout the life of the project to identify areas or view points where impacts to visual resources are of particular concern and to develop additional mitigation that would address impacts that may not be fully identifiable until mining activities begin. The group would consider impacts and suggest additional mitigation. Homestake would review all suggested mitigation considering feasibility, effectiveness, and cost and advise the group as to which measures would be implemented, implemented with modification, or not implemented (along with the reason for this decision). The objectives for the group are to minimize impacts of the project on the community and facilitate Homestake's interaction with the public.

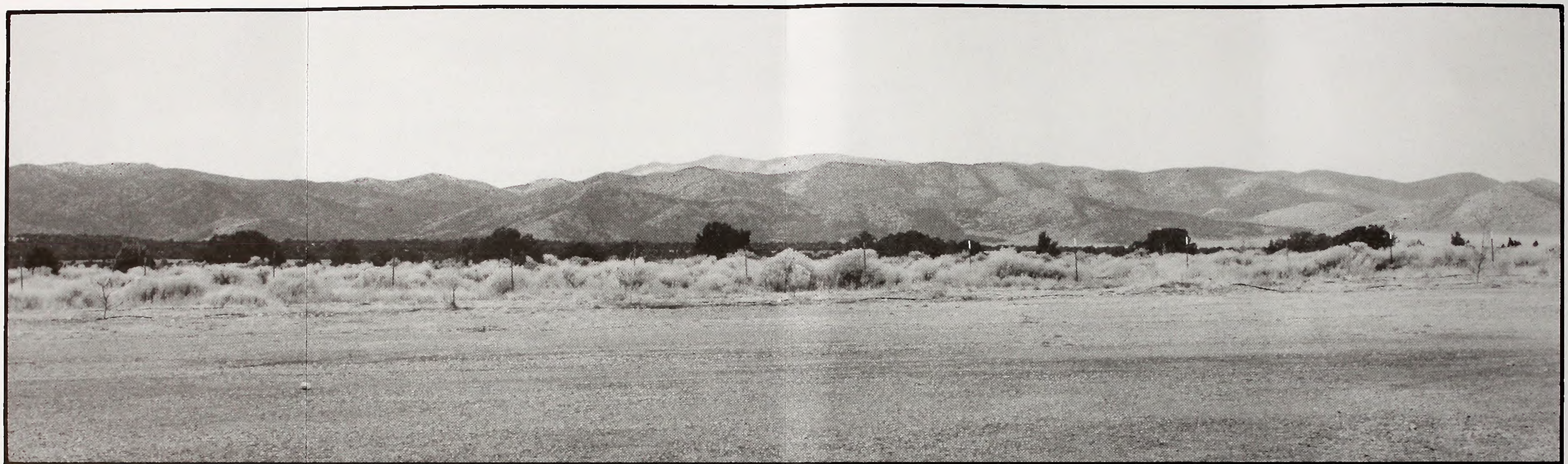
Effectiveness: This measure would be effective in addressing public concerns as they may arise throughout the life of the project.

Application: This measure would apply to the Proposed Action and East Waste Rock Dump Alternative.

3.13.5 Residual Adverse Impacts

Class III visual resource management objectives could be achieved, as viewed from key observation point 1, after successful reclamation of the waste rock dumps and implementation of the suggested Mitigation Measures. Proposed reclamation should notably reduce color and textural contrasts over the long term. If expected benefits to the visual environment from reclamation activities were not realized, contrasts of color and texture on disturbed areas would remain indefinitely.

Outdoor night lighting at the Ruby Hill mine would continue to attract the attention of passing motorists and be visible from residences located within the Diamond Valley during the life of mine operations. Mitigative measures to shield night lighting, however, would reduce excessive skyward illumination and glare. Night lighting of mine facilities would be discontinued upon mine closure; these impacts would therefore be considered short-term.



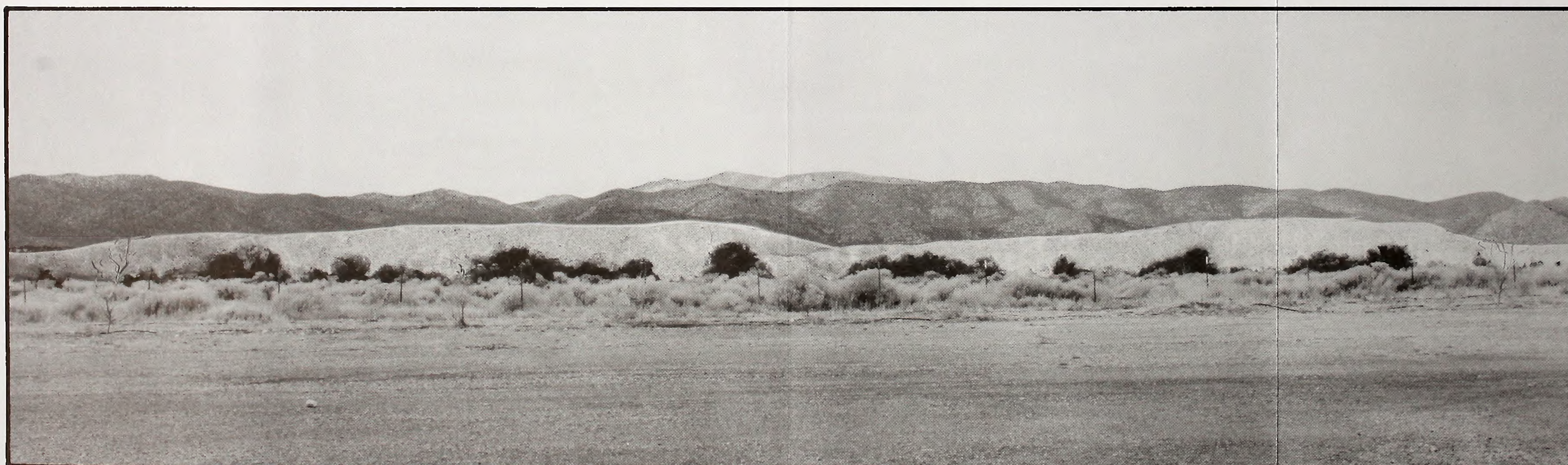
Existing View from Key Observation Point #1 on the Eureka County Fairgrounds

View from Key Observation Point #1 at Mid-Point of Mining

RUBY HILL PROJECT

FIGURE 3-7
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #1
PROPOSED ACTION

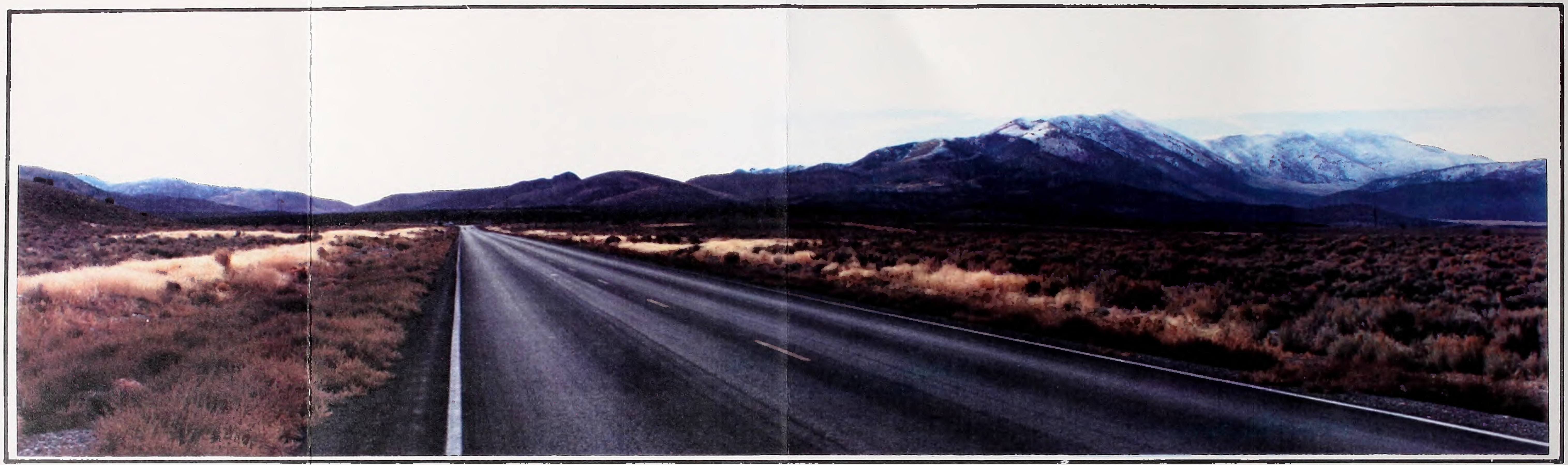
View from Key Observation Point #1 at Height of Mining



View from Key Observation Point #1 after Reclamation

RUBY HILL PROJECT

FIGURE 3-8
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #1
PROPOSED ACTION

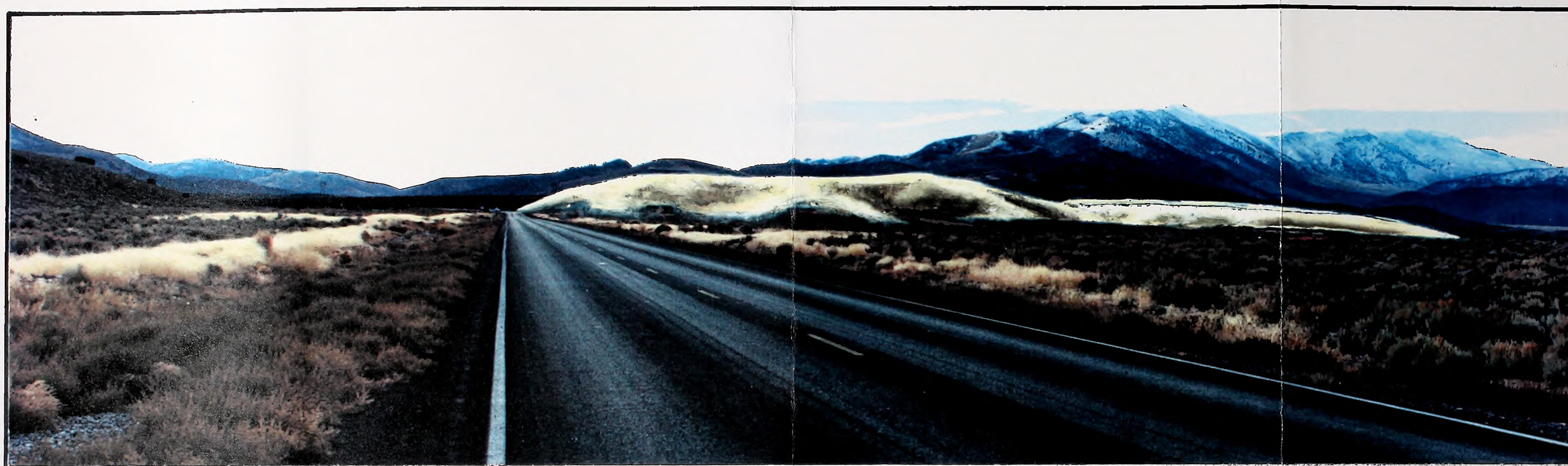


Existing View from Key Observation Point #2 on State Route 278

View from Key Observation Point #2 at Mid-Point of Mining

RUBY HILL PROJECT

FIGURE 3-9
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #2
PROPOSED ACTION

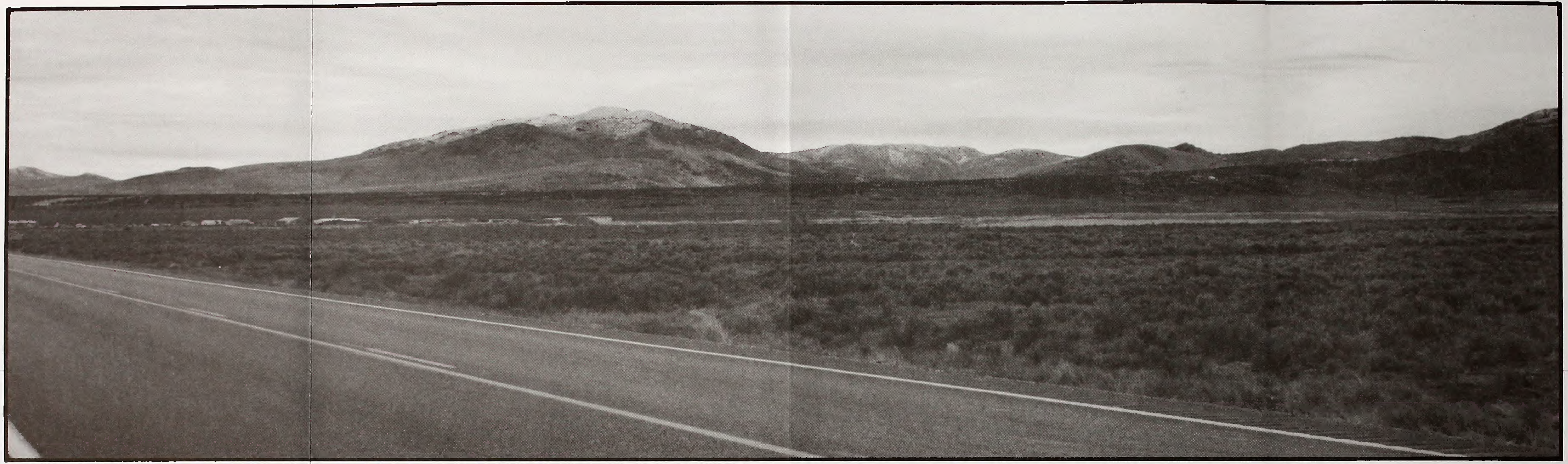


View from Key Observation Point #2 at Height of Mining

View from Key Observation Point #2 after Reclamation

RUBY HILL PROJECT

FIGURE 3-10
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #2
PROPOSED ACTION



Existing View from Key Observation Point #3 on U.S. Highway 50

View from Key Observation Point #3 at Mid-Point of Mining

RUBY HILL PROJECT

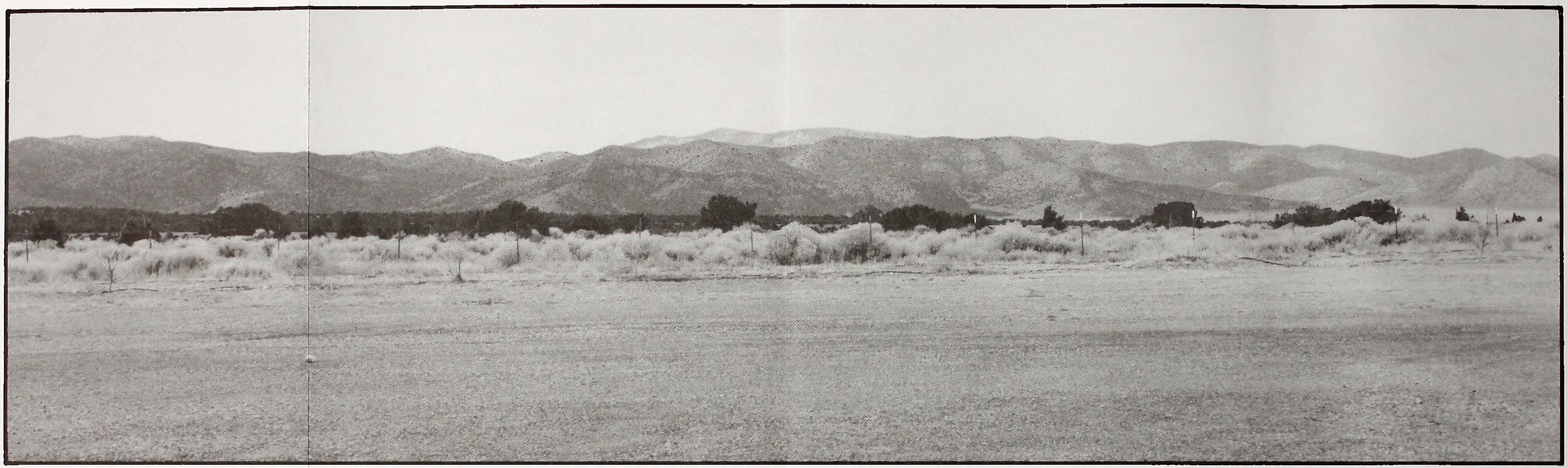
FIGURE 3-11
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #3
PROPOSED ACTION

View from Key Observation Point #3 at Height of Mining

View from Key Observation Point #3 after Reclamation

RUBY HILL PROJECT

FIGURE 3-12
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #3
PROPOSED ACTION



Existing View from Key Observation Point #1 on the Eureka County Fairgrounds

View from Key Observation Point #1 at Mid-Point of Mining

RUBY HILL PROJECT

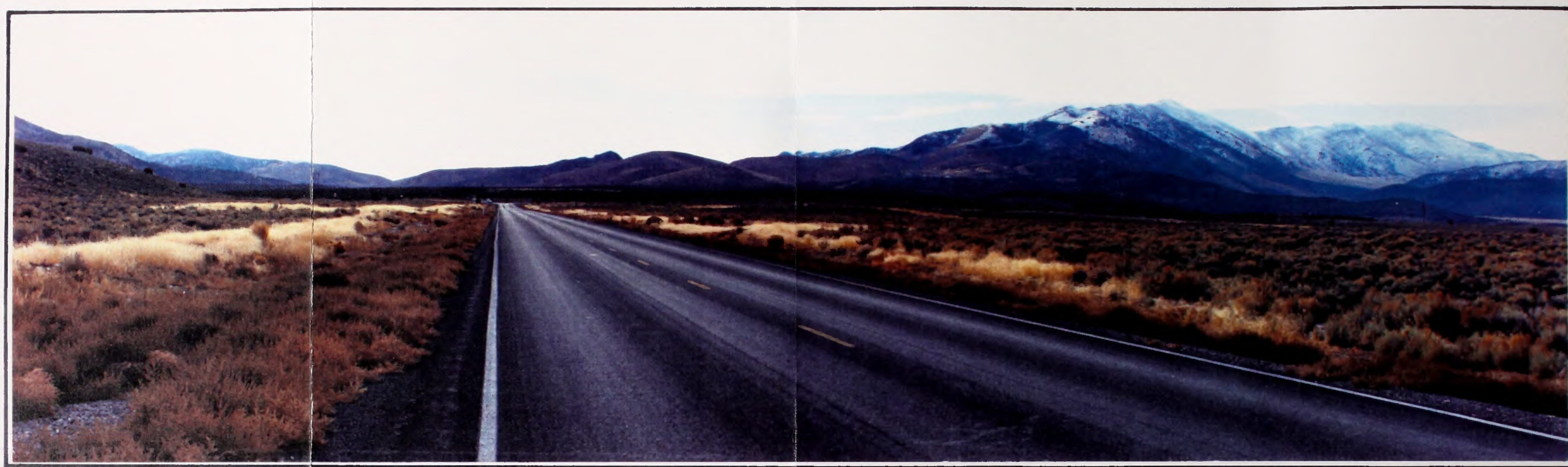
FIGURE 3-13
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #1
EAST WASTE ROCK DUMP ALTERNATIVE


View from Key Observation Point #1 at Height of Mining


View from Key Observation Point #1 after Reclamation

RUBY HILL PROJECT

FIGURE 3-14
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #1
EAST WASTE ROCK DUMP ALTERNATIVE

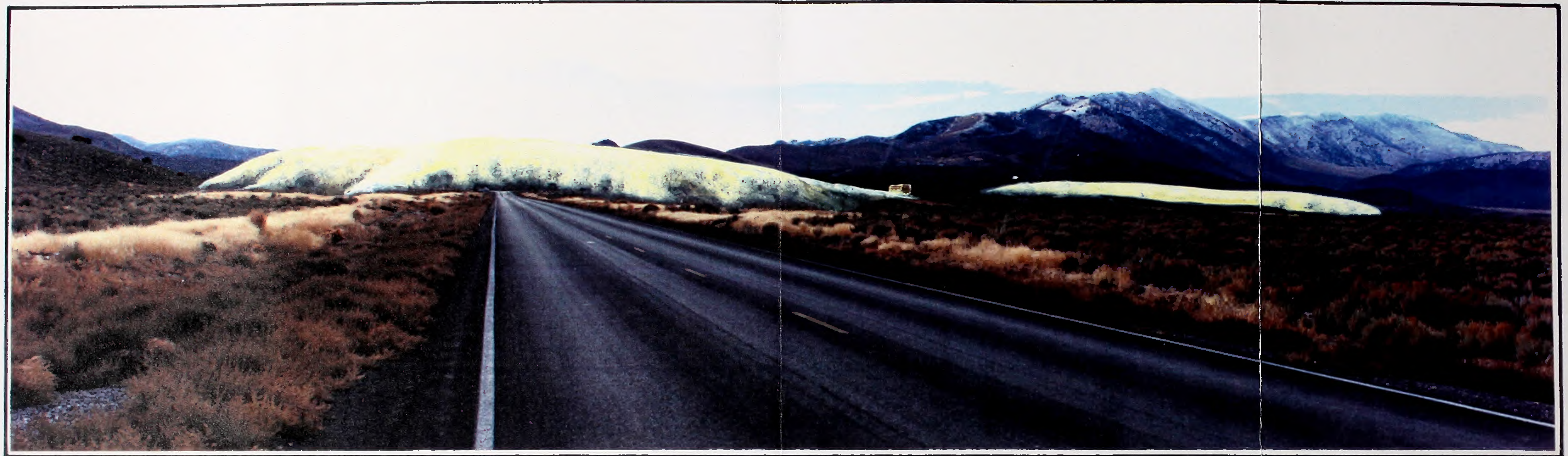


Existing View from Key Observation Point #2 on State Route 278

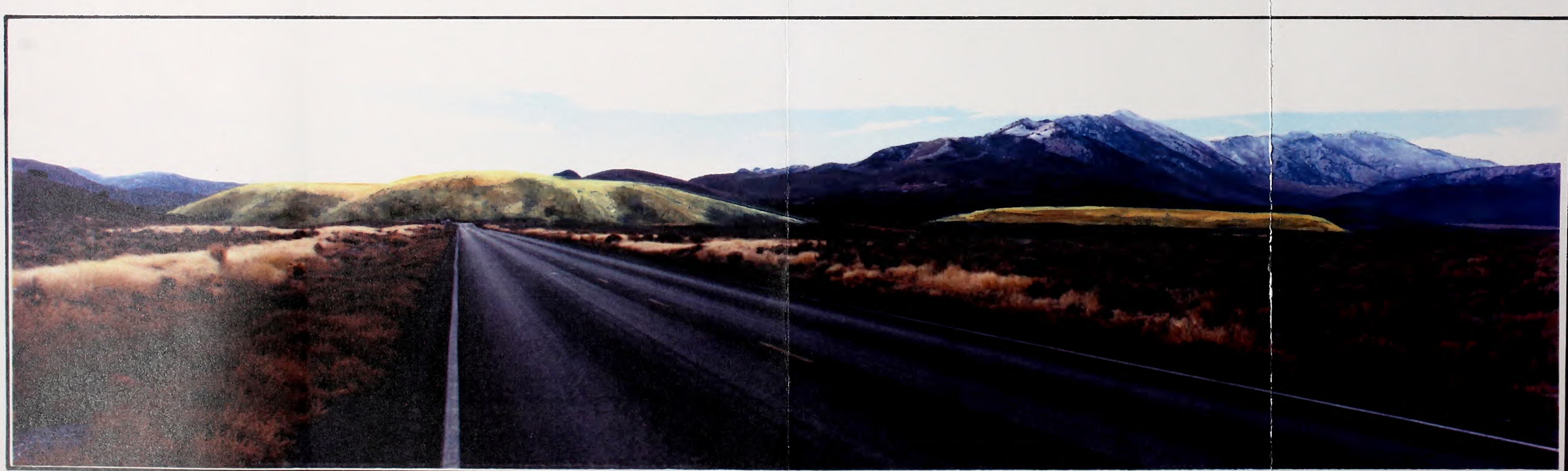
View from Key Observation Point #2 at Mid-Point of Mining

RUBY HILL PROJECT

FIGURE 3-15
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #2
EAST WASTE ROCK DUMP ALTERNATIVE



View from Key Observation Point #2 at Height of Mining



View from Key Observation Point #2 after Reclamation

RUBY HILL PROJECT
FIGURE 3-16 VIEWS AT HEIGHT OF MINING AND AFTER RECLAMATION - KEY OBSERVATION POINT #2 EAST WASTE ROCK DUMP ALTERNATIVE

Existing View from Key Observation Point #3 on U.S. Highway 50

View from Key Observation Point #3 at Mid-Point of Mining

RUBY HILL PROJECT

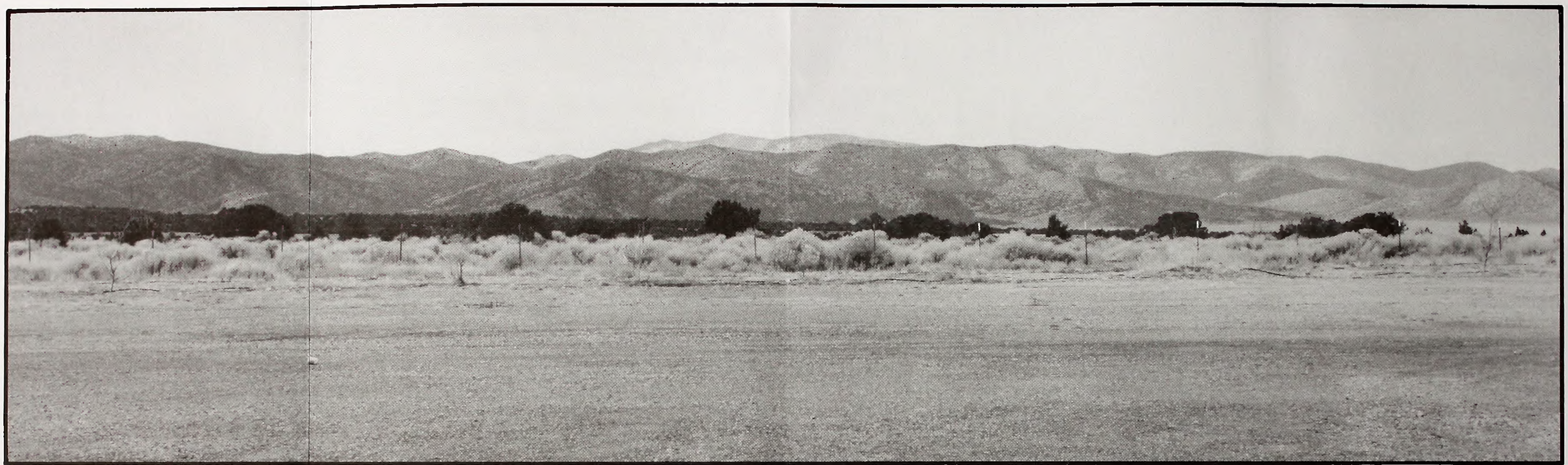
FIGURE 3-17
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #3
EAST WASTE ROCK DUMP ALTERNATIVE

View from Key Observation Point #3 at Height of Mining

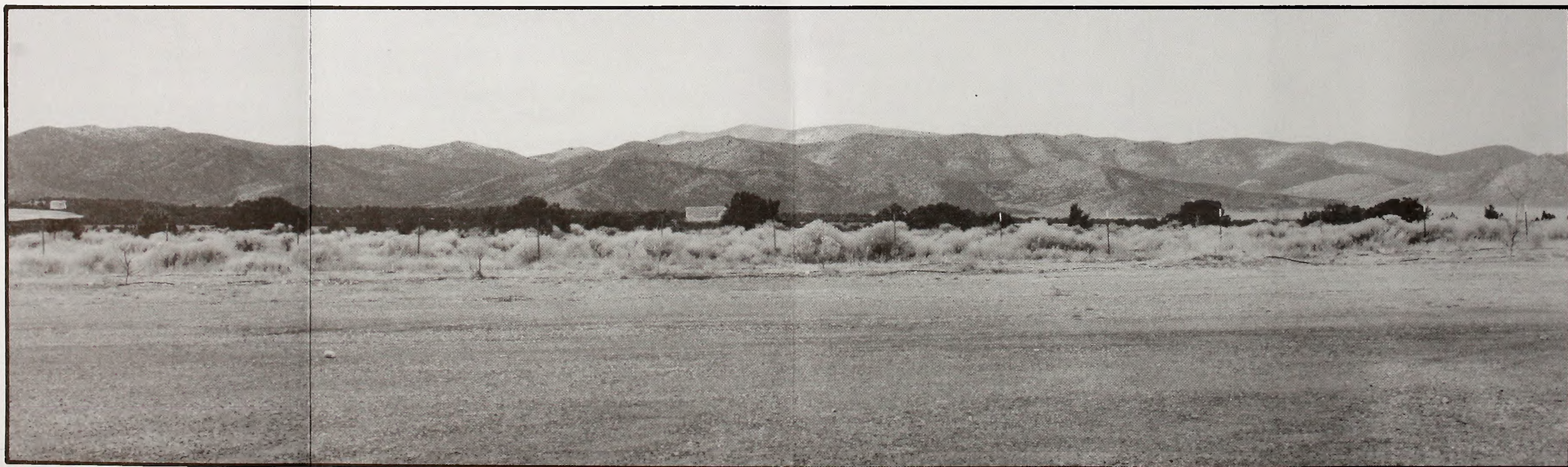
View from Key Observation Point #3 after Reclamation

RUBY HILL PROJECT

FIGURE 3-18
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #3
EAST WASTE ROCK DUMP ALTERNATIVE



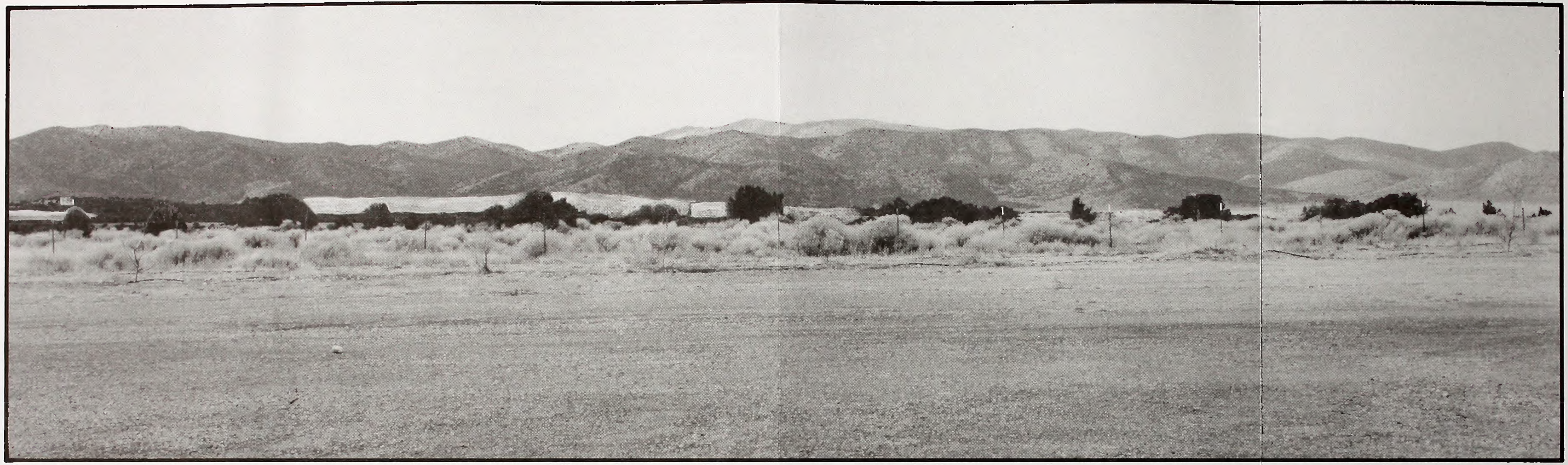
Existing View from Key Observation Point #1 on the Eureka County Fairgrounds



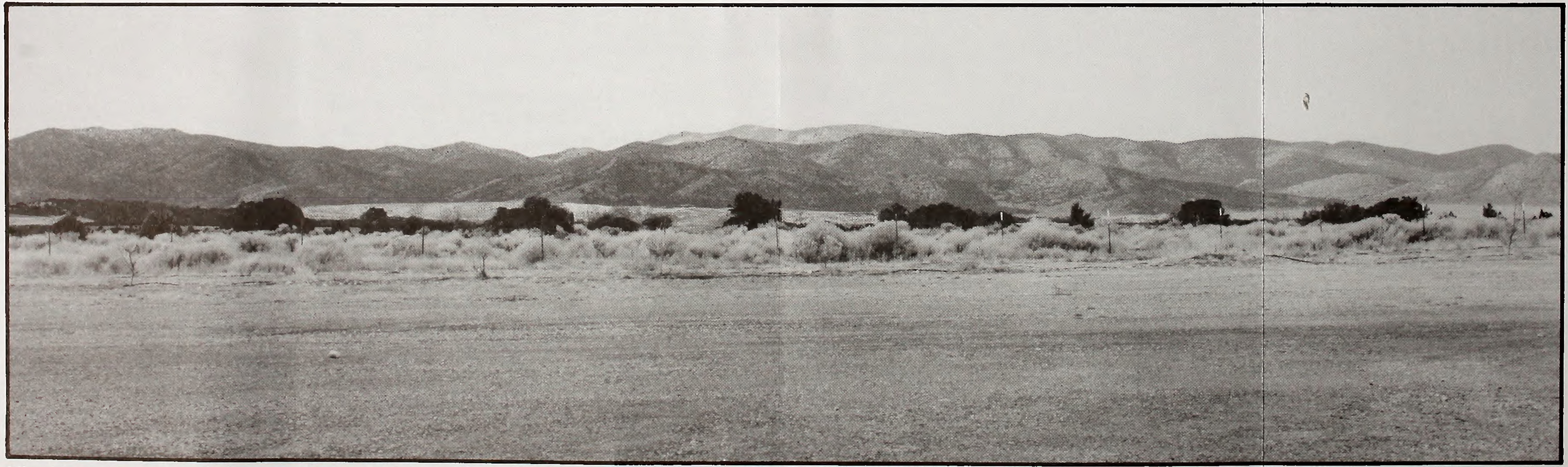
View from Key Observation Point #1 at Mid-Point of Mining

RUBY HILL PROJECT

FIGURE 3-19
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #1
WEST WASTE ROCK DUMP ALTERNATIVE



View from Key Observation Point #1 at Height of Mining



View from Key Observation Point #1 after Reclamation

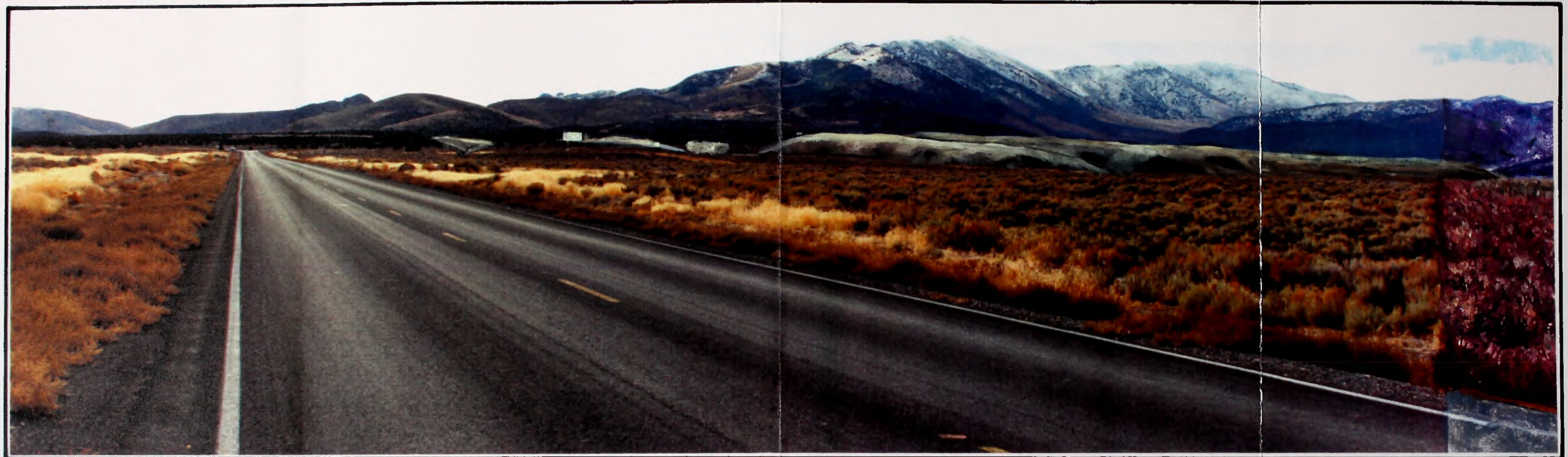
RUBY HILL PROJECT

FIGURE 3-20
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #1
WEST WASTE ROCK DUMP ALTERNATIVE

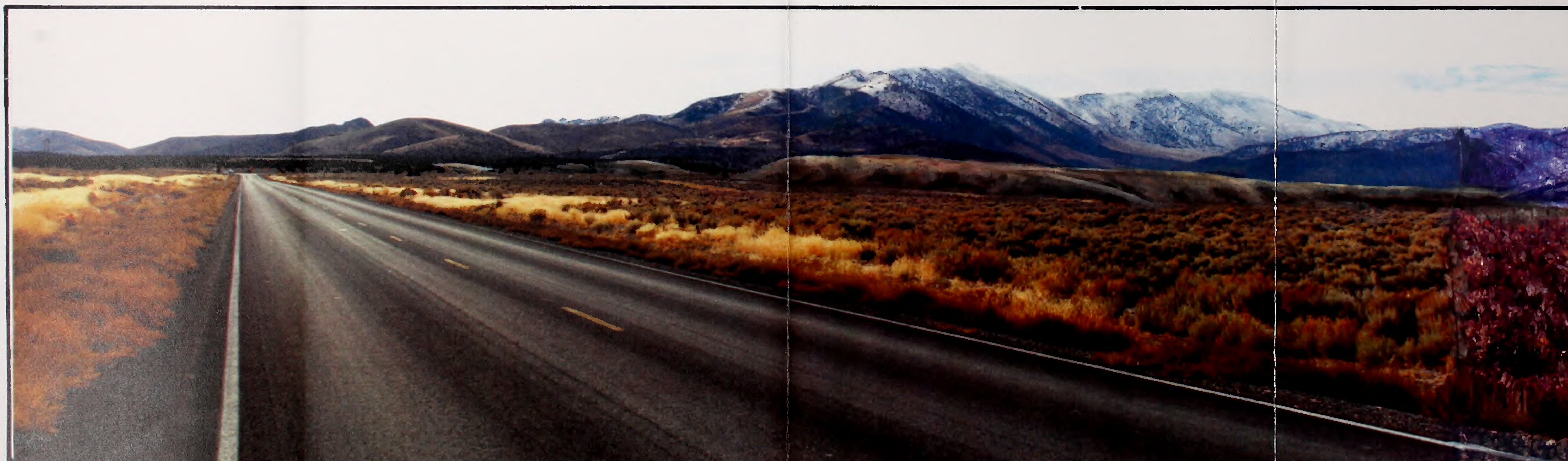

Existing View from Key Observation Point #2 on State Route 278


View from Key Observation Point #2 at Mid-Point of Mining

RUBY HILL PROJECT
FIGURE 3-21 VIEW OF EXISTING CONDITIONS AND VIEW AT MID-POINT OF MINING - KEY OBSERVATION POINT #2 WEST WASTE ROCK DUMP ALTERNATIVE



View from Key Observation Point #2 at Height of Mining

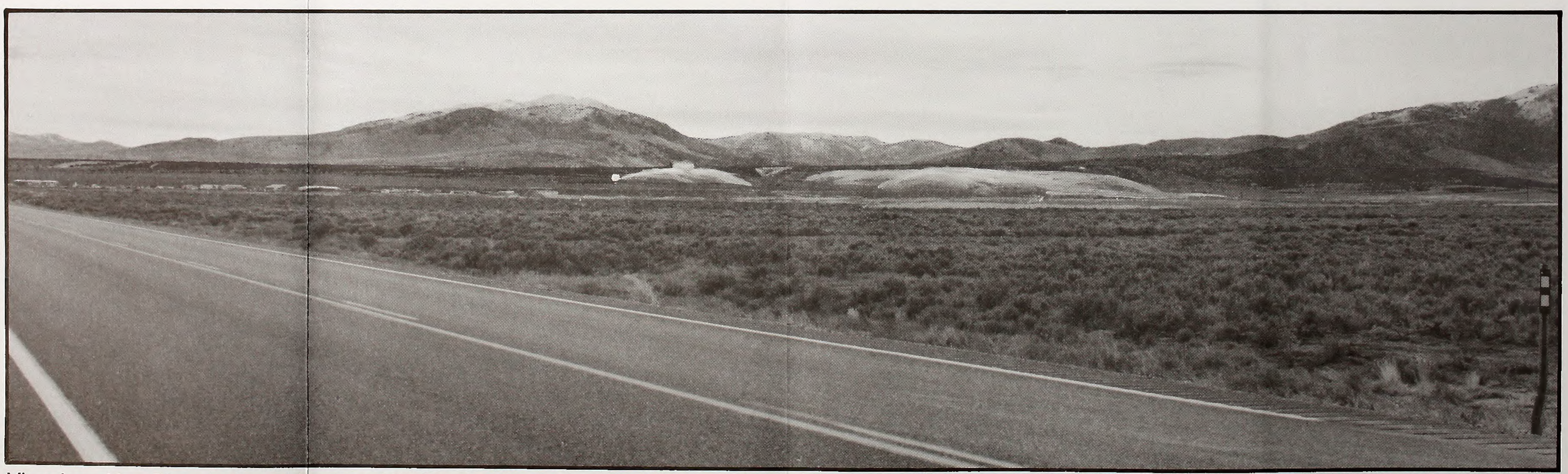


View from Key Observation Point #2 after Reclamation

RUBY HILL PROJECT

FIGURE 3-22
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #2
WEST WASTE ROCK DUMP ALTERNATIVE

Existing View from Key Observation Point #3 on U.S. Highway 50



View from Key Observation Point #3 at Mid-Point of Mining

RUBY HILL PROJECT

FIGURE 3-23
VIEW OF EXISTING CONDITIONS
AND VIEW AT MID-POINT OF MINING -
KEY OBSERVATION POINT #3
WEST WASTE ROCK DUMP ALTERNATIVE

View from Key Observation Point #3 at Height of Mining

View from Key Observation Point #3 after Reclamation

RUBY HILL PROJECT

FIGURE 3-24
VIEWS AT HEIGHT OF MINING
AND AFTER RECLAMATION -
KEY OBSERVATION POINT #3
WEST WASTE ROCK DUMP ALTERNATIVE

3.14 Cultural Heritage

3.14.1 Affected Environment

Cultural heritage 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 heritage 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 heritage resources and have been considered during review of the proposed project. A detailed explanation of each act is provided in Appendix D, Cultural Heritage Resources Legislation Descriptions.

- The Antiquities Act of 1906 (PL 59-209) and the Archaeological Resources Protection Act of 1979 (PL-96-95).
- National Historic Preservation Act of 1966, as amended; 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 1978; requires Federal agencies to evaluate their policies and procedures with the objective of protecting the religious freedoms of Native Americans.
- Native American Graves Protection and Repatriation Act of 1990; although specific actions are required in this Act, to date, no implementing regulation has been promulgated.

3.14.1.1 Cultural Setting

<u>Prehistoric Background</u>

The Proposed Action is located in the central portion of the Great Basin, an area that has experienced a long history of human occupation. The earliest evidence of human occupation recorded to date in eastern Nevada is Smith Creek Cave, located in the Snake Range east of the project area, which yielded radiocarbon dates ranging from 11,680 years before present to 9,940 years before present (BLM 1995).

Archaeological evidence suggests that the area supported 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. During the time period known as the Pre-Archaic (11,200 to 7,000 years before present), adaptive strategies in the project area focused on large and small game hunting and collection of easily consumed seeds and plants. Tools associated with seed processing, such as milling stones, are rarely identified with this period, possibly indicating a heavier reliance on game. Sites from this period are often found along the edges of extinct pluvial lakes or on ancient river terraces (Kautz et al. 1995).

The Archaic period of prehistory (7,000 to 150 years before present) was marked by an increasing dependence on the use of an extremely diverse resource base; settlement patterns became more complex and sites from this period demonstrate a wider range of associated functions with the seasonal timing of resource collection becoming of greater importance (Kautz et al. 1995). Reliance on plant food resources increased with a resultant decline in reliance upon big game. Seasonal camps and winter sites were reoccupied for apparently the first time and social organization became more elaborate. There is some evidence that groups began exploiting definable territories. Trade in exotic materials, such as obsidian and marine shell, also became increasingly important during this period. Grinding implements from this period are common evidence of hard seed processing. Sites from 4,000 to 1,500 years before the present appear to be related to lacustrine and marsh-oriented subsistence patterns that emerged in many areas of the Great Basin during the moister climate found during the era. As the climate became increasingly warmer and drier, sites tended to be located near streams and springs (Christensen and Kautz 1994).

At the time of Anglo entry into the region, the area was occupied by Numic-speaking Western Shoshone. The Shoshone are believed to have migrated into the area approximately 700 to 800 years before the present (BLM 1995). They were hunters and gatherers 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 zone where fuelwood for cooking and heating and food supplies were available (BLM 1995). Shoshone winter villages identified in the project area included Bauwiyoi, a group of six camps located at the northern foot of the Roberts Mountains at the south end of Pine Valley; Tupagadu or "pine nut sitting", a small camp located along the east-facing edge of the Sulphur Mountains west of the alkali flat in the Diamond Valley (north of the project area); and To:dzagadu (a medicinal plant), a group of 15 camps located along Pine Creek on the western slope of the Sulphur Spring Mountains north of the project area (Kautz et al. 1995; Johnson 1993; Rusco 1995).

<u>Historic Background</u>

The incursion of European and American explorers into the area is documented as early as 1827 when Jedediah Smith passed south of the project area on his return from California. John Fremont passed through the Diamond Valley north of Eureka in 1845, and Captain James H. Simpson led a military exploration expedition through this area in 1859, following roughly what is now the route of U.S. Highway 50 (BLM 1995). Portions of the Pony Express Trail/Overland Stage Route, which is designated as a National Historic Trail, are located north of the Eureka area (Kautz et al. 1994).

The Eureka Mining District was established in 1864, when prospectors located silver and lead in an area that is now about 1 mile south of the center of the present town of Eureka. Boom and bust cycles repeated themselves in this district over the years. Additional discoveries of silver at Ruby Hill lead to rapid growth until 1885. With the boom came the development of numerous large smelting furnaces used in processing silver and lead ores, construction of a railroad used to haul ore from the mines to the smelters and a rail line connecting Eureka to Palisade, a drastic increase in population in the area, and increased development of Eureka as a mining supply town (Archaeological Research Services 1994; Kautz et al. 1995). The town of Eureka was listed on the National Register of Historic Places as a Historic District in 1973.

Production of charcoal, which was used to fuel the ore smelters in the area, was a major mining-related industry in the region. Charcoal production was conducted by "carbonari" or Italian or Swiss-Italian immigrants who made the charcoal in kilns or open pits; remnants of the kilns are still found in the area today. Charcoal production required large amounts of wood and by 1885 the hills for a 50-mile radius around Eureka were denuded of available wood, creating a crisis that threatened the local mining industry. Gradual modification of the smelters to the use of coke and coal alleviated the situation but by 1885, the main ore bodies in the area also were mined out and many of the major workings were flooded (Kautz et al. 1994).

Without an incentive to continue operations, the major mine companies and smelters closed. The area remained in a bust cycle until 1905, when the Eureka Consolidated and Richmond Consolidated Mining Companies merged to rework the old mines. Sporadic operations with long periods of inactivity continued from 1912 to the present, with the closure of the Richmond-Eureka mines in 1912, abandonment of the Eureka and Palisade Railroad in 1938, work by the Eureka Corporation at Ruby Hill in the 1940s and at Adams Hill in 1956 followed by closure, and operation of various drilling programs in the 1960s. Recently, Homestake Mining Company leased mining properties on Ruby Hill and began exploration drilling on its Mineral Point Project at Adams Hill (Christensen and Kautz 1994).

3.14.1.2 Cultural Resources Identified in the Project Area

Several previous archaeological surveys have been conducted in the vicinity of the proposed project area. Table 3-42 summarizes the surveys and identifies the sites located during the inventories. Map 3-30 identifies the boundaries of the various cultural resource surveys previously conducted in the project area.

Two surveys were conducted in the 1980s in the Hogpen Canyon area located to the east of the proposed project. A Class II survey in 1981 of 480 acres as part of a land sale recorded a large prehistoric basalt quarry and lithic scatter (CrNV-63-107) extending into Hogpen Canyon. A survey conducted by M. R. Polk in 1989 as part of the Eureka Waterline project identified additional historic and prehistoric loci of site CrNV-63-107 that extend into the project area (Archaeological Research Services 1994; Kautz et al. 1995).

In April 1993, an inventory of approximately 470 acres was conducted in the Mineral Point prospect area by Frank W. Johnson Archaeological Consulting for Homestake as part of an exploration drilling program. The inventory identified 17 previously unrecorded sites (CrNV-63-7222 to -7238); 12 of the sites were historic and 5 consisted of small prehistoric lithic scatters. Additional components of two previously recorded historic sites also were recorded (sites CrNV-63-1075 and CrNV-63-4952). Of the survey total of 19 sites, all but 2 sites, CrNV-63-1075, the Holly Shaft and associated features and artifacts, and site CrNV-63-7233, a trash dump associated with site CrNV-63-1075, were ineligible to the National Register of Historic Places with State Historic Preservation Officer concurrence (Foulkes 1993; Baldrica 1993; Johnson 1993). Site CrNV-63-1075 was unevaluated, as was site CrNV-63-7233 due to the lack of a historic context at that time. Site CrNV-63-1075 was later evaluated by Kautz et al. (1995) and found to be eligible to the Register. Site CrNV-63-7233 remains unevaluated. Both sites were avoided during the exploration activities.

In August and September 1993, Frank W. Johnson Archaeological Consulting also conducted a cultural resource inventory of approximately 325 acres at the Mineral Point prospect area as part of additional mineral exploration. This inventory identified three previously unrecorded archaeological sites (CrNV-63-6547 to -6549) and Locii A to YY of site CrNV-63-6546 (Swift and Harper 1994). Locii A, D, J, L, M, R, W, KK, and RR of CrNV-63-6546 and site CrNV-63-6549 are eligible to the National Register of Historic Places with State Historic Preservation Officer concurrence. Locii N and P of site CrNV-63-6546 remain unevaluated. The remaining two sites are not eligible with State Historic Preservation Officer concurrence. Site CrNV-63-6549 and the loci of site CrNV-63-6546 were avoided during the exploration activities.

In 1994, the BLM consulted with Homestake and determined that a historical context for the entire Eureka Mining District was needed to assist BLM in considering the effects of future proposed mining activity in the area and to further evaluate the sites recorded during previous surveys. In March 1994, Kautz Environmental Consultants, Inc. contracted with Homestake to prepare a Historic Context to support the identification and evaluation of significant historic resources located in the historic mining district, with an emphasis on the Eureka Historic District. The Eureka Mining District, created in 1864, formed the study area for the historic context. One of the main functions of the historic context report was to aid in determining the significance of sites that may be identified in the future given the specific history of the Eureka Mining District. Kautz completed the context in December 1994.

Archaeological Research Services completed a Class III inventory of 1,045 acres in the Mineral Point area for Homestake in April 1994. Two previously recorded sites (CrNV-63-107 and CrNV-63-6546) and 53 previously unrecorded sites (CrNV-63-7559 to CrNV-63-7599, CrNV-63-7900 to CrNV-63-7911) were identified during this survey. Of the 53 new sites, 32 were prehistoric, 10 were historic, and 11 had both historic and prehistoric components (Archaeological Research Services 1994a). Two sites, CrNV-63-7585 and loci 1 and 8 of site CrNV-63-63-6546 were recommended eligible to the National Register of Historic Places

Table 3-42

Homestake Cultural Resources Sites

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
470 Acre Mineral Point Survey (Johnson 1993)					
19 sites (CrNV-63-7222 to -7232, -7234 to -7238, -4952)	Lithic scatters, trash dumps, and scatters	Waste rock dump/mine pit/leach pad	NEL	Direct	NA
CrNV-63-1075	Holly Shaft and associated features;	Mine pit	E	Direct	DR, Educational/ Informational treatment
CrNV-63-7233	trash dump associated with 1075	Mine pit	NEV	Direct	Investigation pending SHPO comments
325 Acre Mineral Point survey (Swift and Harper 1994)					
CrNV-63-6546 (locii A to YY)	lithic and historic artifact scatter	East/Southeast of waste rock dump	JE (locii A, D, J, L, M, R, W, KK, and RR); NEV (locii N and P); NEL (remaining locii)	Indirect	AV
CrNV-63-6549	lithic and historic artifacts scatter	South of mine pit	E	Indirect	AV
CrNV-63-6547	historic artifact scatter	South of mine pit	NEL	Indirect	NA
CrNV-63-6548	lithic and historic artifact scatter	Southeast of mine pit	NEL	Indirect	NA

Table 3-42 (Continued)

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
1,045 Acre Mineral Point Survey (ARS 1994a)					
52 sites (CrNV-63-7559 to -7566, -7568 to -7584, -7586 to -7599, -7900 to -7911, -107)	Dumps, debris scatters, prospects, mines, roads, wood cutting site	—	NEL	—	NA
CrNV-63-6546 (locii 1 and 8) (site previously recorded by Swift and Harper 1994)	prehistoric and historic artifact scatter, mines	East/Southeast of waste rock dump	JE	Indirect	AV
CrNV-63-7585 (prehistoric component)	Lithic and tool scatter	East of waste rock dump	E (prehistoric component)	Indirect	AV
CrNV-63-7567	Lithic scatter	West growth medium stockpile, access road	NEV	Direct	DR
Archeological Monitoring Results of the Ruby Hill Project (ARS 1994b)					
CrNV-63-7962	Holly Ditch	Pit/waste rock dump	NEV	Direct	Investigation pending SHPO comments
Class II Mineral Point Survey (Christensen and Kautz 1994)					
13 sites (CrNV-63-7980, -7982, -7984, -7985, -7987 to -7992, -7994, locus E1 and E2/E3 of -107)	Lithic scatters, quarry, trash scatters, campsite, corral, stockwatering station, prospect pit, trash smears	Cumulative effects area (within 1.5 miles of project area)	NEL	Indirect	NA

Table 3-42 (Continued)

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
CrNV-63-7981	Rock house, mining prospect, trash dump	West of project area; cumulative effects area (within 1.5 miles of project area)	E	Indirect	AV
CrNV-63-7993	Lithic quarry, trash scatter, prospect pits	Southwest of pit; cumulative effects area (within 1.5 miles of project area)	NEV	Indirect	AV
CrNV-63-7986	Lithic scatter and town dump	Southeast of pit; cumulative effects area (within 1.5 miles of project area)	E (historic component)	Indirect	AV
CrNV-63-7983	Lithic scatter and historic prospect	South of pit; cumulative effects area	E (prehistoric component)	Indirect	AV
632 Acre Holly Shaft and Mineral Point Survey (Kautz et al. 1995)					
22 sites (CrNV-63-4947, -4962,-8430 to -8438, -8441, -8443 to -8451, -8454)	Lithic scatters, pipeline	Southwest of mine pit	NEL	Indirect	NA
CrNV-63-1075 (site previously recorded by Johnson 1993)	Holly Shaft complex	Mine pit	E	Direct	DR
CrNV-63-4965	Bullwacker Mine Complex with lithic scatter	Southwest of mine pit	E	Direct	DR
CrNV-63-1072	H.L.T. Shaft Complex	Southwest of mine pit	NEV	Indirect	AV

Table 3-42 (Continued)

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
CrNV-63-8442	Williamsburg Mine Complex with lithic scatter	Southwest of mine pit	JE (historic)	Direct	DR, Educational/ Informational treatment
Inventory of Selected Blocks (Christensen et al. 1995)					
CrNV63-8700 to -8712, -8714 to -8719, -8721 to -8732, -7946, -8736 to -8738, -8740 to -8749, -8754 to -8756, -8761 to -8770, -8774, -8775, -8778, 06-170, Locus E2, E3, 06-1074	Prospects pits; rock cairns; mine complexes; trash scatters; lithic scatters; mine shafts; Ruby Hill waterline; adit; roads; lightening rod; structures; cistems	Cumulative effects area (within 1.5 mile of project area)	JI	Indirect	AV
CrNV-63-8713	Charcoal concentration (carbonari platform)	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-8720	Structural remnants and mining features with associated trash scatters.	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-7993	Wales Mine complex and lithic scatter	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-1073	Cyanide Shaft mine complex	Southwest of pit; Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV

Table 3-42 (Continued)

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
CrNV-63-8733	Possible charcoal platform, waterline, cairn, and a lithic scatter	Cumulative effects area (within 1.5 mile of project area)	JE (prehistoric component)	Indirect	AV
CrNV-63-8735	Lithic scatter	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-8739	Lithic scatter and historic trash scatter	Cumulative effects area (within 1.5 mile of project area)	JE (prehistoric component)	Indirect	AV
CrNV-63-8750	Mining complex with habitation areas and trash dump	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-8751	Historic habitation complex	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-8753	Railroad grade, road, and trash scatter	Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV
CrNV-63-7983 (previously recorded by Christensen and Kautz 1994)	Caribou Hill Quarry; lithic quarry and historic mining features	Within cumulative effects area	E (prehistoric component)	Indirect	AV
CrNV-63-8757	Helen Mine complex	South of pit; Cumulative effects area (within 1.5 mile of project area)	JE	Indirect	AV

Table 3-42 (Continued)

Site Number	Site Description	Project Association	NRHP Potential	Project Disturbance	Mitigation
CrNV-63-8777	Fad Mine complex	Cumulative effects area (within 1.5 mile of project area)	NEV	Indirect	AV
CrNV-63-8776	Lincoln Highway and associated features (trash scatters, prospect pits)	Leach pad, powerline and access road	***NEL***	Direct	***NA***
An Historic Preservation Treatment Plan for a Portion of the Eureka Mining District (Kautz et al. 1996)					
CrNV-63-8776 (previously identified by Christensen et al. 1995)	Lincoln Highway	Leach pad/pit area; powerline and access road	***NEL***	Direct	***NA***

Notes:

E = eligible (SHPO concurrence)
JE = judged eligible (pending SHPO concurrence)
JI = judged ineligible (pending SHPO concurrence)
NEL = not eligible (SHPO concurrence)
NEV = eligible pending further evaluation
AV = avoid
DR = data recovery
NA = no action

by the BLM; the determination of eligibility for site CrNV-63-7585 was concurred with by the State Historic Preservation Officer in January 1995 (Baldrica 1995). Locii A, D, J, L, M, R, W, RR, and KK of site CrNV-63-6546 also were listed as eligible to the Register with State Historic Preservation Officer concurrence.

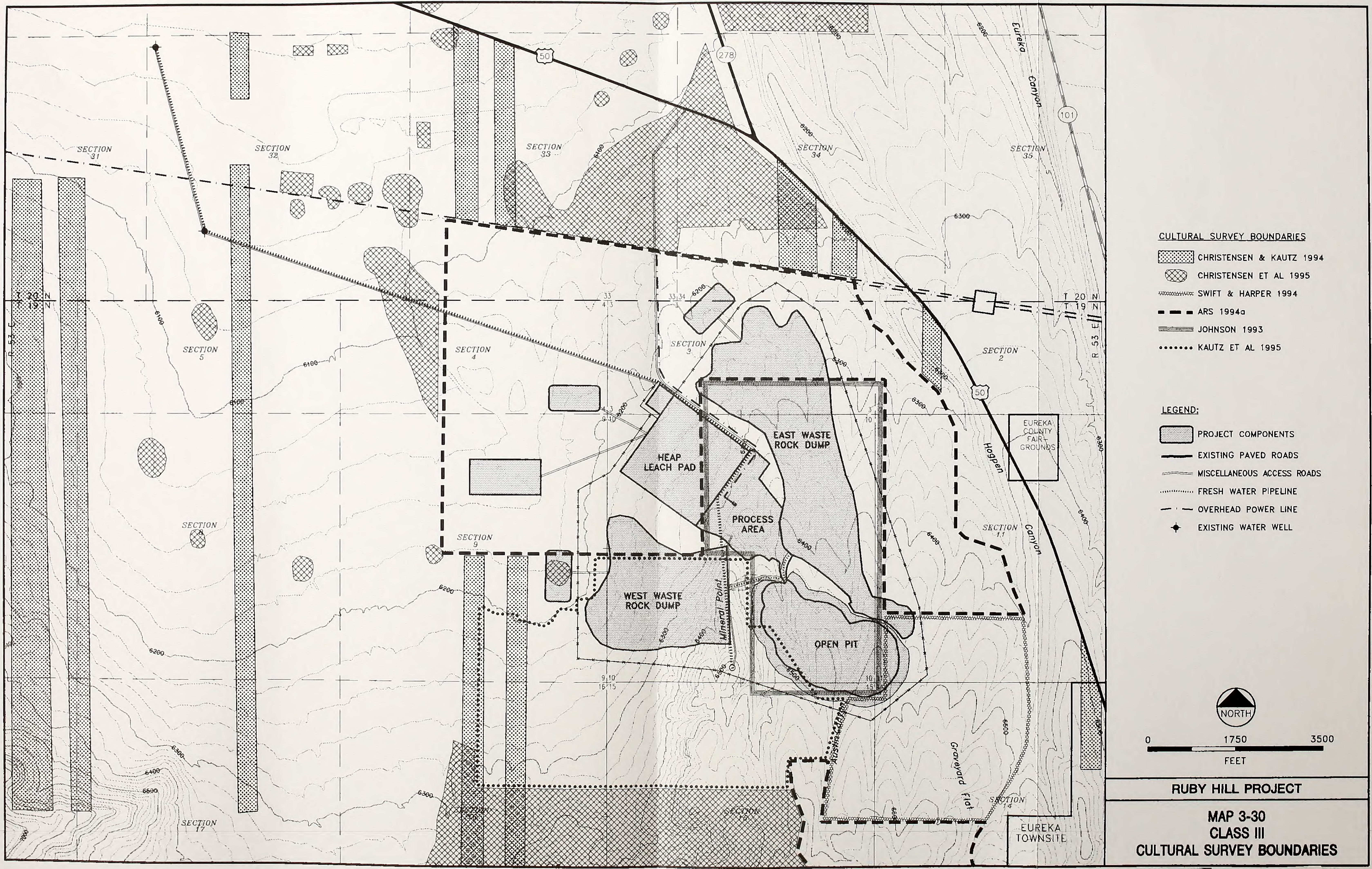
Locii N and P were unevaluated. The BLM deferred a determination of National Register of Historic Places eligibility for site CrNV-63-7567, pending further study. This also was concurred with by the State Historic Preservation Officer in January 1995. Eligible sites were avoided during the exploration work that led to the necessity for this survey, and monitors were present to ensure that no inadvertent impacts occurred to sites CrNV-63-7585, -7567, and -6546.

An additional unevaluated site (CrNV-63-7962) was located during a monitoring program conducted by Archaeological Research Services, Inc., in July 1994. The site, the Holly Ditch, runs through the proposed pit and waste rock dump sections of the Proposed Action (Archaeological Research Services 1994b).

Kautz Environmental Consultants, Inc. conducted a Class II sample survey in September 1994 within a 4,000-acre buffer zone surrounding the Mineral Point exploration areas north and west of Eureka. The survey area consisted of a 20 percent sample (approximately 840 acres) of the proposed 4,000-acre project area divided into randomly selected transect corridors. The corridors were 100 percent surveyed. The survey was undertaken to aid in predicting the presence or absence of cultural resources in clearly distinguishable zones or locations, to determine the level of management involvement in anticipation of future exploration or expansion activities within the project area, and to assist in determining areas within the project area that can be exempted from further Class III inventory requirements (Christensen and Kautz 1994).

The survey confirmed that important prehistoric and historic resources are generally restricted to the intermediate slopes and steeper upland zones west of Eureka near Ruby Hill. It was recommended that areas south of the highway and below 6,200 feet in elevation be exempted from further Class III inventory requirements. The inventory identified 17 sites (CrNV-63-7980 to -7994, and loci E1, E2, and E3 of CrNV-63-107), including 2 prehistoric sites, 8 historic sites, and 7 sites with both historic and prehistoric components. Portions of site CrNV-63-107 had been previously identified. Of the 17 sites, only sites CrNV-63-7981, -7993, and the historic portion of site CrNV-63-7986 were identified as potentially eligible to the Register pending State Historic Preservation Officer concurrence. The prehistoric portion of site CrNV-63-7983 was unevaluated (Christensen and Kautz 1994). Sites CrNV-63-7981, -7983, and -7986 have been determined eligible to the Register with State Historic Preservation Officer concurrence. Site CrNV-63-7993 remains unevaluated.

In March and April 1995, Kautz Environmental Consultants, Inc. conducted a Class III inventory of 632 acres in the Holly Shaft and Mineral Point areas in accordance with a Programmatic Agreement between the BLM, the Nevada State Historic Preservation Officer, and the Advisory Council on Historic Preservation, with Homestake as a concurring party. The Programmatic Agreement is on file at the BLM district office in Battle Mountain, Nevada. The inventory was conducted as part of the proposed mine development project. A total of 26 sites were identified during this survey (CrNV-63-8430 to 8438, CrNV-63-8441 to 88451, CrNV-63-1075, -1072, -4965, -4947, -4962, -8454); including 4 prehistoric sites (CrNV-63-8432, -8433, -8438, -4962), 15 historic sites, and 7 sites with both prehistoric and historic components (CrNV-63-1075, -8435, -8436, -8437, -4965, -8442, -8445. Of these 26 sites, 3 (the historic portions of sites CrNV-63-1075 [the Holly Shaft] -4965 [the Bullwacker Mine complex], -8442 [the Williamsburg Mine complex]) are eligible to the Register with State Historic Preservation Officer concurrence and 1 site (CrNV-63-1072) remains unevaluated until further archival and oral history work can place the site (Kautz et al. 1995). A ***suspected*** portion of the historic Lincoln Highway (site CrNV-63-8776) crossed through the proposed leach pad and pit area (Kautz et al. 1996a). ***Further evaluation of the highway determined that it was not associated with the Lincoln Highway and is ineligible to the Register.***


CULTURAL SURVEY BOUNDARIES
CHRISTENSEN & KAUTZ 1994
CHRISTENSEN ET AL 1995
SWIFT & HARPER 1994
ARS 1994a
JOHNSON 1993
KAUTZ ET AL 1995
LEGEND:
PROJECT COMPONENTS
EXISTING PAVED ROADS
MISCELLANEOUS ACCESS ROADS
FRESH WATER PIPELINE
OVERHEAD POWER LINE
EXISTING WATER WELL
NORTH
0 1750 3500
FEET
HEAP LEACH PAD
EAST WASTE ROCK DUMP
PROCESS AREA
WEST WASTE ROCK DUMP
OPEN PIT
EUREKA COUNTY FAIR-GROUNDS
EUREKA TOWNSITE
Eureka Canyon
Hogpen Canyon
Graveyard Flat
Mineral Point
T 20 N
T 19 N
R 53 E
RUBY HILL PROJECT
MAP 3-30
CLASS III
CULTURAL SURVEY BOUNDARIES

In Fall 1995, Kautz Environmental Consultants, Inc. also conducted Class III surveys in the vicinity of Windfall Canyon, Purple Mountain, Adams Hill, and scattered localities north and west of the proposed project area. These surveys identified 80 sites (see Table 3-42); 18 of these sites were identified as prehistoric, 44 were identified as historic, and 18 sites contained both prehistoric and historic components. Of these 80 sites, 12 were recommended eligible to the Register pending concurrence from the State Historic Preservation Officer (CrNV-63-1073, -7983, -7993, -8713, -8720, -8733, -8735, -8739, -8750, -8751, -8753, -8757) and 67 were judged ineligible to the Register pending State Historic Preservation Officer concurrence. One site, CrNV-63-8777, remains unevaluated (Christensen et al. 1995). ***Data recovery field work was conducted on sites CrNV-63-1075, -4965, -7233, -7567, -7962, and -8442 during July and August 1996 under a treatment plan approved by the State Historic Preservation Officer. Analysis of the data is currently underway.***

3.14.1.3 Ethnography

The project area lies within the traditional ethnographic range of the Western Shoshone, who speak a Numic language. Several historic Shoshone winter villages have been identified in the vicinity of the project area (see Section 3.14.1.1, Cultural Setting). Descendants of the people who lived in these villages and used resources in the project area may now be found on Western Shoshone reservations, such as Duckwater, Yomba, the Ely Colony, or living in various towns in central Nevada (Rusco 1995).

Prior to Euro-American contact, the Western Shoshone were hunter/gatherers who utilized a wide range of plant foods, with piñon pine nuts providing the bulk of the plant foods collected. The gathering of pine nuts entailed travel to the south and east of Eureka into the Antelope or White Pine Ranges, a distance of approximately 20 miles. Communal antelope hunts took place in the south end of Diamond Valley just north of Eureka (Kautz et al. 1995). Groups from the Fish Creek and Sigi Canyon areas attended festivals in Eureka in later years and participated in antelope drives in Diamond Valley.

Two Western Shoshone subgroups have been identified as living in the area; the Pasiatikka or "eaters of redtop grass", in the Diamond Valley and along Pine Creek; and the Uywinai or "dwellers in the south", who lived in Little Smoky Valley (Rusco 1995).

The Western Shoshone lived in small, highly mobile, kin-based groups that travelled throughout an extended territory, following the harvest schedule of foods during spring through early autumn. In the fall, when the piñon nuts became ripe, the groups joined other households for a more permanent winter village. Large gatherings were held in connection with communal economic activities, such as rabbit or antelope drives and pine nut harvests (Rusco 1995).

Shoshone winter houses were typically located in areas with diverse food procurement localities near piñon forests on ridges or spurs extending into downthrust valleys. The structures were typically conical with a covering of bark slabs and accommodated a family of approximately six persons.

Religion in the Great Basin focused on the balance between subsistence and the environment. Religious goals were oriented toward the needs and patterns of subsistence and the nomadic social units. Water was the keystone of religion in the Basin, since "power, with its affinity for life, was strongly attracted to water" (Rusco 1995). Mountain peaks and caves, with their affiliation with water, were considered places of power and prominent mountain peaks were honored as scared places. Animals and certain plant species also contained power, and power was present in all places that people had lived, and particularly, around graves (Rusco 1995). Traditional rituals often persist today, particularly to ensure the assistance of spiritual beings in such practices as hunting. Under some Shoshone beliefs, disturbance of the land can cause some spiritual beings to "go away" (Rusco 1995).

Prolonged contact between Euro-Americans and the native inhabitants around Eureka did not occur until the 1860s with the development of the Eureka Mining District. Mining and agricultural activities, such as the cutting of piñon pine, juniper, and mountain mahogany to make charcoal for the mine smelters, lead to the depletion of the Shoshone's subsistence plant and animal resources. Within a few years the native ecology was significantly changed, thereby changing the traditional Western Shoshone lifeway. Because of the depletion in subsistence resources, wage labor became increasingly important to many Western Shoshones and many went to work at the mines. Hostilities often resulted between the Western Shoshone and Euro-American settlers and prospectors. This culminated in the establishment of Fort Ruby in the Ruby Valley located approximately 45 miles northeast of the project area and the signing of the Treaty of Ruby Valley by representatives of the Western Shoshone in 1863. By about 1900, plots of Federal land were set aside for Indian colonies in areas such Reno, Carson City, Elko, and Battle Mountain (Kautz et al. 1995; Rusco 1995).

3.14.2 Environmental Consequences

The significance of a cultural heritage resource is an assessment of its importance to the citizens of the United States and indicates whether a site has attributes that qualify it for inclusion on the National Register of Historic Places. In order to be considered eligible for the National Register of Historic Places, a cultural resource must be a district, site, building, structure, or object that retains its integrity of location, design, setting, materials, workmanship, feeling, and association, and satisfies at least one of the four significance criteria defined in 36 Code of Federal Regulations part 60.4. These criteria include:

- Part 60.4a - sites that are associated with events that have made a significant contribution to the broad patterns of history;

- Part 60.4b - sites that are associated with the lives of persons significant in our past;

- Part 60.4c - sites that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction;

- Part 60.4d - sites that have yielded, or may be likely to yield, important information on prehistory or history (Parker and King no date).

Cultural heritage sites also are considered significant if they are protected under other state or Federal statutes, such as the Native American Graves Protection and Repatriation Act or the Nevada Indian Burial Protection Act (Nevada Regulations Statutes 383.150), which outlines procedures regarding treatment of human burials on state or privately-owned land in Nevada.

An undertaking has an effect on a cultural property if it alters any of the characteristics or criteria that may qualify the property for inclusion on the National Register of Historic Places or otherwise affects a property's legally protected status. Impacts to cultural heritage resources are considered adverse if the effect diminishes the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects can include, but are not limited to:

- Direct physical disturbance, damage, or alteration of all or part of a site or property that is listed on or is eligible for the National Register of Historic Places, or is protected under state and/or other Federal statutes;

- Isolation of the property from or alteration of the character of the property's setting;

- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;

- Neglect of a property resulting in its deterioration or destruction; and

- Transfer, lease, or sale of the property (CFR36, 800.9, revised as of July 1, 1994).

Discussions of project impacts are limited to sites within the proposed mine area deemed to be significant or eligible for inclusion on the National Register of Historic Places or sites that have

Federal and/or state protection under other statutes.

Effects of an undertaking that have been found to be adverse as described above may be considered not adverse when:

- The property is of value only for its potential contribution to archeological, historical, or architectural research, and when that value can be preserved through appropriate research conducted in accordance with applicable professional standards and guidelines. This applies only to those sites identified as eligible to the Register under Criterion "D" and mitigated under treatment plans approved by the applicable agencies.

- The undertaking is limited to rehabilitation of structures that preserves the historical and architectural value to the property, and when transfer, sale, or lease includes restrictions or conditions that ensure the preservation of the property's significant features (36 CFR 800.9 (c)(1-3).

Sites eligible to the Register under Criteria A, B, and C that may experience adverse effects from the undertaking can sometimes be mitigated through such methods as development of educational centers or kiosks that provide information on the affected properties. Mitigation for sites nominated under Criteria A, B, and/or C that would experience adverse effects must be developed and defined in a treatment plan approved by the appropriate agencies.

3.14.2.1 Proposed Action

Cultural Sites

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 cultural resources by altering site settings and isolating the resource from access and further study.

Direct physical impacts to cultural resources could occur during ground-disturbing activities associated with construction and operation of the mine pit, waste rock dumps, the leach pad, ore and solution processing facilities, access roads, powerline, waterline, office, and other ancillary facilities. Indirect impacts could result from increased erosion or improved access, and increased human activity in the area, which make sites more vulnerable to accidental or deliberate disturbance and illegal collecting.

Increases in the number of people in the area and improved access could impact sites located outside of the direct impact area by making the sites more susceptible to vandalism and casual collecting. Changes in topography due to mine construction and waste rock disposal also could result in indirect impacts to cultural resources due to alteration of the amount or patterns of erosion. Waste rock dump areas may not completely destroy any known cultural sites but could potentially restrict access and limit future study. Data recovery conducted as part of mitigation on directly affected sites could provide additional information on prehistoric and historic components in the area.

Implementation of the Proposed Action would introduce audible elements that do not currently exist near the Eureka Historic District. Introduction of audible elements is not expected to alter the setting or character of the Historic District or diminish the integrity of the District, since these elements are similar to historic mining activities in the area that formed the basis for development of Eureka and provided the historic character that led, in part, to inclusion of the District in the National Register of Historic Places. In addition, studies conducted in the District indicate that vibrations produced by blasting at the mine should not effect historic structures in the area.

Potential effects on the structural integrity of historic structures in the Eureka Historic District from mine pit blasting that could occur under the Proposed Action was studied in 1995. Seventy-nine structures, both historic and modern, were evaluated and the potential for impacts from blasting were modeled. This risk analysis study found that all structures surveyed would have less than one chance in a thousand or 0.1 percent of being cosmetically affected by blast vibrations if blasting charge weights were 200 pounds or less per delay. If blasting charges were 500 pounds per delay, two of the structures would have a greater than 0.1 percent chance of being affected. Typical charge weights proposed by Homestake would be approximately 200 pounds per delay, indicating that the structural integrity of historic buildings in the area would not be compromised (Golder Associates, Inc. 1996a). An additional study to test potential impacts from actual test blasts also was conducted. Results from this study indicated that the likelihood that any one structure in Eureka would be affected by any one blast was less than one in a million-million. The potential for damage to any structure over the life of the mine was determined to be less than one in 100 million (Golder Associates, Inc. 1996b). See Section 3.16, Noise and Blasting Vibrations, for a detailed discussion of the noise studies.

Visual elements created by implementation of mine activities should not be visible from the Eureka historic business district as discussed in Section 3.13, Visual Resources, and should not have an effect on the setting, character, or integrity of the Historic District.

Employment and population growth related to the Proposed Action could expand local business trade and increase real estate investment interest in Eureka. This development could either threaten or enhance historic resources, particularly in the Eureka Historic District. Potential threats could include possible demolition to accommodate new construction and remodeling or renovations that compromise historic resources. Benefits could include historically sensitive renovation and rehabilitation of deteriorating vacant or underutilized structures that are currently infeasible due to a weak economy. No planning and zoning restrictions currently exist in Eureka to provide for structural renovations and remodeling that retain the historic value and character of buildings in the Historic District. Tax incentives and grants are available, however, for historically accurate renovation and remodeling of historic properties that are eligible to the Register. The likelihood of either demolition or renovation of historic properties or assessment of the effects on specific buildings and on private property is speculative and beyond the scope of this assessment.

Avoidance of impacts is the primary mitigation for cultural heritage resources. When disturbance of or effects on National Register of Historic Places-eligible or other Federal and state-protected sites is unavoidable, impacts would be mitigated via a site-specific treatment plan that has been prepared in accordance with guidelines established in a Programmatic Agreement that has been formulated in consultation among Homestake, the BLM, the State Historic Preservation Office, and the Advisory Council on Historic Preservation (Kautz et al. 1996b). The Programmatic Agreement established an understanding between Homestake, the State Historic Preservation Office, the BLM, and the Advisory Council on how the consultation process under Section 106 of the National Historic Preservation Act would be implemented with regard to actions occurring within the Ruby Hill area, and how objectives and requirements of the National Historic Preservation Act would be fulfilled.

If previously undocumented sites or subsurface components of documented sites are discovered within the Proposed Action area, construction would be halted until the resources are examined by professional archaeologists. If the resources are eligible for the National Register of Historic Places or protected under state and Federal statues, impacts would be mitigated through an appropriate data recovery program agreed upon in the Programmatic Agreement.

Previously identified cultural sites that could be impacted during mine closure and reclamation would be mitigated prior to commencement of closure and reclamation operations. Ground-disturbing activities associated with mine waste rock disposal reclamation could result in direct impacts to previously unidentified prehistoric, proto-historic, and historic cultural resources. Subtle changes in topography due to mine reclamation could result in indirect impacts to cultural resources due to alteration of the amount or patterns of erosion.

Reports detailing the results of the intensive archaeological evaluations conducted as part of this project are on file at the BLM office in Battle Mountain, Nevada. Only brief summaries and general location descriptions are provided in the EIS to protect the confidentiality of the sites.

At least *12* known sites eligible or potentially eligible to the National Register of Historic Places (pending State Historic Places Officer concurrence) have been identified within the proposed project area. These include 6 sites that are eligible to the National Register of Historic Places (CrNV-63-1075, -4965, -6549, -7585, -7983, and -7986) and *6* sites with National Register of Historic Places potential (CrNV-63-1072, -6546, -7233, -7567, -7962, and -8442) (see Table 3-42). Of the *12* sites either eligible or potentially eligible to the National Register of Historic Places, *6* sites (CrNV-63-1075, -4965, -7233, -7567, -7962, and -8442) could be directly impacted by the proposed Project and *6* sites would be avoided.

The directly impacted sites include 3 sites located in the mine pit and waste rock dump areas (CrNV-63-1075, -7233, and -7962), *one* site (CrNV-63-7567) located in the leach pad area/west *growth media* stockpile area, and two sites located in the processing/fresh water storage area (CrNV-63-4965 and -8442).

The *6* sites with National Register of Historic Places potential (Table 3-42) that would not be directly impacted by the proposed Project could still experience indirect impacts associated with construction and operation of the project. These may include increased potential for vandalism and illegal collecting, and potential effects from erosion, particularly in those sites, such as CrNV-63-1072, -6546, and -6549, which are located directly adjacent to areas that would be disturbed during the project.

Based on review of cultural survey boundaries (see Map 3-30), it appears that portions of the powerline remain to be surveyeo. The waterline has been surveyed and lies below the 6,200-foot elevation. Under stipulations agreed to in the Programmatic Agreement, surveys will be conducted in these areas prior to disturbance.

Homestake has prepared a treatment plan for sites potentially affected by the Proposed Action. BLM and the State Historic Preservation Officer are currently reviewing the plan. The majority of the sites potentially impacted by the Proposed Action were either determined eligible for inclusion on the Register under Criterion A and D (36 CFR Part 60.4) or require further evaluation before a determination of eligibility can be made (see Section 3.14.2, Environmental Consequences introduction for criteria definitions and descriptions). Sites eligible under Criterion D that would experience adverse effects can be mitigated through data recovery and research in accordance with standards and guidelines as outlined in the proposed treatment plan. Sites also eligible under Criterion A, which include sites CrNV-63-1072, -1075, -and -8442, would be treated as outlined in the treatment plan currently being reviewed by the BLM and State Historic Preservation Officer. Treatment for Criterion A sites could include:

- A brochure on Eureka's mining history written for the layman that would be available in several locations in Eureka.
- Donation of selected historic artifacts to the Eureka County Museum.
- Donation of selected historic and modern mining literature currently held by Homestake to the University of Nevada, Reno Library.
- Oral history interviews with individuals familiar with the effected sites.
- Security measures, such as fencing, designed to protect existing historic resources from vandalism.
- Placement of an informational historic marker on Highway 50 in or near Eureka (Kautz et al. 1996b).

3.14.2.2 Partial Backfilling Alternative

Since no reduction in area disturbed by the project would occur under this alternative, impacts to cultural heritage resources and mitigation under the Partial Pit Backfill Alternative would be identical to those identified for the Proposed Action. Any impacts to cultural heritage resources would be mitigated using guidelines established under the existing Programmatic Agreement.

3.14.2.3 East Waste Rock Dump Alternative

Under the East Waste Rock Dump Alternative, the waste rock dump area would be expanded and fencing would be relocated. The *12* sites identified under the Proposed Action as potentially being impacted also would be effected under this alternative, however, sites CrNV-63-6546, and -7585 that were indirectly effected under the Proposed Action would be directly effected under this alternative. In addition, site CrNV-63-4965, which was directly effected under the Proposed Action, would be indirectly effected under this alternative. In summary, ***seven*** sites eligible or potentially eligible to the Register (CrNV-63-1075, -6546, -7233, -7567, -7585, -7962, and -8442) would be directly effected by this alternative. Eight sites eligible or potentially eligible to the Register (CrNV-63-1072, -1073, -4965, -6549, -7983, -7986, -7993, and -8757) could be indirectly effected by this alternative. Any impacts to cultural resources would be mitigated using guidelines established under the existing Programmatic Agreement.

3.14.2.4 West Waste Rock Dump Alternative

Under the West Waste Rock Dump Alternative, impacts to cultural heritage resources and mitigation requirements would be identical to those identified for the Proposed Action.

3.14.2.5 No Action Alternative

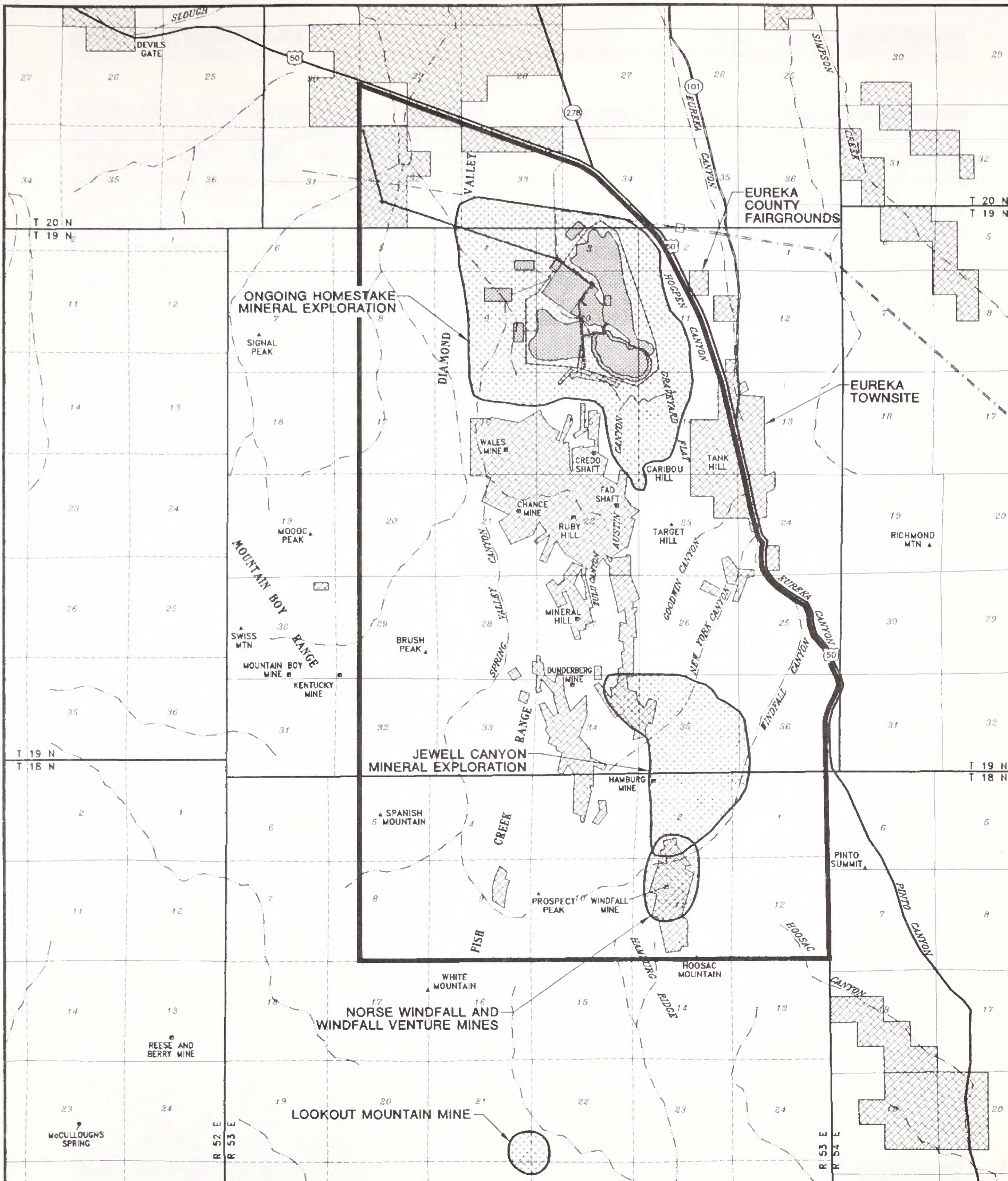
Under the No Action Alternative, impacts to cultural heritage resources from mine development would not occur. Continued erosional effects and illegal collecting would continue to occur at a rate similar to what is currently taking place in the area. Data that would have been obtained from mitigation of sites that would have been impacted under the Proposed Action would not be collected.

3.14.3 Cumulative Impacts

The cumulative effects area for cultural heritage evaluation generally ranges from U.S. Highway 50 on the north and east to Hoosac Mountain on the south and the Mountain Boy Range on the west (see Map 3-31). Reasonably foreseeable future actions proposed in the cultural heritage cumulative effects area includes the East Archimedes Pit expansion. Other future actions proposed in the region, which include development of the Atlas Mine and the Tonkin Springs Mine, lie a substantial distance outside the cumulative effects area boundary identified for cultural heritage review.

Any mining or other ground-disturbing activities within the cumulative effects area could impact National Register of Historic Places-eligible sites or state and Federally protected sites. As directed by law, cultural heritage resource inventories and consultations would be conducted for any projects involving public lands, and impacts would be avoided or mitigated as appropriate. All actions associated with Homestake activities would be in accordance with guidelines established in the Programmatic Agreement between Homestake, BLM, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

Cultural inventories and consultations required for the reasonably foreseeable future actions would add to the information base for cultural heritage 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 or treatment plans for any significant properties identified during the inventories in the reasonably foreseeable future actions and also would increase the overall knowledge of cultural heritage resources in the cumulative effects area. Direct impacts to cultural heritage resources would be reduced under the provisions of the National Historic Preservation Act of 1986, which requires that cultural heritage resources be considered in any Federal undertaking. Even with mitigation, physical destruction of sites could still occur in the reasonably foreseeable future actions, and there could be a permanent loss of some cultural heritage sites. Permanent loss of sites also has



LEGEND:

- PAST DISTURBANCE
- PRESENT DISTURBANCE
- PROPOSED ACTION
- CUMULATIVE ASSESSMENT BOUNDARY

MILES 0 1 2

NORTH

RUBY HILL PROJECT

MAP 3-31
CUMULATIVE ASSESSMENT AREA
FOR CULTURAL RESOURCES

occurred within the areas disturbed by past and present actions. Indirect impacts, such as vandalism and illegal collecting, have and could occur to cultural heritage resources through increased access, development, increased human presence, as a result of the reasonably foreseeable future actions and past and present activities.

The majority of past disturbance in the cumulative effects area has consisted of historic mining operations or associated activities; they have in turn impacted an unidentified number of prehistoric and proto-historic sites. The town of Eureka and the mining district have been included in the Eureka Historic District with protective status under the National Historic Preservation Act. The town of Eureka was listed on the National Register of Historic Places as a Historic District in 1973. Previous impacts to cultural heritage resources in the Eureka Historic District have included replacement of previous mining and milling activities with new equipment and machinery, road construction and use, logging, vandalism and dumping, bulldozing, erosion, collecting, and soil disturbance. A traditional use site, a pine nut roasting feature, was impacted by previous work in the Eureka sewer pool area. Modifications to historic structures located within the current Eureka business district may have been made in the past.

Current disturbances, including ongoing Homestake exploration, have been subject to cultural heritage resource protection regulations. The majority of the areas have been surveyed for cultural heritage resources, and, in the case of current Homestake exploration work, sensitive sites were avoided (Johnson 1993; Swift and Harper 1994; Archaeological Research Services, Inc. 1994a, 1994b; Kautz et al. 1995). See Section 3.14.1.2, Cultural Resources identified in the Project Area, for a discussion of past surveys conducted in portions of the ongoing Homestake mineral exploration area.

Three cultural resources surveys conducted in the Norse Windfall, Windfall Venture, and Lookout Mountain Mine areas identified 21 sites (Christensen et al. 1995; Mackey 1994a,b). These included three sites recommended as eligible to the Register pending State Historic Preservation Officer concurrence (CrNV-63-8733, -8735, -8739), four sites requiring additional evaluation (CrNV-63-7493, -7944, -7945, -7946), and 14 sites judged ineligible to the Register pending State Historic Preservation Officer concurrence (CrNV-63-7959, -7960, -8736 to -8738, -8740 to -8748). None of these sites are expected to be directly impacted under present operations and should be avoided (Christensen et al. 1995; Mackey 1994a,b). If eligible or potentially eligible sites are identified as being directly impacted by current mineral exploration activities in the Jewell Canyon area, the sites would be mitigated under Homestake's existing Programmatic Agreement. Potentially impacted sites in the Norse Windfall, Windfall Venture, and Lookout Mountain Mine exploration areas would be mitigated in accordance with conditions agreed upon by the operators, the BLM, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

The Proposed Action is expected to directly impact ***six*** sites that are eligible or potentially eligible to the National Register of Historic Places. See Section 3.14.2.1, Proposed Action, for a detailed discussion on impacts under the Proposed Action.

The East Archimedes Mine Pit expansion proposed for the reasonably foreseeable future would directly impact Site CrNV-63-6549, a lithic and historic artifacts scatter eligible to the Register. The expansion also would impact larger portions of Sites CrNV-63-7233, -1075, and -7962 that would be directly impacted under the Proposed Action.

Sites CrNV-63-8713 and -8733 are charcoal producing localities associated with historic "carbonari" operations and lie within the cumulative effects area. Charcoal from these sites may have been used in historic operations at the Atlas Mine, however, neither of these sites is expected to be impacted by present or reasonably foreseeable future actions in the cultural resources cumulative effects area or by Proposed Actions at the Atlas Mine.

Employment and population increases related to current and future mining production activities, including development of the Atlas and Tonkin

Springs Mines, could create additional real estate interest in Eureka. Similar to the discussion in Section 3.14.2.1, Proposed Action, this could either promote greater interest in rehabilitation or renovation of historic structures or pose additional threats of demolitions in the Eureka Historic District. The likelihood of either type of impact, or assessment of the effects on specific buildings, particularly those on private property, are speculative and beyond the scope of this EIS.

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. 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 American Indian Religious Freedom Act of 1978 prior to any future action taking place within the cumulative effects area. A traditional use area (CrNV-63-6546) was identified in the proposed Ruby Hill Mine area. This site is considered eligible for the Register pending State Historic Preservation Officer concurrence. At this time, the site is expected to be avoided.

3.14.4 Mitigation and Monitoring

The procedures for evaluation and mitigation of impacts to cultural heritage resources documented in the proposed project area have been determined in consultation among the BLM, Homestake, the State Historic Preservation Officer, and the Advisory Council on Historic Preservation and are outlined in the Programmatic Agreement, which is on file at the Battle Mountain District office of the BLM. The Programmatic Agreement allows the BLM to determine effect based upon the mutually agreed upon guarantee of identification, evaluation, and mitigation of cultural resources in the proposed project area pursuant to Section 106 of the National Historic Preservation Act and implementing regulations (36 Code of Federal Regulations 800). As directed by the Programmatic Agreement, a treatment plan for mitigation of sites that would be directly effected under the Proposed Action ***has been finalized and implemented, field work is complete, and analysis and report preparation are in progress.***

Issue: Indirect impacts to cultural heritage resources on project lands from project-related activities.

Measure 1: Mitigation of indirect impacts could be accomplished by limiting employee access to known archaeological sites, educating Homestake employees as to the significance of cultural resources and their vulnerability, and implementing a strict Homestake 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, with the exception of the No Action Alternative.

Issue: Impacts to traditional use site CrNV-63-6546 from project-related activities.

Measure 2: Homestake will attempt to avoid directly impacting this site. If the site cannot be avoided, consultations with the appropriate Native American groups would be initiated and additional mitigation would be implemented.

Effectiveness: This measure would prevent direct impacts and reduce indirect impacts to site CrNV-63-6546, but would not eliminate indirect effects.

Application: This measure would be applied to the Proposed Action and all alternatives.

3.14.5 Residual Adverse Impacts

Direct impacts to National Register of Historic Places eligible sites or other Federally or state-protected sites on Federal, state, or Homestake property would be mitigated as provided for under the Programmatic Agreement; however, direct and indirect impacts to cultural heritage resources would result in permanent loss of site context and traditional use, and in the case of sites indirectly impacted, potentially the loss of information and artifacts.

Changes in Eureka's economic climate related to proposed mining activities could lead to potential beneficial or detrimental effects to historic structures in the Eureka Historic District. The likelihood of either type of effect is speculative, particularly for structures on private property, and are beyond the scope of this document.

3.15 Social and Economic Values

3.15.1 Affected Environment

3.15.1.1 General Perspective

Eureka County is located in east-central Nevada. With an area of 4,182 square miles and a population of about 1,550 residents, Eureka County is the second least populous county in the state. The county is long and narrow, approximately 128 miles from north to south, and between 22 and 42 miles wide. Its population is concentrated in three small unincorporated towns. Eureka, the county seat and largest of the three, is located in the southern portion of the county. Beowawe and Crescent Valley are located in the northwestern portion of the county. About 110 farm and ranch households are situated throughout the county (U.S. Bureau of the Census 1991).

The primary study area for the socioeconomic assessment is the unincorporated town of Eureka and nearby outlying areas. The assessment also considers the Eureka County government and Eureka County School District. The former provides all administrative functions for the county and unincorporated towns and the Eureka County Board of Commissioners serves as the Eureka Town Board. The latter is responsible for providing public education in the county.

Today, Eureka light-heartedly boasts of being the "Loneliest Town on the Loneliest Road in America," referring to both its location on Highway 50 across sparsely populated central Nevada and its remoteness from other cities. Elko, the regional trade and service center, lies 115 miles to the north, while Ely is 77 miles east. Reno is the nearest metropolitan area, 240 miles west of Eureka (State of Nevada 1995a). Bypassed by major highways and having only limited new development, many historic buildings survive in Eureka to offer tourists a look back in time to the town's mining heyday. Spurred by restoration of the Eureka Opera house in 1993, the county has initiated economic development efforts to attract new industry, increase tourism, promote immigration and encourage overall community development (Eureka County Chamber of Commerce 1995). The proposed Ruby Hill project would be located north of but adjacent to the town's limits.

3.15.1.2 Economy and Employment

The economic fortunes of Eureka County and its residents have been tied to mining since the discovery of silver-lead mineralization near the present site of the town of Eureka in the 1860s. Improvements in smelting processes fostered increases in production and rapid population growth, that by 1878 Eureka was the state's second largest city. As ore bodies played out, mine production and population declined as rapidly as it had grown. Several cycles of mine activity have occurred in the Eureka area since then, but none has approached the magnitude of the first boom (Eureka County Chamber of Commerce 1995). Past mining activity included an underground mine, also known as the Ruby Hill Mine, just south of the proposed project. Exploration and production occurred at that mine from the mid-1930s through 1958.

The 1980s brought mining's latest renewal in the region. This time it is being driven by large-scale surface gold mines located across the northern tier of Nevada. In 1980, only about 225,000 ounces of gold were produced in Nevada. In 1986, total production topped 2.0 million ounces, with the 5.0 million-ounce milestone reached in 1989. Gold production in 1994 reached 6.8 million ounces, equal to about 10 percent of worldwide production. The two largest gold producers in Nevada, Barrick Gold's Goldstrike Mine and Newmont Gold's mine, are located in northern Eureka County. Together these two mines produced 3.4 million ounces in 1994, half of the statewide total (State of Nevada 1995b). In addition to the two large mines, several smaller mines initiated operations in the late 1980s and early 1990s, but all have since ceased operations. Efforts are being considered to restart two of these, the Atlas Gold Bar Mine and U.S. Gold's Tonkin Springs Mine, located north/northwest of Eureka.

Most of the mining services businesses supporting the Barrick and Newmont mines and most of the employees of these mines are based outside of Eureka County, primarily in nearby

Elko. Elko is the regional trade and service center for northeastern Nevada. Elko County had a 1990 population of 33,530, of which 14,736 resided within the city of Elko.

Mining's most recent resurgence is evident in employment trends in northeastern Nevada and Eureka County. Mining employment in a 5-county region encompassing Elko, Eureka, Humboldt, Lander, and White Pine counties increased from 2,384 in 1980, to 3,125 in 1985, then nearly tripled to 8,807 in 1990. It has since stabilized, with a total of 8,844 mining jobs in the region in 1993. Driven by mining's expansion, total employment increased in the region, topping 41,700 in 1993. During the mining sector's primary expansion between 1985 and 1990, the region's total employment increased by 13,295 jobs, nearly half of which was in mining (U.S. Bureau of Economic Analysis 1995).

Employment in Eureka County mirrored the regional trend, increasing from 935 in 1980 to over 4,200 in 1990 and 4,758 in 1993 (Table 3-43). Most of the change occurred in the mining industry, where the number of jobs jumped from 361 to nearly 3,600 in 1990. Since then, it has been relatively stable. The apparent trend in local employment is misleading as Eureka County is in the unusual position of having more jobs than it has residents. This occurs because most of the service companies and employees of the mines reside outside of Eureka County, with only limited secondary employment generated in Eureka County.

In keeping with a long-term national trend, local farm employment has declined in Eureka County since 1980. Other private sector and local government employment in Eureka County, the former primarily in construction, retail trade and services, has increased, but not to the extent of mining employment.

The local business sector in Eureka is quite small and limited in diversity. Retail shopping opportunities include groceries, hardware and lumber, consumer electronics, auto parts/fuel/supplies, and several novelty/specialty/gifts stores. There are also a number of cafes and bars and beauty/barber shops. All of the outlets are relatively small and there are no full-line department, discount or apparel stores in Eureka.

Consumers travel to Elko or Reno to gain access to the selection and inventory carried in such stores, as well as to access more specialized types of stores, financial services, and medical and dental care (Baumann 1995).

The limited scale of the consumer business sector is shown by the volume of taxable sales. In 1994, taxable sales in Eureka County totaled $162 million. Of the total, only about $22.5 million or 14 percent of the total were by businesses such as food stores, service stations, eating and drinking places and hardware stores that are largely consumer-oriented. Agricultural and industrial firms, such as mining companies, assay

Table 3-43

Eureka County Employment, 1980 to 1993

Industry	1980	1985	1990	1991	1992	1993
Farm	198	175	181	151	153	158
Mining	361	690	3,586	3,451	3,625	3,905
Other Private	264	249	287	409	556	480
Government	112	127	170	186	194	215
Total Employment	935	1,241	4,224	4,197	4,528	4,758

Source: U.S. Bureau of Economic Analysis 1995.

offices, construction firms, farm supply and other wholesalers accounted for the remaining $139.5 million. In contrast to Eureka County, Elko County registered $565 in total taxable sales in 1994. Non-consumer-oriented firms accounted for $153.6 million in sales, just slightly more than in Eureka County. However, consumer-oriented businesses in Elko County had gross taxable sales of $411.2 million, 18 times those in Eureka County (State of Nevada 1995d).

The local labor force is limited, a reflection of the county's low resident population. In 1990, the labor force of the entire county totaled just 839 persons. Only 31 of the total were unemployed, an unemployment rate of only 3.7 percent (U.S. Bureau of the Census 1991). Since then, both the labor force and number of unemployed have risen, largely in conjunction with the needs of the mining industry (see Table 3-44). The Atlas Gold Bar mine ***operated from mid-1986 through mid-1994.*** Additional labor demand also has been generated by ***BHP's*** Robinson Mine, Rea Gold's Mt. Hamilton Mine, and ***Placer Dome U.S.'s Bald Mountain and Alligator Ridge mines*** in neighboring White Pine County. all of which have some employees living in the town of Eureka (Baker, Blair and Key 1995). Placer Gold's Cortez mine in east-central Lander County to the west of Eureka County primarily affects labor force and population in the Crescent Valley area.

The mining industry's recent expansion in Eureka County also is reflected in local personal income trends (Table 3-45). From 1980 to 1985, total earnings paid to workers in the county increased by over 130 percent, to $31.9 million. In the wake of the opening of the Barrick and Newmont mines, total earnings increased more than five-fold between 1985 and 1990 to $167.6 million. Most of the increase occurred in the mining industry, but was paid to workers commuting from other counties. In 1990, over 80 percent of the total wages and salaries earned in Eureka County was paid to non-residents. Earnings have continued to rise since then, as have outflows to non-residents. Consequently, total personal income of Eureka County residents has increased modestly, from $32.5 million in 1990 to $35.5 million in 1993 (U.S. Bureau of Economic Analysis 1995).

Despite the substantial outflow wages and salaries paid by the mining industry, Eureka County residents have benefitted from the economic expansion. Per capita incomes have risen from $16,371 in 1985 to $24,269 in 1993. By comparison, per capita income for the state of Nevada in 1993 was $22,894.

Table 3-44

Eureka County Labor Force and Unemployment, 1990 to 1995

	1990	1991	1992	1993	1994	1995
Labor Force	839	870	840	860	920	920
Unemployed	31	40	50	60	90	50
Unemployment Rate	3.7%	4.6%	6.0%	7.0%	9.8%	5.4%

Note: 1995 is for the third quarter, July to September 1995.

Sources: U.S. Bureau of the Census 1991; State of Nevada 1996.

Table 3-45

Eureka County Personal Income, 1980 to 1993 (Millions of $)

	1980	1985	1990	1991	1992	1993
Earnings -- Place of Work	$13.8	$31.9	$167.6	$175.8	$202.0	$228.0
Residency Adjustment	($3.1)	($15.5)	($134.3)	($141.4)	($166.0)	($189.7)
Social Security Withholdings	($0.4)	($1.3)	($7.9)	($8.5)	($9.7)	($10.9)
Other Income of Residents	$3.5	$4.9	$7.1	$7.4	$7.6	$8.1
Total Personal Income of Residents	$13.8	$20.0	$32.5	$33.3	$33.9	$35.5

Note: A negative residency adjustment reflects the net earnings of workers employed by businesses located in Eureka County, but residing elsewhere, e.g., primarily in Elko County, above and beyond the earnings of Eureka County residents employed outside of the county.

Source: U.S. Bureau of Economic Analysis 1995.

3.15.1.3 Population and Demography

Eureka County's population peaked at over 7,000 residents in the late 1800s. The mining industry's subsequent decline and lack of other economic opportunities resulted in a long-term decline to 948 residents in 1970. Population rebounded slightly with the mining industry's resurgence; population was nearly 1,200 in 1980 and increased to 1,547 residents in 1990 (see Table 3-46). The county's total population has been relatively stable since, with population estimated at 1,550 in 1994. However, a shift in the geographical concentration of population has occurred from south to north as a result of recent growth in Crescent Valley.

Eureka has been the least affected county in the region by the population influx associated with mining. Total population of nearby Elko County more than doubled between 1980 and 1994, growing from 17,269 to 41,050. Humboldt and Lander counties also experienced strong growth. Nye County to the south also has seen its population more than double since 1980. However, Nye County's growth is being driven primarily by the rapid growth of the Las Vegas metropolitan area rather than mining.

Demographic characteristics of Eureka County's population reflect recent immigration of younger households in response to increased economic opportunities. In 1990, nearly 55 percent of the county's population were male, with those between the 25 and 44 years of age accounting for nearly 20 percent of the total population. The average household size in the county was 2.49 persons, slightly below the statewide average. Children and young adults under 18 years of age represented 27.7 percent of the population, compared to 24.7 percent in Nevada as a whole. One-person households were more prominent locally than in the state as a whole. Senior citizens 65 and over were 8.3 percent of the population, compared to 10.6 percent of Nevada's overall population (U.S. Bureau of the Census 1991).

3.15.1.4 Housing

Eureka County's housing inventory is limited in quantity and availability. The 1990 census tallied 817 housing units. Of the total, 617 (75.5 percent) were occupied and 200 were vacant. Owner-occupied housing numbered 421 units (68.2 percent) and renter-occupied homes totaled 196 (31.8 percent). Only 18 vacant units were identified for sale or for rent. Another

Table 3-46

Regional Population Trends, 1980 to 1994

County	1980	1990	1994	Change 1980-1994 Absolute	Change 1980-1994 Percent
Elko	17,269	33,530	41,050	23,781	137.7%
Eureka	1,198	1,547	1,550	352	29.4%
Humboldt	9,434	12,844	15,640	6,206	65.8%
Lander	4,076	6,266	6,410	2,334	57.3%
Nye	9,048	17,781	20,740	11,692	129.2%
White Pine	8,167	9,264	9,280	1,113	13.6%
Total	49,192	81,232	94,670	45,478	92.5%

Sources: U.S. Bureau of the Census 1981, 1991; State of Nevada 1995c.

69 were identified for seasonal use or use by migrant workers and most of the remainder were listed as "other" vacant. The latter category typically reflects units with structural or other problems that effectively limit the potential for use. As in many rural western communities, mobile homes are the predominant dwelling type in Eureka County (527 units or 64.5 percent). Of the 290 dwellings in permanent structures, most were single-family detached homes.

Two-thirds of the 1990 housing stock, 542 units, were in the southern portion of the county including the town of Eureka.The Eureka County Assessor compiles records of year-round housing for the tax rolls. Records for 1990 indicate 734 dwellings in the county, about 10 percent fewer than counted in the 1990 census. By mid-1995, a total of 838 dwelling units were enumerated, an increase of 104 units over 1990 (see Table 3-47). Mobile homes accounted for the entire change, with many of those located in the northern portion of the county. Since that time, a 12-unit low-income housing project for seniors has been completed in Eureka.

There are few homes and other lots currently for sale in the town and only limited vacant land available that is suited to residential development and served by utilities. A residential subdivision offering about 10 lots for new homes is under development in Eureka. Most of the vacant land within the town is owned by the town of Eureka. Several larger tracts suited to development do exist, but would require utility system extension and construction of additional water storage capacity at a higher elevation to serve these areas.

A developer is proceeding with plans to build a residential subdivision north of town near the airport. A preliminary plan has been developed. The plan includes nearly 300 building lots, property for an 18-hole golf course, recreational vehicle lots, and parcels suitable for possible apartment units and commercial development. Construction is anticipated to begin in the third quarter of 1996. Additionally, a few scattered residential building lots are north of town in Diamond Valley, along U.S. Highway 50, and in other outlying areas. However, the county's land use plan discourages residential development in much of the rural area due to poor soils and physiographic considerations (Eureka County Economic Development Council 1995; Gourley 1996).

Temporary accommodations for tourists and transients also are limited in the town of Eureka. Five motels and a bed and breakfast offer a total of 80 rooms, while 4 recreational vehicle parks provide 47 spaces for short-term rental for recreational vehicles and travel trailers. Due to the limited overnight capacity, both types of accommodations are frequently at 100 percent occupancy during the peak summer tourism/travel season. However, with the exception of fall hunting season, occupancy rates are very low during the remainder of the year. The Eureka County Chamber of Commerce is pursuing tourism promotion activities and seeking to attract regional conferences to the renovated Eureka Opera Hall to generate additional business for the lodging industry and local restaurants.

Because of tight housing markets throughout the region, mine employees frequently commute long distances. Consequently, existing housing in Ely and Austin, both over 70 miles from Eureka could help meet future demands. As a result of growth brought about by recent mine openings in White Pine County, over 30 homes and about as many developed building lots are available in Ely, with another 20 to 25 homes for sale or rent in Austin (Almberg 1996; Malloy 1996). No modular or mobile home dealers have outlets in Eureka.

However, dealers from throughout the region sell, transport, and set up homes in Eureka for customers who have a lot or space in a mobile home park.

3.15.1.5 Community Facilities and Services

Public Safety

The Eureka County Sheriff provides law enforcement for the entire county. In 1995 the department's staff totaled 25; a sheriff and under-sheriff, nine patrol officers, five dispatchers, five jailers and four administrative personnel. Current staffing does not allow continuous 7-day per week, round-the-clock patrol in the town of Eureka. However, officers are on call during non-patrolled hours and to back up the on-duty staff if needed.

A new Criminal Justice Center was built in Eureka in 1988. The center houses the main administrative offices, dispatch center, detention facilities, and the offices of the Eureka County District Attorney. Detention capacity of the jail is 20 beds, 4 of which are designated for female inmates. The sheriff's office handles dispatch for all public safety functions in the southern portion of the county, including the Nevada State Patrol, emergency medical and fire suppression activities. The Justice Center is adequate for current needs in terms of overall size, but additional administrative and office space would be desirable (Jones 1995).

A sheriff's substation is located in Crescent Valley. Three of the patrol officers are assigned to that location. Juvenile detention facilities are located in Elko, requiring the department to provide transportation services. Although an infrequent occurrence, this service poses a burden on the department, requiring an officer and vehicle to be dedicated to that assignment for at least a half-day per trip.

The County currently provides detention services for Lander County on a contract basis. Two or three inmates are typically housed in Eureka under this arrangement, generating revenues to help support the department.

The local judicial system includes a justice of the peace in Eureka, and the Seventh Judicial District Court covering Eureka, Lincoln, and White Pine counties.

Table 3-47

Eureka County Housing Inventory

Housing Type	1990	1995
Single and Multifamily	277	277
Mobile Homes	457	561
Total Units	734	838

Source: Planning Information Corporation 1994; Ithurralde 1996.

The Eureka Volunteer Fire Department provides fire suppression service in and around the town of Eureka. The department is one of six local volunteer fire departments funded by Eureka County. These departments, along with the Nevada Division of Forestry, maintain a series of mutual-aid agreements to augment the capacities of any given department should the need arise. Eureka County provides funds to the Nevada Division of Forestry to help fund its fire suppression activities.

The department is staffed by 18 active volunteers and 5 pieces of rolling equipment, including a new 2,500-gallon tanker, 2 pumpers, a rescue vehicle, and a tender. The apparatus is housed in an aging, but presently adequate, five-bay firehouse. Access and egress to the firehouse can be difficult because of steep terrain. Improvements to the existing fire house or construction of a new facility have been discussed, but a final decision has not been made nor have funds been earmarked for this purpose. A new communications base station, to be provided by the Nevada Division of Forestry, would improve communications.

Water pressure and the number and placement of hydrants in Eureka are excellent as is storage which was recently expanded with the addition of a new 750,000 gallon storage tank (Hubbard 1995).

Emergency management coordination is currently a function of the public works department, with the job responsibilities assigned to the director of public works. The County is considering hiring an emergency management coordinator (Fiorenzi 1995).

Public Education

The Eureka County School District is headquartered in the town of Eureka. In addition to its administrative offices, the District operates an elementary and a junior/senior high school in Eureka. The elementary school is new, opened at the beginning of the 1995-1996 school year. There are several modular classrooms in use at the high school. The former elementary school is used for storage, with the adjacent gymnasium continuing in use. ***Operations at the existing Beowawe elementary school will be suspended following*** completion of a new elementary school in Crescent Valley, ***while the District evaluates other potential uses of the facility***.

During the 1995-96 school year, the District employed a staff of 58, including 34 certified teaching staff. The total number does not include substitute teachers and other employees who are employed as needed. Twenty classified staff provide administrative services, operate the District's transportation and maintenance programs or other support functions (Eureka County School District 1995b).

During the preceding 6 school years, 1990-91 to 1995-96, total enrollment in the district has fluctuated between 291 and 309. Changes in enrollments of individual schools have occurred as a result of changing residency patterns and demographics of the student body (see Table 3-48). Enrollment at Eureka Elementary declined to 118 ***students in the 1995-96 school year***, a level not experienced since the late 1980s. Meanwhile, the number of students in the junior/senior high school has increased over time, reaching a record 136 students during the 1995-96 school year. Enrollment in the Beowawe school also is growing due to continuing residential development in Crescent Valley, increasing from 34 students in 1990-91 to 55 at the start of the ***1995-96*** school year.

Due to geographic distances between communities, school districts in Nevada often serve students who live in rural areas outside the District's boundaries. At the beginning of the ***1995-96*** school year, 5 students from White Pine County and 20 students from Nye County were attending schools in Eureka. In addition there were 28 students from Eureka County, ***in grades 7 through 12,*** attending school in Lander County, with another 8 attending school in Elko County.

Table 3-48

Eureka County School Enrollment, 1990-91 to 1995-96

School	School Year 1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Eureka Elementary	147	146	129	128	124	118
Eureka Junior/Senior	114	125	125	129	111	136
Beowawe Elementary	34	32	37	42	39	55
Total Enrollment	295	303	291	299	274	309

Note: Enrollments are the 10th month reporting period through 1994-1995; 1995-1996 is for the first month.

Sources: Planning Information Corporation 1994; Eureka County School District 1995a.

According to the District Superintendent, the new Eureka Elementary school has a physical design capacity of about 300 students. However, the optimum capacity given the District's desired staffing levels, program offerings and parental expectations is about *225* students. A comparable optimum capacity of the junior/senior high is about 140 students. With completion of the elementary school building program, the District is undertaking an assessment of space needs for the junior/senior high school to address growing enrollment as well as changing curriculum needs. Consideration is being given to the merits and feasibility of expansion and renovation of the existing facility versus construction of a new school (Stevens 1995).

The new Crescent Valley school ***has*** a capacity of 120 to 140 students. It would ***operate*** initially as a ***school for children in*** pre-kindergarten to 6th grade. However, depending upon overall enrollment trends in the area, it could be expanded to include 7th and 8th grades if sufficient students are available to support athletic and extracurricular programs.

Health Care and Social Services

Medical service in southern Eureka County is provided at a clinic staffed by a physician, ***a physician assistant,*** and several administrative employees. Financial support for the clinic is provided from fees for service and County revenues. The ***medical staff provides*** 7-day-a-week service. The clinic is open during normal business hours, Monday through Friday, with service available on an on-call basis at other times. Nevada Rural Health Centers, Inc. provides some administrative support. The nearest hospitals are located in Elko (115 miles) and Ely (77 miles). A public health nurse, funded by the state, visits Eureka periodically offering immunizations and routine screening for several medical conditions. No resident dentist currently serves Eureka (Sayler 1995).

The clinic's physical plant is old and somewhat out-of-date, but adequate for existing needs. Handicapped access is inadequate and the clinic is poorly heated. Construction of a new clinic, using a combination of local funds and federal grant monies, is under consideration by Eureka County and the Eureka County Chamber of Commerce's Economic Development Committee. Preliminary site selection and design are underway, but no decision to proceed has been reached (Baumann 1995; Goicoechea 1995).

Emergency medical care and transportation is provided by the Eureka County Emergency Medical Services Council, a volunteer ambulance service serving the entire county. ***The service is funded through user fees and by the County. Six*** emergency medical technicians are on call and two ambulances are housed in a new garage in the town ***of Eureka***. Another ambulance is located in Crescent Valley in northern Eureka County ***and is staffed by local volunteers. One of the units in Eureka is a recently delivered 1996 model which replaces an older unit. The older model will be refurbished and then based in***

Crescent Valley. The ambulances have radio communication with Elko General Hospital, where most patients are transported. Fixed-wing air transportation ***also is available*** from hospitals in Reno and Salt Lake City (Eureka County Economic Development Council 1995; Sayler 1995). The Eureka County sheriff's office handles dispatch for the ambulance service.

Mental health service is provided by Ely Mental Health, one of a state-wide network of eight rural clinics. Twice each month a counselor visits Eureka offering residents 1.5 days of appointments. Funding comes from the County and from income-based fees. The employee is a licensed, clinical social worker and certified as a substance abuse counselor. About 10 clients currently use the service, under the supervision of a psychiatrist in Ely. Those clients requiring prescriptions must visit the psychiatrist in Ely (Fowler 1995).

Eureka County provides emergency assistance to those requesting it on an as-needed basis. The County Clerk and Treasurer administers the assistance program which ranges from providing a free meal or fuel to a month's rent. A few people each month ask for this assistance (Shangle 1995).

The Nevada Human Resource Department's Division of Welfare maintains no staff in the town of Eureka, even on a visiting basis. Those social services provided to Eureka residents (cash grants, medical assistance, food stamps) are obtained either through application by mail or by visiting the office in Ely. The caseload from Eureka has traditionally been limited, with the largest demand for food stamps (McMurray 1995).

Eureka's Senior Citizen's Center provides lunch Monday through Friday. Twenty-five to 30 people eat at the center each day. The center has the resources to serve twice that many lunches. In addition, the center qualifies applicants for a food bank, using state income guidelines, and distributes commodities to 63 families in the region. The center also oversees 12 recently constructed low-income, senior housing units. These units are now fully occupied and have a waiting list. Finally, the center coordinates a daily visiting helper to persons in Eureka who need assistance in taking medicines or daily living. The helper is funded by the "Lend a Hand" program in Elko (Oram 1995).

Utilities

Public water and wastewater utilities serve the town of Eureka. Most other areas of the county are on individual wells and septic systems. Eureka's water supply is from two high-volume wells north of town, one of which was completed in 1994, and spring-fed sources south of town. Total production capacity is over 1,000 gallons per minute. Current demand is satisfied by pumping for about 7 hours daily during the summer and 4 hours during the winter. A new 750,000-gallon storage tank was completed in 1995, raising the total storage volume to over 1.4 million gallons. This volume is adequate for both typical consumptive use and fire protection requirements. Over the past several years, new water lines were installed throughout most of the town (Fiorenzi 1995).

A two-cell aerated, evaporative lagoon facility handles wastewater treatment needs for the town. The existing facility is adequate for the current volume of effluent given the area's arid climate. It is estimated that the system could accommodate at least a 25 percent increase in volume without the need to expand capacity. Capacity expansion could be achieved by adding additional cells to the current system or building a primary treatment system. A plan to add two new cells in the near future and as many as four additional cells at a later date was recently approved (Fiorenzi 1995, 1996; Goicoechea 1995).

Mt. Wheeler Power, Inc., a rural electric cooperative, serves the electrical energy needs of the town of Eureka and surrounding area. There is no natural gas service in the area, however, propane and bottled gas are available from local suppliers.

Library

Eureka County contracts with Elko County to provide a full-time librarian and the library in Eureka is open 22 hours a week. The building housing Eureka's library was built in 1982. A wide selection of books and periodicals is available, with additional materials available through interlibrary loan accessed through a statewide computer database. The facility and service is adequate for current needs (Fipps 1995).

Recreation Facilities

The county funds a county-wide recreation program. An indoor swimming pool, a number of ballfields and playgrounds and some activities are funded in the town of Eureka through this program. In 1993, the swimming pool was enclosed in a brick building. The pool is adequate for current use, even in the summer when the pool is busiest. It is open in the morning for lap swimming and in the afternoons and evenings for aerobics, swimming lessons and recreational swimming. No other recreational facilities are offered at the pool (Groth 1995).

The Eureka County School District maintains indoor gymnasiums and a running track/football field complex in Eureka. Although school-sponsored events and activities have preference at these facilities, they also support community recreation.

County Government Administrative Facilities

Eureka County offices are housed in the historic courthouse and in several adjoining and nearby buildings. Existing office space is inadequate for all needs, and the courthouse requires major rehabilitation and modernization. A new auxiliary administrative office building is under construction in Eureka. When completed in 1996, offices currently housed in the courthouse would temporarily relocate to the new building while renovations of the courthouse are completed. Thereafter, the primary administrative functions would again be housed in the courthouse, with public works and offices now housed in other locations then being consolidated in the new office building (Goicoechea 1995).

3.15.1.6 Public Finance

The primary governing bodies in Eureka County are the Board of County Commissioners and the Eureka County School District. The County Commissioners oversee county operations, including administration, law enforcement, judicial, public works and economic development. The County also administers the budgets of the town of Eureka and various special districts. The district serves the entire county and is governed by an elected board, with the superintendent and administration responsible for day-to-day operations.

Local government and school finances in Nevada are complex, involving locally derived and state-shared revenues. The former consist primarily of ad valorem property taxes on real and personal property and the net proceeds of mines located within the county. The latter include sales, motor vehicle and fuel and gaming revenues. Intergovernmental transfers from the state are particularly important in Nevada and have evolved in response to Nevada's unique economic, tax and geopolitical structure, particularly the disparities between the Las Vegas and Reno metropolitan areas and rural agricultural and mining communities. Current fiscal conditions of the two primary entities are summarized below.

Eureka County

The County's fiscal structure reflects a strong dependence on mining for its ad valorem tax base and necessary responses to the combined influences of a small population base and large physical service in the county. Eureka County's assessed valuation has increased sharply due to mining; from $234.6 million in 1988-1989 to $844.2 million for the current year. The increase reflects $349 million in added real and personal property assessments and $285 million in added net mining proceeds subject to ad valorem taxes in Nevada.

Ad valorem taxes levied on this tax base by Eureka County climbed from just over $5.0 million in fiscal year 1993-1994 to nearly $6.2 million budgeted for fiscal year 1995-1996. Over the past 3 years, such revenues have accounted for nearly

45 percent of the county's total annual revenues which have climbed from $11.65 million to $13.67 million. These revenues are paid largely by the mining industry. Combining the real and personal property valuations associated with mining and the net proceeds from mining illustrates the current reliance of local government finances on mining. As shown in Table 3-49, the mining industry represents approximately 96 percent of the total ad valorem tax base of the County and District and hence pays a comparable portion of the associated taxes.

Other locally-derived revenues have averaged just over $1.0 million for the past 3 years, about 8 percent of the County's total annual revenues (see Table 3-50).

These include substantial fees generated by County departments and interest earnings on reserves and funds which the County has been accruing to meet capital outlay requirements associated with the construction and rehabilitation of county offices.

Intergovernmental revenues account for the bulk of the County's remaining revenues. Such revenues totaled $5.5 million in fiscal year 1993-1994 and had increased to $6.4 million in

Table 3-49

Mining's Share of Eureka County Assessed Valuation, Fiscal Year 1995-1996

Assessed Valuation Category	Mining Related	Total	Share From Mining
Real and Personal Property	$427,125,100	$454,324,486	94.0%
Net Mining Proceeds	$385,353,775	$389,876,799	98.8%
Totals	$812,478,875	$844,201,285	96.2%

Sources: Eureka County Assessor's Office 1995c; State of Nevada 1995d.

Table 3-50

Eureka County Revenues For Fiscal Years 1994 to 1996

	Fiscal Year		
Sources	1993-1994 (Actual)	1994-1995 (Estimated)	1995-1996 (Budgeted)
Ad Valorem Taxes			
General Property	$2,731,429	$3,091,166	$3,330,850
Net Proceeds of Mine	$2,293,834	$2,788,801	$2,841,221
Other Taxes	$126,878	$121,525	$220,675
Intergovernmental Revenues			
BCCRT	$990,888	$1,091,462	$1,162,138
SCCRT	$3,226,374	$4,021,930	$4,216,339
Other	$1,347,662	$932,223	$1,047,905
Charges for Services	$461,555	$331,100	$349,885
Fines and Forfeits	$87,079	$28,800	$49,250
Miscellaneous	$388,076	$499,300	$456,250
Total Revenues	$11,653,775	$12,906,307	$13,674,513

BCCRT: Basic County-City Relief Tax.

SCCRT: Supplemental County-City Relief Tax.

Source: Eureka County 1995a.

the current budget year. Intergovernmental revenues include the Basic County-City Relief Tax, Supplemental County-City Relief Tax, motor vehicle property taxes, and fuel taxes. Basic County-City Relief Tax and Supplemental County-City Relief Tax are statewide sales and use taxes enacted to provide property tax relief. Basic County-City Relief Tax is a state-mandated, county-imposed sales and use tax returned to the county of origin, while revenues derived from the Supplemental County-City Relief Tax sales and use tax are pooled and distributed according to a specific formula.

The overlapping ad valorem tax rates of all entities imposed on property in the town of Eureka is $1.795 per $100 of assessed valuation. This is among the lowest rates in the state and is less than half of the state-mandated maximum of $3.64. Eureka County's levy is $0.7288, 41 percent of the total (see Table 3-51). Eureka County School District's levy is $0.75, a uniform statewide levy for public education. Other levies include $0.1577 for the town of Eureka, primarily for public works, a county-wide levy to support television service and a state-mandated levy of $0.15, with proceeds dedicated to emergency medical care for indigent motor vehicle accident victims.

County-wide tax rates also apply to the net proceeds of mining. Such proceeds are taxed at a rate of $5 per $100 by the state. From the total, revenues equivalent to that which would have been derived by the local levy are returned to the county and school district of origin, the remainder being retained by the state.

Eureka County expenditures for the past three fiscal years are shown in Table 3-52. Total budgeted expenditures have climbed from $9.6 million in 1993-1994 to $19.3 million for the current year. Budgeted outlays in all major functions/departments have increased over the period, in some cases by substantial amounts. General government expenditures account for most of the increase, increasing from $2.9 million to $9.2 million over the three-year period. Public works and public safety are the next two largest functions in terms of budgeted outlays and the increases in such outlays. The combined budgets of these two departments have increased from $3.1 million in 1993-1994 to $4.6 million in 1995-1996. Community support and intergovernmental transfers also posted large increases in budgeted outlays (Eureka County 1995a).

Underlying the sharp rise in expenditures are major capital improvements funded from accumulated reserves and current revenue. Recent and ongoing improvements included in these budgets are construction of a new auxiliary office building, courthouse renovation, joint

Table 3-51

Ad Valorem Tax Rates in the Town of Eureka
Fiscal Years 1993-1994 through 1995-1996

Taxing Entity	Tax Rate	Percent of Total
Eureka County	$0.7288	41%
Eureka County School District	0.7500	42%
Eureka Town	0.1577	9%
Eureka County TV	0.0085	<1%
State Rate (indigent health care)	0.1500	8%
Total Ad Valorem Rate	$1.7950	100%

Note: Rates are in dollars per $100 of assessed valuation.

Sources: Final budgets of local entities for fiscal year 1995-1996; Eureka County 1995c.

Table 3-52

Eureka County Budgeted Expenditures, Fiscal Years 1994 to 1996

Function/Department	Fiscal Year 1993-94 (Actual)	1994-95 (Estimated)	1995-96 (Budgeted)
General Government	$2,911,457	$5,370,415	$9,248,258
Judicial	$500,137	$583,500	$597,200
Public Safety	$1,067,580	$1,356,800	$1,739,177
Public Works	$2,007,787	$3,005,000	$2,837,500
Sanitation	$119,679	$320,000	$666,933
Health	$376,880	$510,000	$415,400
Culture & Recreation	$519,588	$800,573	$643,928
Community Support	$316,173	$425,000	$1,179,700
Intergovernmental	$1,811,357	$2,030,000	$1,719,000
Contingencies/Other	$0	$0	$300,000
Total Expenditures	$9,630,638	$14,401,288	$19,347,096

Source: Eureka County Assessor's Office 1995c.

funding with the Nevada Division of Forestry of a new fire protection garage in Crescent Valley, fire equipment purchases, improvements at the landfill, and airport improvements. Eureka County is participating in the construction of a regional juvenile detention facility in Elko County, providing an intergovernmental transfer of over $1.0 million. The County Commissioners are considering construction of a new medical clinic in Eureka in the next 1 or 2 years. Despite the large capital outlays, the county has total fund balances and reserves totaling approximately $8.0 million, including a $2.0 million reserve account to provide an adjustment and transition period in the event of an unanticipated sudden and sharp decline in the mining industry (Goicoechea 1995).

The County has refrained from using debt for capital improvements. The policy of funding improvements using available resources reflects both the substantial revenues generated by mining and the uncertainty that surrounds the industry. While current mine plans of the existing mines indicate sufficient reserves to sustain operations beyond 2010, variability in the price of gold may affect production levels and net proceeds, in turn affecting the county's tax base. Such uncertainty, particularly given current revenues, makes long-term debt both unnecessary and somewhat risky.

Eureka County School District

General fund revenues of the Eureka County School District have increased from $5.8 million to $6.9 million over the past 3 years (see Table 3-53). The District derives virtually all its revenue from locally generated ad valorem property taxes levied on real and personal property and the net proceeds of mining. Such sources accounted for 85 to 90 percent of all revenues over the past three years. Other local sources, including local school support sales tax and earnings on invested funds, generated most of the remaining revenues. Given the locally generated revenue base, the District does not qualify for additional state funding under Nevada's public education funding structure.

General fund expenditures for the District have increased by nearly 50 percent over the past three years, from $3.9 to $5.7 million (Table 3-54). The increase reflects higher enrollments in the junior/senior high, expanded curriculum and

Table 3-53

Eureka County School District Revenues
Fiscal Years 1994 to 1996

Revenue Source	Fiscal Year 1993-1994 (Actual)	1994-1995 (Estimated)	1995-1996 (Budgeted)
GENERAL FUND			
Ad Valorem Taxes			
General Property	$2,888,262	$3,181,719	$3,427,742
Net Proceeds of Mines	$2,374,347	$2,662,500	$2,924,076
Other Local Sources	$501,355	$485,497	$511,662
State Sources	$125	$0	$0
Federal Sources	$29,068	$16,000	$25,000
Subtotal General Fund	$5,793,157	$6,345,716	$6,888,480
OTHER REVENUES			
Rents & Interest Earnings	$170,400	$158,000	$261,000
Bond Proceeds		$4,000,000	
Misc. State & Federal	$97,017	$0	$0
Subtotal Other	$267,417	$4,158,000	$261,000
Total Revenue	$6,060,574	$10,503,716	$7,149,480

Source: Eureka County School District 1995a.

Table 3-54

Eureka County School District Expenditures
Fiscal Years 1994 to 1996

Major Function	Fiscal Year 1993-1994 (Actual)	1994-1995 (Estimated)	1995-1996 (Budgeted)
GENERAL FUND			
Education	$1,945,003	$2,113,175	$2,925,075
Other (see note)	$313,314	$308,700	$401,800
Undistributed (see note)	$1,628,806	$1,883,226	$2,384,600
Subtotal General Fund	$3,887,123	$4,305,101	$5,711,475
OTHER FUNDS			
Capital Projects	$2,912,652	$6,208,214	$6,874,413
Special Education	$227,700	$340,650	$394,100
Other	$108,320	$15,200	$88,800
Subtotal Other	$3,248,672	$6,564,064	$7,357,313
Total Expenditures	$7,135,795	$10,869,165	$13,068,788

Note: Other general fund includes athletics, community services, and food service. Undistributed funds include student support, administration, operation and maintenance of facilities, and transportation services.

Source: Eureka County School District 1995a.

programs, additional faculty, and opening of the new elementary school in Eureka. One factor underlying the District's budgets are substantial outlays for salaries. Average salaries paid by the District are among the highest in the state. The higher than average salaries are necessary to recruit and keep quality faculty given the remoteness of its schools, shortage of housing and other factors. Rising school-age population in Beowawe and Crescent Valley also have contributed to the increases in budgets, raising the amount of tuition paid to neighboring school districts and higher transportation costs.

As has Eureka County, the District has taken advantage of the current economic prosperity to undertake a major capital improvements program. A new elementary school was recently completed in Eureka and construction of a new elementary school in Crescent Valley scheduled for completion in the summer of 1996. The District undertook $4.0 million in short-term debt in 1995, supplementing accumulated cash balances to fund capital construction of the two elementary schools. The District has no other debt, and the recently issued debt is to be retired in 1999.

With the completion of its elementary school construction program in sight, the District is initiating a review of its capital needs for the junior/senior high school. *Facility utilization is approaching its maximum due to recent increases in secondary enrollment and expanded curriculum. Temporary classrooms have been established in the school's cafeteria and on the stage to accommodate the added cirriculum.*

The merits, costs and other considerations associated with expansion versus new construction would be weighed. When completed, the District believes that it would be well-positioned for foreseeable future needs.

3.15.2 Environmental Consequences

3.15.2.1 Proposed Action

No single criterion exists to assess the socioeconomic impacts of the Proposed Action and alternatives within the region of influence. Rather, significance criteria were established for several key dimensions of the socioeconomic environment. These criteria are listed below.

- Demand for temporary or permanent housing exceeds the expected supply of available housing during the scheduled construction and operations periods.
- Changes in local population, employment or resident earnings associated with operations is 10 percent or more.
- Long-term demands on public infrastructure and key services would absorb remaining surplus capacity, either triggering the need for capital expansion or resulting in a discernible reduction in the level of service provided.
- The project's effects on public sector fiscal conditions would result in a 10 percent or greater change in revenues or expenditures or would affect the underlying fiscal conditions beyond the life of the project.
- The project would substantially affect a number of residences or businesses, by displacement, other diminution of property values, or otherwise affect the owner's normal and customary use of the property.
- Changes induced in the social or business community are likely to cause important changes in organizational structures, local government, or traditional lifestyles of the community.

This section describes the impacts of the Proposed Action within the context of social and economic conditions of the primary study area, that is, the town of Eureka and surrounding areas of southern Eureka County. Where appropriate, changes affecting areas outside the region are noted. Both short-term impacts during construction and long-term effects during operations and post-mining are described.

Homestake Mining Company currently employs a small work force in Eureka County conducting exploration and pre-mining planning and design. Construction of the proposed project is scheduled to occur in 1997. Pre-stripping of overburden would occur concurrently with construction, with processing beginning in late 1997. Production would continue through the year 2003, based on current reserves.

During a 9-month construction period, an average of about 100 non-Homestake employees would work at the site. After construction of the permanent structures is completed, non-Homestake employment would taper off to about 70 workers in late 1997, with those individuals involved in contract mining.

Homestake would begin expanding its work force when construction begins, reaching full employment of 121 employees in mid- to late-1997. Homestake's operational work force would remain at about 121 for the remainder of the project's operating life. Project employment would decline following the end of mining, as processing and reclamation are completed. The size of the post-mining work force would be limited due to concurrent reclamation being conducted throughout the life-of-mine.

The peak employment impact associated with the project would occur in mid-1997 during a 6-month period between construction and full production. During this period a maximum of 126 non-Homestake and 99 Homestake employees would be on site. Figure 2-1 profiles project-related employment over time.

Employment, Economic, and Population Impacts

The local economy is dependent on mining, agriculture, tourism and government for its economic base. Approval of the proposed project would result in short-term increases in the number of local construction jobs and long-term increases in mining sector employment in Eureka County. The higher-than-average earnings paid in these two industries would provide a major economic stimulus to the local economy.

Expenditures made locally by mine employees and Homestake and its contractors would support increased local trade and retail and public-sector employment in Eureka. Existing businesses, many of which rely on seasonal demands from tourists and hunters, would benefit from the added year-round trade and some new businesses would likely start in Eureka. However, much of the indirect economic activity generated by the project would occur outside the local economy because of the limited size and diversity of the local retail and service sector and anticipated commuting by mine employees from other communities. Businesses in Elko, Ely, and as far away as Reno, would capture this trade.

The project's effects on the region's economy, population and other elements of the socioeconomic environment would depend on the number and demographic characteristics of immigrating workers. In turn, the level of in-migration would be determined by the availability of qualified workers in the local labor force and the availability of housing.

There are four potential sources of local labor for the Ruby Hill Project: persons who are unemployed, underemployed, employed at other mines, and those living elsewhere in the region and willing to commute. As shown in Table 3-55, the size of the local labor force is limited. Despite having nearly 4,000 mining jobs within its borders in 1993, Eureka County is sparsely populated and has a limited work force. Unemployment typically ranges between 50 and 70 persons, and is sensitive to both seasonal variation and the actions of a single employer. Eureka's remoteness and limited number of job opportunities limit the community's attraction to outsiders seeking employment, and those without jobs do not tend to remain long.

The broader region of northeastern Nevada, delineated in the table, supports a substantially larger work force, with an average of over 1,600 unemployed persons in 1995. Although distances between communities in northeastern Nevada are great and tend to encourage miners to live in the closest community to the work site, long-distance commuting is not uncommon.

Table 3-55

Regional Labor Market Conditions

County	Labor Force	Unemployment	
		Persons	Rate
Elko	20,833	1,133	5.4%
Eureka	920	50	5.4%
Lander	3,127	230	7.4%
White Pine	4,257	250	5.9%
Total	29,137	1,663	5.7%

Source: State of Nevada 1996.

Some employees at the existing mines in northern Eureka County live in the Crescent Valley, but most live in Elko and a few commute to the town of Eureka. Similarly, a number of miners live in Eureka but are employed at mines in neighboring White Pine County and commute 50 to 70 miles each way to the mine site. Some of these workers may choose to work for Homestake instead, though this creates openings at the existing mines that also could spawn in-migration. Finally, some under- or unemployed residents in the neighboring communities may commute to Homestake.

These factors are taken into consideration in projecting the expected employment and population impacts of the proposed Ruby Hill project in the primary study area. Tables 3-56 and Table 3-57 summarize these impacts for the construction, transition, and operations period.

Construction. The construction work force would average 100 workers over the construction period, with a short-term peak of about 126 workers. Homestake would hire a general contractor with expertise in mine development for construction. The contractor would relocate key management and supervisory staff, hiring the remainder from the local and regional labor force.

Indirect employment spawned by the construction activity is projected at 20 additional jobs, raising the temporary construction impact to 120. Local labor is expected to meet 15 percent of the total jobs during construction, yielding an unmet labor need of 102. In relative terms, the employment impact during construction represents a 2.5 percent increase over Eureka County's 1993 employment when reported on a place-of-work basis, but a 13.8 percent increase compared to the presently employed work force of 870.

Direct payroll to construction workers, including the value of benefits, is projected to exceed $5.3 million. Much of this would be spent locally for items such as food, clothing, fuel and rent, stimulating the local economy.

Demographic characteristics of construction households expected to relocate to Eureka for this project include an average of 1.2 workers and 1.7 persons per household. Thus, there would be an average of 85 new households in Eureka during construction, with a corresponding population impact of 145 persons. Some of these households are likely to be located in the surrounding region, commuting on a weekly basis but maintaining their permanent residence elsewhere. While not technically residents of Eureka, they would generate demands on local services, as well as added expenditures in the local economy. Compared with the 1994 resident population of 1,550 persons, the construction population impact is between 9.4 and 14.1 percent.

Beyond the project's direct construction employment, additional construction jobs would

Table 3-56

Employment and Labor Force Impacts, Ruby Hill Project

Description and Derivation	Construction	Transition	Operations
Average Project Employment	100	225	121
Plus: Indirect Jobs[1]	20	87	90
Equals: Total Employment	120	312	211
Less: Local Labor[2]	-18	-63	-53
Equals: Nonlocal Labor	102	249	158
Divided By: Average Jobs/Household	1.2	1.29	1.4
Equals: New Households	85	193	113

[1]Based on indirect job multipliers of 0.20 for construction and 0.74 for operations.

[2]Local labor is assumed to fill 15 percent of the jobs during construction and 25 percent during operations.

Source: Hammer, Siler, George Associates based on census and other economic information, reviews of other EISs and professional judgement.

Table 3-57

Population Impacts, Ruby Hill Project

Description and Derivation	Construction	Transition	Operations
New Households	85	193	113
Regional Population Impact[1]	145	428	323
Eureka Population Impact[2]	145	391	275
Population Impact Elsewhere	0	37	48
Students in Eureka Schools	26	81	72

[1]Based on an average household size of 1.7 persons for construction and 2.86 persons for operations households.

[2]Based on 100 percent local residency during construction and 85 percent local residency during operations.

Source: Hammer, Siler, George Associates based on census and other economic information, reviews of other EISs and professional judgement.

be created by Homestake's plan to sponsor new housing development in or near Eureka. These plans call for the construction of approximately 32 single- and multi-family units. Homestake is also negotiating with a housing developer for the provision of 30 lots in a new mobile/modular home subdivision to be developed north of Eureka. Employment estimates associated with residential construction are not available, but would occur prior to project construction and therefore would not increase project-related employment above the direct peak indicated earlier.

__Transition.__ Homestake staffing and contract mining are planned to occur concurrently with construction. During the transition from construction to full production, the combined non-Homestake and Homestake employment would reach 225 workers. This represents the peak direct-employment associated with the proposed project, though it would occur for only a 3- to 6-month period. A total of 98 additional indirect jobs would be supported in the region during the transition period. Based on the combined demographic characteristics and residency patterns of the respective construction and operations work forces, and contingent on housing availability, the population impact for the area is estimated at 428, of whom 391 could seek to live in the Eureka area.

__Operations.__ Operations employment is anticipated to average 121 jobs over the long term. According to research by Dobra (1988), each new mining job indirectly supports another 0.74 jobs in northeastern Nevada and 0.5 jobs elsewhere in the state. For the Ruby Hill project, this indirect multiplier effect translates to between 90 additional jobs, for a total impact of 211 jobs.

In relative terms, the peak operations employment impact represents a 4.4 percent increase over Eureka County's 1993 employment on a place-of-work basis, but a 24.3 percent increase compared to the county's presently employed resident work force of 870.

Not all of these jobs would be in Eureka County, but rather in Elko and other communities that have larger mine service, wholesale and retail sectors. The adjacent counties also have larger unemployed labor forces to meet some of the demands. Consequently, the existing labor force is projected to meet 25 percent of the total long-term demand. Such demand includes many indirect jobs located outside of Eureka County.

The residual unmet labor need of 158 jobs would be filled through in-migration. With an average of 1.4 workers per new household, 113 additional households would migrate to the region. Based on an average of 2.86 persons per household, characteristic of the region, the corresponding net population impact is projected at 323 persons. No more than 85 percent of the total are expected to live in and near Eureka, as a result of the limited housing availability. The remainder would live elsewhere, primarily in Ely and Austin, and commute to Eureka. The employment and population impacts would be significant within the context of the local setting.

At full production, annual earnings paid to the mine's employees are estimated at $4.79 million. Homestake would incur an added payroll costs of $1.77 million annually for fringe benefits and other employer overhead. Each $1.00 in local earnings would indirectly generate $0.37 in earnings to other workers in the local economy (U.S. Bureau of Economic Analysis 1992; Dobra 1988). Consequently, the annual indirect impact on earnings is $1.78 million, yielding a combined direct and indirect impact of $6.57 million. The increase in income earnings would be an important economic benefit accruing from the project to the local economy. Based on expected residency patterns, about $4.27 million or 65 percent of the total would accrue to Eureka County residents, and the remainder to households in neighboring counties. Earnings supported by the proposed project would be equivalent to 11.2 percent of the total earnings of $38.3 million by Eureka residents in 1993, a significant impact that benefits local households and businesses. With the higher income and spending, some new businesses would likely start in Eureka, providing sought-after economic expansion and diversification.

The increased support for local business associated with the Ruby Hill project could indirectly affect current tourism promotion efforts in Eureka. First, temporary demand for housing during the construction and transition periods could impinge on the marketing efforts of the Eureka Opera House to attract regional conferences due to limited room availability. Over the long-term, however, the increased business activity and expanded base of services and trade would likely benefit these efforts. Second, the improved economic climate could spawn new real estate investment interest in Eureka's business district. This could either jeopardize some historic buildings by creating demand for new construction or benefit the community by promoting renovation and rehabilitation previously rendered infeasible by the weak economy.

Housing

The local housing supply is extremely tight, particularly for permanent housing. The current housing stock is too inadequate in size to meet the peak demands associated with the project. Consequently, the project would have significant impact on the local housing market.

An average of 85 households would seek temporary housing in Eureka during construction. To meet this demand are 127 motel rooms and recreational vehicle spaces in Eureka. Although adequate in number to meet the project-related demands, these units also serve demands from tourists, hunters, and business travellers. Therefore, some displacement of seasonal visitors could occur and nightly and weekly rental rates would increase.

The most severe pressure on local housing would occur during the transition period when as many as 183 temporary and permanent households could seek housing. Some housing shortages are expected for up 9 months. Completion of the company-sponsored housing program would provide up to ***29 housing units and 30 modular/mobile home lots***. Additional spaces for mobile/modular homes will be available in a new subdivision and some land is available in other locations to accommodate other private development. However, the number of such sites probably numbers fewer than 30.

The strong market could create inflationary pressures on housing costs, particularly for current households living in rental housing. Landlords may increase rents, or they may use the favorable market conditions to sell their property. Such tight market conditions for housing also can spawn informal and dispersed parking of travel trailers and/or recreatinal vehicles on nearby public and private lands, a less than ideal situation. Although not ideal, in such circumstances some construction contractors allow workers to park recreational vehicles and travel trailers near the construction site temporarily, making provisions for basic solid waste collection and disposal requirements.

The shortages and high costs would induce some households to commute from other locations, primarily Austin and Ely, at least temporarily. Ely offers a number of existing homes and building sites for sale, which would be affordable given the typical mining household's income. Multifamily rentals and mobile home/travel trailer parking spaces also are available in Ely. However, mineral development also is affecting the Ely market, which could limit future availability. Housing is available for sale or rent in Austin, due to layoffs and closures affecting the local work force in that community.

The local housing market would improve once construction is complete and operations begin. Long-term average housing demand is estimated at 96 units. This demand could be met by a combination of the housing sponsored by Homestake, new development anticipated by private contractors, and use of some recreational vehicle/travel trailer spaces on an extended basis. The added housing demand is significant in that it represents an increase of 11.5 percent over the current housing stock in the entire county.

Prospective buyers locating in Eureka would need to work with mortgage lenders, title companies, and modular and mobile home dealers in Battle Mountain, Ely and Elko as there are no suppliers currently active in Eureka. Furthermore, the life-of-mine is shorter than the typical term of home loans. This could make home financing problematic, particularly for households not employed directly by Homestake and thus not having access to any company-approved housing assistance programs.

The mine would be located adjacent to the town's boundaries in general proximity to existing residential and nonresidential development in the community. Residents of the community would be aware of the project as noise, and sometimes dust, from the operations would carry to the community. Some residents of the community would find this experience detrimental to their quality of life. However, most residences in the town are located 0.5 mile or farther from the mine and therefore would not be directly impacted by its operations.

Owners' uses of business properties located along Eureka's main street would not be adversely affected by noise or dust. In fact, the overreaching impact would be beneficial as the new population and added consumer expenditures stimulate local trade and thereby enhance property values.

<u>Community Facilities and Services</u>

<u>Public Safety.</u> Project-related growth would affect local public safety services. The sheriff foresees the need for two additional patrol officers during construction and one or two patrol officers and one administrative position during operations. These staff changes would increase the department's payroll, operating, and capital equipment costs. The added personnel would allow 7-day-a-week, 24-hour coverage by a patrol officer and the possibility of having two officers on duty for some shifts. These needs are based on an expected rise in the number of calls for assistance and traffic accidents. In addition, the sheriff is concerned that the project's effect on housing cost and availability would hamper recruitment and retention. Existing detention facilities are adequate to accommodate the added demands, but growth would add to current deficiencies in the amount of administrative space (Jones 1995).

Additional population and development would increase the number of calls to the Eureka Volunteer Fire Department. Though the increased demand would not strain the department's equipment capabilities, it would place added pressure on the department's cadre of volunteers. However, the Fire Chief knows of departments in other communities that have benefitted from increased staffing when mine employees have joined the local fire department. He anticipates this occurring in Eureka, benefitting both the department and community. Some of the new volunteers who work night shifts at the mine would likely be available to respond to calls during the day, a time when many rural volunteer fire departments experience slower response as most volunteers are at work (Hubbard 1995).

Calls for emergency medical assistance to the volunteer ambulance service also would increase in number, but again would be within the capabilities of the current staff. As with the Eureka Volunteer Fire Department, the service could gain additional volunteers with growth. Building and equipment capabilities are adequate with the recent completion of a new garage and anticipated delivery of a new ambulance.

<u>Public Education.</u> Enrollments in the Eureka County School District would increase by 26 students during ***initial*** construction. Though substantial in comparison to the District's ***1995-96 school year*** enrollments of 254 in the two schools in Eureka, the ***increase would be temporary and*** could be accommodated with existing capacity. Depending on the age distribution of the new students, the District may need to add a class of a specific elementary grade and one or two additional teachers and staff.

During the transition and operations phases, enrollment impacts would be significant. Between 72 and 81 additional students would be expected during these periods. The entire impact would not occur at once, but would likely occur over a 6- to 9-month period. Although the age-distribution of the ***additional*** students is uncertain and would vary over time, elementary students frequently account for 60 to 70 percent of new enrollments during periods of rapid growth. For the Ruby Hill Project, this translates to between 43 and 57 elementary ***(K through 6)*** and 22 to 32 ***(7 through 12)*** secondary students.

Average class sizes could grow as a result of the enrollment growth. Current class sizes in the District are below statewide averages and standards, and the District's objective is to maintain an overall student-teacher ratio of 10:1. The Superintendent believes that the District's

Board of Trustees would try to limit increases in class size, particularly through third grade, to promote higher quality education and to meet parental expectations. ***To achieve this objective, the district would have to hire additional staff.***

The Superintendent foresees the need for six additional staff, depending on the age distribution of the new students. Recruiting this number of new teachers would be difficult. The District already faces difficulty in recruiting and retaining teachers due to, among other factors, the limited housing availability. Thus, it must pay higher salaries, and in some instances, provide housing in one of several homes owned by the District (Stevens 1996). In the short-term the proposed Project could compound the tight housing market, but over the long-term would promote an increase in housing supply.

Even with the growth, some excess capacity would remain at the new Eureka Elementary School. But, ***with enrollment at the existing junior/senior high school already approaching capacity, the school district has identified alternatives to address more secondary-aged students. These alternatives include split sessions, adoption of a year-round school schedule, relocating the 7th and/or 8th grade classes to Eureka Elementary School, or allowing increases in class sizes. Another option would be to use modular clasrooms to expand capacity of the existing junior/senior high***. The District is considering renovation and expansion of that school or construction of a new school. Capital construction costs of any new facilities would be borne by all property owners in the county, including the Homestake Mining Company (see the Public Finance discussion below).

Health Care and Social Services. The population growth resulting from the proposed Ruby Hill mine could double or triple the health clinic's caseload to 30 to 45 visits per day. The existing health care clinic is adequate for the present population, but the added demand would strain the capacities of both the current facility and staff. This would ***intensify*** the need to expand the clinic or construct a new facility, particularly to increase the number of examination rooms. Additionally, though admittedly difficult to predict, the added demand could bolster local efforts to recruit a visiting or even resident dentist ***or other medical practitioners*** to the community. Such an effect could result from the expanded population associated with the mine, particularly as these employees would be covered under an health insurance program (Sayler 1995). If this were to happen, all residents of the region would benefit.

Mental health and social services are provided locally by several state and local agencies, often on a visiting basis. Local case loads of the various providers have traditionally been light. Case loads and requests for emergency assistance are expected to increase with the Proposed Action, particularly at the beginning of construction and as the operating work force is hired. These activities tend to attract many job-seekers, some of whom arrive in town without adequate economic resources to tide them over or get to their next destination if no jobs are found. Eureka County provides some emergency financial assistance and could accommodate a temporary increase in demand, but the Nevada Human Resource Department's Division of Welfare has no staff in Eureka and would be strained to provide assistance. Some of these problems can be avoided by careful coordination with the Nevada Job Service, particularly the Elko and Ely offices, funneling all inquiries to the Job Service and by concerted efforts to emphasize that only qualified personnel need apply and that no applications or direct hiring be done at the mine site.

Utilities. The water system in the town of Eureka can handle a 75 to 100 percent increase in peak consumption without requiring expansion and the town has additional water rights if needed. The lagoon-based wastewater system is operating with approximately 25 percent surplus capacity (Fiorenzi 1995).

Project-related population growth would impact these utilities. Homestake's 32-unit housing development would be located in the northwest part of Eureka. This area can be served by the town's systems. Water supply and storage would be adequate, though additional distribution lines would be required. Plans to expand its capacity were approved in June 1996. The expansion is expected to be completed within one year. Demand on existing systems would increase due to residential development and increased commercial usage, for instance at motels, restaurants and other businesses. The existing and planned capacity would be adequate to meet these demands. The new residential subdivision located north of Eureka will rely on individual wells and septic systems.

Library. Population growth associated with the Ruby Hill Project would increase demands on the public library. The existing facility was built in 1982 and is adequate to handle additional patronage. To better serve the expanded population base, the collection should be enlarged and volunteer or part-time staff added to allow the library to adopt longer hours of operation (Fipps 1995).

Recreation Facilities. Local recreation programs, the community swimming pool, and athletic facilities maintained by the county and the school district are adequate to meet current and increased demand. However, Eureka lacks facilities and equipment for general physical fitness, for instance, aerobics, weight training, stair/bicycle/treadmill trainers and a whirlpool. These needs exist currently, but would intensify with the added population (Groth 1995).

County Administrative Facilities. Eureka County is presently engaged in a long-term facilities expansion and renovation program. As a result of these efforts, the county's administrative facilities would have adequate capacity to accommodate existing and project-related demands (Fiorenzi 1995; Goicoechea 1995).

Public Sector Fiscal Conditions

The Proposed Action would affect public sector revenues, both directly and indirectly during the life of the project. Added revenues would be generated and ***public sector costs*** would rise to meet the added demand. Eureka County and the Eureka County School District would be the two jurisdictions most directly affected.

Both ***entities*** would ***receive additional tax revenues as a result of the Proposed Action,*** primarily from general property, net proceeds, sales and use and motor vehicle privilege taxes. For Eureka County, the increased revenues ***over the life of project would be substantially more than*** the incremental costs of serving the added demands from a larger population. ***For the Eureka County School District, the incremental revenues virtually offset the District's entire added costs***. Table 3-58 summarizes the ***incremental staffing needs, revenues, and costs*** of the proposed project on these two entities.

Eureka County. Eureka County would experience an increase in demand for services, likely requiring added staffing. No increases in the county's administrative staff are envisioned. Two or three additional staff may be requested by the sheriff. The public works department, which is responsible for street maintenance, snow removal and the utility systems in Eureka, would need one or two employees to serve the increased demand and traffic. Other staffing needs could arise, for instance, at the library or swimming pool, but such needs would likely be met using seasonal or hourly employees. No ***additional*** utility infrastructure or administrative space would be needed. ***Assuming five additional staff are hired during the operations phase, the projected costs for the county to meet these needs is $206,000 in the first year and $260,000 per year during full operations.***

Project-related revenues accruing to the county would include property taxes on the real and personal property improvements at the mine, sales and use taxes on local taxable purchases and taxes levied on the net proceeds of the mine. Eureka County also would realize added motor vehicle privilege tax revenues and other miscellaneous revenues.

During construction, taxable purchases of materials and mining equipment, ***as well as*** purchases by contractors, ***construction workers, and contract miners,*** Homestake and their employees are projected at ***approximately $44.0*** million. These purchases would generate ***nearly $900,000*** in local sales and use tax receipts ***to Eureka County***. Such receipts would be the primary revenue source accruing to the county, ***because*** property and net proceeds taxes would

Table 3-58

Projected Revenues and Costs for Eureka County and the Eureka County School District, Ruby Hill Project

	1997	1998	1999	2000	2001	2002	2003	2004
ADDED STAFFING NEEDS								
Eureka County	4	5	5	5	5	5	5	2
Eureka County S.D.	2	6	6	6	6	6	6	2
PROJECTED REVENUES AND COSTS								
Eureka County								
Revenue Source								
Sales and Use Tax 1/	$467,300	$457,400	$136,600	$178,800	$134,400	$109,600	$71,100	$31,500
Motor Veh. Privilege Tax	$4,200	$8,300	$8,300	$8,300	$8,300	$8,300	$8,300	$2,100
Property Tax	$0	$56,300	$111,800	$99,900	$90,900	$82,200	$74,900	$74,900
Net Proceeds Tax 2/	$0	$112,100	$125,500	$104,500	$111,200	$84,600	$91,300	$18,300
Total Incremental Revenue	$471,500	$634,100	$382,200	$391,500	$344,800	$284,700	$245,600	$126,800
Incremental Costs 3/	$208,000	$260,000	$260,000	$260,000	$260,000	$260,000	$260,000	$104,000
Annual Net Revenue	$263,500	$374,100	$122,200	$131,500	$84,800	$24,700	($14,400)	$22,800
Cumulative Net Revenue	$263,500	$637,600	$759,800	$891,300	$976,100	$1,000,800	$986,400	$1,009,200
Eureka County School District								
Revenue Source								
Sales and Use Tax 4/	$467,400	$457,400	$136,600	$178,800	$134,400	$109,600	$71,100	$31,500
Motor Veh. Privilege Tax	$4,200	$8,300	$8,300	$8,300	$8,300	$8,300	$8,300	$2,100
Property Tax	$0	$57,900	$115,000	$102,700	$93,500	$84,500	$77,000	$77,000
Net Proceeds 2/	$0	$114,000	$127,700	$106,400	$113,100	$86,100	$92,900	$18,600
Total Incremental Revenue	$471,600	$637,600	$387,600	$396,200	$349,300	$288,500	$249,300	$129,200
Incremental Costs 5/	$144,000	$552,000	$447,000	$447,000	$447,000	$447,000	$447,000	$159,000
Annual Net Revenue	$327,600	$85,600	($59,400)	($50,800)	($97,700)	($158,500)	($197,700)	($29,800)
Cumulative Net Revenue	$327,600	$413,200	$353,800	$303,000	$205,300	$46,800	($150,900)	($180,700)

[1]At 2.25% (basic and supplemental city-county tax relief rates) on local consumer purchases and anticipated taxable purchases by the mine. Based on projected capital expenditures and operating expenses provided by Homestake Mining Company.

[2]Based on projections by Homestake Mining Company and current (1996) local property tax rates.

[3]At an average budgeted allowance of $52,000/employee for salaries, benefits, and miscellaneous operating and capital costs.

[4]At 2.25% (local school support tax) on local consumer expenditures and projected taxable purchases of $500,000 by the mine.

[5]Based on an allowance of $72,000/employee for salaries, benefits and other operating expenses, plus $120,000 for modular classrooms and $15,000/year in added maintenance costs.

Source: Hammer, Siler, George Associates lag behind completion of construction and initiation of operations.

Once full production is reached, ***an average of about $330,000 in annual revenues*** would be generated from property taxes, ***sales, and use taxes,*** and the local share of the net proceeds tax. Property taxes are based on the cost of construction and mining equipment, depreciated over time using state guidelines, and an estimated $1.9 million in additional valuation due to new residential development associated with the mine.

Net proceeds taxes are typically the major source of revenues for local governments. Over the life of the mine, Homestake expects to pay an average of over $600,000 annually in such taxes. However, local jurisdictions in which mines are located retain only an amount equivalent to that generated by the local property tax rate. Since Eureka County's ad valorem tax rate of 0.7288 is among the lowest in the state, it would receive about $100,000 per year, ***on average, during full production.*** The remainder would be divided between the State of Nevada and the school district.

Additional sales and use taxes accruing to Eureka County during operations are projected at over ***$662,000 through the completion of processing.*** The total reflects average taxable purchases by the mine of ***$5.0*** million annually and added taxable consumer purchases of $600,000 per year. Due to the limited base of local retail establishments, it is assumed that 60 percent of the consumer expenditures would occur outside of Eureka County. The lack of suppliers restrict purchases by the mine from local businesses, however, most of the purchases would still be taxable locally ***because*** the mine site is typically the point of sale for major purchases.

Over the life of the project, Eureka County would receive a net cumulative surplus of ***just over $1.0*** million, ***that is, projected incremental revenues of $2.9 million compared to the added costs of $1.9 million.*** Although substantial, neither the revenues or expenditures associated with the project are significant in the context of the county's overall budgets.

<u>Eureka County School District.</u> Schools in Eureka may already experienced some enrollment increase in conjunction with Homestake's exploration efforts. Further increases of an estimated 26 students would occur during construction. The long-term average enrollment impact is projected at 72 students during full production. During the transition period, up to 81 new students would be expected, contingent upon the overlapping of construction and initial operations. Delays in startup, or the occurrence of the overlap during summer months when school is not in session could temper the actual impacts experienced by the District.

A need for two additional positions is foreseen during initial construction, with up to six additional positions foreseen to accommodate the long-term enrollment increase. Added payroll costs and other operating costs ***associated with the increase in staff*** are projected at $144,000 during the first year and ***$447,000*** per year during full production.

The District is considering alternatives to address the effects of higher secondary enrollments. Modular classrooms offer the District one option to accommodate the growth in secondary enrollments. A one-time ***$120,000*** allowance for modular ***classrooms and*** associated annual maintenance costs of $15,000 ***are assumed in the fiscal analysis.*** However, the District is contemplating ***expansion of*** the existing high school or ***construction of*** a new facility ***to address its long-term facility needs.*** While the project-related enrollment would factor into the decision, it is not the motivating factor behind these deliberations. Rather, the District is acting to take advantage of its strong fiscal foundation ***which is*** supported largely by existing mines in the northern part of the county. Approval and operations of the proposed Ruby Hill Project would add to the tax base available to support new construction.

Given the projected revenues and costs accruing to the District, it would experience an ***incremental surplus totalling $413,000 over the first 2 years of the project. The surplus is due primarily to sales and use taxes during initial construction.*** Annual deficits would then occur through the completion of the life of project ***as a result of lower sales and***

use tax receipts during operations and declining property taxes revenues. Over the life of the project, the net cumulative fiscal impact to the district is a projected ***revenue shortfall of ($180,700) that is, projected incremental revenue of $2.9 million compared to added costs of $3.1 million. Given*** the District's large property and net proceeds tax base ***from existing mining projects***, the fiscal impact on the district would not be significant within the context of its overall budget.

Tax receipts of the State of Nevada also would increase from the Proposed Action. Sales and use taxes and net proceeds taxes would be the two primary sources of such revenues.

3.15.2.2 East Waste Rock Dump Alternative

The socioeconomic impacts of this alternative would be the same as those with the Proposed Action.

3.15.2.3 West Waste Rock Dump Alternative

The socioeconomic impacts of this alternative would be the same as those with the Proposed Action.

3.15.2.4 Partial Backfilling Alternative

The socioeconomic impacts of this alternative would be the same as those with the Proposed Action.

3.15.2.5 No Action Alternative

The No Action Alternative would preclude development and operations of the proposed project. Thus, both the beneficial and adverse socioeconomic impacts previously described would not occur. Existing conditions and trends, characterized by limited growth and development in southern Eureka County, would continue.

An estimated 120 short-term and 211 long-term jobs and the incomes thereby derived by local and in-migrating residents would be foregone. The project's indirect economic stimulus and beneficial effects on the region's economic development and diversification would not occur, thereby foregoing the added spending to support existing and new businesses in the local and regional economies. Because there is little other new business or industrial activity occurring in southern Eureka County, there are no constraints or other competition for resources that would be avoided under the No Action Alternative. Therefore, the benefits foregone would represent net losses.

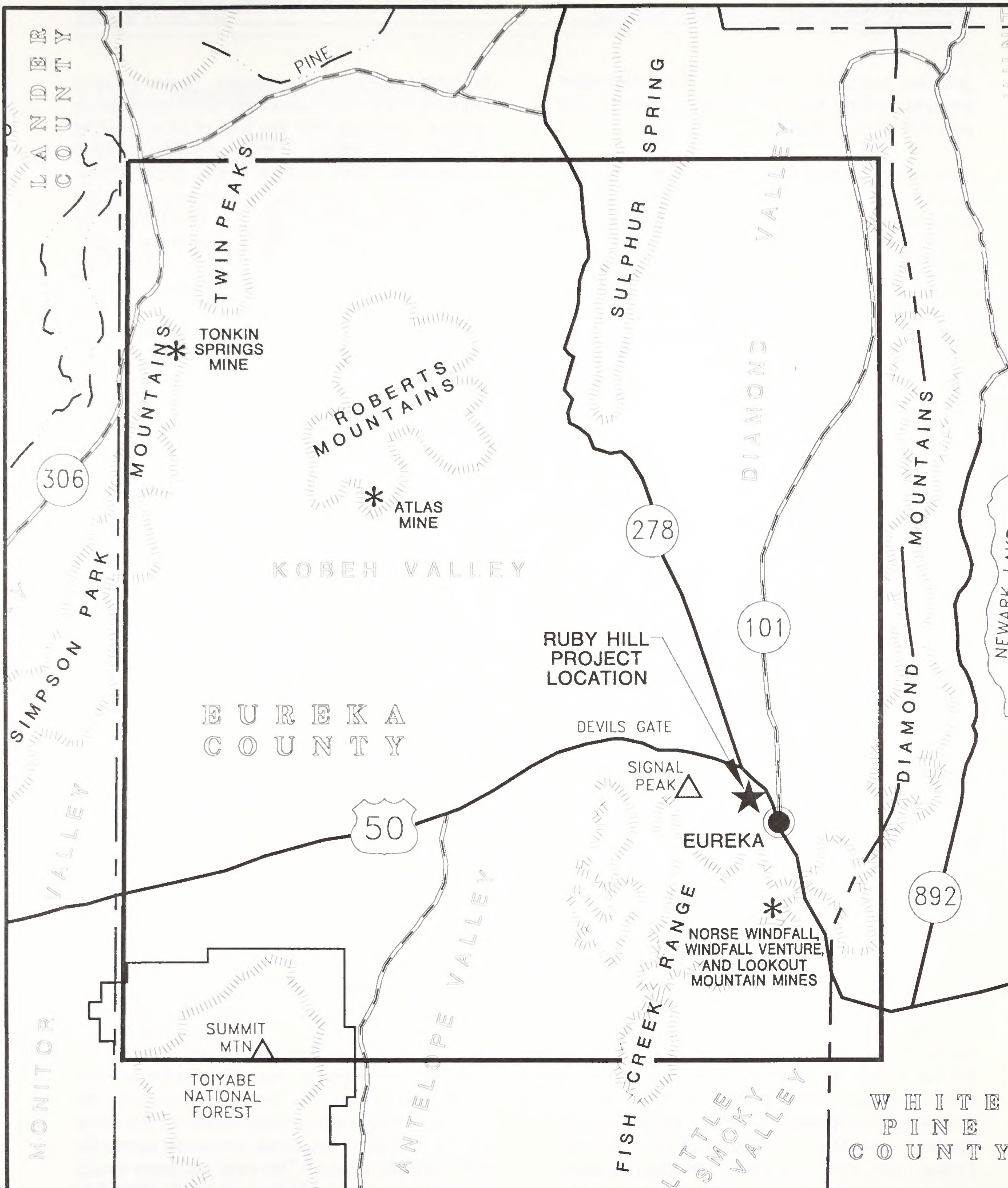
Demand for local housing would not increase. Construction of new housing, which has already begun to occur in anticipation of the project, would likely cease. Further additions to the local housing stock, both in terms of quantity and quality, would be foregone, as would be the inflationary pressures on rents and values of existing homes. Potential expansion of the water distribution system would be avoided.

Population growth and increased demands on local law enforcement, public works and other entities would be avoided. The Eureka County School District would not need to cope with the projected influx of 72 to 81 new students in its schools in Eureka.

Fiscal conditions of local public entities would remain unaffected by the additional revenues and costs directly and indirectly associated with the project. As many as 10 new public service employment opportunities would not be created. Over the life of the project, the county and school district would forego a combined total of nearly $7.0 million in revenues, while avoiding a projected $5.5 million in expenditures to meet the additional service demands.

3.15.3 Cumulative Impacts

The cumulative assessment area for social and economic values is illustrated on Map 3-32. Cumulative socioeconomic impacts associated with the reasonably foreseeable future actions would depend on the timing and scope of the specific activities. Specific information regarding the timing, duration, and level of employment are not available for the reasonably foreseeable future actions, precluding a comprehensive analysis of



LEGEND:

PAVED ROAD

UNPAVED ROAD

CUMULATIVE ASSESSMENT BOUNDARY

MILES
0 5 10

NORTH

RUBY HILL PROJECT

MAP 3-32
CUMULATIVE ASSESSMENT AREA FOR
SOCIAL AND ECONOMIC VALUES

potential cumulative impacts. The interrelated projects include both exploration activities and potential mine projects.

Exploration requires relatively few employees and often occurs intermittently over time. Such activities generate temporary demand for housing and short-term impacts on the economy, public service providers, and public fiscal resources. If the Jewell Canyon mineral exploration activities coincide with the construction and transition periods of the proposed Ruby Hill project, the projected housing shortage would be exacerbated over the short-term. Once the Homestake-sponsored housing is completed and full production achieved, project-related demand for temporary housing would decrease sufficiently to accommodate demands tied to exploration. Other cumulative impacts arising from coincidental activity at Ruby Hill and Jewell Canyon exploration could include more calls to local public safety and emergency medical providers. Little additional impact would occur on the enrollment of the Eureka County School District. Public sector fiscal resources would not be significantly affected by exploration, as such activities generate limited additional revenues or needs for public expenditures.

The Jewell Canyon Mineral Exploration Project could evolve into full production mining operation, contingent upon locating economically recoverable mineral deposits, completion of permitting and other factors. The Tonkin Springs Mine (about 45 employees) and the Atlas Mine (130 to 140 employees) also are included among the reasonably foreseeable future actions.

Mine construction and operations are more labor-intensive than exploration and could generate additional population growth and related impacts on housing, public services, and public sector fiscal conditions similar to those discussed for the Proposed Action. The occurrence and severity of such impacts would depend on the size of each project's work force, each project's timetable compared with those of the Ruby Hill Project, and other reasonably foreseeable future actions, and other changes in the socioeconomic environment that may occur in the interim. If such activities were initiated during the operations phase of the Ruby Hill Project, the impacts could be compounded. Conversely, fewer impacts would occur if other reasonably foreseeable future actions coincided with the end of production at the Ruby Hill Project. Rather, the reasonably foreseeable future actions would provide new employment opportunities for residents who might otherwise have limited job opportunities and be facing the prospect of migrating from the area.

Depending on the timing and population impacts associated with these other projects, cumulative housing demands, particularly for permanent housing, could trigger further shortages until new units come on line. Concerns regarding cumulative housing impacts would be greater for the Atlas Mine than with other reasonably foreseeable future actions, due to its location, larger work force, and shorter operating life.

Coincidental activity also could generate higher student enrollment in the school district, filling or exceeding the available capacity in the Eureka Elementary School. Conditions at the junior/senior high school would depend on the district's decision regarding construction of a new school. The district may need to hire additional staff and increase its payroll and operating budget. Locally derived property tax revenues would increase, but may not fully cover the increased costs.

Fiscal conditions of Eureka County would be enhanced by one or more of the interrelated projects progressing to operations and production. Additional property and sales tax revenues would likely offset additional operating expenditures since the County would need little additional staffing.

One interrelated action involves further exploration by Homestake. Such activity could extend the productive life of facility and equipment investments at the Ruby Hill Project and provide continued employment opportunities for its work force. In this case, the impacts on housing, the economy, and public entities would be the same as, not in addition to, those discussed above for the Proposed Action. The local economy would benefit from the continued economic stimulus, indirect job creation, local incomes, and public sector fiscal benefits, with no incremental demands on public services or facilities.

3.15.4 Mitigation and Monitoring

Issue: Potential impacts to the Eureka County infrastructure from increased employment.

Measure 1: Homestake would coordinate with Eureka County and the Eureka County School District if substantial increases in employment levels are expected.

Effectiveness: Coordination efforts between Homestake and Eureka County would minimize potential impacts to the Eureka County infrastructure.

Application: This measure would apply to the Proposed Action and all alternatives, except for the No Action Alternative.

3.15.5 Residual Adverse Impacts

Residual adverse impacts to public infrastructure and services, local housing, and the local economy would be minor and short-term.

3.16 Noise and Blasting Vibrations

3.16.1 Affected Environment

3.16.1.1 Noise

The characteristics of sound include parameters such as amplitude, frequency, and duration. Sound can vary over an extremely large range of amplitudes. The dB, a logarithmic unit that accounts for the large variations in amplitude, is the accepted standard unit measurement of sound. Table E-1 in Appendix E presents definitions of noise terminology and symbols. Examples of typical sound levels and public reaction to such sounds is presented in Table E-2 in Appendix E. Different sounds may have different frequency contents. When measuring sound to determine its effects on a human population, A-weighted sound levels are typically used to account for the response of the human ear. A-weighted sound levels represent adjusted sound levels. The adjustments are applied to the frequency content of the sound.

In terms of human response to noise, a sound that is 10 dBA higher than another is judged to be twice as loud, a sound that is 20 dBA higher is four times as loud, and so forth. Normal conversational speech is in the range of 60 to 65 dBA, and any noise in this range or louder may interfere with speech. Contribution to hearing impairment begins at 70 dBA, a noise level that is equivalent to a vacuum cleaner at 10 feet, while sustained noise levels of 90 dBA can cause hearing damage.

The State of Nevada and Eureka County do not have noise level criteria for evaluating noise impacts associated with mining operations. The day-night average sound level (L_{dn}) has been adopted by the U.S. Environmental Protection Agency as the rating method used to describe community noise. L_{dn} is a 24-hour, time-weighted, average noise, or average dBA level that adds a 10 dBA penalty to noise measured between 10:00 p.m. and 7:00 a.m. This adjustment is an effort to account for the increased sensitivity to nighttime noise events. The U.S. Environmental Protection Agency recognizes $L_{dn} \leq 55$ dBA as a goal for outdoor residential areas to protect public health and welfare with an adequate margin of safety; however, it is not a regulatory requirement (U.S. Environmental Protection Agency 1974). This threshold is considered the point that, if exceeded, people could become irritated with such sounds. The State of California's Model Community Noise Control Ordinance recommends an ***outdoor*** maximum noise level (Lmax) of 70 dBA for ***brief, impulse-type*** noise sources such as blasting; Nevada has no such ordinance. Appendix E contains a description of noise terminology and symbols used in this EIS.

The contribution of outdoor noise to indoor noise levels is usually small, with the sound level reduction of a building being largely determined by whether its windows are open or closed. The U.S. Environmental Protection Agency has estimated that the typical sound level reduction of buildings with windows open averages 15 dBA, whereas a reduction of 25 dBA could be realized when windows are closed. Further, indoor noise levels are influenced primarily by internal noise sources such as appliances, radio and television, heating and ventilating equipment, and people. The U.S. Environmental Protection Agency's goal of Ldn ≤55 dBA also ensures adequate protection of indoor speech perception, which is used as a surrogate for annoyance (U.S. Environmental Protection Agency 1978).

The nearest receptors who may be impacted by project-related noise are the Eureka County High School and residents located in the western portion of town. The high school is located ***0.7*** mile southeast of the project ***area*** along a small ridge overlooking the town of Eureka. Modular classrooms to the rear of the building are within line-of-sight of the southern portion of the project area. Residences in the northwestern portion of town would be closer to the nearest disturbance and on the opposite side of this ridge, whereas residences located south of the high school (i.e., on the west side of Tank Hill) lie within line-of-sight of portions of the project area. The Eureka County Fairgrounds are located approximately 0.25 mile east of the project area and can be considered a sensitive noise receptor when activities requiring special qualities of serenity and quiet, such as poetry readings and wedding receptions, occur there.

The project site is located in a rural area where ambient noise levels would be expected to be quite low and dominated by noise from traffic and wind. Noise level measurements were conducted by Brown-Buntin Associates in June 1995 in the project area and within Eureka to determine existing background noise levels and noise level trends throughout the day (Brown-Buntin Associates 1995).

Results of the noise level measurements indicate that background hourly average noise levels along the ridge on the western edge of Eureka generally range between 39 dBA and 59 dBA L_{eq}, the equivalent sound level, during the daytime hours (7:00 a.m. to 10:00 p.m.), and 35 dBA and 48 dBA L_{eq} during the nighttime hours (10:00 p.m. to 7:00 a.m.). Note: L_{eq} is the logarithmic measured sound level for a 1-hour period. Noise measurements taken at the Minoletti Ranch (located approximately 1.5 miles northwest of the project site) indicate that background noise levels range between 40 dBA and 60 dBA, L_{eq}, during daytime hours, and 29 dBA and 52 dBA, L_{eq}, during nighttime hours. It should be noted that noise measurements were conducted during a period of extensive exploratory drilling within the project area that included 24-hour core sample drilling.

Based upon the noise level measurements, wind was determined to be a major contributor to noise at the monitoring sites. The data indicated that, when wind speeds exceeded 10 meters per second (approximately 22 miles per hour), background noise levels were defined by the wind.

Traffic is a major noise source in the town of Eureka, with traffic volumes in the area being dominated by U.S. Highway 50. Traffic data compiled by the Nevada Department of Transportation (1994) indicates that U.S. Highway 50 through Eureka carried an average of approximately 1,700 vehicles per day in 1993. Modeling of highway traffic noise levels were based upon average daily traffic volumes within the town of Eureka. The modeling results indicate that noise levels within approximately 200 feet of U.S. Highway 50 are approximately 55 dBA, L_{dn} (Brown-Buntin Associates 1995).

3.16.1.2 Blasting Vibrations

There are no mandatory Federal or state standards for vibration resulting from mining operations. Industry standards, as published in the Federal Register, Part III, Department of the Interior, March 8, 1983, are used for the purposes of this analysis.

Vibrations are measured and expressed in inches per second. Vibration levels possibly capable of producing cosmetic or perceptible structural damage are assumed in this analysis to range from 0.5 to 2.0 inches per second. Structures can then be categorized according to three predicted thresholds for sustaining damage: 0.5, 1.0, and 2.0 inches per second. While a vibration limit of 2.0 inches per second is quite adequate for sound, modern buildings, 1.0 and 0.5 inch per second are more conservative limits for older and historic buildings, respectively.

Although blasts are generally perceived to be one large explosion, mining blasts are actually a series of smaller, single-hole explosions. Each hole is sequentially delayed and detonated independently of the other holes. Less noise and ground vibrations are generated because several small blasts (delays) are detonated in sequence rather than as one large instantaneous blast. For example, instead of setting off one 600-pound blast, a properly delayed series of four, 150-pound blasts would significantly reduce vibration. Blasting effects can be further controlled by varying the amount of explosive, the type of delay, the delay sequence and even the type of explosive.

The literature reveals that natural environmental forces are the most significant factor in the production and widening of cracks and structural damage. Oriard 1989 compared structural damage due to temperature and humidity to that from blasting vibration and found the former factors to be much more likely causes of structural damage. Truck traffic on local roadways and sonic booms from overflying jets can generate significant vibration.

The nearest sensitive receptors are the structures located in the town of Eureka. Many of the buildings in the town are on the National Register of Historic Places, having been constructed in the late 1800s. A vibration analysis for the proposed Ruby Hill Project was undertaken by Golder Associates, Inc. (Golder Associates 1996a). It included a detailed survey of structures in the town of Eureka and an assessment of their sensitivity to potential blast vibrations. In their survey of building conditions, Golder categorized the buildings according to their susceptibility to vibrational damage (i.e., building materials and maintenance status). The historic buildings, having been constructed of rock and timber were found by Golder to be more sensitive to cosmetic/structural damage than newer ones, and were thus assigned vibration limits of 0.5 inch per second. Structures in good repair or not constructed with archaic building materials were assigned limits of 1.0 inch per second. New, sound buildings were assigned limits of 2.0 inches per second. Table E-3 in Appendix E provides a summary of the structures surveyed and their estimated vibration limits.

3.16.2 Environmental Consequences

Environmental impacts from noise and blasting vibrations would be considered significant if the Proposed Action or selected alternative would result in the following:

- Noise levels in excess of 55 dBA, L_{eq}, as measured outside at the nearest sensitive receptor.
- Maximum noise levels in excess of 70 dBA as a result of blasting.
- Ground vibration as a result of blasting that could initiate or extend observable cosmetic cracking of structures in the Eureka area.

The first criterion is more conservative than the 55 dBA, L_{dn} criterion for mining-related noises. The last criterion is more conservative than criterion that would focus on damage to structural integrity; cosmetic damage is defined here as the onset or extension of existing cracks.

3.16.2.1 Proposed Action

Noise

Noise levels associated with construction of the Proposed Action would be temporary and would vary widely during the day. Activities that may generate noise perceptible at nearby sensitive receptors includes the excavation of pit overburden and construction of the waste rock dumps; excavation of the soil borrow area; construction of the heap leach pad, mine-related buildings, and the water storage tank; the operation of other heavy mobile equipment; and the movement of traffic to and from the mine site. Noise levels associated with construction are expected to be less than noise levels during active mining operations and are not expected to adversely affect nearby sensitive receptors due to their relatively short duration.

After the initial construction phase, the proposed Ruby Hill Mine is expected to operate 24 hours per day, 365 days per year during the projected 7.5-year life of mine operations. Although a detailed blasting schedule has not been completed, it is expected that blasting within the open pit would occur infrequently (a few times each day) and only during daylight hours (see Section 2.1.2.3, Drilling and Blasting).

The Proposed Action would contain several discrete components that would contribute to the cumulative noise environment. Those components include: drilling into rock formations using two rotary hammer-type drills; excavation of rock from the open pit using a bulldozer and two wheel loaders; transporting waste material from the pit to the waste dump using haul trucks; processing of material at the crushing, grinding, agglomeration circuit using primary, secondary, and tertiary crushers, and screen decks; and use of piggy-back conveyors from the crushers in the crushing, grinding, agglomeration circuit to the leach pad. The drilling of blast holes could occur continually for up to 24 hours a day, and it is assumed that the bulldozer and wheel loaders within the pit would also run continually. Unprocessed rock would be transported to the rock dump with 85-ton haul trucks and spread with bulldozers. It is assumed that approximately 10 to 20 haul truck trips to the rock dump would occur each hour.

Brown-Buntin Associates used the Environmental Noise Model for projecting noise levels associated with the Proposed Action. Their report is included in Appendix E. The model included input factors such as topography, meteorology, distance, and noise levels from equipment similar to that expected to be used under the Proposed Action to predict noise levels at given distances from the Ruby Hill Mine. Several models were run assuming various wind effects that could result in either mine noise being carried further or being almost masked. In their initial Environmental Noise Analysis, Brown-Buntin Associates (1995) demonstrated that of the two mining stages, "initial mining operations" and "progressed mining operations," the former would result in higher noise levels at nearby sensitive receptors. This is because noise models representing initial mining operations assumed no shielding of noise emanating from the open pit. For progressed mining scenarios, many of the mine noises were assumed to emanate from within the pit, thereby preventing the direct transmission of noise to nearby sensitive receptors.

The initial mining operations period would occur three times during the life of the mine and is defined in this EIS as mining operations when work on the active face of the open pit occurs within 30 feet of the surface. It is assumed that the initial mining operations scenario would first apply through a period of approximately 3 months from the start of mining operations (Phase I of pit construction), after which time work on the pit walls would be at depths greater than 30 feet from the surface and the largest sources of noise (i.e., rotary-hammer drills) would be largely contained within the deepened pit. The second initial mining scenario would occur approximately 3 years after the start of operations (Phase II of pit construction). The period during which operations in the pit would be within 30 feet of the surface is estimated to be 3 months. The final initial mining scenario would occur approximately 4 years after start of operations (Phase III) and again would last for a period of approximately 3 months (Protani 1996b).

The results of the modeling revealed that the combined noise levels from operations of the proposed Ruby Hill Mine would be perceptible at nearby sensitive receptors, but generally would remain below the 55 dBA, L_{eq}, level identified above for protecting public health and welfare with an adequate margin of safety. These standards are consistent with those of the Environmental Protection Agency and other state governments (including California and Oregon) for outdoor noise in residential areas. Noise levels in the town of Eureka as a result of mining were predicted to be between 30 to 35 dBA, L_{eq}, under no wind conditions during initial mining operations and would therefore not be perceptible above existing ambient noise levels. In general, the extent of the 55 dBA noise contour was found to be limited mostly to the confines of the Ruby Hill Mine site, except when northwesterly winds reached approximately 10 meters per second, in which case noise levels in excess of 55 dBA, L_{eq}, were projected to be perceptible throughout the northern portion of the town of Eureka. Thus, elevated noise levels during each of the 3-month initial mining periods under these wind conditions could be audible outside the Eureka High School and other nearby sensitive receptors. However, winds of 10 meters per second is the threshold after which it is assumed that noise levels are dominated by the wind itself. Although mining operation noise levels would be audible, it is anticipated that noise resulting from the wind would range between 45 and 50 dBA, L_{eq}. The maximum impact to sensitive receptors in the Town of Eureka has been modeled for these conditions (i.e., with northwest wind of 10 meters per second), however, the frequency of northwest winds being this speed or greater in the project area has been measured to be one-hundredth of one percent for the period April 1, 1994 through March 31, 1995 (see Appendix A, Homestake Ruby Hill Monitoring Program Wind Rose

Analysis). Consequently, no significant impact to sensitive receptors in the Town would occur.

Within the project area, predominant winds are from the south (Section 3.1.1.1 of Air Quality), and as such would not serve to convey mining-related noises toward the Town of Eureka. In Brown-Buntin Associates 1995 Environmental Noise Analysis, modeling was performed for initial mining operations with 10-meter per second southerly winds. Noise levels under this scenario were expected to exceed 55 dBA L_{eq} at the Eureka County Fairgrounds, and as such could interfere with the enjoyment of some of the more "quiet" uses such as poetry readings and wedding receptions, when present. However, this would not be considered a significant impact given the rarity of these events coinciding with winds of this speed from this direction. Homestake has committed to minimize noise during noise sensitive activities at the fairgrounds and High School.

Atmospheric effects such as temperature inversions also can increase noise levels as they can serve to reflect soundwaves directed toward the sky, toward the ground. Inversions occur most frequently at night and in the early morning when winds are absent. In the Eureka area, inversions occur primarily during winter months (see Section 3.1.1.1 of Air Quality).

According to noise models for progressed mining operations, noise levels in excess of 55 dBA, L_{eq}, would be contained entirely within the mine site and would not be perceptible by nearby sensitive receptors (Brown-Buntin Associates 1995). Further, winds were not expected to significantly convey noises generated at the mine site toward known sensitive receptors.

It should be noted that under none of the scenarios described above would noise levels in excess of 40 dBA, L_{eq}, be expected at residences near the Minoletti Ranch, located northwest of the mine site. As such, mine operation noise would not be noticeably perceptible above existing average hourly noise levels at these receptors.

In follow-up to the noise modeling program, Brown-Buntin Associates modeled noise generated from test blasts within the project site in order to predict noise levels for the Proposed Action (Brown-Buntin Associates 1996b). Maps depicting blasting noise contours are included in Appendix E. Air blast noise levels were monitored at sites between the proposed mine open pit and sensitive receptors to the southeast. The predicted L_{max} (maximum average noise level) expected in Eureka under conditions of no wind was 55 dBA, well below the 70 dBA limit identified in Section 3.16.2, Environmental Consequences. Blasting noise was not expected to exceed 70 dBA within the town when noise levels were modeled for northwest winds of 5 meters per second. With northwest winds of 10 meters per second, modeling results indicated that the 70 dBA contour would extend into the northernmost portion of town. This worst-case scenario, however, is extremely unlikely for the reasons described previously. Consequently, significant noise impacts from blasting would not be expected to occur.

Noise levels from closure and reclamation activities would be short-term in nature and would be of minor consequence relative to noise levels associated with mining operations. Upon the completion of mine closure activities, noise impacts at nearby sensitive receptors such as the town of Eureka would be greatly reduced as site activities and related traffic diminish.

Blasting Vibrations

The Environmental Noise Analysis for Blasting at the Ruby Hill Gold Mine (Brown-Buntin Associates 1996) states that blasting activities typical of the Proposed Action would consists of up to 200 holes with approximately 150 pounds of explosives in each hole. Each explosive charge would be buried with approximately 12 feet of stemming. Timing delays would be used between each shot, so that no two explosive charges would detonate simultaneously.

A computerized risk analysis was performed by Golder Associates (1996a) to determine the potential for vibration damage to buildings in the Eureka area as a result of Proposed Action blasting activities. In running the risk analyses, Golder assumed three different levels of explosive charge (200, 500, and 1,000 pounds per delay), detonated at the location of the proposed open pit nearest to town. The risk analysis included 10,000 blast vibration scenarios. For each of the 79 structures surveyed in Eureka, damage thresholds were determined. The results indicated that the probability of cosmetic cracking from blasting for all of the 79 structures is less than 0.1 percent if 200 pounds of explosive (or less) per delay were used. Only four structures were found to exceed a 0.1 percent chance of sustaining cosmetic damage at 500 pounds per delay. These structures were the Eureka Jail/Justice facility, the Ambulance building, and the State Highway Office and storage shed.

Geophysical testing to predict the effects of blasting vibrations was performed by Golder Associates (Golder Associates 1996b). The testing program consisted of detonating charges of varying weights and measuring geologic response with vibration recording instruments. These instruments were established at eight locations between the proposed open pit and the Town of Eureka. Charge weights ranged between 2-pound, single hole detonations and 150-pound, delayed multiple hole detonations, and were detonated near the eastern edge of the proposed open pit. Results of the testing program were used to statistically determine whether vibrations resulting from blasting at the proposed Ruby Hill Mine open pit would exceed vibration tolerances of buildings in the Eureka area. Risk analysis was performed for each of the inventoried structures using the scaled distance method to calculate the probability of exceeding each structure's vibration threshold. The likelihood that any one structure in Eureka would be affected by any one blast was found to be less than one in a trillion. The likelihood of damage to any structure over the life of the mine (estimated to total approximately 10,000 blasts) was determined to be less than one in 100 million. These probabilities were stated by Golder Associates to be "indistinguishable from zero."

Despite the conservative engineering and statistical assumptions in this investigation, the Golder Associates report concludes that there is no indication that any structure in the Eureka area would be affected by standard, modern blasting techniques (using charges of 200 pounds per delay or less) at the proposed Ruby Hill Mine open pit. The Proposed Action would therefore not be expected to generate ground vibrations that would result in either cosmetic cracking or damage to the structural integrity of any building in the Eureka area. Consequently, no significant impact with respect to vibration would result from implementation of the Proposed Action.

3.16.2.2 East Waste Rock Dump Alternative

Noise modeling by Brown-Buntin Associates (1996a) included analysis of the East Waste Rock Dump Alternative (see Appendix E). It was determined that noise levels associated with this alternative would be similar to those described for the Proposed Action, with the exception of those scenarios described below.

Included as part of the East Waste Rock Dump Alternative is a proposal to construct a 30-foot high berm along the eastern and southeastern perimeter of the open pit to further shield noises generated in the pit area from sensitive receptors to the southeast. Results of the modeling indicate that noise levels in the Town of Eureka would be less than 30 dBA, L_{eq}, during initial mining operations when winds are absent. The addition of the berm was found to reduce mine-related noises within the town by 8 to 10 dBA as compared to those modeled for the Proposed Action. With 10-meter per second winds from the northwest, modeling results indicated that noise levels from initial mining operations would range between 48 and 55 dBA, L_{eq}, at sensitive receptors within the northwestern portion of town. This estimated includes a 2 to 3 dBA reduction (as compared to the Proposed Action) resulting from the presence of the berm. Noise levels at the County Fairgrounds would be approximately 60 dBA, L_{eq}, under this scenario. Given that wind conditions assumed for this worst-case noise scenario are rare, these impacts cannot be considered significant and adverse.

Noise and vibration associated with blasting operations at the mine site under this alternative are not expected to differ from those described for the Proposed Action; the blasting regime under this alternative would remain unchanged and vibration and the maximum average noise level would not be appreciably affected by the location of the waste rock dump. Consequently, no significant impacts would occur.

3.16.2.3 West Waste Rock Dump Alternative

Noise modeling by Brown-Buntin Associates (1996a) included analysis of the West Waste Rock Dump Alternative. It was determined that noise levels associated with this alternative would be similar to those described for the Proposed Action (see Appendix E). This is because noise levels associated with activities on top of the waste rock dumps were found not to contribute significantly to overall worst-case noise levels of mine operations.

Noise and vibration associated with blasting operations at the mine site under this alternative are not expected to differ from those described for the Proposed Action; the blasting regime under this alternative would remain unchanged and vibration and the maximum average noise level would not be appreciably affected by the location of the waste rock dump. Consequently, no significant impacts would occur.

3.16.2.4 Partial Backfilling Alternative

Noise and vibration impacts associated with the alternative to partially backfill the pit would not be perceptibly different than those described for the Proposed Action.

3.16.2.5 No Action Alternative

Under the No Action alternative, noise impacts as described for the Proposed Action would not occur and existing noise conditions would be maintained, as described in Section 3.16.1, Affected Environment.

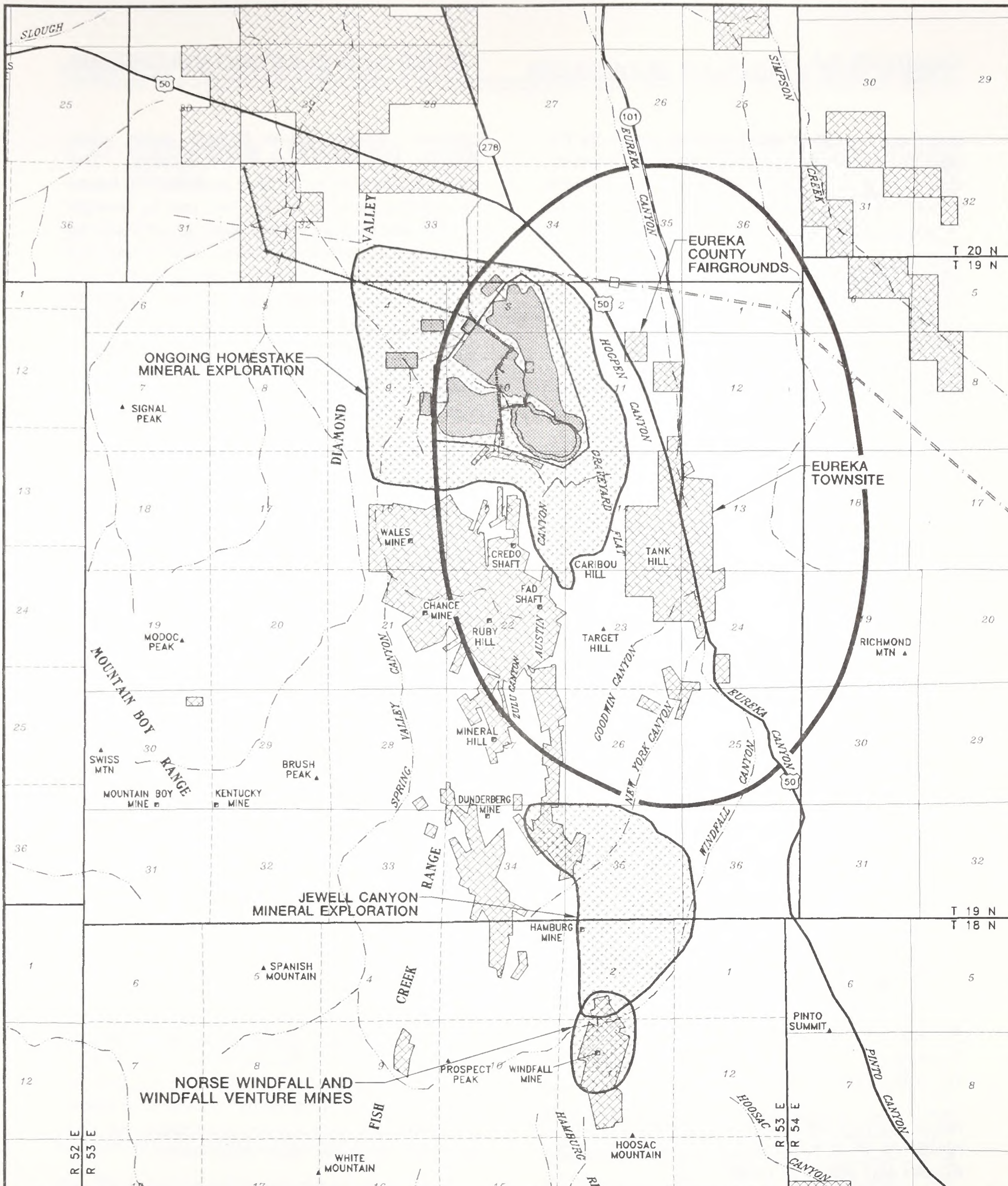
3.16.3 Cumulative Impacts

The area for analysis for cumulative effects from noise is defined as the area within a 1.5-mile radius of the Town of Eureka and the County Fairgrounds; it is shown on Map 3-33. This distance represents the maximum distance noise in excess of 55 dBA, L_{eq}, could travel from a source (or sources) with the aid of a 10-meter per second wind. Noise levels at sensitive receptors affected by the Proposed Action or alternatives are not expected to be greater than those discussed for the Proposed Action. Noise levels in the project area as a result of present actions generally have been characterized in the description of baseline noise levels found in the Affected Environment section (Section 3.16.1.2, Blasting Vibrations). Noise associated with mineral exploration in the cumulative effects area is relatively minor, of short duration, and therefore of minor consequence. The only reasonably foreseeable future action that could result in cumulative noise impacts to sensitive receptors within the Town of Eureka would be the East Archimedes Oxide Project. However, this project would not occur concurrently with the Proposed Action, but would instead occur toward the end of its projected life, extending the time frame during which noise impacts from the mine site would occur. Further, the character of noises generated by operations of the East Archimedes Oxide Project would be almost identical to those of the Proposed Action, with only minor differences expected depending on the location of the waste rock dump(s).

3.16.4 Mitigation and Monitoring

Issue: Noise from mining operations is likely to be audible at nearby residences and within the town of Eureka, although noise levels are expected to remain below levels recommended by the U.S. Environmental Protection Agency for the protection of public health and welfare.

Measure 1: Noise mitigation procedures should include use of quiet model drills, coatings in the beds of haul trucks to reduce noise resulting from loading and dumping, and the scheduling of



LEGEND:

- PAST DISTURBANCE
- PRESENT DISTURBANCE
- PROPOSED ACTION
- CUMULATIVE ASSESSMENT BOUNDARY

MILES 0 1 2

NORTH

RUBY HILL PROJECT

MAP 3-33
CUMULATIVE ASSESSMENT AREA
FOR NOISE

blasting to avoid times of greater sensitivity for potential receptors (generally between 7:00 p.m. and 7:00 a.m.). Temporary berms or barriers should be constructed around areas where crushers, screens, and loaders are operating.

Effectiveness: These measures would collectively aid in the reduction of noise generated from the mine site and reduce the occurrence of obtrusive noises impacting nearby sensitive receptors. In time, the pit itself would shield direct noise transmission of many of the mine-related noises.

Application: These measures would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: blasting as a result of the Proposed Action has a very small potential to result in ground vibrations that could damage buildings within the Town of Eureka.

Measure 2: Homestake would monitor ground vibration within the Town of Eureka throughout the duration of blasting activities at the mine site to identify whether mining operations are resulting in ground acceleration in excess of *0.25* inch per second. If such vibrations are detected as a result of mining operations, Homestake would notify appropriate federal, state, and local agencies and review blasting practices immediately to avoid further ground vibration in excess of *0.25* inch per second.

Effectiveness: This measure should ensure that potentially damaging ground vibrations would be identified and further avoided throughout the life of the mine.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

Issue: Noise from mining activities would disturb residents in the surrounding area, including Eureka and Diamond Valley.

Measure 3: Homestake would establish an advisory group of interested parties, to address issues that are of concern to the public. The group would include Homestake, agencies, and citizens. These issues include noise, dust, blasting vibrations, and visual impacts. This group is intended to function as a clearing house for public concerns, so that they can be brought to the attention of Homestake as quickly as possible for corrective actions. Homestake has agreed to work with the group throughout the life of the project to identify areas where monitoring for noise or blasting vibrations is needed and to develop additional mitigation that would address impacts that may not be fully identifiable until mining activities begin. Monitoring information that is collected by Homestake would be available to the group for their review and consideration in suggesting additional mitigation. Homestake would review all suggested mitigation considering feasibility, effectiveness, and cost and advise the group as to which measures would be implemented, implemented with modification, or not implemented (along with the reason for this decision). The objectives for the group are to minimize impacts of the project on the community and facilitate Homestake's interaction with the public.

Effectiveness: This measure would be effective in addressing public concerns as they may arise throughout the life of the project.

Application: This measure would apply to the Proposed Action and all alternatives, except the No Action Alternative.

3.16.5 Residual Adverse Impacts

Upon successful implementation of the noise and vibration mitigation measures, noise levels at the closest sensitive receptors (i.e., the Eureka County Fairgrounds and the Eureka High School) would be expected to remain at or below the 55 dBA, L_{eq}, during the life of mine operations, even during times when winds conducive to conveying noise are present. Noises at or below this level are considered acceptable for the protection of public health and welfare.

3.17 Hazardous Materials and Waste

3.17.1 Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that could potentially be affected by an accidental release of hazardous materials during transportation to and from the project site and during storage and use at the project site.

With the exception of limited exploration activities, there are no mining operations ongoing at the project site at this time. However, the Eureka area has a history of mining activities including lead smelting operations. There is no record of releases of hazardous substances from these prior activities. However, the nature of these activities would indicate a high probability that the surrounding environment has already been impacted by hazardous substances to some extent. Without an indepth study of the historical operations at the project site, it is not possible to define what the nature and/or extent of historical impacts may be.

The present exploration activities at the site require the use, in limited quantities, of the following materials classified as hazardous: diesel fuel, gasoline, propane, petroleum oils, greases, antifreeze, and solvents used to operate and maintain equipment. The limited activity does not require the transportation of significant volumes of hazardous material nor does it generate waste characterized as hazardous under Resource Conservation and Recovery Act.

3.17.2 Environmental Consequences

3.17.2.1 Proposed Action

<u>Project-Related Hazardous Materials</u>

The Proposed Action would require transporting, handling, storing, using, and disposing of the following materials classified as hazardous by the 49 Code of Federal Regulations 172.101:

1. Diesel fuel, gasoline, propane, petroleum oils, greases, antifreeze, and solvents used to operate and maintain equipment;
2. Sodium cyanide, sodium hydroxide, portland cement, calcium oxide (lime), hydrochloric acid, flocculent, and antiscalant used in the gold extraction processes;
3. Ammonium nitrate and explosives used for blasting in the open pit;
4. Various by-products and chemicals classified as hazardous waste from the assay laboratory; and
5. Calcium hypochlorite would be stored on site for use as a neutralizing agent in case of cyanide spills.

Of the chemicals cited above, sodium cyanide, sodium hydroxide, hydrochloric acid and calcium hypochlorite are hazardous substances that also are listed in the 40 Code of Federal Regulations 302.4 of the Comprehensive Environmental Response, Compensation, and Liability Act and the appendices of the Superfund Amendments and Reauthorization Act. These chemicals have established reportable quantities which apply to the reporting requirements associated with a release of each chemical. In addition, petroleum products also have an established reportable quantity but are excluded as hazardous substances under Comprehensive Environmental Response, Compensation, and Liability Act section 101(14). A summary of the reportable quantities for those chemicals discussed above is presented in Table 3-59.

All hazardous materials would be shipped to and from the site in accordance with applicable United States Department of Transportation hazardous materials regulations. All shipping containers and vehicles would be United States Department of Transportation approved for that material. The rate of use, and storage volumes of these substances are listed in Table 2-4. A brief description, including the use and storage of the hazardous materials employed during the

Table 3-59

CERCLA Reportable Quantities

Material	CERCLA Reportable Quantity (lbs)
Hydrochloric Acid	5,000
Sodium Cyanide	10
Sodium Hydroxide	1,000
Diesel Fuel	25 gal
Gasoline	25 gal
Petroleum Oils	25 gal
Antifreeze[1]	1
Solvents	100-5000

[1]Reportable quantity for ethylene glycol.

Proposed Action, is provided in Section 2.1.13, Hazardous Materials and Wastes.

Impact Analysis

Important issues related to the presence of hazardous materials at the proposed facility are the potential impacts to the environment from an accidental release of hazardous materials during transport to the proposed project area or a release related to use or storage at the site. The criterion for evaluating the hazardous materials impacts is the risk of a potential spill and associated impacts to sensitive receptors along transport routes or exposure pathways.

If some of the previously listed chemicals were to enter the environment in an uncontrolled manner, there could be associated direct or indirect adverse effects. The environmental effects of a release would depend on the substance, quantity, timing, and location of the release. The event could potentially range from a minor oil spill on the project site where cleanup equipment would be readily available, to a severe spill during transport involving a large release of sodium cyanide solution. Some of the chemicals could have immediate destructive effects on aquatic resources and water quality if spills were to enter streams such as the Humboldt River. Spills of hazardous materials could seep into the ground and contaminate the local groundwater. Depending on the proximity of such spills to populated areas or the use of degraded water for human consumption, such accidental spills could affect human health.

Transportation

Trucks would be used to transport a variety of non-hazardous materials as well as hazardous materials and wastes to and from the project site. Based on the quantity and number of deliveries, the materials of greatest concern would be diesel, sodium cyanide solution and sodium hydroxide solution.

The most potentially hazardous delivery (based on frequency and hazard) to the proposed project would be that of sodium cyanide solutions, with a specially designed 17,400-pound insulated tanker truck. The second most potentially hazardous delivery is that of sodium hydroxide solutions. Diesel fuel is included as well because it would be transported to the site in the greatest quantity. All these chemicals would be most likely supplied from Elko and Carlin, Nevada, located approximately 115 miles from the project site. The most likely transportation route would be west on Interstate 80 to Carlin and south on State

Highway 278 to U.S. Highway 50, then west on U.S. Highway 50 less than 1 mile to the project access road. The route would pass through only the community of Carlin. The Humboldt River and Pine Creek also are crossed along this route. The analysis of transport hazards would be confined to trucking along State Highway 278 (90 miles of the route) and would not consider Interstate 80, where project-related trucks would be a very small percentage of the total truck volume.

Based on information provided in the Plan of Operations, an approximate delivery frequency for the three chemicals can be determined. If all sodium cyanide and sodium hydroxide were delivered in solution form, 1 sodium cyanide truck every 7 days and 1 sodium hydroxide truck every 12 days would be required to operate the mill facility over the life of the project (7 years). Diesel fuel would be supplied to the site at a rate of one 6,000-gallon truckload every 5.5 days. This schedule would result in a total of 378 shipments of sodium cyanide (54 shipments per year x 7 years), 336 shipments of sodium hydroxide (48 shipments per year x 7 years) and 467 shipments of diesel fuel (67 shipments per year x 7 years) over the life of the project.

The risk of an accident involving deliveries of these three substances was determined using national statistics for truck accidents resulting in the release of hazardous materials (Abkowitz et al. 1984). According to these national statistics, the average rate of truck accidents resulting in a release for all roads traveled is 0.28 accident per million miles traveled. Using this statistic, the probability of an transportation accident and release for the three chemicals occurring over the life of the project is as follows:

Sodium Cyanide:

378 truck deliveries x 90 miles (haul distance) x 0.00000028 accidents per mile = 0.0095 release

Sodium Hydroxide:

336 truck deliveries x 90 miles (haul distance) x 0.00000028 accidents per mile = 0.0085 release

Diesel Fuel:

467 truck deliveries x 90 miles (haul distance) x 0.00000028 accidents per mile = 0.0118 release

The above analysis indicates that the probability of an accident during the transport of any of these substances would be low. Considering that the likely transportation routes would include primarily rural, two-lane roads, and that the probability is based on all types of roads, the actual probability of accidents may be slightly greater. However, the number of deliveries is based on the conservative scenario of having all sodium cyanide and sodium hydroxide delivered as solutions.

All hazardous substances would be transported by commercial carriers or vendors in accordance with the requirements of Title 49 of the Code of Federal Regulations. Carriers would be licensed and inspected as required by the Nevada Department of Transportation and United States Department of Transportation. Tanker trucks would be inspected and would have a Certificate of Compliance issued by the Nevada Motor Vehicle Division. These permits, licenses, and certificates are the responsibility of the carrier. Title 49 of the Code of Federal Regulations requires that all shipments of hazardous substances be properly identified and placarded. Shipping papers must be accessible and must include information describing the substance, immediate health hazards, fire and explosion risks, immediate precautions, fire-fighting information, procedures for handling leaks or spills, first aid measures, and emergency response telephone numbers.

In the event of a release off the project site, the transportation company would be responsible for response and cleanup. Each transportation company is required to develop a *Spill Prevention, Control, and Countermeasures Plan* to address the materials it would be transporting. Local and regional law enforcement and fire protection agencies also may be involved initially to secure the site and protect public safety. Title 49 of the Code of Federal Regulations requires that the carrier notify local emergency response personnel, the National Response Center (for discharge of reportable quantities of hazardous substances to navigable waters), and the U.S. Department of Transportation in the event of an accident involving hazardous substances.

Storage and Use

As described above, the proposed operation would require the use and storage of materials classified as hazardous. Homestake has developed a *Spill Prevention, Control and Countermeasure Plan* and an *Emergency Response Contingency Plan* in accordance 40 Code of Federal Regulations 112 which describes the required level of containment and safety measures associated with petroleum products and other materials. Over the life of the project, the probability of minor spills of materials such as lime and portland cement (from loading/unloading activities at storage silos) or oils and lubricants is relatively high. Operation in accordance with the *Spill Prevention, Control, and Countermeasure Plan* would ensure that spills of this nature would most likely be localized, contained, and removed. Homestake would have the necessary spill containment and cleanup equipment available at the site, and personnel would be able to quickly respond.
In particular, 40 Code of Federal Regulations 112 requires the following measures and actions to be addressed in the *Spill Prevention, Control, and Countermeasure Plan*;

- A prediction of the direction, rate of flow and total quantity of oil that be spilled from any point where there is a reasonable potential for equipment failure.

- Appropriate containment and/or diversionary structures, in some including berms, containment ponds, retaining walls, and collection systems.

- A commitment of manpower and equipment to expeditiously control any harmful quantity of oil discharged.

- A complete discussion of all regulations and procedures that apply to:

  1. Facility drainage;
  2. Bulk storage tanks;
  3. Facility transfer operations, pumping and in-plant processes;
  4. Facility tank truck loading/unloading operations;
  5. Inspections and records;
  6. Security; and
  7. Personnel training requirements.

Furthermore, the *Emergency Response Contingency Plan* is required to contain the following information in addition to general information concerning the facility and emergency response procedures:

- A hazard evaluation;

- Response planning levels;

- Facility response training drills/exercises;

- Description of discharge protection systems;

- The identity and telephone number of the designated qualified individual having authority to implement removal activities;

- The identity of individuals to be contacted;

- A description of information to be passed to response personnel;

- A description of response equipment and location;

- A description of response personnel capabilities and duties;

- Evacuation plans as appropriate;

- A description of immediate containment measures; and
- A diagram of the facility.

The design of the processing facilities minimizes the potential for an upset that could result in a major spill. The processing facilities would be designed to prevent discharge to the vadose zone (the unsaturated layer above the water table) groundwater, and surface water. Hazardous materials storage tanks would have secondary containment sufficient to hold the volume of the largest tank in the containment system, as well as additional freeboard. All tanks and vessels would comply with manufacturer's recommendations, state and Federal regulations and best management practices.

All hazardous substances would be handled in accordance with applicable Mine Safety and Health Administration or Occupational Safety and Health Administration regulations (Titles 30 and 29 of the Code of Federal Regulations). The hazardous substances to be used in the Proposed Action would be handled as recommended on the manufacturer's Material Safety Data Sheets. With the above-listed design features and operational practices in place, the probability of a major release occurring at the site would be low.

In the event of a major or minor spill occurring on site, Homestake has prepared an *Emergency Response and Contingency Plan* that establishes procedures for preventing, controlling, and reporting environmental releases within or from facilities located at the Ruby Hill Project. All spills, including transportation and loading/unloading related spills occurring onsite, would be cleaned up or neutralized and reported, if required, to the Nevada Division of Emergency Management, the Nevada Division of Environmental Protection, the Bureau of Mining Regulation and Reclamation, the Environmental Protection Agency, the National Response Center, the BLM, and the Eureka County Emergency Response Coordinator.

Disposal. Non-hazardous solid waste generated on the site would be disposed of in an approved Class III on-site landfill. Used tires would be either disposed of in the landfill or recycled by the suppliers. The facility would produce two waste streams that are not disposable in the Class III landfill. Assay lab wastes, consisting of slag, crucibles, and cupels, would be produced at the approximate rate of 8 tons per year and would be either introduced into the production circuit or disposed offsite at an approved facility. All hazardous waste generated at the Ruby Hill Project would transported to approved disposal facilities by approved hazardous waste transporters. When practical, hazardous wastes would be shipped to a licensed recycling facility. Used antifreeze, and solvents would be recycled on-site. Used petroleum oil would be produced at a rate of 5,000 gallons per month, and it would either be used to heat shop buildings or recycled off-site.

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 accident/release statistics 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 site or the loss of several thousand gallons of sodium hydroxide, diesel fuel, or sodium cyanide into a riparian drainage, such as the Humboldt River. In general, the materials of greatest concern would be sodium cyanide, diesel fuel, and sodium hydroxide.

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 special status species. Sodium hydroxide 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 base destroys plant and animal cells.

A sodium hydroxide release into a stream or other water body has the potential to migrate much farther from the spill site, raise the pH of the water, and likely reduce populations of aquatic invertebrates, amphibians, and fish. Base spills may be neutralized by acidic 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 is used in the process solutions to leach gold. The effects of a sodium cyanide release would be highly variably, much more so than a release of sodium hydroxide 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 immediate 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. Sodium cyanide solution decomposes rapidly when in contact with the atmosphere into poisonous and flammable hydrogen cyanide gas. Animals species that breathe this gas would suffer severe effects or death depending on the concentration of cyanide gas and the duration of exposure. 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 into benign elements ***when exposed to direct sunlight or oxygen***.

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. U.S. Department of Transportation statistics show that for the state of Nevada between 1983 and 1992, and average of 0.03 injuries or deaths occurred for each hazardous materials highway incident (U.S. 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 use 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, and accident resulting in a release could impact soils, water, biological resources, and people.

Response to a Release

Sodium hydroxide, 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 Code of Federal Regulations 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 0.2 milligram of cyanide per kilogram of soil. Homestake 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 Ruby Hill Project, the transportation company would be responsible for response and cleanup. Law enforcement and fire protection agencies also may be involved to initially secure the site and protect public safety.

Hazardous materials transporters are required to maintain an emergency response plan which 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 material. Any cleanup would be followed by appropriate restoration regarding the disturbed area, which could include replacing removed soil and seeding the area to prevent erosion, and the return of the land to its previous use.

3.17.2.2 East Waste Rock Dump Alternative

The East Waste Rock Dump Alternative would result in the same impacts as the Proposed Action.

3.17.2.3 West Waste Rock Dump Alternative

The West Waste Rock Dump Alternative would result in the same impacts as the Proposed Action.

3.17.2.4 Partial Backfilling Alternative

The Partial Backfilling Alternative would result in the same impacts as the Proposed Action.

3.17.2.5 No Action Alternative

Under the No Action Alternative, none of the transportation, storage, or use of materials described for the Proposed Action would occur.

3.17.3 Cumulative Impacts

Since the potential for accidents involving trucks delivering hazardous materials would be low, cumulative impacts resulting from the shipment of hazardous materials to the Ruby Hill Mine and other mining operations in the region would be minimal. The cumulative effects of using and storing hazardous materials on the project site would be minimized by implementing spill prevention and containment design features along with the *Emergency Response and Contingency Plan*.

3.17.4 Mitigation and Monitoring

Additional mitigation measures, beyond those discussed in Section 2.1.13, Hazardous Materials and Wastes, would not be needed.

3.17.5 Residual Adverse Effects

Residual adverse effects from the use of hazardous materials on the project site for the Proposed Action would depend on the substance, quantity, timing, location, and response involved in an accidental spill or release. Operation in accordance with the facility's *Spill Prevention, Control and Countermeasures Plan* and prompt cleanup of spills and releases according to the Homestake's *Emergency Response and Contingency Plan* would minimize the possibility of any residual adverse effects due to hazardous materials.

3.18 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 Ruby Hill Project through closure and reclamation (2010). 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 until the areas have fully recovered. Long-term soil and vegetation productivity under all alternatives 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 88 acres that would not be reclaimed. Long-term productivity would be reduced on 608 acres reclaimed.

- Range Resources and Woodland Products - Long-term productivity for grazing and woodland product harvesting would be lost on the 88 acres not reclaimed and would be reduced on the 608 acres reclaimed until they have fully recovered. Most of the reclaimed area would eventually be reopened for livestock grazing, but woodland product harvesting from 370 acres of piñon/juniper woodland disturbed could take up to 100 years to recover.

3.19 Irreversible/Irretrievable Commitment of Resources

Construction and operation of the Ruby Hill 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 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 3-60.

Table 3-60

Irreversible/Irretrievable Commitment of Resources - Proposed Action

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Air Quality	No	No	Emissions from the project would not deteriorate the existing air quality in the Eureka area.
Geology and Minerals	Yes	Yes	Mineral resources that are mined would no longer be available for future production.
Paleontology	No	No	No disturbance to paleontological resources is expected.
Water Quality and Quantity	No	Yes	Water that is removed from the aquifer and used for operations would not be available for other uses.
Soils	No	No	Soils from the pit, waste rock dump, and heap areas would be salvaged for use in reclaiming other areas.
Vegetation Resources	Yes	Yes	Irreversible impacts to 88 acres of vegetation would result from pit development.
Woodland Products	Yes	Yes	About 88 acres would be irreversibly lost for woodland product harvesting; there would be an irretrievable loss of production on about 608 acres of public land available for woodland harvest until reclamation is sufficient to restore productivity on the remainder of the project site.
Range Resources	Yes	Yes	About 88 acres would be irreversibly lost for livestock grazing. There would be an irretrievable loss of public land available for livestock grazing, (about 608 acres) until reclamation is sufficient to restore productivity and allow this activity to resume. Forage production is expected to recover in the long-term following reclamation, with a loss of only 20 animal unit months.
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.
Wildlife and Fisheries Resources	Yes	Yes	About 88 acres of wildlife habitat would be irreversibly lost.

Table 3-60 (Continued)

Resource	Irreversible Impacts	Irretrievable Impacts	Explanation
Special Status Species	Yes	Yes	About 88 acres of potential habitat for resident and migrant species would be irreversibly lost.
Land Use Authorizations and Access	Yes	Yes	There would be no irreversible impacts to access; public access patterns would be maintained. Land that is utilized for the pit, waste rock dumps, and heap would no longer be suitable for disposal.
Recreation/Wilderness	No	Yes	The 88 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.
Cultural Heritage	Yes	Yes	Disturbance of cultural sites would result in the permanent loss of site context.
Social and Economic Values	Yes	No	Production and further uses of the gold resources underlying the Ruby Hill Project would be irreversible. The jobs, incomes, and taxes created over the life of the project reflect irreversible resource commitments to achieve such production, but they also represent measures of the economic benefits associated with the project.
Noise and Blasting Vibrations	No	No	Noise and blasting are not considered irreversible because they would cease when mine operations cease.
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. If one did occur, impacts could last for several months or years, but would not be considered irreversible. Remediation of a spill would be initiated immediately and should be able to mitigate most impacts.

3.20 Energy Requirements and Conservation Potential

Energy for the Proposed Action would be supplied by electricity, propane, and diesel fuel. Electricity would be used to power all equipment in the process plant and ancillary facilities, pump water used in the operation, and provide lighting for mining and processing activities. The electrical load would be approximately three megawatts. Propane would be used to heat buildings, and about 20,000 gallons per year would be consumed. Diesel fuel would be used to power all mobile equipment and emergency back-up generators. About 600,000 gallons per year would be used, following initial start-up and pre-stripping. Life-of-project energy consumption is presented below:

- Electricity - 184,000 Megawatt-hours
- Propane - 140,000 gallons
- Diesel fuel - 4.2 million gallons

The only action alternative that would have an energy consumption different from the Proposed Action is the Partial Backfilling Alternative. By backfilling three million tons of waste rock, total diesel fuel usage would be reduced by approximately 40,000 gallons. This represents a 0.4 percent reduction in diesel fuel consumption, so the alternative has only very limited energy conservation potential.

4.0 CONSULTATION AND COORDINATION

4.0 CONSULTATION AND COORDINATION

4.1 Public Participation

The public participation program for the Ruby Hill Project EIS includes the following components.

Two public scoping meetings were held for the EIS, one on August 7 and one on August 9, 1995, in Eureka and Reno, respectively. The public scoping period for the EIS closed on September 5, 1995.

The scoping comments were summarized and included in the EIS Preparation Plan. The following are the key scoping issues for the Ruby Hill Project.

- Vibration from blasting affecting historic buildings in Eureka.
- Additional medical facilities necessary for Homestake personnel.
- Future mine expansion.
- Effects of sulfide ore on groundwater quality.
- Effects on groundwater aquifers from well pumping.
- Impacts to Eureka schools from increased worker population.
- Housing availability for Homestake personnel.
- Amount of dust generated by the project.
- Proposed frequency and schedule for blasting.
- Height of proposed waste rock facility.
- Possible devaluation of neighboring private property.
- Noise levels from mine operations.
- Options for access through the mine site for hunting or ranching.
- Impacts to tourism from mining activities.
- Response to hazardous material spills.

The BLM prepared a brief newsletter summarizing the project and the status of the EIS. The newsletter was distributed to the individuals on the BLM's EIS mailing list in March 1995.

On August 8, 1996, the 60-day public comment period on the Draft EIS for the Ruby Hill Project began. During this period, BLM also held public meetings in Eureka and Reno (September 17 and 19, respectively). Comments that were received from agencies, organizations, and the public are presented in Section 4.5, along with BLM's responses to these comments. The public also will be allowed a 30-day review period of the Final EIS, during which comments on the agency-preferred alternative may be sent to the BLM.

4.2 Native American Consultation

Recent legislation and regulations provide for Federal agencies to consult with Native Americans before certain types of land or resource management decisions are implemented. These acts and regulations, which provide a measure of protection to traditional Indian religious and other cultural beliefs and practices, are: 1) the American Indian Religious Freedom Act; 2) the Religious Freedom Restoration Act; 3) the Archaeological Resources Protection Act; 4) the National Historic Preservation Act, as amended to provide a role for Indian Tribes in Section 106 consultation provisions; 5) the Native American Graves Protection and Repatriation Act; and 6) the Nevada Indian Burial Protection legislation.

Notification and requests for comment letters were sent in May 1995 to the Tribal Chairs of the Yomba Shoshone Tribal Council, the Western Shoshone Defense Project, the Duckwater Shoshone Tribe, the Battle Mountain Band of the Te-Moak Tribe, the Duck Valley Tribal Council, the Elko Band of the Te-Moak Tribe, the Ely Shoshone Tribe, the South Fork Band of the

Te-Moak Tribe, the Te-Moak Tribe of Western Shoshone, the Wells Band of the Te-Moak Tribe of Western Shoshone, the Nevada Indian Environmental Coalition, the Western Shoshone Historic Preservation Society, the Western Shoshone National Council, and the Spiritual Leader of the Western Shoshone Nation (Corbin Harney). These groups were identified as having potential ties to the project area. Follow-up telephone calls were made by Western Cultural Resource Management, Inc. in June and July 1995 and an on-site visit for representatives of tribal groups and organizations was conducted by Western Cultural Resource Management, Inc. on August 2, 1995, with approval from the BLM and Homestake. ***A second on-site visit to the area was made by tribal representatives in July 1996 to all pre-historic sites undergoing data recovery, and a Native American monitor was present during data recovery operations at these sites.***

Native American Consultation

During the telephone conversations with tribal representatives, representatives of the Ely Shoshone Tribe and the Wells Band of the Te-Moak Tribe of the Western Shoshone indicated that they were probably too far away from the site to be familiar with it and would not attend the onsite visit, but would consider providing comments by letter after review of the consultation report.

Representatives of one tribal government (James Birchum, the Tribal Chair of the Yomba Shoshone Tribe), four representatives of the Western Shoshone Defense Project, and Corbin Harney, the Western Shoshone spiritual leader attended the on-site visit, which focused on sites that may be eligible to the Register as a traditional and cultural property. After the site visit, participants were asked to make recommendations. Additional telephone calls were made to individuals who could either not attend the site visit or were unable to stay for the recommendation meeting. Copies of the consultation report was sent to the tribal representatives that had requested it. The following comments and recommendations were made:

- Carrie Dann with the Western Shoshone Defense Project was concerned that modern mining is more destructive than the mining that the Western Shoshone agreed to allow in the Treaty of Peace and Friendship that they signed at Fort Ruby in 1863.

- Corbin Harney, the Western Shoshone spiritual leader, was concerned about the effect dust created during the planned mining would have on the people who live nearby since it contains toxic materials released by mining in the 1860s and is now part of the surface soil in the project area. Mr. Harney also indicated in an October 1995 letter that it should be noted that all tribal participants in the on-site visit were opposed to the project. He indicated that it was against Western Shoshone traditional spiritual beliefs and practices to engage in mining or any other practice that would disturb the earth.

- Representatives of the Western Shoshone Defense Project were concerned about the destruction of native food and medicinal plants in the project area.

- Tribal governments must be notified concurrently with the BLM and the State Historic Preservation Office pursuant to the Nevada Indian Burial Act about any burials that might be discovered during archaeological investigations of subsequent mining activities. Tribal representatives also request information about any unexpected finds of significant archaeological remains.

- Representatives of the Duckwater and Yomba Shoshone Tribes wish to be kept informed about reclamation progress at the mine, particularly with respect to revegetation with native plants.

- Some members of nearby tribes or tribal organizations would like access to the mine (subject to notification, safety precautions, and necessary BLM permits) to collect native plants and to remove firewood from downed trees prior to mining.

- Tribal representatives were concerned about the disposition of archaeological collections that may be made during mitigation of cultural site impacts.

- The pine nut roasting feature in Site CrNV-63-6546 should be preserved for Western Shoshone people as a Traditional and Cultural Property. The pine nut roasting feature at site CrNV-63-6546 has been identified as a traditional use site by the BLM and would be managed accordingly. Homestake would attempt to avoid directly impacting this site, which lies in the vicinity of the proposed boundary of the waste rock dump. If the site cannot be avoided, consultations with the appropriate Native American groups would be reinitiated and mitigation would be implemented.

- Before archaeological excavation and collection is undertaken at significant sites in the project area prior to mining, members of the Yomba and Duckwater Shoshone tribal councils would like to see that additional onsite inspections by representatives of concerned tribal governments and organizations be made, and that tribal monitors are used during excavation of features deemed to be traditionally or culturally significant (Rusco 1995). *Tribal representatives made on-site inspections during July 1996 at pre-historic sites undergoing data recovery. A monitor of Native American extraction also was present during data recovery in July and August 1996.*

No additional letters, comments, or telephone calls have been received as of the date of this printing from any of the other tribal representatives contacted. A complete report on the consultation is available from the BLM, Battle Mountain District office in Battle Mountain, Nevada.

4.3 Draft Environmental Impact Statement Preparation

In preparing the draft environmental impact statement, 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 the Interior
- Fish and Wildlife Service (Reno)
- U.S. Geological Survey

State Government Agencies/Universities

Colorado Division of Wildlife (Fort Collins)
Nevada Department of Conservation and Natural Resources:
- *Division of Environmental Protection*
- Division of Historic Preservation and Archaeology
- *Division of Water Resources*
- Division of Wildlife (Eureka, Reno, Elko)

Nevada Human Resources Department
Nevada Natural Heritage Program (Carson City)
Northern Nevada Community College
State Historic Preservation Office

Local Governments

Director of Ely Mental Health, Eureka Clinic
Eureka County Assessor's Office
Eureka County Chamber of Commerce and Economic Development Council
Eureka County Commission
Eureka County Director of Public Works
Eureka County Librarian
Eureka County Planning Commission
Eureka County School District
Eureka County Senior Citizens Center
Eureka County Sheriff
Eureka County Swimming Pool
Eureka County Treasurer
Eureka County Volunteer Fire Department

Private

Cottage RV Park
Desert Mountain Realty - Ely, Nevada
Homestake Mining Company
Larralde Sheep Co.
Magma Nevada Mining Company
Mount Hamilton Mine
Pita RV Park
T/C Trailer Park

4.4 Final Environmental Impact Statement Review

In the course of preparation of the environmental impact statement for the Ruby Hill 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 490 copies of the ***Draft EIS and 520 copies of the Final EIS*** were distributed by mail to various individuals, organizations, and government agencies. A listing of the agencies, organizations, and individuals who received copies of the ***Final EIS in December 1996*** is presented below.

Agencies, Organizations, and Individuals Who Received Copies of the *Final* Environmental Impact Statement

Department of Defense
- Army Corps of Engineers - San Francisco, CA; Sacramento, CA; Reno, NV
- National Training Center - Fort Irwin, CA
- U.S. Air Force - Washington, D.C.

Department of Energy, Office of Environmental Compliance - Washington, D.C.
Department of the Interior
- Bureau of Land Management - Washington, D.C.; Reno, NV; Battle Mountain, NV; Carson City, NV; Elko, NV; Ely, NV; Las Vegas, NV; Winnemucca, NV
- Bureau of Reclamation - Denver Federal Center - Denver, CO
- Fish and Wildlife Service - Reno, NV, Washington, D.C.
- Minerals Management Services, Offshore Environmental Assessment Division - Washington, D.C.
- Minerals Management Service - Washington, D.C.
- Natural Resources Library - Washington, D.C.
- Office of Environmental Policy and Compliance - Washington, D.C.
- Office of Public Affairs - Washington, D.C.
- U.S. Geological Survey - Reston, VA

Department of Transportation - Washington, D.C.
Library of Congress - Washington, D.C.
National Park Service - Washington, D.C.
U.S. Environmental Protection Agency, Office of Federal Activities - Washington, D.C.; San Francisco, CA
U.S. Environmental Protection Agency, Region IX, Office of External Affairs - San Francisco, CA

<u>State Agencies</u>

Colorado State University, The Libraries - Fort Collins, CO
Commission for the Preservation of Wild Horses - Sparks, NV
Mackay School of Mines - Reno, NV
Nevada Division of Wildlife - Elko, NV
Nevada Division of Wildlife, Habitat Division - Reno, NV
Nevada Department of Minerals - Carson City, NV
Nevada Division of Environmental Protection, Bureau of Mining Regulation and Reclamation - Carson City, NV
Nevada Ecological Services, State Office - Reno, NV
Nevada State Clearinghouse/SPOC, Department of Administration - Carson City, NV
Nevada Division of Transportation, Right-of-Way Division - Carson City, NV
University of Miami, Marine Affairs - Miami, FL
University of Nevada - Beowawe, NV
University of Nevada Las Vegas - Las Vegas, NV

University of Nevada Libraries - Reno, NV
University of Nevada Reno, Department of Mining Engineering - Reno, NV

County Agencies

Board of Humbolt County Commissioners - Winnemucca, NV
Board of Eureka County Commissioners - Eureka, NV
Board of Eureka County Commissioners, Chairman - Eureka, NV
Elko County Commissioners - Elko, NV
Eureka County Commissioners - Eureka, NV
Eureka County Deputy District Attorney - Eureka, NV
Eureka County Public Works - Eureka, NV
Eureka County School District Superintendent - Eureka, NV
Eureka Opera House - Eureka, NV
Lander County Board of Commissioners - Battle Mountain, NV
Lander County Commissioner - Austin, NV
Lander County Commissioners - Battle Mountain, NV
Lander County District Attorney - Battle Mountain, NV
Nye County Planning Department - Tonopah, NV
Pershing County Commissioners - Lovelock, NV

Local Agencies

Eureka Branch Library - Eureka, NV
Humbolt River Basin Water Authority - Winnemucca, NV
Lovelock Water District - Lovelock, NV
Pershing Water Conservation District - Lovelock, NV
Winnemucca City Council - Winnemucca, NV

Elected Officials

Congresswoman Barbara Vucanovich - Elko, NV
Governor Bob Miller - Carson City, NV
Senator Dean A. Rhoads - Tuscarora, NV
Honorable Richard Bryan - Carson City, NV

Tribal Organizations

Battle Mountain Tribal Council - Battle Mountain, NV
Citizen Alert Native American Program - Reno, NV
Shoshone National Council - Duckwater, NV
Te-Moak Bands of Western Shoshone - Elko, NV
Western Shoshone Defense Project - Crescent Valley, NV
Western Shoshone Historic Preservation Society - Elko, NV
Western Shoshone Resources Inc. - Reno, NV
Yomba Shoshone Tribe - Austin, NV

Organizations

A I L A - New York, NY
Computer Eaze - Rock City Falls, NY
Concerned Citizen for Responsible Mining - Ontario, OR
Friends of the Clearwater - Moscow, ID
Laser, Inc. - Gridley, CA
Mineral Policy Center - Washington, D.C.; Bozeman, MT
National Resources Defense Council - Washington, D.C.
National Audubon Society - Washington, D.C.
National Wildlife Federation - Washington, D.C.
Nevada Outdoor Recreation Association - Carson City, NV
Nevada Cattlemen's Association - Elko, NV
Nevada Mining Association - Reno, NV
Nevada 4-Wheel Drive Association - Las Vegas, NV
Northern Nevada Building Trades Council - Portland, OR
People for the West, Northeast Nevada Chapter - Elko, NV
People for the West, Northwest Nevada Chapter - Truckee, CA
Sierra Club - Reno, NV
Sierra Club, Toiyabe Chapter - Las Vegas, NV; Reno, NV
The Nature Conservancy - Reno, NV
The Wilderness Society - San Francisco, CA
Toiyabe Chapter, People for the West - Austin, NV
United Association of Plumbers and Pipefitters - Sparks, NV
Utah Peace Test - Salt Lake City, UT
Wild Horse Organization Assistance - Reno, NV

Industries/Businesses

Agri-Beef Co. - Golconda, NV
Alpha Analytical, Inc. - Sparks, NV
American Wildlands - Sparks, NV
Arava Natural Resources Co. - Price, UT
Bald Mountain Mine - Elko, NV
Bald Mountain Mine - Ely, NV
Barium Products and Mining Co. - Reno, NV
Battle Mountain Bugle - Battle Mountain, NV
Bechtel Consulting Group - San Francisco, CA
Beowawe Geothermal Power Company - Beowawe, NV
Brown-Buntin Associates, Inc. - Fair Oaks, CA
Central Nevada Newspapers, Inc. - Tonopah, NV
Converse Environmental Consultants Southwest - Las Vegas, NV
Cortez Pipeline Project - Beowawe, NV
Cortez Gold Mines - Beowawe, NV
Cyprus Minerals Company - Englewood, CO
Death Valley Gateway Gazette - Pahrump, NV
P.M. DeDycker & Associates - Lakewood, CO
Dewatering Coordinator - Valmy, NV
Dynamic Corp. Environmental Services - Rockville, MD
Elko Daily Free Press - Elko, NV
Ellison Ranching - Tuscarora, NV
Environmental Strategies, Inc. - Denver, CO

Environmental Managment Associates - Reno, NV
Eureka Hardware - Eureka, NV
Euro-Nevada - Reno, NV
FB&D Technologies, Inc. - Houston, TX
Filippini Ranching Co. - Battle Mountain, NV
Goldfield Mining Corporation - Golden, CO
Greystone - Englewood, CO
HCI - Lakewood, CO
Homestake Mining Company - San Francisco, CA
Huntingdon Chen-Northern, Inc. - Helena, MT
Hydrologic Consultants - Lakewood, CO
IMC - Elko, NV
ISC - Las Vegas, NV
JBR Environmental Consultants - Reno, NV; Springfield, UT
Julian Tomera Ranches Inc. - Battle Mountain, NV
Kohls Exploration Limited - Lakewood, CO
Magma Copper Company - Tucson, AZ
Marydean & Associates - Las Vegas, NV
McGraw-Hill, Metals Weekly - New York, NY
Miramar Mining Corporation - Reno, NV
Morrison-Maiere Environmental - Helena, MT
Newmont Gold Company - Carlin, NV
Palisade Ranch - Carlin, NV
Parsons, Behle, Latimer - Salt Lake City, UT
Pastorino Rentals - Eureka, NV
Placer Dome U.S. Inc. - Elko, NV
Planning Information Corp. - Denver, CO
PTI - Boulder, CO
Riverside Technology, inc. - Fort Collins, CO
Royal Gold, Inc. - Denver, CO
S R I C - Albuquerque, NM
SAIC - Falls Church, VA
Santa Fe Pacific Gold - Albuquerque, NM
SEI - Fort Collins, CO
Sheep Creek Ranch - Carlin, NV
Silver Creek Ranch - Austin, NV
Slagowski Ranch - Carlin, NV
SWRIC - Albuquerque, NM
Tetra-Tech Inc. - Alexandria, VA
The Industrial Company - Carson City, NV
The Ranch House - Crescent Valley, NV
WESTEC - Reno, NV
Western Traction Company - Sparks, NV

Individuals

Mark Abrams - Reno, NV
C. J. Anderson - Carlisle, OH
Edward Anderson - Eureka, NV
Jerry Anderson - Eureka, NV
Monica Antonovich - Reno, NV
Hale Bailey - Carlin, NV

Doug Bailey - Elko, NV
John Balliette - Eureka, NV
Kathy Baltzer - Reno, NV
Dan Banghart - Elko, NV
Gary J. Baschuk - Elko, NV
Jim Baumann - Eureka, NV
Vera Baumann - Eureka, NV
Didi Benede-Dann - Crescent Valley, NV
Dirf Benford - Crescent Valley, NV
Mark Bennett - Battle Mountain, NV
Jay and Myrna Blackburn - Crescent Valley, NV
Mark Blair - Elko, NV
John Bloom - Elko, NV
Joseph Boralby - Carlin, NV
Julia Bosma-Douglas - Elko, NV
Roy Boyd - Carson City, NV
Shannen Brade - Eureka, NV
M. Bradley - Reno, NV
Paula Brady - Elko, NV
Joy K. Brandt - Austin, NV
Aaron Britt - Elko, NV
Joe Broasn - Reno, NV
Dan Brown - Eureka, NV
Jacob Brown - Eureka, NV
Joe Brown - Reno, NV
John Brown - Eureka, NV
Dr. Patricia Brown - Bishop, CA
John Bunch - Elko, NV
Ralph Bunch - Elko, NV
John Burrows - Elko, NV
Gregg Bush - Elko, NV
Gail Callan - Portland, OR
Jay Callisto - Verdi, NV
Mr. and Mrs. Michael Campbell - Battle Mountain, NV
Rich Capurro - Sparks, NV
Anthony Cardinalli - Reno, NV
J. T. Cardinalli - Reno, NV
Jack Cardinalli - Carson City, NV
John C. Carpenter - Elko, NV
Ron Carrion - Eureka, NV
Mr. and Mrs. Ken Carson - Battle Mountain, NV
Larry Carson - Battle Mountain, NV
Joel Casburn - Zephyr Cove, NV
Rocky Chase - Beatty, NV
Ursula Chanse - Crescent Valley, NV
R. Lee Chapman - Elko, NV
James Chavis - Elko, NV
Jack Chesney - Sparks, NV
Vic Chevillon - Reno, NV
William E. Clark - Crescent Valley, NV
Shelley Collins - Hesperia, CA
George Conger - Carlin, NV

Harry Coolidge - Crescent Valley, NV
Johnathan Coorman - Elko, NV
Lindsay Craig - Reno, NV
Kenneth D. Cunningham - Reno, NV
JoAnn W. Curtis - Reno, NV
Vivian Curtis - Reno, NV
Eric Daniels - Battle Mountain, NV
Jess Daniels - Tucson, AZ
Nancy DelCastillo - Crescent Valley, NV
Mark Demuth - Reno, NV
Natalie Deringer - Elko, NV
Cindy DeWeese - Valmy, NV
Pete A. Dilles - Sparks, NV
Paul Dobak - Elko, NV
Darrell G. Dugan - Crescent Valley, NV
Dennis Duwell - Elko, NV
Shane Edgar - Battle Mountain, NV
Cindy Emmons - Salt Lake City, UT
David L. Emmons - Reno, NV
Larry Espinola - Eureka, NV
LeRoy Etchegaray - Eureka, NV
Leonard L. Evans - Crescent Valley, NV
Jill Faaborg - Reno, NV
Ed Falk - Reno, NV
Bill Faulk - Crescent Valley, NV
Russ Fields - Carson City, NV
Mr. and Mrs. Dan Filippini - Battle Mountain, NV
John and Billie Filippini - Beowawe, NV
Leonard Fiorenzi - Eureka, NV
Stan Foo - Elko, NV
Carlton P. Forbes - Eureka, NV
Steven Foster - Reno, NV
Sherrie L. Franco - Eureka, NV
Gregory French - Eureka, NV
Gary & Melody Garaventa - Eureka, NV
Pat Garver - Salt Lake City, UT
Ronald Gash - Reno, NV
Dennis Geason - Reno, NV
Debbie Gibson - Elko, NV
Tammy Gnerer - Crescent Valley, NV
Deborah Goetz - Elko, NV
Don P. Gray - Coeur d'Alene, ID
Stuart Grange - Elko, NV
Dan Green - Eureka, NV
Jeff Green - Sandy, UT
Sandy Green - Eureka, NV
Rob Greenbaum - Crescent Valley, NV
Tom Griswold - Crescent Valley, NV
Dennis Gunn - Reno, NV
Royce L. Hackworth - Elko, NV
Rich Haddock - Reno, NV
Art Hakas - Reno, NV

Marie Hallmark - Eureka, NV
Martin Hanson - Eureka, NV
Corbin Harney - Nevada City, CA
Charlie Harper - Beowawe, NV
Mike Harris - Anaheim, CA
Bruce Harvey - Elko, NV
Eugene L. Haub - Elko, NV
David S. Hennen - Sparks, NV
Bob & Clarisse Herrera - Eureka, NV
Bill and Robin Hicks - Eureka, NV
Connie Hicks - Eureka, NV
E. Hirholzer - Elko, NV
Alan Hitchborn - Elko, NV
Fred Hornbarger - Elko, NV
Dorothy Hughett - Crescent Valley, NV
Jim Ithurralde - Eureka, NV
Joe Jarvis - Cedar City, UT
Chuck Jeannes - Reno, NV
Chris Jensen - Eureka, NV
Bob Johnson - Reno, NV
Dave Johnson - Elko, NV
Walter Johnson - Austin, NV
Bruce Johnston - Gearhart, OR
Benita Jones - Crescent Valley, NV
Helen Irene Jones, J. D. - Reno, NV
Jerry Jones - Elko, NV
L. A. Jones - Crescent Valley, NV
Rick Jones - Reno, NV
Tilman Jones - Austin, NV
W. C. Jones - Golden, CO
Doris Kaesz - Los Angeles, CA
Garry Keizer - Elko, NV
Mr. & Mrs. Frank Kelsey - Eureka, NV
Collon Kennedy - Golden, CO
Conrad and Doris Kersch - Stagecoach, NV
Ann Kersten - Sparks, NV
Larry Kibby - Elko, NV
Floyd Klindt - Eureka, NV
Judith A. Klindt - Eureka, NV
Kolbe Klindt - Eureka, NV
Tom Konen - Elko, NV
Karen LaBarry - Eureka, NV
Mark Lanz - Elko, NV
Rick Lassen - Reno, NV
Nathan Lauritzen - Battle Mountain, NV
Gary Lavelle - Elko, NV
Dennis Lee - Reno, NV
Max Lenaburg - Battle Mountain, NV
Tony and Nancy Lesperance - Elko, NV
Matt Lewis - Lakewood, CO
Scott Lewis - Elko, NV
Jon Liechty - Bloomington, IN

Marrianna Lipe - Crescent Valley, NV
John B. Lombda - Crescent Valley, NV
Robert G. Lopes - Sparks, NV
Gregg Loptien - Reno, NV
Cecile Lowrey - Eureka, NV
Bill Lyle - Winnemucca, NV
Cheryl Lyngar - Battle Mountain, NV
D. L. Mabe - Cody, WY
Karl Marlowe - Sparks, NV
Kent McAdoo - Elko, NV
Deborah McAlexander - Crescent Valley, NV
Jeff McCleary - Moab, UT
Merlin McColin - Elko, NV
Robert D. McCracken, Ph.D - Las Vegas, NV
Mike McDonald - Elko, NV
Gary G. McGill - Elko, NV
Thomas Metcalf - Albuquerque, NM
Arthur Miles - Eureka, NV
Paul Miller - Winnemucca, NV
Donald A. Molde, M.D. - Reno, NV
George and Barb Montgomery - Crescent Valley, NV
Scott Moore - Lower Lake, CA
Allen Moss - Reno, NV
Mark Moyle - Eureka, NV
Lynn Mulder - Eureka, NV
Terry Munson - Elko, NV
Tom Myers - Reno, NV
Wondell J. Myers - Carlin, NV
Steven R. Newman - Elko, NV
Clayton E. & Melodie L. Nicholes - Eureka, NV
Donna Nicolino - Willimantic, CT
Gerald Olander - Eureka, NV
Paula Oliver - Eureka, NV
Ken Olsen - Eureka, NV
Hal Orton - Carlin, NV
Norman and Adell Panning - Beowawe, NV
D. P. Parker - Reno, NV
Dave Parker - Reno, NV
Ruth Parman - Eureka, NV
David Pastorino - Eureka, NV
Eric J. Pastorino - Eureka, NV
Marjory Pastorino - Eureka, NV
Wil Patrick - Bozeman, MT
B. Patsch - Reno, NV
Lance A. Paul - Crescent Valley, NV
Myron Payne - Salt Lake City, UT
Jerry and Lisa Peck - Eureka, NV
Mike Peterson - Republic, WA
Mike Podborny - Eureka, NV
David Potter - Portland, OR
Matt Potter - San Diego, CA
Randy Powell - Elko, NV

Todd Process - Reno, NV
Duane Rambel - Crescent Valley, NV
Steven Rambel - Crescent Valley, NV
Joe M. Ratliff - Reno, NV
Mr. Reith - Eureka, NV
Deborah Rhine - Denver, CO
Paul Rice - Eureka, NV
Matthew Riley - Cave Junction, OR
Michael W. Roper - Elko, NV
Clarlie Rose - Austin, NV
Elyssa Rosen - Reno, NV
Judy Rosenthal - Salt Lake City, UT
Carolyn and John Ross - Elko, NV
Tom Ross - Eureka, NV
Randy Saderup - Sparks, NV
Ray Salisbury - Austin, NV
Virginia Sanchez - Reno, NV
Paul Scheidig - Reno, NV
Andy Schumacher - Elko, NV
Gaylen Schwartz - Crescent Valley, NV
Laura Mae and Jay Scott - Crescent Valley, NV
Diane Seaborg - Lafayette, CA
James D. Sefton - Crescent Valley, NV
Nancy Sellard - Crescent Valley, NV
Chris Sewell - Crescent Valley, NV
Christine Smith - Eureka, NV
Grant Smith - Reno, NV
Larry Spencer - Eureka, NV
Eve Spoo - Crescent Valley, NV
Roger Steininger - Reno, NV
Bob Stephenson - Eureka, NV
Cliff Stewart - Battle Mountain, NV
Claus Stoiber - Valmy, NV
Roberta Straud - Eureka, NV
Debra W. Struhsacker - Reno, NV
Sharon Swisher - Lamoille, NV
Tom Temkin - Reno, NV
Mr. and Mrs. Thomas - Fenelton, PA
Dennis Thomas - Ely, NV
Robert D. Thomas, Jr. - Reno, NV
Mr. and Mrs. Macks Thomsen - Battle Mountain, NV
Ed Tilsey - Sparks, NV
Kim Townsend - Duckwater, NV
Andrea Turman - Virginia City, NV
John H. Uhalde - Reno, NV
Dave Ullrich - Eureka, NV
Ted and Sharlene Vernes - Eureka, NV
Eric S. Vokt - Elko, NV
Mr. and Mrs. Richard Waldemar - Battle Mountain, NV
Norbert Walters - Eureka, NV
Dowell O. Ward - Crescent Valley, NV
Stephanie Weigel - Fort Collins, CO

Terry White - Reno, NV
Diana Williams - Haywood CA
Jane Williams - Rosamond, CA
John Williams - Portland, OR
Ray H. Williams, Jr. - Austin, NV
Robert E. Williams - Eureka, NV
Cy Wilsey - Sparks, NV
Edie Wilson - North Brunswick, NJ
Edward Wilson - Somerset, N.J.
Tim Wilson - Reno, NV
W. L. Wilson - Grand Junction, CO
Jay C. Winrod - Austin, NV
James P. Wold - Carlin, NV
Lester Wood - Cedar City, UT
Elwood Wright - Crescent Valley, NV
Chris Wyatt - Elko, NV
Alan Yoshida - Reno, NV
Bud Younts - Reno, NV

4.5 Public Comments and Responses

During the 60-day public comment period, comments on the Draft EIS were submitted at the public meetings held in Eureka and Reno, Nevada, on September 17 and 19, 1996, respectively, and by letter. These comments are presented and responded to in the following sections.

The first public meeting was held in the Eureka Opera House, on September 17, 1996 and had 32 attendees. Twenty-three of the attendees represented themselves or local agencies, while 9 were affiliated with Homestake Mining Company. Eight people presented statements and are listed below.

Edward Anderson
Jerry Anderson
John Brown
Dave Ullrich
Ron Carrion
Paula Oliver
Arthur Miles
Bill Hicks

The second public meeting was held at the Airport Plaza Hotel on September 19, 1996, and had 22 attendees. Sixteen of the attendees represented themselves, organizations, or other companies, while 6 were affiliated with Homestake Mining Company. One person presented a statement.

Paul Scheidig

In addition to the comments received at the public meetings, the BLM received 43 letters addressing the Draft EIS during the 60-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 EIS, modify or correct the Draft EIS, or provide additional information in the Final EIS. Comments that did not require one of these responses but may be relevant to the BLM's ultimate decision regarding the Ruby Hill Project were acknowledged. Where changes (modification, correction, or addition) have been made to the text contained in the Draft EIS, these changes have been presented in the Final EIS in bold-italic type.

Table 4-1 lists each of the public meetings and comment letters by author and reference number assigned to the meeting or letter. The meeting transcripts and 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 comments have been reviewed and considered by the BLM in determining the agency preferred alternative for the proposed project.*

Following Table 4-1, the comments and responses are presented. Each comment is identified by a bracket and reference number keyed to the meeting or letter reference number. Thus, Comment 4-3 refers to the third comment in Letter 4. The response to each comment accompanies the transcript or letter and is identified by the reference number of the respective comment (e.g., Response to Comment 4-3).

Table 4-1

Public Meetings and Comment Letters

Public Meeting or Letter Number	
1	Eureka Public Meeting Edward Anderson Jerry Anderson John Brown Dave Ullrich Ron Carrion Paula Oliver Arthur Miles Bill Hicks
2	Reno Public Meeting Paul Scheidig
3	U.S. Environmental Protection Agency
4	U.S. Geological Survey
5	U.S. Fish and Wildlife Service
6	Nevada Division of Minerals
7	Nevada Natural Heritage Program
8	Nevada Division of Water Resources
9	Nevada Division of Wildlife
10	Eureka County
11	Northern Nevada Building Trades Council
12	Eureka Hardware (Trina Machecek)
13	Christine Smith
14	Karen Labarry
15	Judith A. Klindt
16	James P. Ithurralde
17	Gary & Melody Garaventa
18	Mike Harris
19	Lynn Mulder
20	Ted & Sharlene Vernes
21	Jeff McCleary
22	Paul Rice
23	Shannen Brade
24	Carlton P. Forbes

Table 4-1 (Continued)

Public Meeting or Letter Number	
25	Eric J. Pastorino
26	Sherrie L. Franco
27	Ruth Parman
28	Larry Spencer
29	Roberta Straud
30	Jacob Brown
31	Bob Stephenson
32	Mark Moyle
33	Dan Brown
34	Tom Ross
35	Clayton E. & Melodie L. Nicholes
36	Cecile Lowrey
37	Bob & Clarisse Herrera
38	Gerald Olander
39	Leonard Fiorenzi
40	Norbert Walters
41	Mr. & Mrs. Frank Kelsey
42	Eric J. Pastorino
43	Marie Hallmark
44	Gregg Loptien
45	Gregory McN. French

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Public Meeting 1

TUESDAY, SEPTEMBER 17, 1996, EUREKA, NEVADA, 7:00 P.M.

-o0o-

MR. EDWARD ANDERSON: Edward Anderson, and I own north half of section 29 in township 20.

1-1 My concern is the runoff when the waste dumps on the east side and the west side in heavy rain or snow melt, all this water will run down in Spring Valley wash and will come across into section 32 and into section 29.

And in the 60s we had a runoff and they took a lot of mine tailings from the dumps of the Holly Mines, and that is located a few hundred feet from the open pit on section 10 in township 19, and all this runoff and they are converting to the Austin Canyon to dump off in Spring Valley watershed. And during heavy snow melt, heavy rain, this loose material will wash down on us.

And over the years I have seen this kill 40 acres just east of Homestake, property belonging to John Minoletti in section 32, killed close to 40 acres.

In the 60s, on section 32, township 20, John Minoletti owned 80 acres joining the Collingwood Homestake property. The drainage from Spring Valley dumped into that property in the 60s, it totaled 40 acres of that field. Now, they are converting the water to Austin Canyon and they are dumping that into the Spring Valley runoff, increasing the

Response to Public Meeting 1

1-1 Homestake would be required under the State of Nevada's Storm Water Program to obtain a discharge authorization and have a Storm Water Pollution Prevention Plan submitted before development commences. Storm water discharges would be authorized under the State of Nevada's general discharge permit GNV0022225. This storm water discharge authorization would require Homestake to manage storm water flows to prevent pollution. Best Management Practices would be set out and storm water controls, including the use of straw bales and silt fences, would be required. Periodic inspections and maintenance of these storm water control devices would be required to ensure their effectiveness. Any incidents of non-compliance with the General Discharge Permit or Storm Water Pollution Prevention Plan are required to be documented and reported to regulatory agencies. The surface water flow modeling completed as part of the baseline hydrologic evaluation of the Proposed Action indicates that the diversion and detention structures planned by Homestake (page 3-60 of the Draft EIS) should prevent sediment from reaching Sections 32 and 29.

Public Meeting 1 Continued

chances to move more material down into that area and onto me on section 29.

1-2
MR. JERRY ANDERSON: They are talking about 30 or 60 some employees in Slough Creek in a flood zone right below my place. They are using the roads and stuff to back the water. It's very dangerous. In other words, I have seen water as high as six feet in the flood zone and at least a half a mile across.

And Homestake is promoting 60 some units working people live down in that swamp. I don't know if the planning board is going to let them do it or not, but I think so, on federal waterway.

MR. EDWARD ANDERSON: That one on section 17.

MR. JERRY ANDERSON: On Third Street.

MR. JOHN BROWN: John Brown.

1-3
I really prefer the west waste dump.

1-4
I can't read the figures in the appendix showing the decimal contours. It's hard to tell where the call and the fairgrounds are.

The third comment is the about the dust and the particulate comments. Adjustment down is this shows the background PM count is pretty low. It's right below, well

1-5
below the federal and state limits. It shows the modeling is supposed to be pretty close to that, actually 49.8 micrograms per cubic. meter. That's only 2/10 of a cubic meter less than

Response to Public Meeting 1

1-2 The lots being developed near Slough Creek are not directly connected to Homestake or the Ruby Hill Project. Homestake has agreed to rent thirty of these lots for several years but has no control over their development or location.

1-3 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

1-4 Please refer to Response to Comment 10-61 for a discussion regarding the improvements made to the noise contour maps.

1-5 Please refer to Response to Comment 3-3 for a discussion of the revised analysis of impacts to air quality, particularly PM_{10} (dust).

Public Meeting 1 Continued

1-5 set by the state and feds. I have a hard time believing they are going to be able to stay that close.

1-6 MR. JERRY ANDERSON: I have an irrigation well on the north half of section 29, township 20. It is located on Collingwood Lane in the southwest corner. I would like to have Homestake monitor that well during their operations.

MR. DAVE ULLRICH: Dave Ullrich. I run the little BLM office and fire station here.

1-7 Looking at their proposed actions and the two alternatives I find in terms of visual impact on the scenery and probable air quality impact upon my facility up by the fairgrounds, I would find the west waste dump proposal the best alternative, the only acceptable alternative.

Thank you.

MR. RON CARRION: Ron Carrion. I'm a businessman here in town. I own the Owl Club.

1-8 And one of my main, two of my main concerns is the dust level that is going to be created by the mine and its actions.

1-9 And my second concern, I'd rather have all of our decisions being made out here in the West as opposed to the East Coast. So local concern, you know, for regulatory agencies, through regulatory agencies, and our comments I'd like to see taken care of here.

MS. PAULA OLIVER: Paula Oliver.

Response to Public Meeting 1

1-6 The background data presented in Section 3.4.1.2 of the Draft and Final EIS demonstrates that the water table in Diamond Valley has been declining over the past 30 years. Homestake would be pumping less water for mining use from its Collingwood Ranch wells than has been pumped historically to irrigate the ranch. A significant impact to groundwater resources is not predicted; therefore, water level monitoring would not be required.

1-7 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

1-8 Please refer to Response to Comment 3-3 for a discussion of the revised analysis of impacts to air quality, particularly PM_{10} (dust). Also, an advisory group will be formed to work with Homestake to respond to public concerns about dust. (Please refer to Mitigation Measure 1 in Section 3.1.4 of the Final EIS.)

1-9 Decisions on BLM EISs are made by the BLM Authorized Officer. For BLM EISs for mining plans of operations in Nevada, the BLM Authorized Officer is the District Manager for whichever BLM District will contain the mining activity. The final decision on the Ruby Hill EIS will be made by the BLM's Battle Mountain District Manager, whose office is in Battle Mountain, Nevada.

Public Meeting 1 Continued

4

1-10

My main comment is that I'd like to go as a resident of Eureka on the record as saying I support Homestake Mining here. I think mining is good for our community, our business people. I also think that mining is good for the state.

I worry as these mining companies are leaving the United States and going places like South America with their money and their mines, and this hurts us in general and me as a woman in particular, because the women don't move with them. In South America and that, women are not valued like they are in the United States, in my opinion. Mining is good for me, my community and my state.

I guess that's a good enough comment.

MR. ARTHUR MILES: Arthur Miles.

1-11

I was concerned about placement of the dump sites. I go with either the west dump site or the split dump site instead of one strictly on the east which would be running down Highway 50.

1-12

My other two concerns are the air quality and the noise factor. And basically talking to the guys over here, they say that they are going to try to meet the limits. But if they don't meet the limits, and us as residents, if we have a complaint, basically as it stands right now we have no resource to do anything about it, from what they say, from what I understand. If there is a complaint after the mine is

Response to Public Meeting 1

1-10 Thank you for your comment. No response necessary.

1-11 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

1-12 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Public Meeting 1 Continued

1-12 in operation, I guess the EPA or whatever doesn't have a set standard for doing anything about it, if I understood right. I'm not sure, but basically what I understood is there is no avenue for us to take if this happens after the fact that would cure the situation quickly.

1-13 So that was one of the things I was concerned about, monitoring the air, and that's supposed to be done basically in house by the mine. But basically my two concerns there is air quality and noise and leaving us an option to be able to do something about it quickly to remedy the situation if it does arise.

1-14 MR. BILL HICKS: I just want to let you know I prefer the one they are looking at with sites on both sides or the west, rock dump area. I'm in favor of either of those two.

-oOo-

Response to Public Meeting 1

1-13 Please refer to Response to Comment 3-4 for a discussion of air quality monitoring.

1-14 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

STATE OF NEVADA,)
) ss.
COUNTY OF WASHOE.)

I, LESLEY A. CLARKSON, a Certified Court Reporter in the State of Nevada, do hereby certify:

That on Tuesday, September 17, 1996, I was present and took stenotype notes of the comments presented at the Public Open House held in Eureka, Nevada, and thereafter transcribed them into typewriting as herein appears;

That the foregoing transcript is a full, true and correct transcription of my stenotype notes of said comments.

Dated at Reno, Nevada, this 21st day of September, 1996.

Lesley A. Clarkson

Lesley A. Clarkson, CCR #182

Public Meeting 2

RENO, NEVADA, THURSDAY, SEPTEMBER 19, 1996, 8:50 P.M.

-oOo-

PAUL SCHEIDIG: I just want to put on the record verbally that Homestake Mining Company has been a valued member of the Nevada Mining Association, has conducted themselves in all ways as a corporate responsible citizen, taking care of the environment and ensuring that good mining practices are always adhered to.

2-1 This project certainly reflects that corporate attitude, and we think it's a very positive project for Eureka County as well as the town of Eureka. I think the impacts to Eureka will be very slow and the benefits will be very high. We will certainly provide written comments to a greater extent with regard to our specific concerns on the project, but essentially there doesn't seem to be very much negative.

2-2 The wildlife issues that have been addressed in the D.E.I.S. and with regards to bats, deer habitat and other things seem to be very positively thought out and reflective again of the good environmental attitude and corporate responsibility carried out by Homestake Mining Company for the Ruby Hill project.

Our comments in the future will touch on other issues. We'll highlight those at that time. Thank you.

Response to Public Meeting 2

2-1 Thank you for your comment. No response necessary.

2-2 Thank you for your comment. No response necessary.

STATE OF NEVADA,)
) ss.
COUNTY OF WASHOE.)

I, DEBBIE ARNAUD, a Certified Court Reporter in and the State of Nevada, do hereby certify:

That on Thursday, September 19, 1996, at the Airport Plaza Hotel, Reno, Nevada, I was present and took verbatim stenotype notes of the Public Open House for the Homestake Ruby Hill Draft Environmental Impact Statement; and thereafter transcribed the same into typewriting as herein appears;

That the foregoing transcript is a full, true and correct transcription of my stenotype notes of said hearing.

Dated at Reno, Nevada, this 21st day of September, 1996.

Debbie Arnaud

Debbie Arnaud, CCR #416

Letter 3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

October 7, 1996

Gerald M. Smith
Bureau of Land Management
Battle Mountain District
P.O. Box 1420
Battle Mountain, NV 89820

Dear Mr. Smith:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the Ruby Hill Project, Eureka County, Nevada. Our review and comments are provided pursuant to our responsibilities under the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Section 309 of the Clean Air Act.

The DEIS evaluates alternatives for the Ruby Hill gold mining operations proposed by Homestake Mining Company ("Homestake"). The alternative proposed by Homestake includes excavation of an open pit, two waste rock dumps, heap leach facilities, an ore processing facility, power line and water line corridors, and other ancillary facilities. Other alternatives include the East Waste Rock Dump Alternative, the West Waste Rock Dump Alternative, the Partial Pit Backfilling Alternative, and No Action.

Because the DEIS does not disclose BLM's preferred alternative, EPA has rated each of the alternatives presented. We have rated the No Action Alternative, LO -- Lack of Objections and we've rated the action alternatives, including the Proposed Action, EO-2 -- Environmental Objections-Insufficient Information (see the enclosed "Summary of Rating Definitions and Follow-up Action). Our EO-2 ratings are based on the potential for significant air quality impacts. For example, it appears that the Proposed Action, the West Waste Rock Dump Alternative, and the Partial Backfilling Alternative could exceed the annual National Ambient Air Quality Standard (NAAQS) for PM10 (particulate matter smaller than 10 microns). It also appears that the East Waste Rock Dump Alternative would result in a

3-1 significant increase in the PM10 annual concentration. The DEIS does not provide information on mitigation measures that would be implemented to reduce project emissions and ensure that ambient PM10 concentrations remain below the standard. The Final

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Response to Letter 3

3-1 Please refer to Response to Comment 3-3 for a discussion of the revised analysis of impacts to air quality, particularly PM_{10} (dust), and to Response to Comment 3-4 for a discussion of mitigation measures for PM_{10}.

Letter 3 Continued

3-1 Environmental Impact Statement (FEIS) should provide additional information regarding the modeling that was conducted to estimate air pollutant emissions and concentrations, mitigation measures to reduce emissions, and air quality monitoring.

EPA also has concerns regarding residual impacts to sensitive species and their habitats, and design of the proposed facilities. The FEIS should provide additional information on these issues. For specific recommendations, please refer to our detailed comments which are enclosed.

3-2 Of the action alternatives presented, the West Waste Rock Dump Alternative, would appear to be the environmentally preferable alternative **if** impacts to air quality and sensitive species could be sufficiently mitigated. We recommend that BLM consider adopting the West Waste Rock Dump alternative as the preferred alternative in your FEIS.

We appreciate the opportunity to review this DEIS. Please send a copy of the FEIS to this office at the same time that it is officially filed with our Washington, D.C., office. Meanwhile, our principal reviewer, Jeanne Geselbracht, is available to discuss any questions you or your staff may have. She can be reached at (415) 744-1576.

Sincerely,

Deanna M. Wieman, Deputy Director
Cross-Media Division

Atch: Detailed Comments (3 pages)
Rating Definitions (1 page)

cc: Doug Zimmerman, NDEP
Jolaine Johnson, NDEP
Rory Lamp, Nevada Division of Wildlife
Mary Jo Elpers, U.S. Fish and Wildlife Service

Response to Letter 3

3-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 3 Continued

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 3 Continued

Air Quality Impacts

3-3 The predicted annual concentration for PM10 for the proposed action alternative is 49.8 ug/m^3. This estimate is so close to the PM10 annual National Ambient Air Quality Standard (NAAQS) of 50 ug/m^3 as to raise serious concerns that the standard would be exceeded, resulting in the possible designation by EPA of the area as a PM10 non-attainment area. Furthermore, EPA is in the process of reevaluating the particulate matter standard, which potentially could be lowered in the foreseeable future. EPA strongly objects to a project that would result in the exceedance of any NAAQS. The DEIS does not provide sufficient information for the reader to determine how realistic the PM10 concentration estimates in the DEIS are. The FEIS should identify the model that was used and discuss the assumptions that were used in calculating the 24-hour and annual PM10 concentrations for each alternative. The FEIS should indicate how emissions were calculated for each source, including what percentage operating capacities were assumed; how background concentrations were derived; how future projects in the area would contribute to the background and cumulative project concentrations for each alternative; and the margin of error for the calculations. The FEIS should discuss why the PM10 estimates for the East and West Waste Dump alternatives are different from that of the proposed action and each other. We respectfully request a copy of the air emissions modeling report prepared for this DEIS at your earliest convenience.

3-4 In light of the potential significance of the project's impacts to air quality in the Eureka area, we urge BLM to require stringent mitigation measures to reduce the project's air impacts and ensure that PM10 concentrations would remain below the standard. The DEIS mentions that the Nevada Division of Environmental Protection air quality permits would require air pollution controls. No measures are specified, however, and it is difficult to discern whether further mitigation is feasible. The FEIS should discuss in detail the mitigation measures that would be implemented to reduce PM10 emissions for point sources and nonpoint sources on the mine site. Furthermore, we recommend that air quality monitoring be conducted during operations to ensure compliance with NAAQS and that this be discussed in the FEIS.

3-5 The DEIS (p. 3-18) states that "modeling results shown in Table 3-6 confirm that when impacts from the existing mine operations and from other mines in the area are added to the new impacts from the Proposed Action or alternatives the resultant cumulative impacts are well below state and Federal ambient air quality

Response to Letter 3

3-3 As a result of your comment, impacts to air quality have been analyzed further with refined dispersion modeling to demonstrate with greater precision and confidence that there would be no significant impacts. Dispersion modeling details are included in a technical report that has been transmitted to the EPA for review prior to the completion of the Final EIS. This technical report also is on file at the BLM Battle Mountain Field Office. The text in Section 3.1.2.1 of the Final EIS has been modified to include the results of the revised dispersion modeling.

3-4 Please refer to Response to Comment 3-3 for a discussion of air quality impacts. The State of Nevada is expected to require that ambient monitoring continue. Ambient monitoring would not be a BLM mitigation measure.

3-5 As discussed in Response to Comment 3-3, refined dispersion modeling shows that impacts are expected to be well within air quality standards. Table 3-6 has been revised for the Final EIS.

Letter 3 Continued

3-5 standards." Actually, Table 3-6 indicates that the cumulative impacts of the Proposed Action and the West Waste Rock Dump Alternative would result in annual PM10 concentrations approximately at, and just above, the federal standard, respectively. We recommend that your statement be modified to accurately reflect these significant impacts.

Biological Resource Impacts

3-6 The DEIS states that the proposed project would result in residual impacts (i.e., after the proposed mitigation) to sensitive species such as displacement of the ferruginous hawk; habitat loss for the burrowing owl, loggerhead shrike, and pygmy rabbit; and loss of bat hibernacula and maternity roosts. We believe that further mitigation, such as nearby habitat preservation, is feasible and reasonable, if becomes clear that residual impacts are occurring during mine operations. We recommend that BLM consider further mitigation and discuss this in the FEIS.

Facilities Design

3-7 Homestake has proposed to design the heap leach facilities with the capacity to contain all process fluids and meteoric waters generated by the 25-year, 24-hour storm event. The FEIS should describe the fate of overflow solutions for storm events greater than this (e.g., 50-year or 100-year) and discuss the environmental impacts of such events.

3-8 According to the DEIS (p. 2-14), the heap leach pad liner bedding would consist of 12 inches of fine-grained soil compacted to provide a permeability of less than 1 x 10^{-5} cm/sec. It is unclear whether a future expansion of the open pit for the East Archimedes Oxide project would extend the life of the heap leach pad beyond nine years. EPA recommends that BLM adopt a target permeability of 1x10^{-6} cm/sec. This permeability should be confirmed not only from lab tests but with field tests. In addition, we believe that soil to a thickness of one foot and a permeability of 1 x 10^{-6} cm/sec is not practical in the field with large construction equipment (sheepsfoot compactor). A two-foot thick bedding layer to a permeability of 1 x 10^{-6} cm/sec is much more feasible. We recommend that the liner bedding be specified as two feet thick.

3-9 Map 3-8 in the DEIS depicts monitoring wells downgradient of the heap leach facilities and the east waste rock dump, but none downgradient of the west waste rock dump. We recommend that a monitoring well be specified downgradient of the west waste rock dump.

Response to Letter 3

3-6 Please refer to Responses to Comments 5-2, and 5-5 through 5-10 for further discussion of mitigation measures for wildlife and special status species.

3-7 The State of Nevada is responsible for reviewing design and operating plans to assure that zero discharge systems meet or exceed regulatory requirements. Nevada Administrative Code (NAC) 445A.433 (Section 1.d) requires that the primary fluid management system be designed to contain all accumulations from a 24-hour, 25-year storm event and that contingency plans for managing flows in excess of this event be described in the operating plans. Homestake would be in compliance with these requirements under the State of Nevada Water Pollution Control Permit Program. The BLM accepts this state regulatory standard as being sufficient to provide a baseline for analysis of potential impacts associated with the heap leach pad.

3-8 The State of Nevada is responsible for reviewing design and operating plans to assure that leach pad liner systems meet or exceed regulatory requirements. Nevada Administrative Code (NAC) 445A.434 (Section 2.b) and NAC 445A.438 (Section 1) require containment equal to or greater than that provided by a synthetic liner placed atop 12 inches of soil liner meeting a maximum in-place permeability requirement of 1 x 10^{-5} cm/sec when combined with a leak detection system. Homestake would be in compliance with these requirements under the State of Nevada Water Pollution Control Permit Program. The BLM accepts the state regulation which sets standards for heap leach pad liners as being sufficient to provide a baseline for analysis of potential impacts associated with heap leach pads.

3-9 The State of Nevada is responsible for reviewing design and operating plans to assure that monitoring systems meet or exceed regulatory requirements. Nevada Administrative Code (NAC) 445A.440 (Section 1) requires a program to monitor groundwater beneath the site and facilities. Two additional monitor wells have been proposed, one downgradient of the West Waste Dump and one downgradient of the Mine Pit. Homestake would be in compliance with these requirements under the State of Nevada Water Pollution Control Permit Program.

Letter 3 Continued

Alternatives

3-10 The Proposed Action would disturb 696 acres, as compared with 573 acres of disturbance under the West Waste Rock Dump Alternative and 715 acres of disturbance under the East Waste Rock Dump Alternative. If air quality impacts and residual impacts to sensitive species from the West Waste Rock Alternative can be sufficiently mitigated, this alternative appears significantly less environmentally damaging than the Proposed Action and the East Waste Rock Dump Alternative. As it would appear to be the environmentally preferable alternative, EPA would recommend that BLM select the West Waste Rock Dump Alternative as its preferred alternative.

Response to Letter 3

3-10 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 4

United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Reston, Virginia 22092

In Reply Refer To:
Mail Stop 423

OCT 8 1996

MEMORANDUM

To: Ruby Hill EIS Project Managers, Bureau of Land Management

From: James F. Devine
Senior Advisor for Science Applications

Subject: Review of Draft Environmental Impact Statement for the Ruby Hill Project, Eureka County, Nevada

Per the request contained in the Bureau of Land Management memorandum of July 24, 1996, the U.S. Geological Survey (USGS) has reviewed the subject draft environmental impact statement (EIS) and offers the following comments.

4-1 1. SUMMARY, pages iii-iv: The locations of the seep and seven springs identified beyond the project area should be defined. In addition, seasonal flow characteristics of the seep and springs should be discussed in the main body of the EIS.

4-2 2. Section 3.4.1.1 SURFACE WATER, Surface Water Inventory subheading, first paragraph: The first sentence states that a few perennial streams in Diamond Valley are on the east slopes of the Diamond Mountains. The east slopes of these mountains are in Newark Valley. Such streams are on the west slopes of the mountains. In the third paragraph, the seven springs and one seep are stated to be within 3.5 miles of the project area. It is then stated that all of the springs are at least 2.5 miles from the proposed pit. On page 3-60, paragraph 5, the seep is said to be 0.75 miles from the project area and the springs more than one mile from the area. If the spring and seep locations were shown on map 3-10, the reader could evaluate the potential effects of pumping on these water resources.

4-3 3. Section 3.4.1.2 Groundwater, first paragraph: One of the hydrologic studies cited (Arteaga et al. 1995), is not listed in the references section. The correct reference for this report is Arteaga, F.E., Smith, J.L., and Harrill, J.R., 1995, Irrigated croplands, estimated pumpage, and water-level changes in Diamond Valley, Eureka and Elko Counties, Nevada through 1990: U.S. Geological Survey Open-File Report 95-107, 68 p.

4-4 4. Table 3-13, page 3-43: Values of transmissivity and hydraulic conductivity should be listed for the Bullwhacker and Goodwin bedrock units, and for alluvium, so that a discussion of analytical methods used to evaluate test results could be discussed in the EIS.

Response to Letter 4

4-1 No text changes were needed in the Summary section regarding seep and spring locations. However, the text in Section 3.4.1.1 and Section 3.4.2.1 of the Final EIS has been revised to clarify the location of springs and the seep relative to the proposed pit. These springs and seep are upgradient from the project area and beyond the area of potential impact. Thus, they are not addressed in the EIS. Seasonal data on these springs are not available.

4-2 As a result of your comment, the text in Section 3.4.1.1 and Section 3.4.2.1 of the Final EIS has been revised to clarify the location of perennial streams in Diamond Valley and the locations of springs and the seep relative to the proposed pit.

4-3 As a result of your comment, the text in Chapter 6.0 of the Final EIS has been revised.

4-4 The single well slug tests conducted in the Bullwhacker and the Goodwin by Westec 1996c used wells with short screens (10- or 20-foot screens). The hydraulic conductivities represent only the short screened interval and not the entire thickness of the formation. Thus, calculating a transmissivity would be misleading, and one was not included on Table 3-13 in the Draft EIS.

Letter 4 Continued

4-5 Section 3.4.1.2 Groundwater, Tertiary Volcanics subheading on page 3-45: Does the last sentence in this paragraph mean that recovery of the water level in piezometer P-1 took 36 hours after a period of pumping? If so, the rate and duration of pumping should be given in the EIS.

4-6 5. Section 3.4.1.2 Groundwater, Water Levels subheading: On page 3-46 the hydraulic connection between bedrock and alluvium near the project site is estimated to be poor on the basis of uncited hydrologic studies conducted in nearby valleys. These hydrologic studies should be cited in this section.

4-7 Section 3.4.1.2 Groundwater, Groundwater Quality subheading: On page 3-59, the last two sentences of the third paragraph state that, with three exceptions, calcium and bicarbonate are the dominant cations and anions, respectively, in ground water in and near the project area. According to map B-1, however, the dominant cation in water at wells 30cc, 27aa, 33dd, and 03ab is sodium and at MW-3 is magnesium. These differences should be discussed in the EIS.

4-8 Section 3.4.1.2 Groundwater, Groundwater Quality subheading, page 3-59, fourth paragraph: In the fourth sentence, septic leach fields and livestock areas are listed as the probable sources of high nitrate concentrations in ground water near the project area. Agricultural fertilizers may be another source.

6. Section 3.4.2.1 Proposed Action, Groundwater Impacts subheading, last paragraph of section on page 3-63:

4-9 a) The first three sentences of the paragraph discuss permitted, anticipated, and maximum pumping rates at the two production wells. The rate used for modelling purposes should also be discussed in the EIS.

4-10 The Theis method apparently was utilized to develop the modelling results shown in map 3-10. However, the reference in sentence six to a two-dimensional horizontal-flow model based on the Theis equation should be deleted because the Theis equation deals only with one-dimensional radial flow to a well.

4-11 b) The specific yield of 0.125 discussed in sentence eight is not consistent with the assumption of a confined aquifer in sentence nine.

4-12 c) The ground-water gradient in sentence eight (0.005 ft/ft to the north) is not consistent the water-level contours on map 3-8, which indicate that the gradient is about 0.05 ft/ft to the east-northeast in the vicinity of the two production wells. In addition, the assumption of a negligible water-table slope in sentence nine is not consistent with the gradient indicated on map 3-8.

Response to Letter 4

4-5 The statement "took more than 36 hours to recharge any water" refers to the length of time required for water to fill the drill hole after drilling was complete. The hole was dry to slightly moist during drilling. No pumping was involved.

4-6 Based on your comment, two references were added to Section 3.4.1.2 of the Final EIS and Chapter 6.0. These references include evaluations of Newark Valley and Long Valley by the State of Nevada, Department of Conservation and Natural Resources. References include Eakin (1960), Groundwater Resources Reconnaissance Series Report 1, and Eakin (1961), Groundwater Resources Reconnaissance Series Report 3, respectively.

4-7 As a result of your comment, the text in Section 3.4.1.2 of the Final EIS has been revised to clarify the discussion of different groundwater anions and cations sampled from 3 wells relative to more prevalent groundwater anions and cations sampled from the majority of wells.

4-8 As a result of your comment, the text in Section 3.4.1.2 of the Final EIS has been expanded to add cropland as a potential source of nitrates in groundwater.

4-9 As a result of your comment, the text in Section 3.4.2.1 of the Final EIS has been expanded to clarify the discussion of the maximum pumping rate used in the groundwater model.

4-10 The Theis equation is 1-dimensional, but the Quickflow model is a 2-dimensional modeling code. Thus, the use of the term 2-dimensional.

4-11 The Quickflow model uses the Theis equation, but does not assume a confined aquifer. For an unconfined aquifer, such as the one in Diamond Valley, the specific yield is substituted for the storativity in the equation used in Quickflow.

4-12 Thank you for your comment. The 0.005 in Section 3.4.2.1 of the Draft EIS was a typographical error and is revised to read 0.05 in the Final EIS.

Letter 4 Continued

Christopher Stubbs, Battle Mountain District Office, BLM
Lynn Ricci, Battle Mountain District Office, BLM

4-13
d) What is the basis for the statement in sentence 10, that actual drawdown should be less than that predicted by the model because the wells are assumed to fully penetrate the aquifer? A partially penetrating well could result in drawdowns that exceed those predicted for a fully-penetrating well.

4-14
e) Sentences 17 and 18 indicate that drawdowns predicted by the model will have no impacts on surface water or groundwater. However, a 1-ft water-level decline could affect the flow of a spring or seep. This should be discussed in the EIS and the locations of the seep and seven springs south and east of the project area should be shown on map 3-10.

Copy to: USGS State Representative, Water Resources Division, Nevada
Director, Office of Environmental Policy and Compliance

Response to Letter 4

4-13 The Quickflow model assumes that a well would fully penetrate an aquifer and that the aquifer is confined. Homestake's wells are assumed to only partially penetrate the Diamond Valley aquifer, which is believed to be unconfined. For the same pumping rate, a fully penetrating well would have greater drawdown away from the well, but a partially penetrating well would have greater drawdown near the well. Because the Quickflow model assumes confined conditions, it would overestimate the drawdown in an unconfined aquifer. The commentor may or may not be correct in that a partially penetrating well may have greater drawdown near the well; because, the aquifer is probably unconfined.

4-14 The 1-foot drawdown contour for the production wells would not be near any spring or seep. Also, the springs and seeps are perched water bodies and not connected to the alluvial aquifer.

Letter 5

United States Department of the Interior

FISH AND WILDLIFE SERVICE
NEVADA STATE OFFICE
4600 KIETZKE LANE, BUILDING C-125
RENO, NEVADA 89502-5093

October 8, 1996
File No. BLM 4-4

Memorandum

To: District Manager, Battle Mountain District Office, Bureau of Land Management, Battle Mountain, Nevada

From: State Supervisor, Nevada State Office, Reno, Nevada

Subject: Ruby Hill Project Draft Environmental Impact Statement

The Fish and Wildlife Service (Service) has reviewed the August 1996 draft environmental impact statement (DEIS) for Homestake Mining Company's Ruby Hill Project. The DEIS analyzes impacts associated with the mining and recovery of gold at the Ruby Hill Mine located 0.7 miles northwest of Eureka, Nevada. The project would develop an open pit, waste rock disposal sites, an ore processing facility, heap leach facilities, powerline and waterline corridors, and other ancillary facilities. The proposed mining activities would disturb 696 acres of land.

GENERAL COMMENTS

5-1 We support the measures which have been incorporated into the facilities design to reduce wildlife entry into hazardous areas.

5-2 We recommend the project proponent develop additional measures to avoid, reduce, or compensate for significant impacts to wildlife resources that would result from the proposed mining project. Compensation for temporal loss of wildlife resources, habitat fragmentation, and other impacts could include reclamation of other Federal lands disturbed by past mining activities, placement of monies into a fund for restoration, or enhancement of other disturbed areas. Sites used to compensate for permanent or long-term impacts should be set aside in

5-3 perpetuity by closing these areas to mineral entry. We also recommend that only native plant species indigenous to the area be used in reclamation to prevent the further spread of non-native

Response to Letter 5

5-1 Thank you for your comment. No response necessary.

5-2 The BLM has identified a number of mitigation measures applicable to the anticipated impacts to terrestrial wildlife from the Proposed Action. The scope and breadth of these measures have been determined to be sufficient to help prevent or minimize the adverse effects to wildlife resources discussed in the Draft EIS. Please note that Mitigation Measure 2 for Wildlife and Fisheries Resources has been expanded in the Final EIS, and Measures 1 and 2 for Special Status Species have been revised, based on the recent mitigation activities undertaken by Homestake. In addition, please refer to Responses to Comments 5-7 and 5-8 for a discussion on the deletion of Measures 3 and 4 for terrestrial wildlife in the Final EIS.

5-3 As a result of your comment, the text in Section 2.1.15.6 of the Final EIS has been expanded to clarify the potential development and use of seed mixes comprised solely of native species. 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 BLM'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.

Letter 5 Continued

5-3 vegetation which may adversely affect biological diversity.

SPECIFIC COMMENTS

CHAPTER 3. WILDLIFE AND FISHERIES RESOURCES

5-4 3.9.1.2 Nongame Species, table 3-35, page 3-127. The scientific name of the Townsend's big-eared bat is incorrectly identified in the table and text. It should be *Plecotus townsendii.*

5-5 3.9.4 Potential Mitigation and Monitoring, pages 3-139 and 3-140. Mitigation Measure 1 is designed to "minimize" the loss of annual productivity of breeding raptors. Activities, including mitigation measures, which result in the death or loss of any migratory bird or their nest contents (eggs, nestlings, etc.) may be a violation of the Migratory Bird Treaty Act (15 U.S.C. 701-718h), and no permits are issued to allow take of migratory birds. Therefore, once nesting occurs within an area that might be disturbed by project activities, mitigation measures must be implemented to avoid the loss of the nest contents. If operating restrictions are applied to site specific disturbance zones they should be monitored for their effectiveness. The removal of a nest site cannot be done if the nest is active. Removal and translocation of existing nest sites should be conducted outside of that species' breeding season to avoid possible impacts. Artificial nest sites should be constructed in areas which do not, or are not likely to, receive human disturbance. We also recommend that the ratio of artificial nest structures to nest sites destroyed be greater than a 1 to 1 ratio since occupancy rates of artificial raptor structures have been shown to range from 15 percent to 50 percent (Olendorff, 1993). We recommend the guidance provided in Olendorff (1993) regarding use of artificial nest structures be considered. The effectiveness of this mitigation measure should be monitored.

5-6 It is inferred that Mitigation Measure 2 applies only to undisturbed pinon-juniper woodland vegetation. It should be specified that this mitigation measure would apply to all vegetation that supports breeding migratory birds.

5-7 Mitigation Measure 3 does not specify whether or by whom the artificial water source would be maintained after mining operations cease. If wildlife become accustomed to this water source over the life of the project and the water source is no longer maintained, this could cause adverse impacts to those species dependent on that water source.

5-8 Mitigation Measure 4 would create nesting areas in the pit high walls. The Final EIS should identify the target species for this mitigation measure, whether this species' habitat has been destroyed or eliminated as a result of past or projected mining activities, the type of nesting structure proposed, and any potential indirect impacts on the prey base or potential for

Response to Letter 5

5-4 The genus for the Townsend's big-eared bat has been recently changed from *Plecotus* to the genus *Corynorhinus*. This change can be confirmed with Dr. Karl Koopman of the American Museum of Natural History. In addition, please refer to the following references, which verify this change:

Frost, D. R. And R. M. Timm. 1992. Phylogeny of plecotine bats (Chiroptera: Vespertilionidae): Summary of the evidence and a proposal for a logically consistent taxonomy. Am Mus. Novit. 0(3034):1-16.

Tumlinson, R. And M. Douglas. 1992. Parsimony analysis and phylogeny of plecotine bats (Chiroptera: Vespertilionidae) J. Mamm. 73:276-285.

To minimize confusion, this genus has been clarified in Table 3-35 in the Final EIS.

5-5 Your comments are correct. The intent of Mitigation Measure 1 for Wildlife and Fisheries in Section 3.9.4 of the Draft EIS was to protect nesting raptors from mine development and operation. It was never inferred that an active raptor nest would be removed during the breeding season. A clearance survey for breeding raptors would be the initial step in determining potential impacts to nesting birds. In the event that occupied territories or active nest sites were found within 0.5 mile of the proposed disturbance areas, Homestake would coordinate with the BLM and Nevada Division of Wildlife to develop the appropriate measures for nest protection, which may include avoidance during the nesting season. Associated variables (e.g., nest location, type of disturbance, species, nest phenology) would determine the extent of these measures. To clarify this position, a statement has been added to Measure 1 that indicates that any subsequent mitigation would be in accordance with the Migratory Bird Treaty Act.

In reference to the ratio of nest replacements, please review the revised text in Mitigation Measure 1 for Special Status Species, which outlines the methods used to mitigate the loss of three ferruginous hawk breeding territories. The replacement ratio is greater than 1:1, with six nest structures planned to replace four natural nests removed prior to the 1997 breeding season, which would equate to a 1:1.5 replacement ratio.

Also, as stated in Measure 1 for Special Status Species in Section 3.10.4 of the Draft EIS, a number of sources was used for the design and development of the artificial nest structures, including Olendorff (1993). Finally, the comment on future monitoring of these nest sites is noted. This measure may be included as part of the agency direction, depending on the variables listed above. As outlined in the Draft EIS and restated in Measure 1 for the ferruginous hawk (see Section 3.10.4), monitoring for 5 consecutive years is planned for the artificial nest structures and natural nest sites identified for the project vicinity.

5-6 Based on your comment, Measure 2 in Section 3.9.4 of the Final EIS has been expanded to cover all habitats supporting breeding migratory birds.

5-7 As a result of your comment, Measure 3 in Section 3.9.4 of the Final EIS has been deleted. The measure was reviewed by the BLM and Nevada Division of Wildlife (a cooperating agency on the preparation of the EIS), and it was concluded that an additional water source would not be needed.

5-8 As a result of your comment, Measure 4 in Section 3.9.4 of the Final EIS has been deleted. The measure was reviewed by the BLM and Nevada Division of Wildlife (a cooperating agency on the preparation of the EIS), and it was concluded that sufficient nesting habitat for raptor species that would use the pit highwall (e.g., red-tailed hawks) is available in the project area. Therefore, the measure would not be needed.

Letter 5 Continued

5-8 competition with other raptor species within the area.

CHAPTER 3. SPECIAL STATUS SPECIES

5-9 3.10.2.1 Proposed Action, Birds, page 3-154, paragraph 6. It is stated that there would be a potential loss of nests, eggs, or young loggerhead shrikes. This may be a violation of the Migratory Bird Treaty Act. Extending Mitigation Measure 2 to all habitats supporting breeding migratory birds would provide protection to this species.

5-10 3.10.4 Potential Mitigation and Monitoring, page 3-159, measure 2: We support the identification and protection of other bat use areas as a mitigation measure. We support identification and protection of existing nursery and hibernacula in northern Nevada. All bat use areas within the immediate area should also be protected. However, if a nursery colony or hibernacula is lost as a result of project implementation, similar bat habitat should be protected elsewhere even if it occurs outside of the project area. The potential indirect impacts of project implementation on known bat colonies should be monitored as well as the effectiveness of proposed mitigation measures.

We appreciate the opportunity to comment on the DEIS for this project. If you have any questions, please contact Pam Repp or Mary Jo Elpers at (702) 784-5227.

Carlos H. Mendoza

Literature Cited

Olendorff, R. R. 1993. Status, biology, and management of ferruginous hawks: a review. Rapt. Res. And Tech. Asst. Cen., Spec. Rep. U.S. Dep. Interior, Bur. Land Manage., Boise, Id. 84pp.

cc:

Regional Manager, Nevada Division of Wildlife, Elko, Nevada
Administrator, Nevada Division of Wildlife, Reno, Nevada
Administrator, Nevada Division of Environmental Protection, Carson City, Nevada
Director, Bureau of Land Management, Reno, Nevada
Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Portland, Oregon
Assistant Regional Director, Interior Basin Ecoregion, Fish and Wildlife Service, Portland, Oregon

Response to Letter 5

5-9 Please refer to Response to Comment 5-6 for a discussion of expanding Measure 2.

5-10 Please refer to Mitigation Measure 2 for Special Status Species in Section 3.10.4 of the Final EIS. The text has been revised to reflect the current mitigation activities that have been conducted to protect resident bats. Mitigation work has been conducted that should effectively prevent bats from accessing areas, including the Holly Extension, where they could be adversely impacted by the implementation of the Ruby Hill Project. A bat gate is recommended for two openings at the Bullwhacker Complex. These will be installed at the appropriate time of year. There is a good possibility that with the bat gates, the Townsend's big-eared bat might establish a maternity colony at the upper level of the complex. The bat gates will be inspected regularly to ensure their integrity.

In addition to these protection measures, a monitoring plan has been recommended for the underground openings and historic mine workings that may support roosting bats. Monitoring will be important both in the warm season at the surface and also in the winter below the surface. Surface monitoring will occur once per year during the first several years of the mining operation. At that time, monitoring frequency will be evaluated based on monitoring results to that date. It will be critical for the surface monitoring to occur at the same time of year. Mid August is the preferred time to conduct the surface monitoring as adults and juveniles will be counted. Winter monitoring for hibernating bats will occur in January. This monitoring will be conducted every other year to minimize disturbance to hibernating bats that could occur while monitoring. If monitoring indicates an upward trend in numbers of hibernating bats, monitoring could be reduced to once in every 3 to 5 years.

Letter 6

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

October 3, 1996

Christopher Stubbs & Lynn Ricci
Project Managers
Bureau of Land Management
Battle Mountain District Office
P.O. Box 1420
Battle Mountain, NV 89820

Re: SAI NV # E1997-022 — Project: DEIS – Ruby Hill Project
N64f-95-001P, NV-060, 1793/3809

Dear Mr. Stubbs & Ms Ricci:

Enclosed are the comments from the Nevada Division of Mineral, Natural Heritage Program and the Division of Water Resources concerning the above referenced project. These comments constitute the State Clearinghouse review of this proposal as per Executive Order 12372. Please address these comments or concerns in your final decision. If you have any questions please contact either me, at 687-6382, or Julie Butler, Clearinghouse Coordinator/SPOC, at 687-6367.

Sincerely,

Terri Rodefer

Terri Rodefer, Environmental Advocate
Nevada State Clearinghouse

Enclosures

	ACT	INF	INT	DATE
DM				
P&C		✓	TJS	10/4
SS			JJ	10/8
RR				
NR				
File/Library/Toss (circle one)				

Letter 6 Continued

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

SEP 30 1996
DEPT OF ADMINISTRATION
DIRECTOR'S OFFICE

September 26, 1996

Julie Butler, Coordinator
Nevada State Clearinghouse
Department of Administration, Planning Division
Blasdel Bldg., Room 200
Carson City, NV 89710

Re: Nevada SAI #E1997-022 -- Draft EIS -- Ruby Hill Project -- Homestake Mining Company -- Due Date: October 3, 1996.

The Division of Minerals has reviewed the Draft EIS for the Ruby Hill Mine project.

6-1 We would like to congratulate Homestake for their efforts in maintaining excellent and open channels of communication and public education in the planning for this project. The Ruby Hill Mine will be a very positive asset for the town and county of Eureka and the State of Nevada.

6-2 A concern relative to the post-mining perimeter securing of the open pit has been very well addressed in Section 2.1.15.9 on page 2-35. A combination of berms, sturdy fencing and warning signs will alert the inquisitive visitor. This securing method fulfills the requirements set forth in NAC Chapter 513.

6-3 The Division has provided information to Homestake on design and construction of "bat gates" for use on adit portals in the vicinity of the Ruby Hill project. It is hoped that a design will be selected that is economical and "unattractive". BLM and Homestake should be aware that any method used for securing a mine opening is not indestructible. The more durable and indestructible it appears, the more attractive it will be for vandals.

6-4 The Division supports the proposed action. Having two waste dump sites will afford more flexibility in the control of dust during windy seasons. The use of the dumps can be alternated

Response to Letter 6

6-1 Thank you for your comment. No response necessary.

6-2 Thank you for your comment. No response necessary.

6-3 Thank you for your comment. Your concerns will be considered with the final decision-making process.

6-4 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 6 Continued

6-4 depending on direction and velocity of wind currents. It appears that having the two dump sites will help to lessen the overall visual impact that might be created by one very large dump, the east dump, in particular.

The Ruby Hill Mine project has the full support of the Division of Minerals.

Please contact Division staff at any time for additional information or assistance.

Sincerely,

Doug Driesner for

Bill Durbin - Chief
Abandoned Mine Lands Program

bd\aa197022

Letter 7

NEVADA STATE CLEARINGHOUSE
Department of Administration
Budget and Planning Division
Blasdel Bldg., Rm. 200
(702) 687-4065
fax (702) 687-3983

AUG 1 9 1996

RECEIVED

DATE: August 16, 1996

Governor's Office	Legislative Counsel Bureau	Conservation-Natural Resources
Nuclear Projects Office	Communications Bd	Director's Office
Business & Industry	Emp. Training & Rehab Research Division	State Lands
Agriculture	PSC	*Environmental Protection
Energy	*Transportation	Forestry
*Minerals	*UNR Bureau of Mines	*Wildlife
Economic Development	UNR Library	*Region 1
Tourism	UNLV Library	Region 2
Fire Marshal	Wild Horse Commission	Region 3
Human Resources	Historic Preservation	Conservation Districts
Aging Services	Emergency Management	State Parks
Health Division	Washington Office	Water Resources
Colorado River Commission		Water Planning
Indian Commission		Natural Heritage ✓

Nevada SAI # E1997-022 **Project: DEIS -- Ruby Hill Project**

✓ Yes __ No Send more information on this project as it becomes available.

CLEARINGHOUSE NOTES:
Those agencies with an asterisk (*) should have already received a copy of the DEIS directly from BLM. If you did not receive a copy, please notify the Clearinghouse.

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 **October 3, 1996**. Use the space 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. If you have any questions, please contact Terri Rodefer, Clearinghouse Environmental Advocate, at 687-6382, or Julie Butler, Clearinghouse Coordinator, at 687-6367.

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:

7-1 All seed mixes used in connection with this project should use only 100% native species. We object to the introduction or further spread of exotic plant species on any lands in Nevada. We appreciated the detailed information on reclamation plans, weed-control measures, and proposed seed mixes provided in the DEIS

Response to Letter 7

7-1 Please refer to Response to Comment 5-3 for a discussion of the use of native species only in the reclamation seed mix.

Letter 8

09-30-1996 04:20PM FROM TO 96873983 P.01

NEVADA STATE CLEARINGHOUSE

Department of Administration
Budget and Planning Division
Blasdel Bldg., Rm. 200
(702) 687-4065
fax (702) 687-3983

Mike

DATE: August 16, 1996

Governor's Office	Legislative Counsel Bureau	Conservation-Natural Resources
Nuclear Projects Office	Communications Bd.	**Director's Office**
Business & Industry	Emp. Training & Rehab.	**State Lands**
Agriculture	Research Division	***Environmental Protection**
Energy	PSC	Forestry
***Minerals**	***Transportation**	***Wildlife**
Economic Development	***UNR Bureau of Mines**	***Region 1**
Tourism	UNR Library	Region 2
Fire Marshal	UNLV Library	Region 3
Human Resources	**Wild Horse Commission**	Conservation Districts
Aging Services	**Historic Preservation**	State Parks
Health Division	Emergency Management	**Water Resources** ✓
Colorado River Commission	Washington Office	Water Planning
Indian Commission		**Natural Heritage**

Nevada SAI # E1997-022 **Project: DEIS – Ruby Hill Project**

__ Yes __ No Send more information on this project as it becomes available

CLEARINGHOUSE NOTES:
Those agencies with an asterisk (*) should have already received a copy of the DEIS directly from BLM. If you did not receive a copy, please notify the Clearinghouse.

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 October 3, 1996. Use the space 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. If you have any questions, please contact Terri Rodefer, Clearinghouse Environmental Advocate, at 687-6382, or Julie Butler, Clearinghouse Coordinator, at 687-6367.

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

____No comment on this project
____Proposal supported as written
_X_Additional information below
____Conference desired (See below)
____Conditional support (See below)
____Disapproval (Explain below)

AGENCY COMMENTS:

Letter 8 Continued

Homestake Mining Company (Homestake) has made application to change 242 acre-feet of water heretofore appropriated in each of two applications (62027 and 62028) for a total of 484 acre-feet annually. The applications change a portion of the existing irrigation rights they hold (certificates 7025 and 7519, respectively) to mining and milling at the proposed Ruby Hill site. The applications are currently under review.

8-1 If the solution and stormwater ponds approach twenty (20) feet in height at the highest point on the embankment or if the impoundments reach twenty (20) acre-feet in capacity at a bank-full condition, a dam safety application will be required prior to construction.

Response to Letter 8

8-1 The Ruby Hill solution ponds would be 12 feet deep and partially constructed in cut. The largest pond is designed to hold approximately 4 million gallons (12.2 acre-feet). Homestake would meet Dam Safety Program requirements.

Letter 9

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

October 1, 1996

Chris Stubbs, EIS Project Manager
Battle Mountain District
Bureau of Land Management
P.O. Box 1420
Battle Mountain, NV 89820

RE: Ruby Hill Draft Environmental Impact Statement, Homestake Mining Company - BLM

Dear Mr. Stubbs:

9-1 We appreciate the opportunity to review and provide comments on the subject document. In Section 2.1.14.5, Wildlife and Livestock Protection, the document indicates Homestake proposes to store process in steel tanks. This is an excellent design feature. Steel tanks can be completely enclosed, thereby eliminating any opportunity for terrestrial or avian wildlife access to potentially lethal process solutions.

9-2 In Section 2.2.15.6, Seeding Mixtures and Rates, the document indicates serviceberry and bitterbrush seeds would be collected locally and used to grow seedlings to be planted on the reclaimed mine site. This is an excellent design feature. These shrubs are very important to the local wildlife. They can be very hard to establish from seeds. The use of locally collected seeds germinated to produce seedlings for the site should enhance the success at reestablishing these species on the disturbed mine site.

9-3 On Map 2-9, the Placer Dome operations near Bald Mountain should be added. These operations are in the vicinity of the proposed action. They would include the Bald Mountain Mine, the Alligator Ridge Mine, the Yankee Mine and the planned Mooney Basin Project. The White Pine Mine is also in the vicinity.

9-4 In Section 3.6.2.1, Proposed Action, on Page 3-94 the document discusses reclamation of the proposed action. The text indicates reclamation activities would consist of "grading of final slopes; ripping of compacted soil; potential application of topsoil". Why is the application of topsoil only a potential activity? If topsoil is available, it should be utilized to the greatest extent. In most cases, topsoil is the best available medium to establish the shrub species identified as desirable in this document. Sagebrush and serviceberry establishment is greatly enhanced by using topsoil. We would recommend the use of all available topsoil be included in the reclamation planning for this project

Response to Letter 9

9-1 Thank you for your comment. No response necessary.

9-2 Thank you for your comment. No response necessary.

9-3 The text in the Draft EIS remains unchanged. Map 2-9 is associated with the discussion of interrelated projects that have a potential to interact with the Proposed Action in a manner that would result in cumulative impact. Map 2-9 shows the location of only those projects satisfying this criterion. Several of the mining projects cited in this comment are operational and do employ individuals residing in the Eureka area. However, no changes in the level of activity or employment at these mines are anticipated during the life of the Ruby Hill Project. Similarly, the Mooney Basin Project is an expansion that will sustain current employment rather than introduce a new workforce and population into the areas. Thus, the projects listed are not considered interrelated for this EIS.

9-4 The use of growth media for reclamation will be evaluated during the test plot program. Different surface treatments, slope conditions, seed mixes, and shrub plantings will be tested to determine which will be most effective for reclamation of the Ruby Hill site. If growth media is shown to be necessary for successful reclamation, it will be applied in those areas where the greatest benefits can be achieved.

Letter 9 Continued

Chris Stubbs
October 1, 1996
Page 2

9-5 In the same section, on the same page, in the last paragraph, the text states weed species provide biomass, which eventually increases the germination rate of desirable species. We question this statement. Weeds such as cheetgrass, whitetop and leafy spurge dominate native sites and do not allow for natural succession or establishment of desirable species.

9-6 Finally, in Section 3.9.2.1, Proposed Action, the impacts to wildlife resources is well described. This text provides a very good description of the expected results of the proposed mining on wildlife resources in the vicinity. Please feel free to contact me for any additional information or comments concerning this input.

Sincerely,

Rory E. Lamp

Rory E. Lamp
Biologist
1375 Mountain City Highway
Elko, NV 89801
(702) 738-5332

RL
cc: Habitat Bureau
Leo Drozdoff, Chief, Bureau of Mining Regulation and Reclamation, NDEP
Mike Protani, Homestake
Mike Podborny, Pete Bradley
File

	ACT	INF	INT	DATE
DIA		✓	[illegible]	10/8
SS			[illegible]	10/4
RR				
ER				

... Library/Loss (circle one)

Response to Letter 9

9-5 Based on your comment, the sentence you reference has been deleted from the Final EIS. The basic conclusions presented in the Draft EIS have not changed.

9-6 Thank you for your comment. No response necessary.

Letter 10

October 7, 1996

Bureau of Land Management
Battle Mountain District Office
Ruby Hill EIS Project Managers
PO Box 1420
Battle Mountain, NV 89820

Dear EIS Project Managers:

Following are Eureka County's comments on the Ruby Hill Project Draft Environmental Impact Statement (DEIS):

Summary

10-1 **Page ii ~ Alternatives** – Dimensions (height x length x width) of east waste rock dump alternative are significantly larger than the dimensions of west waste rock dump alternative. However, both alternatives are for 60 million tons.

Page iii ~ Important Issues and Impact Conclusions

10-2 ⇒ Air Quality - The conclusion that Nevada and National air quality standards will be met does not indicate the actual impacts to air quality. The section on air quality (3.1.1.2) does show the project will have an effect on air quality. This needs to be noted in the summary.

10-3 ⇒ Air Quality - How is a Class I area defined? What is the classification in the Eureka area? Would Eureka's status on the National Register of historic places qualify as a Class I designation? These questions also apply to section 3.1.1.2.

10-4 ⇒ Geology and Minerals - The statement – "The proposed project area has been seismically inactive for recorded history,..." conflicts with seismicity discussion on page 3-27. Perhaps this statement could read "Although the region has a history of seismic activity, the project site has been seismically inactive for recorded history."

10-5 **Page iv ~ Important Issues and Impact Conclusions** – Although a pit lake is not expected to form, the potential for a pit lake study should be mentioned in the summary.

Response to Letter 10

10-1 As a result of your comment, the text in the Summary of the Final EIS has been expanded to include the dimensions of the East and West Waste Rock Dumps. The East Waste Rock Dump Alternative dimensions are greater than the Proposed Action waste dump dimensions and the West Waste Rock Dump Alternative dimensions. This is because the East Dump Alternative was designed early in the project planning stage, before an accurate material swell factor was determined. The Proposed Action and the West Dump Alternative were designed subsequent to an accurate material swell factor determination and thus appear to contain fewer tons of waste rock. Any of the three waste rock dump alternative configurations would contain the Ruby Hill Project waste rock.

10-2 Based on your comment, the Conclusion for air quality impacts in the Summary of the Final EIS has been modified. The basic conclusions presented in the Draft EIS have not changed.

10-3 As a result of your comment, definitions of Class I, II, and III air quality areas have been added to the Glossary in the Final EIS. The Eureka area is Class II.

10-4 Based on your comment, the Conclusion for geology and minerals impacts in the Summary of the Final EIS has been modified. The basic conclusions presented in the Draft EIS have not changed.

10-5 Since a pit lake is not expected to form, discussion of a pit lake study is not an appropriate topic for the Summary of the EIS.

Letter 10 Continued

Page viii ~ Important Issues and Impact Conclusions

10-6 ⇒ Adverse effects to the Eureka Historic District... – The sentence "Implementation of the Proposed Action would introduce audible elements that do not currently exist near the District" should be changed to "The Proposed Action will result in noises that do not currently exist near the District." The term "audible elements" should be changed to sounds in this section. This should help non-technical reviewers understand impacts of proposed action.

10-7 ⇒ The comparison of historic activities to the proposed action is not a realistic comparison. Sounds associated with a present day open pit mining operation have no similarity to sounds associated with an underground mining operation of the 1800's. This statement should be stricken.

10-8 ⇒ The sentence "Studies conducted in the District indicate that vibrations produced by blasting at the mine should not affect historic structures in the area" should be replaced with "Studies conducted in the District indicate that vibrations and dust produced by mining activities should not affect historic values of the area.

Page ix ~ Important Issues and Impact Conclusions

10-9 ⇒ Social and Economic Values - The conclusion to the first issue indicates only one solution for growth at the Junior-Senior High School, that being modular classrooms. The School District has identified alternatives to address more secondary-aged students: 1) split sessions, 2) year around school, 3) move the 7th and/or the 8th grade to Eureka Elementary School, or 4) accept overcrowding conditions at the Junior-Senior High School.

10-10 ⇒ The DEIS indicates that additional tax revenue generated by the Proposed Action would offset most of the School District's added costs. However, Table 3-58 (p. 3-257) indicates the School District will experience a net cumulative deficit of $877,700.

10-11 **Page x ~ Important Issues and Impact Conclusions** - The DEIS indicates that combined noise levels "generally would remain below levels identified to negatively impact public health and welfare for residential areas." This implies noise levels will at times negatively impact public health and welfare. The impacts noise will have on Eureka's schools, townsite and fairgrounds should be clearly identified.

1.0 INTRODUCTION

10-12 **Page 1-1 Section 1.3 ~ Purpose of and Need for the Proposed Action** – The subsequent sections of 1.3.1 and 1.3.2 do not clearly state the purpose and need of the proposed action.

Response to Letter 10

10-6 Based on your comment, the term "sounds" has been used in the Summary of the Final EIS. The basic conclusions presented in the Draft EIS have not changed.

10-7 Based on your comment, the reference to historic mining operations has been deleted from the Summary of the Final EIS. The basic conclusions presented in the Draft EIS have not changed.

10-8 The primary issue is the effect of blasting vibrations on historic structures. Therefore, no changes have been made to the impact conclusion.

10-9 As a result of your comment, the text in the Summary and in Section 3.15.2.1 of the Final EIS, has been revised to clarify the discussion of the effects of higher secondary enrollments on the school district. The basic conclusions presented in the Draft EIS have not changed.

10-10 The revenue projections presented in the Draft EIS for the Eureka County School District and Eureka County, Table 3-58, contained inaccurate estimates of use taxes and errors in the estimates of ad valorem property tax revenues. Projected staffing needs and the associated expenditures to meet those needs did not correspond with the project timetable in that a decline was not shown following the anticipated end of mining. The table has been revised to reflect the updated projections. Estimated additional revenues over the project life total just over $2.9 million compared with incremental expenditures of nearly $3.1 million. The difference between revenues and expenditures implies a net shortfall of $180,700. Given these revisions, the text in the Summary remains unchanged. However, the text in Section 3.15.2.1 has been revised to reflect the corrections.

10-11 As a result of your comment, the text in the Summary of the Final EIS has been revised to clarify the discussion of why noise associated with proposed mining operations is not expected to adversely impact public health and welfare. The basic conclusions presented in the Draft EIS have not changed. Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

10-12 BLM believes that Section 1.3 in the Draft and Final EIS accurately presents the purpose of and need for the Proposed Action from the perspectives of Homestake and the BLM.

Letter 10 Continued

Chapter 2 Alternatives Including The Proposed Action

10-13 **Page 2-9 Section 2.1.2.2 ~ Surface Water Diversions** – If diversion ditches are left as constructed after project closure, who will be responsible for maintenance?

10-14 **Page 2-9 Section 2.1.2.3 ~ Drilling and Blasting** - Drilling, blasting fly rock during initial mining activities are not discussed in this section. The initial mining phase will likely have the most impact on the townsite in terms of noise, vibration and dust.

Page 2-11 Section 2.1.4 ~ Waste Rock Dumps

10-15 ⇒ The approximate dimensions for the proposed action waste rock dumps are not given. The dimensions for alternative waste rock dumps are given in Sections 2.2 and 2.3. The dimensions of the proposed actions waste rock dumps should also be defined.

10-16 ⇒ This section is unclear as to whether lifts or waste rock faces will be reclaimed as soon as possible after construction.

10-17 ⇒ Eureka County's preferred alternative is the West Waste Rock Dump Alternative.

10-18 **Page 2-14 Section 2.1.6.1 ~ Heap Leach Design and Construction** - The heap leach facility, due to the down gradient proximity of residences, should be designed for a 100 year storm event instead of a 25 year event. Even though this is a state permitting issue, environmental concerns raised in the NEPA process may be important to the permitting process.

10-19 **Page 2-16 Section 2.1.6.3 ~ Solution Collection System** - No pipe in pipe design was noted for solution collection and/or solution pumping system. Even though this is a state permitting issue, environmental concerns raised in the NEPA process may be important to the permitting process.

10-20 **Page 2-20 Section 2.1.11 ~ Security and Fencing** - This section should note that fence boundaries delineated on Map 2-2 may change for public safety reasons.

10-21 **Page 2-23 Section 2.1.13.2 ~ Spill Prevention and Emergency Response** - Hazardous material information should also be provided to the Eureka Clinic and Emergency Medical Service.

10-22 **Page 2-28 Section 2.1.14.6 ~ Range** - Eureka County should also be included in discussions on range issues.

10-23 **Page 2-33 Section 2.1.15.2 ~ Test Plot Program** - Second paragraph last sentence - the word "tried" should be replaced with "evaluated."

Response to Letter 10

10-13 As a result of your comment, the text in Section 2.1.2.2 of the Final EIS has been revised to clarify the description of the proposed surface water diversions.

10-14 Please refer to Section 2.1.2.3 in the Draft and Final EIS for a discussion of flyrock and the limited distance rocks would travel. This discussion applies to all stages of mining. Please refer to the appropriate sections in Chapter 3 of the Draft and Final EIS for discussions of noise, vibration, and dust impacts.

10-15 As result of your comment, the text in Section 2.1.4 of the Final EIS has been expanded to provide the waste rock dump dimensions for the Proposed Action.

10-16 As a result of your comment, the text in Section 2.1.4 of the Final EIS has been revised to clarify the description of the construction of the waste rock dumps.

10-17 Agency-Preferred Alternatives have been identified by the BLM. In a memo dated October 29, 1996, Eureka County indicated that it was in consensus with these preferred alternatives, given certain new mitigation measures. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives and measures.

10-18 Please refer to Response to Comment 3-7 for a discussion of heap leach facility design.

10-19 The State of Nevada is responsible for reviewing design and operating plans to assure that secondary containment systems meet or exceed regulatory requirements. Nevada Administrative Code (NAC) 445A.436 allows containers, including pipes, that confine process fluids to not be doubly lined if they are within an area of secondary containment. The process fluid pipelines at Ruby Hill would be within an area of secondary containment (a lined ditch). Homestake would be in compliance with these requirements under the State of Nevada Water Pollution Control Permit Program.

10-20 As result of your comment, the text in Section 2.1.11 of the Final EIS has been expanded to provide a discussion of the possibility of relocating the perimeter fence.

10-21 Based on your comment, the text in Section 2.1.13.2 of the Final EIS has been expanded to clarify the description of the distribution of hazardous material information.

10-22 Based on your comment, the text in Section 2.1.14.6 of the Final EIS has been expanded to include Cooperating Agencies (including Eureka County) in the review of range issues.

10-23 As a result of your comment, the text in Section 2.1.15.2 in the Final EIS has been revised.

Letter 10 Continued

Page 2-33 Section 2.1.15.3 ~ Growth Media Stockpiling and Use

10-24 ⇒ Using stock piles as test plots is an excellent approach. However, areas outside test plots should also be seeded in order to provide protection from erosion.

10-25 ⇒ Because of the projects' close proximity to the townsite, Homestake should also coordinate/communicate with Eureka County on reclamation activity.

10-26 **Page 2-34 Section 2.1.15.5 ~ Surface and Seedbed Preparation** - Seedbed preparation should also include soils analysis and appropriate fertilizers and amendments.

10-27 **Page 2-34 Section 2.1.15.6 ~ Seeding Mixtures and Rates** - Reclaimed sites should be revegetated with a seed mixture that is a result of the test plot program which may not be the seed mix presented in Table 2-5.

10-28 **Page 2-35 Section 2.1.15.9 ~ Facility Reclamation** - Waste rock dump, crushing and processing facilities, ponds, ancillary facilities and landfills should be revegetated with a seed mixture that is a result of the test plot program which may not be the mixture presented in Table 2-5.

10-29 **Page 2-37 Section 2.2 ~ East Waste Rock Dump Alternative** -- Instead of quoting an average height for the East Waste Rock Dump, it would be more meaningful to include a maximum because the maximum height will affect the visual resources the greatest.

Chapter 3 Affected Environment and Environmental Consequences

Page 3.0 Chapter 3 in general

10-30 ⇒ Noise, dust, blasting, vibrations and visual impacts are the primary concern of most residents. The magnitude of these impacts should be clearly stated and each should include potential monitoring and mitigation to address the affects of impacts should they occur.

10-31 ⇒ Mining of the Upper East Archimedes appears likely to occur and will require the mining of the West Archimedes. Because these two actions are so related, both should be included for analysis in the EIS. Potential impacts to ground water and the formation of a pit lake are concerns of the County.

10-32 **Page 3-1 Section 3.0** - BLM is not managing the proposed project area for zero horses. At present 5-10 head are watering near Devils Gate and utilize the area south of Collingwood farm. BLM's appropriate management level for horses in the Fish Creek Herd Management Area (HMA) is 75 head, yet we estimate 500 head in the HMA. BLM also has plans to fence Antelope Valley out of the HMA and this will result in more horses in Spring Valley and ultimately the project area. Wild horses should be addressed within this document.

Response to Letter 10

10-24 Please refer to Sections 2.1.14.1 and 2.1.15.4 in the Draft and Final EIS for a discussion on the seeding and revegetation of other disturbance areas.

10-25 Based on your comment, the text in Section 2.1.15.3 of the Final EIS has been expanded to include Cooperating Agencies (including Eureka County) in the review of reclamation issues.

10-26 The use of soil analysis, fertilizers, and amendments would be evaluated as part of the test plot program.

10-27 Based on your comment, the text in Section 2.1.15.6 of the Final EIS has been expanded to clarify the description of the seed mix that would be used for reclamation. The seed mix presented in Table 2-5 is preliminary, and the title of the table has been modified accordingly.

10-28 Please refer to Response to Comment 10-27 for a discussion of the reclamation seed mix.

10-29 As a result of your comment, portions of text in Sections 2.1.4, 2.2, and 2.3 in the Final EIS, pertaining to overall or average dump heights have been deleted due to the difficulties in describing overall or average waste rock dump heights relative to original elevations and slopes of the existing terrain.

10-30 Noise, dust, blasting vibration, and visual impacts are all addressed in the Draft and Final EIS. These impacts have been quantified wherever possible. Based on a number of comments, additional mitigation measures for noise, air quality, and visual resources have been developed. Please refer to Measure 3 in Section 3.16.4, Measure 1 in Section 3.1.4, and Measures 4 and 5 in Section 3.13.4 (respectively) of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise, dust, and visual resources are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality monitoring and mitigation, and Response to Comment 14-1 for a discussion of the noise berm, a potential technique to reduce noise levels at sensitive receptors.

10-31 BLM guidelines state: "The reasonably foreseeable action is ...a rational projection that combines known action and reasoned, defensible assumptions about future events and developments. [Reasonably foreseeable future actions] should be based on what is reasonable, using available and anticipated future technology and defensible economic projections" (from *Guidelines for Assessing and Documenting Cumulative Impacts*, BLM, 1994). These are the guidelines that were used in developing the East Archimedes as a reasonably foreseeable future scenario in the Ruby Hill EIS. The BLM can only develop a National Environmental Policy Act environmental analysis on an action for which there is a defined, documented plan or proposal. No Plan of Operations has been received from Homestake Mining Company to develop the East Archimedes, nor does the company include this mineralization in its mineral reserves. Therefore, the discussion of the East Archimedes mineralization in the cumulative impacts portion of the Ruby Hill EIS is the most detailed information available to the BLM. No further information is available that could be included in the EIS.

The West Archimedes mineral reserve has been thoroughly evaluated and mining of this ore body would be economically feasible. The East Archimedes mineralization is only considered a mineral resource by Homestake. Substantial additional definition drilling, metallurgical testing, mine planning, and economic analysis must be completed prior to classification of East Archimedes as a mineral reserve. While the mining of East Archimedes may be reasonably foreseeable, it is not proposed by Homestake.

Letter 10 Continued

10-33 **Page 3-11 Section 3.1.2.1 Bullet #2 ~ Proposed Action** -- This sentence is unclear. Does this mean that any increase of PM_{10} particulates due to mining operations is considered significant and therefore must be mitigated?

10-34 **Page 3-12 Table 3-4 Section 3.1.2.1 ~ Summary of Particulate Matter Measurements at the Ruby Hill Project Site µg/m³** - This table is significant in understanding the background or pre-mining particulate matter concentrations. The difference between primary and collocated samples should be defined for the benefit of non technical reviewers. The term "collocated" should be replaced with "co-located."

10-35 **Page 3-15 Table 3-5 ~ Summary of Air Emissions** - The no action alternative should be included in this table to allow the reviewer to understand the significance of impacts for each alternative.

10-36 **Page 3-59 Section 3.4.2.1 ~ Proposed Action** - The meteoric water mobility appendix tables indicated several test exceeded state standards. Potential ground water impacts should be addressed in the EIS.

10-37 **Page 3-60 Section 3.4.2.1 ~ Proposed Action** - Groundwater Impacts - The potential for ground water degradation caused by leaching of arsenic and aluminum. should be discussed in the EIS.

10-38 **Page 3-94 Section 3.6.2.1 ~ Proposed Action** - The sentence "One seed mixture would be used for revegetation activities (Table 2-5)" conflicts with the Test Plot Program (2.1.14.2). This sentence should be changed to "Seed mixtures developed in the Test Plot Program (2.1.15.2) will be used for reclamation activities."

10-39 **Page 3-113 Table 3-30 ~ Forage Production and Animal Units Months Permanently Lost - Proposed Action** - The estimates of forage production in this table should be adjusted to actual utilization and suitability to grazing and not a hypothetical 60 percent. The project area typically receives slight to light utilization which should change the adjusted forage production factor to 10-20 percent. The resulting loss in AUM's would be 8-16 temporary and 2-4 permanent.

10-40 **Page 3-122 Section 3.8.3 ~ Cumulative Impacts** - The reduction of livestock AUM's may not be significant to the individual ranch, however, this reduction will add to the cumulative impacts felt by the county. Over the last several years, BLM's Battle Mountain District has reduced grazing preference in Eureka County by 41,046 AUM's. This represents a reduction of 28%. While the proposed reduction is relatively small, this section should note that this reduction is part of a larger cumulative impact.

10-41 **Page 3-226 Section 3.15.1.2 ~ Economy and Employment** - Atlas Gold Bar mine began in 1983 not 1993.

Response to Letter 10

10-32 Although the Fish Creek Herd Management area extends into the Ruby Hill Allotment, the location of the Ruby Hill Project is outside the boundaries of the herd management area. Any wild horses found in this portion of the herd management area will be removed as funding permits. Wild horses also will be gathered from the Fish Creek Herd Management Area in the Fish Creek Ranch Allotment, as funds allow, until the appropriate management level is reached.

10-33 As a result of your comment, the second bullet in Section 3.1.2.1 in the Final EIS has been rewritten to clarify what constitutes a significant impact to air quality. The significance threshold for PM_{10} (dust) continues to be the Nevada and National Ambient Air Quality Standards.

10-34 The primary sampler is the designated sampler for reporting observed concentrations of particulates. One or more monitoring sites within the reporting organization are selected for duplicate, collocated sampling. The collocated sampler should be located within 4 meters of the primary and be of the same type as the primary sampler, with similar flow rates, inlet types, and flow controller types. The measurements from both samplers are reported. The percentage differences in measured concentrations (micrograms per cubic meter) between the two samplers are used to calculate precision, as described in the Federal regulations. "Collocated" is the proper spelling for this device as it appears in regulatory documents.

10-35 Table 3-5 in the Draft and Final EIS only indicates the anticipated emissions if the facility were to proceed with one of the mining alternatives. No additional emissions would be associated with the No Action Alternative.

10-36 Please refer to Appendix B in the Draft and Final EIS for a discussion of groundwater test results relative to state standards.

10-37 Please refer to Appendix B in the Draft and Final EIS for a discussion of the potential for groundwater degradation. Solute transport modeling, as discussed under groundwater in Section 3.4.2.1 of the Draft and Final EIS, has shown that there should be no impacts to groundwater beyond 1,000 feet from the pit, which is within the project boundary and the area affected by mining.

10-38 As result of your comment, the text in Sections 2.1.15.6 and 2.1.15.9 has been expanded and the text in Section 3.6.2.1 has been revised to clarify the discussion of seed mixtures. The basic conclusions presented in the Draft EIS have not changed.

10-39 The estimates for the temporary and permanent loss of AUMs for the Proposed Action, East Waste Rock Dump Alternative, and West Waste Rock Dump Alternative have been calculated correctly. These estimates were based upon a forage utilization rate of 60 percent, since this was the utilization rate by which the total number of AUMs for the Ruby Hill grazing allotment were determined and adjudicated. Therefore, the loss of AUMs resulting from the removal of vegetation must be calculated using the utilization rate of 60 percent, which is referenced in the adjudication file.

10-40 Typically, the BLM uses the affected grazing allotment as the cumulative assessment area for range resources, vegetation, and soils. Such is the case with the Ruby Hill EIS. Thus, the Ruby Hill Grazing Allotment was used as the area within which to assess cumulative impacts for range resources. Cumulative impacts to range resources and the Ruby Hill allotment are discussed in Section 3.8.3 of the Draft and Final EIS. The Ruby Hill EIS focuses specifically on issues and impacts generated by the proposed Ruby Hill Project. A discussion of impacts for the entire county would constitute a regional impact analysis (rather than a cumulative impact analysis), and is out of the scope of this EIS.

10-41 As a result of your comment, the text in Section 3.15.1.2 of the Final EIS has been revised. The Atlas Gold Bar Mine initiated development in 1986 and operated continuously until operations were suspended in mid-1994. The Atlas mine also is considered an interrelated project for cumulative impacts because a resumption of operations is considered reasonably foreseeable.

Letter 10 Continued

10-42 **Page 3-232 Section 3.15.1.5 ~ Community Facilities and Services** – The discussion on recreation facilities should include Perdiz Sport Shooting and the Fair/Rodeo Grounds. These facilities may also be impacted by the proposed action.

Page 3-234 Section 3.15.1.5 ~ Community Facilities and Services

10-43 ⇒ Public Education - The DEIS indicates the existing Elementary School in Beowawe will be closed in 1996 following construction of a new Elementary School in Crescent Valley. The sentence would be more accurate if it read. "Operations at the existing Elementary School in Beowawe will be temporarily suspended following completion of the new elementary school in Crescent Valley, as the School District evaluates the future, potential use of the Beowawe School."

10-44 ⇒ The first sentence in paragraph two should read. "The School District employs a staff of *77*, including *41* certified teaching staff, *a Computer Systems Engineer, a Director of Special Services,* three principals and the superintendent." Also, the last sentence should be changed to "*Thirty* classified staff provide administrative services......"

10-45 ⇒ The third paragraph contains inaccurate data. The first sentence should read "Total enrollment in the School District has fluctuated between 291 and *356* over the past six school years." The last sentence on that page should be modified by changing the number 55 students to *92* students.

Page 3-236 Section 3.15.1.5 ~ Community Facilities and Services

10-46 ⇒ Public Education - The second sentence in the fifth paragraph should be modified to read "However, a more realistic optimum capacity given the School District's desired staffing levels, program offerings and parental expectations is about 225 students."

10-47 ⇒ The fourth paragraph contains inaccurate data. The second sentence should read "At the beginning of the current school year, five students from White Pine County and *17* students from Nye County..." Also, the last sentence should be changed to "there are *47, 7-12 students* from Eureka County, attending school in Lander County, with another *12* attending school in Elko County."

10-48 ⇒ The Health Care and Social Services should be changed to reflect that the Eureka Clinic is currently staffed by one physician and one physician assistant. Also, the new ambulance has been delivered to Eureka.

10-49 **Page 3-244 Section 3.15.1.6 ~ Public Finance** - Eureka County School District – The first sentence of the fourth paragraph indicates the High School has been modified to accommodate growing enrollment and added curriculum. However, there have been no physical improvements to the High School. The sentence would be more accurate if it stated "Improvements to the High School's curriculum have been made with the addition of several new courses to support the School District's newly established School-to-Work

Response to Letter 10

10-42 Please refer to Section 3.12.1.1, Recreation, in the Draft and Final EIS for a discussion of the Perdiz Sports Shooting Range and the Eureka County Fair/Rodeo Grounds, and to Section 3.12.2.1 concerning the anticipated impact that the Proposed Action would have on recreational facilities within the Town of Eureka. Section 3.13.2.1, Visual Resources, contains a description (with photo simulations) of views from the Fairgrounds toward the proposed mine, and Section 3.16.2.1, Noise, describes anticipated noise levels at the Fairgrounds during mine operations.

10-43 As a result of your comment, the text in Section 3.15.1.5 of the Final EIS has been revised to clarify the status of the Beowawe elementary school. The change does not alter the basic conclusions presented in the Draft EIS.

10-44 In response to your comment, the text in Section 3.15.1.5 of the Final EIS has been revised to indicate that the discussion of the Eureka County School District reflects information through the 1995-96 school year as provided by the school district during the data collection phase for preparation of the EIS. Although the information presented in the comment is more current, it does not affect the basic conclusions in the Draft EIS.

10-45 In response to your comment, the text in Section 3.15.1.5 of the Final EIS has been revised to indicate that the discussion of the Eureka County School District reflects information through the 1995-96 school year as provided by the school district during the data collection phase for preparation of the EIS. Although the information presented in the comment is more current, it does indicate that most of the increase in enrollment occurred in Crescent Valley, rather than in Eureka. Thus, the basic conclusions in the Draft EIS are not affected by the updated information.

10-46 In response to your comment, the text in Section 3.15.1.5 of the Final EIS has been revised to clarify the School District's current assessment of optimum capacity. The estimated capacity presented in the Draft EIS was provided by the school district in response to data requests. The basic conclusions presented in the Draft EIS have not changed.

10-47 Please refer to Response to Comment 10-45 for a discussion of school enrollment.

10-48 In response to your comment, the discussion of health care in Eureka in Section 3.15.1.5 of the Final EIS has been revised. The discussion in Section 3.15.2.1 also has been revised. The changes do not affect the basic conclusions presented in the Draft EIS.

10-49 As a result of your comment, the text in Section 3.15.1.6 of the Final EIS has been revised to reflect the expanded curriculum and equipment investments at the high school more accurately. The basic conclusions presented in the Draft EIS have not changed.

Letter 10 Continued

10-49 program. However, several temporary classrooms have been established in the school's cafeteria and on the stage in order to accommodate the additional curriculum."

Page 3-254 Section 3.15.2.1 ~ Proposed Action

10-50 ⇒ Public Education - The last sentence in the first paragraph under Public Education assumes only one option for increased student enrollment challenges during the construction phase of the proposed project. The sentence should be changed to "However, depending on the age distribution of the new students, the School District may need to move either or both of the Junior High classes from the High School to the Elementary school, purchase one or more modular classrooms, using split session or year around scheduling at the High School."

10-51 ⇒ The first sentence of the third paragraph under Public Education is misleading because it makes an assumption that the most pressure would occur in the Elementary School. Elementary students are defined by the Nevada Department of Education as grades K-8, while secondary students are defined as grades 9-12. The DEIS suggests that 60-70% of the 72-81 new enrollment will be elementary students. However, the 7th and 8th grades are currently educated at Eureka County High School. What percentage of 60-70% of the total increase in students will be in the 7th and 8th grades? Eureka Elementary School can accept a significant increase in new students much more easily than can the High School. As a result, the aforementioned sentence should be changed to "Average class sizes could grow as a result of the enrollment growth, with the larger portion of new student enrollment attending the Elementary School which has additional student capacity. However, with the enrollment at the High School already approaching its maximum, the High School could be severely impacted by increasing student enrollment as a result of the Proposed Project."

Page 3-258 Section 3.15.2.1 ~ Proposed Action

10-52 ⇒ Eureka County School District - The fourth sentence in the third paragraph makes an assumption as to what is not a motivating factor in the School District's decision to remodel/expand the current High School or to build a new High School. The sentence should be changed to read "The increase in student enrollment resulting from the proposed project is only one of the factors to be considered by the School District." In order to clarify the overall intent of the paragraph, the word "Rather" should be deleted from the second to last sentence in that paragraph.

10-53 ⇒ Eureka County School District - The last sentence in the fourth paragraph the DEIS attempts to define what is and what is not a "significant" fiscal impact upon the School District. The last sentence should be deleted entirely.

10-54 ⇒ Paragraph four, the number -$887,700 should be -$877,700.

10-55 **Page 3-261 Section 3.15.4 ~ Potential Mitigation and Monitoring** – The County Commission is concerned about the possibility of a large increase in the proposed

Response to Letter 10

10-50 As a result of your comment, the text in Section 3.15.2.1 of the Final EIS has been expanded to clarify the options being considered by the school district to address the projected increases in school enrollment. However, the changes appear in the discussion of impacts during the transition and operations periods, rather than the initial construction phase. The discussion in the Draft EIS on that topic remains unchanged. The potential responses indicated are appropriate for the limited and temporary enrollment impacts during initial construction. These changes do not affect the basic conclusions presented in the Draft EIS.

10-51 In response to your comment, the text in Section 3.15.2.1 of the Final EIS has been revised to clarify that despite fewer added secondary students, the relative impact on the junior/senior high school may be more severe because less excess capacity is available in that school. With respect to the projected increase in 7th and 8th grade students, the projected impacts on school enrollments presented in the Draft EIS adheres to the grade categories used by the Eureka County School District. In other words, the 43 to 57 elementary students discussed in the EIS is the estimated number in grades K-6. Approximately 40 percent of the projected increase in secondary enrollments, that is, 8 to 13 students, would be expected to be 7th or 8th grade students. In response to this comment, the text in Section 3.15.2.1 of the Final EIS has been revised. The basic conclusions presented in the Draft EIS have not changed.

10-52 The text contained in Section 3.15.2.1, page 3-258, in the Draft EIS reflects the priorities and decisions of the School District to move forward with construction of new elementary schools and then to devote the District's attention to the secondary schools. Those decisions were made prior to the initiation of permitting activities for the Ruby Hill Project. Thus, the Proposed Action did not trigger the District's deliberations regarding its capital facilities. The text contained in the Draft EIS is unchanged.

10-53 The text contained in Section 3.15.2.1, page 3-258, in the Draft EIS remains unchanged. The use of the word "significant" in the sentence cited in this comment is an assessment of the impact on the district's fiscal conditions relative to the socioeconomic significance criteria on page 3-244.

10-54 As indicated in your comment, the number shown in the text of the Draft EIS was incorrect. However, see the Response to Comment 10-10 regarding changes in the fiscal projections. The text in Section 3.15.2.1 of the Final EIS has been revised to be consistent with the revised projections. The basic conclusions presented in the Draft EIS have not changed.

10-55 Based on your comment, Mitigation Measure 1 has been added to Section 3.15.4 in the Final EIS to address potential impacts to Eureka County infrastructure resulting from increased employment.

Letter 10 Continued

10-55 actions' workforce. Doubling employment would adversely affect County infrastructure. This section should include mitigation measures with the County if employment of the proposed project exceeds a certain level.

10-56 **Page 3-263 Section 3.16.1.1 ~ Noise** - In addition to noting that background noise measurements occurred during a period of extensive drilling, the 9:00 p.m. curfew siren should also be noted. Both of these factors may have resulted in artificially high back ground noise levels used in the noise model. These factors combined with the possibility of increased noise levels due to temperature inversions suggest the model may not be accurate. Perhaps this concern could be addressed in Section 3.16.4 by monitoring noise levels in town and mitigating noise impacts should they occur.

10-57 **Page 3-266 Section 3.16.2.1 ~ Proposed Action** - The last sentence of the first full paragraph on p. 3-266 states "Homestake has committed to minimize noise during noise sensitive activities at the fairgrounds and High School." We are concerned about the commitment to minimize noise since Eureka County and School District officials have not been formally contacted about such a plan. Potential mitigation measures should be included in the EIS.

10-58 **Page 3-270 Section 3.16.4 ~ Potential Mitigation and Monitoring** - Monitoring mitigation measure 2 should include monitoring noise and air quality. This section should also include a statement on the availability of monitoring records to the public.

10-59 **Page 3-276 Section 3.17.2.1 ~ Proposed Action** - Effects of a Release - The DEIS indicates environmental effects of a cyanide release would be limited in extent and time of contamination due to the rapid degradation of cyanide within the environment into benign elements. This is not entirely true. Free cyanide will degrade rapidly with aeration and time, unfortunately, it also rapidly complexes with other constituents and forms wad cyanide which does not degrade rapidly.

Appendix C

10-60 **Page C-1** - One copy of the reverse side of the visual contrast rating work sheet should be included in this section.

Response to Letter 10

10-56 The background noise measurements described on page 3-263 of the Draft EIS were performed in order to record statistical trends in noise levels over seven 24-hour periods at three locations in the Eureka area. Results of these measurements indicate that from only one of these locations (Tank Hill) did the 9:00 p.m. Town curfew siren affect average noise levels for that hour. However, the relatively short duration of the siren did not appreciably affect the daytime (7:00 a.m. to 10:00 p.m.) hourly average noise levels reported in the Draft EIS. It should also be noted that the siren did not affect noise levels recorded at Tank Hill when winds in excess of 5 meters/second (11 mph) were present. In addition, noises that continue to occur at regular intervals (such as the curfew siren or morning/evening traffic) are considered to be part of the existing noise environment, and therefore constitute part of the "normal" background noise environment of the Eureka area.

The Environmental Noise Model (ENM) used as the basis for the analysis of noise impacts in the Draft EIS did not include information obtained from the actual noise measurements. The ENM simply projects the extent of noise contours (i.e., lines of equal noise levels) based on inputs such as expected noise levels at the source, topography, and wind direction and speed. Background noise levels are not input into the model, resulting in a default assumption that background noises are absent.

The dynamics of noise propagation under lower atmospheric temperature inversion conditions are far too variable and complex to be accurately represented by the ENM. As with all computer-based models designed to mimic complex systems and relationships, the ENM's accuracy is limited by the finite amount of data available and the many assumptions needed. It is believed, however, that the ENM currently gives the most realistic estimate available for projecting noise levels associated with projects such as the Proposed Action.

Please also refer to Response to Comment 10-58 for a discussion of noise level monitoring during proposed mining operations.

10-57 Please refer to Section 2.1.14.12 in the Draft and Final EIS for a discussion of Homestake's intention to cooperate with Eureka County and School District on minimizing noise impacts. Since this discussion is included as part of the Proposed Action, BLM views it as a commitment on the part of Homestake. Based on a number of comments, an additional mitigation measure for noise has been developed. Please refer to Measure 3 in Section 3.16.4 of the Final EIS. This measure addresses an advisory group that will be formed to work with Homestake to ensure that public concerns about noise are effectively responded to throughout the life of the project. Also please refer to Response to Comment 14-1 for a discussion of the noise berm.

10-58 Please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring. The need for noise monitoring will be determined by the advisory group discussed in Mitigation Measure 3 in Section 3.16.4 of the Final EIS. Monitoring records will be available to the advisory group and thus the public.

10-59 As a result of your comment, the text in Section 3.17.2.1 of the Final EIS has been revised to clarify the discussion of cyanide degradation.

10-60 The reverse side of the Visual Contrast Rating Worksheets is intended to contain information on whether the project design meets visual resource management objectives and whether mitigative measures for any identified visual contrast are recommended. This side of the worksheets was not included in Appendix C of the Draft EIS because this information is considered to have been adequately summarized in Section 3.13, Environmental Consequences.

Letter 10 Continued

Appendix E

10-61 **Page E-1 Figures 1 though 8** These figures are very poor in quality and not readable. These figures should clearly reference the location of the fairgrounds. Eureka Townsite boundary and possibly the school. These figures are very important to the noise analysis and should be included in the text, 3.16.2.1 where the noise modeling discussion occurs.

Sincerely,

/s/ Pete Goicoechea

Pete Goicoechea
Chairman

PG/lh

cc Eureka County District Attorney
Eureka County NEPA Committee
Eureka County Public Land Advisory Commission

Response to Letter 10

10-61 Based on your comment, the noise contour maps in Appendix E (i.e., Maps E-1 through E-8) have been modified to more clearly present the noise contours and potential noise receptors including the Eureka County fairgrounds, Eureka High School, and Eureka townsite.

Letter 11

Mail

By ~~Fax~~ 10/8/96

BLM-Battle Mountain District
Attn: Mr. Christopher Stubbs
POB 1420
Battle Mountain, NV 89820

Dear Mr. Stubbs:

I am a researcher for the Northern Nevada Building Trades Council (NNBCT), which represents thousands of skilled construction workers and their families who live, work and seek recreation in Northern Nevada, including the vicinity of the proposed Ruby Hill Gold Mine. The NNBCT's comments on the Draft Environmental Impact Statement for this project are attached to this letter.

Please send copies of the ~~D~~FEIS for this project to the NNBCT, and to me:

JOHN WILLIAMS
12770 SW FOOTHILL DR.
PORTLAND, ORE 97225
(503)626-5736, 503-641-2093

Yours, John Williams

John Williams
cc: Rich Houts

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Letter 11 Continued

11-1

This Draft Environmental Impact Statement (DEIS) describes the potential impacts from a proposed gold mine sited less than one mile from Eureka, Nevada. Because this mine is so close to the homes, businesses, and recreational areas used by several hundred people, the DEIS should have focused careful analysis on the potential effects from air pollution from this proposal.

The NNBCT found the DEIS failed to provide a detailed analysis of the potential air pollution impacts from the project's emissions of particulate matter less than 10 microns (PM-10). As a result, probable significant and adverse impacts from PM-10 emissions were downplayed in the DEIS.

11-2

Had the DEIS accurately described the potential human health impacts from the PM-10 emissions from this project, then reviewers of the DEIS would be alerted to the need for additional pollution controls to reduce PM-10 emissions from this project.

11-3

The DEIS asserts that only if the project produced levels of pollution that exceeded the ambient air quality standards [1] than that impact would be considered "significant." The NNBCT disputes this criteria for determining significance.

11-4

A large increase in levels of air pollution, especially PM-10, can be a significant and adverse impact, even when no standards are exceeded. Over the last few years, many scientific studies have clearly demonstrated that increased PM-10 levels at concentrations far below the air quality criteria are a health threat to humans. Thus, increases in PM-10 levels could be considered significant even if those levels do not exceed

[1] or the Class 1 area increment

Response to Letter 11

11-1 Please refer to Response to Comment 3-3 for a discussion of the air quality impact analysis, particularly for PM_{10}.

11-2 Please refer to Response to Comment 3-3 for a discussion of the air quality impact analysis, particularly for PM_{10}.

11-3 Thank you for your comment. No response necessary.

11-4 The subject of this comment is beyond the scope of the Ruby Hill Project EIS. The U.S. Environmental Protection Agency and the Nevada Division of Environmental Protection are responsible for establishing ambient air quality standards. These standards are set to protect human health. The BLM does not have the authority to review or modify air quality standards.

Letter 11 Continued

11-4

the current air quality standard.

The DEIS did not discuss the reason why air quality impacts are not considered significant unless ambient standards are exceeded.

11-5

The DEIS's assumption of significance occurring only when a standard is violated, is especially misplaced in this instance for three reasons. First, hundreds of people in the town of Eureka will be exposed to PM-10 emissions and other types of air pollution from this mine. This means any increase in levels of pollution will affect many people.

11-6

Second, The mine will emit PM-10. At this time, the federal EPA has the air quality standard for PM-10 under serious and active review. This review has been continuing for several months. The EPA has produced many study documents, including an external review draft of a new air quality standard for PM-10, published April, 1995.

Virtually all of these studies strongly argue that the air quality standard for PM-10 should be sharply lowered. These studies demonstrate that even if the Mine produces PM-10 levels that do not exceed the current air quality standard, the levels will probably exceed the new PM-10 standards that are in the process of being enacted.

11-7

Third, the DEIS said that the predicted project levels of PM-10 from this Mine's proposed action are very close to exceeding the air quality standard for PM-10. The DEIS' Table 3-6 shows that the projected annual levels of PM-10 at the project fenceline will reach a level of 49.8 ug/M3, compared to the air quality standard of 50 ug/M3.

In other words, the project will produce offsite PM-10 concentrations equalling 99.6% of

Response to Letter 11

11-5 The ambient air quality standards were set by U.S. Environmental Protection Agency to protect human health and the environment. The air quality impacts as analyzed with refined dispersion modeling, which tends to be a conservative estimate of the actual impacts, show no significant impacts on local air quality.

11-6 The proposed fine particulate standard, currently under consideration by U.S. Environmental Protection Agency, would place additional restrictions on the allowable concentrations of particles smaller than 2.5 micrometers. The key element of the U.S. Environmental Protection Agency's interim implementation policy for particulates is to insure that essential programs required under the Clean Air Act for attainment of existing air quality standards are to continue where it is appropriate to do so. The U.S. Environmental Protection Agency has proposed to maintain the PM_{10} standard at the same ambient concentration levels now in existence and has proposed a new standard for fine particulates. The U.S. Environmental Protection Agency is also proposing that the preconstruction review for particulates will continue to involve only review of PM_{10} and their ambient impacts. The dust generated by mine processes, including fugitive dust, generally contains a greater fraction of larger particles, in the range 2.5 to 10 micrometers, rather than the fine particulates such as those smaller than 2.5 micrometers. This would suggest that a new annual standard for fine particulates of 15 $\mu g/m^3$ would be less likely to be violated as a result of mining operations than the present PM_{10} standard of 50 $\mu g/m^3$. It would also suggest that an exceedence of a short term 24-hour standard of 50 $\mu g/m^3$ as proposed for fine particulates would be less likely to occur than an exceedence of the present PM_{10} standard which is 150 $\mu g/m^3$. Fine particulates are often a result of secondary particle formation in an urban setting where gaseous forms of air pollution, such as nitrogen oxides and sulfur dioxide, change to particulate form due to chemical processes in the atmosphere. The proposed facility is not expected to be a major source of gaseous emissions; therefore, it would not contribute significantly to the formation of secondary particulates.

11-7 Please refer to Response to Comment 3-3 for a discussion of the air quality impact analysis, particularly for PM_{10}.

Letter 11 Continued

11-7 the current air quality standard. This is virtually the same as exceeding the PM-10 standard, since air quality modelling is only accurate enough to predict levels of pollution within a wide range of the actual results.

In other words, it is not reasonable to assume that when a project's pollution concentrations are modeled to come within .4% of an air standard, when modelling is conducted with a procedure with a margin of error far greater than .4%, that the proposed action will actually not exceed the standard in practice.[2]

11-8 Nor is it reasonable to assume that there are no impacts at a level of 49.8 ug/M3, and that significant impacts begin only when the threshold of 50 ug/M3 is reached.

Given how close the proposed action comes to violating the air quality standard, the DEIS is misleading in claiming that "the resultant impacts are well below state and federal air quality standards ... and ... are not considered significant." (p. 3-18)

The DEIS' modelled level of PM 10 pollution is only .4% below the standard. It is not "well below" a standard. It virtually equals and potentially exceeds a standard.

11-9 Even if the new air quality standards are not yet established for PM-10, there are many studies that show there will be significant and adverse health impacts from the predicted PM-10 emissions levels from the proposed project's preferred alternative.

These studies show that an short-term

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[2]For instance, one study of 17 air quality models found modelling predictions ranged from 1230% low to 2000% high. GAO/RCED-86-94. Improvements Needed in Developing and Managing EPA's Air Quality Models. Table 2.1.

Response to Letter 11

11-8 Please refer to Response to Comment 3-3 for a discussion of the air quality impact analysis, particularly for PM_{10}.

11-9 Please refer to Response to Comment 11-4 for a discussion of the significance criteria for PM_{10}.

Letter 11 Continued

11-9 increase of 10 ug/M3 will produce a measurable increase in the death and lung ailment rates of the exposed population. The preferred project alternative is modelled to produce PM-10 concentrations far exceeding the 10 ug/M3 threshold found in studies to cause increased deaths among exposed receptors.

For instance, the preferred alternative is modelled in the DEIS to produce an increase of 56.8 ug/M3 in PM-10 concentrations at the project boundary, on a 24-hour average. This increase of 56.8 ug/M3 far exceeds the short-term 10 ug/M3 increases in PM-10 that have been shown to produce a increase in the death rate as high as 3.7% in the exposed population. [1]

Since the project will cause increased levels of PM-10, which exceed the levels shown in several studies to cause higher death rates, then the DEIS should have described the project's PM-10 emissions as a significant impact worthy of explicit mitigation measures.

11-10 The NNBCT suggests that the Record of Decision (ROD) require the developer to hold the resulting project-related PM-10 increases to below 10 ug/M3 at the project fenceline.

11-11 The ROD should also require, and the FEIS should discuss, additional PM-10 control measures as project alternatives, such as paving of the mine's roads, washing of tires and vehicles leaving the mine site to reduce the tracking out of dust that is eventually re-entrained, use of baghouses on crushers and conveyor drop points, and moisture requirements for material processing and stockpiling.

11-12 The NNBCT also points out that the DEIS claims on p. 3-14 that the Mine's process and fugitive emissions will total less than 250 tons/year of PM-10. But in Table 3-5, the Mine's point source and fugitive emissions of PM-10 are shown to apparently total over 271

Response to Letter 11

11-10 Thank you for your comment. Your concerns will be considered with the final decision-making process.

11-11 Please refer to Section 3.1.2.1 in the Draft and Final EIS for a discussion of dust control measures. The mine operator will be required to conform to New Source Performance Standards and opacity limits as set by U.S. Environmental Protection Agency and the State of Nevada.

11-12 Based on your comment, Table 3-5 in the Final EIS has been modified to more clearly present fugitive emissions.

Letter 11 Continued

11-12 tons/year.

This seeming inconsistency should be explained. In any event, this is a significant amount of Pm-10 emissions to be produced less than one mile from a town.

Response to Letter 11

Letter 11 Continued

AIR POLLUTION POINT SOURCES

11-13 The mine will have several sources of air pollution, including the crusher, diesel generators, carbon kiln, and refining furnace. The EIS failed to present the potential air emissions of toxic materials from these sources.

11-14 Nor did the DEIS show the projected amounts of air pollution from construction and initial site clearance activities. This pollution which temporary, can still be a significant impact, especially since the project is close to populated areas.

WATER QUALITY

WATERS OF THE U.S.

11-15 The DEIS identifies several Waters of the U.S. that will be disturbed and filled by the project, but the DEIS does not describe the permit requirements for these impacts, or suggest how the project will meet the regulatory requirements fro filling and disturbing Waters of the U.S.

GROUNDWATER QUALITY

11-16 The DEIS admits that the project could cause elevated levels of arsenic to enter the groundwater, when rainwater "rinses" the pit rock, and the rainwater than infiltrates into the groundwater.

This is a apparent violation of Nevada law, which may proscribe degradation of groundwater from mine pits and other sources.

The DEIS should have described the state requirements for degradation of groundwater, and set out how the project would-or would not-comply with these state rules.

Although the DEIS said that arsenic would probably not cause exceedances of drinking water standards more than 1000 feet from the pit within the first 50 years, the DEIS did not

Response to Letter 11

11-13 Please refer to Section 3.1.2.1 in the Draft and Final EIS for a discussion of planned emission sources. The impacts from all other types of air pollutants will be smaller than the impact from PM_{10} and are therefore considered insignificant.

11-14 Please refer to Section 3.1.2.1 in the Draft and Final EIS for a discussion of air pollution during construction and initial site clearance. Due to the limited construction duration, emissions and overall impacts are expected to be smaller during construction than during operation of the mine.

11-15 The U.S. Army Corps of Engineers (COE) has determined that the intermittent drainages that would be impacted by the project are non-jurisdictional waters of the United States. Based on this determination, a Section 404 Permit is not required.

11-16 The modeling used to estimate possible arsenic contamination of groundwater by the pit was a very conservative scenario where complete leaching of arsenic under maximum infiltration conditions was simulated. This situation is not likely to occur. This modeling showed that arsenic degradation of groundwater quality would be limited to the existing mining district. No private wells would be impacted.

Letter 11 Continued

11-16 describe how this degradation would comply with state law.

For instance, if Nevada law does not allow any degradation of groundwater, at any distance, or at less than 1000 feet from the pollution source, then the project would not comply with State law.

EROSION CONTROL

11-17 Silt fences or straw bales are described as potential erosion control devices. These and other erosion control methods need careful engineering, such as the measures described in the Puget Sound Stormwater Control Manual. Engineering for erosion control measures should be embodied in the Record of Decision, to assure that these methods will be effective.

HABITAT LOSSES

The project would cause the temporal losses of almost 700 ares of upland habitat, virtually all of which is mule deer range. There will also be significant and adverse impacts on habitat for raptors, including the ferruginous hawk, and on the Townsend's bat. There would be a permanent loss of 88 acres of habitat that would not be reclaimed.

11-18 Although it appears that hundreds of acres of sagebrush habitat will be removed, apparently sagebrush will not be replanted in the reclaimed areas. This means that even after reclamation, there will be a net permanent loss of sagebrush-related habitat, and an apparent permanent or long-term conversion of shrub-dominated habitat to a grass-dominated community. This is a potentially adverse habitat impact that was not discussed in the DEIS. While the DEIS discussed the impacts of wood resources in terms of losses of firewood, it did not discuss the wood/scrub resources lost to the project, in terms of lost habitat.

Response to Letter 11

11-17 Please refer to Response to Comment 1-1 for a discussion of erosion control.

11-18 Based on your comment, the text in Section 3.9.2.1 of the Final EIS has been revised to clarify the discussion of the anticipated loss of woody habitat for terrestrial wildlife species. The basic conclusions presented in the Draft EIS have not changed. The loss of sagebrush habitat is considered a long-term impact to wildlife resources, and (as stated in the Draft EIS) it is expected that the natural regeneration of big sagebrush would require approximately 20 to 30 years after reclamation to reach maturity.

Letter 11 Continued

11-19 There is no mitigation proposed for these temporal and permanent losses of habitat. The DEIS should have discussed what forms of reasonable mitigation measures are available, and appropriate steps should be mandated in the Record of Decision. The NNBCT recommends that the developer be required to restore and maintain alternative habitat sites as a mitigation measure. Backfilling the pit is also recommended to restore an additional 88 acres of habitat.

RANGE RESOURCES

About 880 acres of vegetation would be fenced, under the proposed action. This would reduce access to range resources, and it would also, to a certain degree, cause additional temporal habitat losses for some wildlife.

11-20 The DEIS did not discuss an alternative of fencing less area. There is no explanation why 880 acres must be fenced for a 690 acre mine, that will remove vegetation on only 605 acres. Reducing the size of the fenced area should have been discussed as a feasible mitigation measure to reduce the amounts of lost range resources and habitat.

11-21 There is no explanation on how this fencing of public lands will comply with the Inclosures Act which prohibits interference with public access to public lands. While there is some rationale for fencing the active mining area, to protect human life, there is no explanation why an additional 285 acres will be fenced, when no vegetation will be removed from those areas.

SOCIO-ECONOMIC IMPACTS

11-22 The DEIS admits that the project will cause significant increases in the demands on public services, including schools, law enforcement, and on housing.

The NNBTC suggests that the DEIS should have

Response to Letter 11

11-19 Please refer to Response to Comment 5-2 for a discussion of the mitigation measures developed for this project. No additional mitigation has been identified for the short- or long-term loss of the upland habitat referred to in the comment, due to the extent and availability of similar habitats in surrounding areas. The partial backfilling of the pit was analyzed in the Draft EIS and is presented in Section 3.9.2.4 for Wildlife and Fisheries Resources.

11-20 Construction of the perimeter fence, as proposed, would serve to minimize the amount of land within the active mine area (see Map 2-2, Proposed Action in the Draft and Final EIS). This is because mine elements such as growth medium stockpiles, storm water diversion channels, and the soil borrow source have been excluded from the fenced area. The fencing would be constructed to prevent unauthorized public access and to exclude livestock from the active mine area; its proposed location with respect to active mine elements encloses a minimal amount of land in order to reasonably serve this purpose. Thus, the mitigation measure suggested by the commentor would not be necessary or appropriate. Fencing proposed as part of the East Waste Rock Dump Alternative and West Waste Rock Dump Alternatives is similarly configured (see Maps 2-4 and 2-6, respectively).

11-21 The fence is necessary to this mine plan to ensure public safety. Please refer to Response to Comment 11-20 for a discussion of the amount of land enclosed by the proposed fencing.

11-22 Demands on public services in Eureka would increase as a result of the Proposed Action. However, contrary to the interpretation contained in this comment, the effects of the increased demand on public services and facilities were not determined to be significant. Nevertheless, allowances for increased staff and operating costs were included in the fiscal assessment. Net revenue of over $1.0 million is projected to accrue to Eureka County above and beyond the $1.9 million in added operating costs associated with the hiring of additional staff. Incremental revenue accrual to the Eureka County School District covers virtually the entire added costs projected for the District, $2.9 million in revenue compared to $3.1 million in added costs, over the life of the project. Relative to the District's operating budget of over $6.0 million annually, the cumulative shortfall of less than $200,000 would not be significant.

With respect to housing impacts, please refer to Section 2.1.1 in the Draft and Final EIS regarding actions by the Homestake Mining Company to address this issue. The housing construction already initiated by the Homestake Mining Company and future actions proposed by the company to assist in the development of additional housing are considered adequate to address the issue. Consequently, no additional socioeconomic mitigation is called for in the Final EIS.

Letter 11 Continued

11-22 discussed what types of feasible measures are available to mitigate these impacts, and those measures should be incorporated into the Record of Decision.

Letter 11 Continued

ENDNOTES

1. "Particulate Air Pollution and Hospital Emergency Room Visits for Asthma in Seattle." American Review of Respiratory Disease. Schwartz, Slater, Larson, Pierson, and Koenig. V. 147, pp 826-831, 1993.

"Air Pollution and Daily Mortality in Birmingham, Alabama." American Journal of Epidemiology. Joel Schwartz. Vol. 137, No. 10, 1993. See particularly figure 6, page 1145 for an illustration of how any increase in PM10 correlates to increased deaths.

"Air Pollution and Daily Mortality in Steubenville, Ohio.' American Journal of Epidemiology. Joel Schwartz and Douglas Dockery. Vol. 135, No. 1. 1992.

"Increased Mortality in Philadelphia Associated with Daily Air Pollution Concentrations." American Review of Respiratory Disease. Schwartz & Dockery. 145:600-604. 1992.

"Pulmonary Function and Ambient Particulate Matter." Archives of Environmental Health. Chestnut, Schwartz, Savitz, and Burchfiel. May/June 1991 (Vol. 46 (No.3) p 135-144.

"Particulate Air Pollution and Daily Mortality: A Synthesis." Schwartz. Public Health Review 1991/92; 19:39-60/

Letter 12

True Value

EUREKA HARDWARE

10279 Main Street P.O. Box 696
Eureka, Nevada 89316
(702) 237-5111

9-30-96

Mr. Christopher Stubbs
Bureau Of Land Management

Battle Mt., Nevada

Dear Mr. Stubbs,

12-1 In regards to the proposed Homestake Mining dump site in Eureka, Nevada, we would like to request that you do everything in your power to see that Homestake use the West dump site.

12-2 Living in Eureka we are concerned about the possible noise and dust problems from the proposed mining operation. Any thing that can be done before problems arise would be greatly appreciated.

12-3 Another concern is the "fly rock zone." Any assurance that you can obtain about the safety of the Eureka people and property is also requested.

Thank you for your time and attention.

Sincerely,

Trina L. Machacek

Trina L. Machacek

	ACT	INF	INT	DATE
DM				
Chris S.		✓	CJS	10/3
SS			[illegible]	[illegible]
RR				
NR				
FIRE				
File/Library/Toss (circle one)				

Response to Letter 12

12-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

12-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

12-3 Homestake would not allow flyrock in areas accessible to the public and would minimize flyrock on the mine site. Blasting safety is an issue that is highly regulated by the Mine Safety and Health Administration (MSHA).

Letter 13

CHRISTINE SMITH
P.O. BOX 263
EUREKA, NV 89316

OCTOBER 6, 1996

CHRISTOPHER STUBBS / LYNN RICCI
PROJECT MANAGERS
B.L.M
BATTLE MOUNTAIN DISTRICT OFFICE
P.O. BOX 1420
BATTLE MOUNTAIN, NV 89820

BECAUSE I AM A RESIDENT OF EUREKA, HOMESTAKE'S PROPOSED RUBY HILL PROJECT WILL HAVE A LARGE IMPACT ON MY LIFE. I HAVE INVESTED A GREAT DEAL OF TIME AND THOUGHT IN READING THE D.E.I.S - RUBY HILL PROJECT, AND SUBMIT THE FOLLOWING COMMENTS.

WASTE DUMP LOCATION

13-1 I STRONGLY RECOMMEND THAT THE B.L.M. SELECT A COMBINATION OF BOTH THE WEST WASTE DUMP ALTERNATIVE AND THE PARTIAL BACKFILL ALTERNATIVE FOR THE FOLLOWING REASONS:

1) AFTER REVIEWING THE VISUAL SIMULATIONS, THE WEST WASTE DUMP ALTERNATIVE IS THE LEAST VISUALLY OFFENSIVE.

2) THE WEST WASTE DUMP LIES WITHIN A CLASS IV VISUAL RESOURCE MANAGEMENT AREA, WHOSE OBJECTIVES ARE THE LEAST RESTRICTIVE. IN CONTRAST, BOTH THE PROPOSED ACTION AND THE EAST WASTE DUMP ALTERNATIVES LIE WITHIN A CLASS III AREA, AND EVEN WITH THE PROPOSED MITIGATION ~~IS~~ IS UNCERTAIN WHETHER CLASS III MANAGEMENT OBJECTIVES CAN BE ACHIEVED.

3) THERE IS NO ADVANTAGE FOR THE PROPOSED ACTION WITH REGARDS TO NOISE BUFFERING. AN ANALYSIS OF APPENDIX E, FIGS. 1-5 SHOWS THAT THE PROPOSED ACTION WILL HAVE NO AFFECT ON NOISE REDUCTION AT THE FAIRGROUNDS OR IN TOWN AS COMPARED TO THE WEST WASTE DUMP ALTERNATIVE.

4) SOME MIGHT ARGUE THAT SOME FORM OF WASTE DUMP ON THE EAST SIDE WOULD BE BENEFICIAL BECAUSE IT WOULD ~~BLOCK~~ HIDE THE MINESITE BUILDINGS FROM VIEW. HOWEVER, SINCE THE BUILDINGS WILL BE REMOVED AFTER MINING IS COMPLETED, I BELIEVE THAT VIEWING A FEW BUILDINGS FOR 10 YEARS IS MUCH MORE DESIRABLE THAN VIEWING A NEARBY WASTE DUMP FOR MILLIONS OF YEARS TO COME.

Response to Letter 13

13-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 13 Continued

13-1 5) THE PARTIAL BACKFILL ALTERNATIVE SHOULD BE USED IN CONJUNCTION WITH THE WEST WASTE DUMP ALTERNATIVE FOR OBVIOUS REASONS. LESS WASTE VISIBLE ABOVE GROUND EQUATES TO LESS VISUAL IMPACT. ELIMINATING 3 MILLION TONS FROM THE WASTE DUMP IS NOT MUCH, BUT IT HELPS

NOISE

13-2 SECTION 3.16.2.1, PAGE 3-266 STATES THAT "ATMOSPHERIC EFFECTS SUCH AS TEMPERATURE INVERSIONS ALSO CAN INCREASE NOISE LEVELS ...". WAS THE EFFECT OF TEMPERATURE INVERSION INCLUDED IN THE NOISE LEVEL MODEL? WILL RESIDENTS NOTICE AN INCREASED NOISE LEVEL DURING INVERSIONS?

13-3 SECTION 3.16.2.1, PAGE 3-266 STATES THAT "HOMESTAKE HAS COMMITTED TO MINIMIZE NOISE DURING NOISE SENSITIVE ACTIVITIES AT THE FAIRGROUNDS AND HIGH SCHOOL." HOW HAS HOMESTAKE DONE THIS? HOW DO THEY PROPOSE TO DO THIS? I WOULD LIKE TO SEE SPECIFIC MITIGATION MEASURES IN THE FINAL DRAFT E.I.S.

13-4 FINALLY, PREDICTED NOISE LEVELS ARE BASED ON A MODEL. UNTIL MINING ACTIVITIES ACTUALLY BEGIN, NOBODY CAN SAY WHAT THE ACTUAL NOISE LEVEL WILL BE. IF THE NOISE LEVELS DURING MINING ARE HIGHER THAN PREDICTED AND EXCEED 55 DECIBELS AT SENSITIVE RECEPTORS, HOW WILL THAT NOISE BE REDUCED? HOW OFTEN WILL THE BLM CHECK THE INFORMATION GENERATED FROM THE SENSITIVE RECEPTORS?

AIR QUALITY

13-5 IT APPEARS THAT MITIGATION WITH REGARDS TO AIR QUALITY FALLS WITHIN THE NEVADA DIVISION OF ENVIRONMENTAL PROTECTION THROUGH AIR QUALITY PERMITS. ALTHOUGH THE BLM MAY NOT BE PERMITTED TO MITIGATE ON THIS ISSUE, I WOULD STILL LIKE TO EXPRESS MY CONCERN. TABLE 3-6, PAGE 3-16, SHOWS THAT THE PROJECT AREA HAS A VERY LOW (9) BACKGROUND ANNUAL CONCENTRATION OF PM_{10}. THE ANNUAL STANDARD IS 50. MINING AT THE RUBY HILL PROJECT WILL INCREASE THE ANNUAL PM_{10} TO 42.9 – 53.5 AT THE PROJECT FENCELINE. ALTHOUGH THESE AMOUNTS BARELY FALL BELOW OR EXCEED FEDERAL STANDARDS, I BELIEVE THAT IT IS MORE IMPORTANT TO NOTE THAT MINING ACTIVITIES WILL CREATE 4-5 TIMES MORE ANNUAL PM_{10} CONCENTRATION THAN PRESENT.

Response to Letter 13

13-2 Please refer to Response to Comment 10-56 for a discussion of why the effects of temperature inversions were not included in the Environmental Noise Model. It is reasonable to assume that residents in the Eureka area will, on occasion, perceive an increase in noise levels during periods when inversions are present. The duration and intensity of increased noise levels at nearby sensitive receptors can not be accurately predicted; however, it is highly unlikely that such noise levels would exceed levels recommended by the U.S. Environmental Protection Agency as adequate to protect public health and welfare (i.e., 55 dBA, L_{dn}).

13-3 Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

13-4 Please refer to Response to Comment 14-1 for a discussion of the noise berm, a potential technique to reduce noise levels at sensitive receptors. The BLM has no authority to enforce noise levels in and around Eureka.

13-5 Please refer to Response to Comment 3-3 for a discussion of the revised analysis of impacts to air quality, particularly PM_{10} (dust).

Letter 13 Continued

SUMMARY

13-6 THE PROPOSED RUBY HILL PROJECT POSES SOME UNIQUE PROBLEMS BECAUSE IT IS LOCATED UNUSUALLY CLOSE TO AN ESTABLISHED TOWN. CAN A MINE BE A "GOOD NEIGHBOR"?

13-7 THE TOWNSITE OF EUREKA AND EUREKA COUNTY HAVE NO STANDARDS FOR NOISE OR AIR QUALITY. THIS IS WHY CALIFORNIA AND OREGON RESIDENTIAL STANDARDS WERE USED IN NOISE ANAYSIS, AND THIS IS WHY STATE AND/OR FEDERAL STANDARDS ARE USED IN AIR QUALITY ANALYSIS. WHY DOESN'T EUREKA HAVE ITS OWN STANDARDS? THE ANSWER IS BECAUSE IT IS A CLEAN, QUIET RURAL NEVADA TOWN WHICH HAS NEVER NEEDED STANDARDS.

13-6 HOMESTAKE REPRESENTATIVES HAVE ASSURED ME THAT HOMESTAKE IS COMMITTED TO BEING A GOOD NEIGHBOR. HOW, SPECIFICALLY, DO THEY PROPOSE TO ACHIEVE THIS? WHERE ARE THE LONG AND DETAILED MITIGATION PROPOSALS REGARDING NOISE? OR DO I JUST TAKE THEIR WORD FOR IT?

13-8 I BELIEVE THAT THE B.L.M. SHOULD COMPEL HOMESTAKE TO REDUCE THE NOISE AND DUST AS MUCH AS POSSIBLE. I BELIEVE THAT BACKGROUND NOISE LEVELS IN EUREKA SHOULD BE USED AS THE HOMESTAKE NOISE STANDARD. I BELIEVE THAT EUREKA'S ANNUAL PM_{10} SHOULD BE USED AS AN AIR QUALITY STANDARD. I AM NOT NAIVE NOR INFLEXIBLE ENOUGH TO BELIEVE THAT HOMESTAKE CAN MEET THESE STANDARDS. RATHER, I AM HOPING THAT THE B.L.M. AND HOMESTAKE USE THESE STANDARDS AS AN IDEAL GOAL TO PROPOSE CREATIVE AND INNOVATIVE MITIGATION MEASURES IN ORDER FOR HOMESTAKE TO COEXIST WITH EUREKA WITH MINIMUM IMPACT. AND - I'D LIKE TO SEE THESE MITIGATION MEASURES IN WRITING!

SINCERELY,

Christine Smith

Response to Letter 13

13-6 Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

13-7 Eureka County has not established noise or air quality standards because these issues have not been of concern to a majority of county citizens in the past.

13-8 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 14

October 6, 19[illegible]

Dear Mr. Stubbs,

This letter is in regard to the latest EIS for the Homestake Mine in Eureka.

We are a very unique community, and from all reports, Homestake would like to contribute in a positive way.

14-1 There were three points of concern to me in the latest report. One is the noise factor. In the original report there was a berm to help keep the noise from traveling.

It seems that with the location of the mine not only at the backdoor to the townsite but also the highschool, the berm should not be eliminated.

14-2 The second, is the dust factor. Again, with such proximity to the town and school, all reasonable measures to keep the dust down should be exercised.

14-3 And the third concern, is the site for the waste dump. It would be a shame to consider dumping on the east end of the mine site along Highway 50. Dumps are exactly that, dumps.

Response to Letter 14

14-1 Homestake may install berms as a noise mitigation measure. The use of smaller temporary berms will be considered should noise affect the town site. A large berm was not included in the Proposed Action because, subsequent to the noise analyses, it was determined that a permanent noise berm may not be as effective as smaller temporary berms constructed closer to the actual mining activity. It also was discovered that once the pit was mined below approximately 30 feet, the berm would provide little additional noise mitigation. The effectiveness of noise mitigation, should noise be a realized concern, will be discussed in the advisory group.

14-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

14-3 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 14 Continued

14-3 This would be an unsightly entrance to our community. I would hope that <u>only</u> West End dumps be considered.

Thank you for taking the time to read my concerns. I am confident that if more people were aware of this, you would receive numerous letters with the same concerns.

Sincerely,

Karen Kalarry

Letter 15

7 October 1996

To: Project Managers
From: Judith A Dlindt
Re: Draft EIS Ruby Hill Project

15-1 For reasons stated below I would recommend utilization of the East Waste Dump as described on the first page of the Summary

1. There would be less dust created thus less effect on the Township.

2. There would be less ambient noise created by the dump traffic and thus less noise would carry to the Township.

Please carefully consider the above suggestions and the effect they would have on a happy relationship with the mine owners and the town population.

Sincerely

Judith A Dlindt

P.O. Box 70
Eureka NV 89316

Response to Letter 15

15-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives. Please note that there is little difference among alternatives in terms of the amount of dust created (see Table 3-5 in the EIS) and the amount of noise created (see Appendix E, Maps E-1 through E-8).

Letter 16

James P. Ithurralde
P.O. Box 26
Eureka, NV 89316

September 30, 1996

Bureau of Land Management
Battle Mountain District Office
Ruby Hill E.I.S. Project Managers
P.O. Box 1420
Battle Mountain, NV 89820

ENVIRONMENTAL IMPACT STATEMENT / RUBY HILL PROJECT

As permit holder of the *Ruby Hill Allotment* and owning all the livestock water rights on this allotment, I would like to make comments on the proposed project by Homestake Mining Company.

3.8 Range Resources
3.8.2.1 Proposed Action

16-1 I'm uncomfortable with the calculations of the number of temporary and permanent loss of A.U.M.s. Any loss to this small allotment is critical to our operation. Under 3.8.1 it is stated that rangeland in the project *vicinity* is grazed once during the growing season for approximately 3 to 5 days during early May. Due to the lack of use of the project site I feel the allowable utilization rate of vegetation should be 10% to 15% instead of the 60% used in Tables 3-29 and 3-30. With this adjusted utilization rate it would show a temporary loss of 8-16 A.U.M.s and a permanent loss of 2 to 4 A.U.M.s.

16-2 We own several surface springs on this allotment within 4.5 miles of the proposed project. In Chapter 2, Page 2-53, Figure 2-7 the reasonably foreseeable East Archimedes pit is below ground water table. It appears they may have to dewater. In other mine dewatering projects several surface springs have disappeared and I feel the same may happen on this allotment. All of the springs are at a higher elevation south of the proposed project. Since this is

Response to Letter 16

16-1 Please refer to Response to Comment 10-39 for a discussion of the loss of AUMs within the Ruby Hill Grazing Allotment.

16-2 Please refer to Response to Comment 10-31. The East Archimedes reasonably foreseeable future scenario has been addressed in the Ruby Hill EIS to the greatest extent possible. No further information is available on this future scenario, nor does Homestake Mining Company have plans to mine this deposit at the present time. If Homestake Mining Company submits a Plan of Operations to mine the East Archimedes deposit, the BLM would require a detailed environmental analysis, to include but not be limited to: 1) a groundwater hydrology model, 2) a pit water geochemistry model, and 3) a mitigation plan for potentially significant impacts.

Letter 16 Continued

16-2 addressed as a *reasonably foreseeable project* I feel the dewatering of this East Archimedes mine pit should be addressed in this E.I.S. This would cause a hardship to the permitee and I would request that Homestake provide in the Final E.I.S. mitigation measures for such an occurrence.

16-3 We are also owners of a irrigation and domestic well within a 2 mile radius of the proposed project. These are shown as Map Location 14(23722) and Map Location 25 (7352) on Table 3-14 Page 3-52. This project in the future could have significant impact on these wells.

16-4 I'm afraid future mining development will have a bigger impact on this allotment. This allotment and it's water rights cannot take large cuts and losses of spring water. I would request mitigation measures if any of these items are impacted.

JAMES P. ITHURRALDE
(H) 702-237-5167 (W) 702-237-5270

/jpi

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Response to Letter 16

16-3 Please refer to Map 3-10 in the Draft and Final EIS for the 1-foot drawdown radii for each of the Homestake wells. Homestake would not increase annual water withdrawn from these wells when compared to their agricultural use. Wells No. 14 and 25 are within the 1-foot drawdown radius, so there would be a minor effect. However, this effect would not be significant.

16-4 Please refer to Response to Comment 16-2 for a discussion of impacts to springs in the area. No impacts to springs were identified and minor impacts to stocking rates were identified. Therefore, no mitigation measures have been developed for these resources.

Letter 17

GARY & MELODY GARAVENTA
P.O. BOX 65
EUREKA, NV 89316

09-25-1996

CHRISTOPHER STUBBS
LYNN RICCI
BLM
BATTLE MOUNTAIN DISTRICT OFFICE
P.O. BOX 1420
BATTLE MOUNTAIN, NV 89820

I AM WRITING REGARDING THE RUBY HILL PROJECT D.E.I.S. I BELEIVE THAT THE PROPOSED PROJECT WILL HAVE AN EFFECT ON THE WATER QUALITY, WATER QUANITY, AIR QUALITY AND NOISE IN OUR AREA, APPROXIMATELY TWO MILES NORTHWEST OF THE SITE.

ALL STUDIES MADE IN THE DEIS WERE MADE IN THE DIRECTION OF THE EUREKA TOWNSITE, WHICH IS EAST-SOUTHEAST. THE AREA OF MY CONCERN IS NORTH-NORTHWEST OF THE PROJECT. IN THIS AREA WE HAVE A HOME, BUSINESS AND OTHER PROPERTIES.

THE FOLLOWING ARE AREAS OF CONCERN TO US:

GROUND WATER

BEING A LAND OWNER WITH SEVERAL WATER WELLS APPROXIMATELY 2 MILES FROM THE RUBY HILL MINE SITE AND 1 MILE FROM ITS COLLINGWOOD RANCH WELLS HAS US CONCERNED ABOUT OUR GROUND WATER. THE DOMESTIC AND IRRIGATION WELLS IN OUR AREA RANGE IN DEPTH FROM 150 FT. TO 510 FT.AND THIS IS A VERY SMALL AREA. THIS SHOWS THAT THE UNDERGROUND WATER LEVEL VARIES GREATLY IN OUR AREA.

17-1 THE COLLINGWOOD RANCH NORTH WELL IS GOING TO HAVE A 5.44 FT. DRAWDOWN AT THE WELL AND A 1 FT. DRAWDOWN IN A CONTOUR APPROXIMATELY ONE MILE FROM THE WELL ACCORDING TO THE DEIS. THIS I FEEL WILL EFFECT MY TWO WELLS BEING WITHIN THE COUTOUR. WHEN COLLINGWOOD RANCHPUMPED THE WELL FOR IRRIGATION IN PAST YEARS IT WAS FOR THE SUMMER MONTHS ONLY. THIS GAVE TIME TO RECHARGE OUR UNDERGROUND WATER SUPPLY. RUBY HILL PROJECT WILL BE PUMPING YEAR-ROUND. I THINK THE RUBY HILL PROJECT SHOULD MONITOR THE EXISTING DOMESTIC AND IRRIGATION WELLS IN THIS SMALL AREA.

17-2 THE EAST ARCHIMEDES MINERALIZATION IN THE MINE IS BELOW THE WATER LEVEL IN THIS AREA ACCORDING TO FIGURE 2-7 & MAP 3-B IN THIS DEIS. IF DEWATERING DOES OCCUR IN THE RUBY HILL PROJECT HOW MUCH WILL THIS EFFECT OUR UNDERGROUND WATER AT OUR WELL SITES? WILL WE BE NOTIFIED IF THE RUBY HILL PROJECT MONITOR WELLS SHOW A DECREASE IN WATER LEVELS? IF WATER LEVELS DROP DUE TO THE RUBY HILL PROJECT AND CAUSE US TO DRILL DEEPER OR FIND OTHER MEANS FOR WATER WILL THE MINE COMPENSATE?

Response to Letter 17

17-1 Please refer to Response to Comment 16-3 for a discussion of impacts to wells within the 1-foot drawdown radius. Also, please refer to Response to Comment 1-6 for a discussion of well monitoring.

17-2 Please refer to Responses to Comments 10-31 and 16-2 for a discussion of the East Archimedes development and future impact analysis.

Letter 17 Continued

AIR QUALITY

17-3 IN YOUR DEIS IT STATES THAT THIS PROJECT WILL FOLLOW STANDARD CONSTRUCTION PRACTICES TO MINIMIZE DUST AND DUST EMISSIONS. AT THE RUBY HILL PROJECT HOUSING CONSTRUCTION SITE IN EARLY SEPTEMBER ON THE NORTH END OF THE EUREKA TOWNSITE, DUST WAS BLOWING HARD ACROSS HIWAY 50 ON SEVERAL OCCASIONS. WILL THE MINE SITE HAVE THE SAME DUST CONTROL? AS I WRITE THIS, CONSTRUCTION EQUIPMENT IS USING THE ROAD AROUND COLLINGWOOD RANCH (NORTH AND WEST SIDES) WITH NO DUST CONTROL. I THINK THAT DUST CONTROL SHOULD BE CONSIDERED IN ALL AREAS OF THIS PROJECT.

NOISE AND BLASTING VIBRATIONS

17-4 ACCORDING TO THE DEIS THE COMBINED NOISE LEVELS FROM THE MINE SITE WERE ALL CONSIDERED FROM THE EUREKA COUNTY FAIRGROUNDS, EUREKA HIGH SCHOOL AND THE NORTHERN PORTION OF THE EUREKA TOWNSITE. BEING A LAND OWNER NORTH-NORTHWEST OF THE SITE, WE WERE NOT CONSIDERED. EXPLORATION AT THE MINE SITE IN 1995 AND 1996 EFFECTED THE NOISE LEVEL IN OUR HOME 24 HRS. A DAY. THE DEIS STATES THAT IT WILL COOPERATE WITH NOISE SENSITIVE ACTIVITIES IN TOWN AND AT THE FAIRGROUNDS, BUT THE HOME OWNERS NORTH-NORTHWEST WERE NOT IN THE DEIS. THIS PROJECT DURING CONSTRUCTION AND REGULAR MINE ACTIVITIES WILL EFFECT US GREATLY.

THANK YOU FOR LETTING US STATE OUR CONCERNS AND QUESTIONS ON THE RUBY HILL PROJECT. WE HOPE YOU WILL TAKE THESE CONCERNS AND QUESTIONS INTO CONSIDERATION.

THANK YOU;

GARY & MELODY GARAVENTA
P.O. BOX 65
EUREKA, NV 89316

Response to Letter 17

17-3 Please refer to Response to Comment 3-4 for a discussion of mitigation measures for PM_{10} (dust).

17-4 Please refer to Appendix E of the Draft and Final EIS for figures depicting estimated noise levels in the mine vicinity during proposed mining operations. These figures have been redrafted in the Final EIS for better clarity. The figures indicate that outside noise levels at residences located north of the mine would not be expected to exceed 40 dBA, Leq, under all scenarios represented in Appendix E (see also the fourth paragraph on page 3-266 of the Draft EIS). Consequently, noise from mining operations would not exceed levels recommended by the U.S. Environmental Protection Agency as adequate to protect public health and welfare at these sites. Also, please refer to Response to Comment 10-57 for a discussion of how Homestake would cooperate with adjacent land owners/users to minimize noise impacts.

Letter 18

Dear BLM:

18-1 At one time I lived in Eureka in the 60's And I think that this project is a good Idend but I think that the west dump would be the best way to solve the problem at this time until Homestake find A way to fix what they want to start in Eureka.

Mike Harre

Response to Letter 18

18-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 19

TO WHOM IT MAY CONCERN

19-1 I'M AWARE THAT BOTH THE NOISE AND THE DUST (FUGITIVE PARTICLES) ARE GOING TO INCREASE GREATLY IN EUREKA DUE TO THE HOMESTAKE MINING. AS A RESIDENT OF EUREKA, I'D LIKE THE B.L.M. TO MITIGATE STRONGLY TO TRY TO KEEP THE NOISE AND THE DUST DOWN TO A MINIMUM.

SINCERELY

[illegible]

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Response to Letter 19

19-1 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 20

To: Homestake
Ruby Hill Project
Eureka, NV

From: Ted & Sharlene Vernes
P.O. Box 142
Eureka,NV 89316
(702)237-7019

20-1 Let us make it very clear to you That we are not against your Ruby Hill,project.However your E I S report is very vague on noise levels and dust control.Being a former member of the Operating Engineers #3 with over 25 years in heavy construction. I fully understand that you can not have total control of these elements,on a project like yours will be.We feel that you should be alot more honest and forthright with the people of Eureka,on these issues,and be advised,that your proposed waste dump sites are also coming under scrutiny by the citizens of this commuity.

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Thank You

Ted Vernes

Sharlene Vernes

Response to Letter 20

20-1 A full discussion of the Proposed Action, alternatives, the affected environment, and an analysis of potential impacts has been presented in the Ruby Hill EIS, following the format outlined in the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (40 CFR 1500-1508). In addition, the public has been involved in the EIS process, as outlined in Chapter 4 of the EIS. Every attempt has been made to present the analysis of impacts and mitigation measures in a clear, understandable format.

Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 21

Attention Christopher Stubbs,

I am a frequent visitor to the Eureka area and have become aware of the proposed mine dumps for the Ruby Hill Project.

21-1 I would strongly recommend that the west dump alternative be selected.

In Moab, Utah where I live the mill tailings at the north end of town have become controversial for several reasons and there is a strong push locally to move the pile. Eureka County could easily avoid a similar controversy by selecting the most aesthetic location (the west alternative) at the present time — before development starts.

Sincerely

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Response to Letter 21

21-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 22

Dear B.L.M.

22-1 I don't like the proposed waste dump alternate. I prefer the West waste dump.

22-2 I am concerned about the noise and dust level modeled in the E.I.S. I want the B.L.M. to do everything possible to make sure that Homestake reduce the [illegible] that I have stated above; because this is a major concern. I proud to live in Eureka and want it to stay the way it was when I came here

Sincerely yours
Paul [illegible]

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Chris S.		✓	GTS	10/3
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Response to Letter 22

22-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

22-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 23

Dear Sirs: Concerning the Ruby Hill Project:

23-1 I think that the West Waste Dump is the best choice because its away from the fairgrounds and doesn't look as bad as the other alternatives.

23-2 It looks to me that there's going to be a lot more noise and dust in this town because of the mine. I live in Eureka, and I'd like the B.L.M. to make sure that the Homestake mine does whatever it can to reduce the noise and dust

Thank you.

Shannon Brad

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Response to Letter 23

23-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

23-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 24

Director BLB

I as a Citizen of Eureka County and the Township of Eureka I have a few concerns about Homestakes Ruby Hill Project.

24-1 1) East Waste Dump
2) Dust from open pit and waste Dump
3) Noise in the Town of Eureka

Carlton P. Forbes
Carlton P. Forbes

24-2 P.S. I prefer the West Waste Dump site, and I

24-3 want the BLM to make Homestake keep noise & dust down.

Response to Letter 24

24-1 Thank you for your comment. Your concerns will be considered with the final decision-making process.

24-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

24-3 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 25

Homestake Comment

I previously commented that I wanted the waste dump split into EAST & WEST

25-1 I now am aware of the pit expansion causing more waste dump rock, therefore the waste dump should be kept all to the west side

Eric J Paston

9/28/96

Response to Letter 25

25-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 26

9/28/96

26-1 I think the west waste dump is the best choice for our Community.

26-2 I want to insure that Homestake does everything possible to reduce the noise & Dust levels.

Sherrie L. Mano

Response to Letter 26

26-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

26-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 27

To Whom It May Concern:

27-1 The noise and dust is going to have a negative impact on Lead.
As a concerned citizen I would like to voice my opinion that Home Stake should do all it can to eliminate the noise and dust in our town.

Sincerely

Ruth Parmen

Response to Letter 27

27-1 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 28

BLM.

28-1 I am concerend. about the noise & dust. I want the BLM to insure that Homestack does everything possible to Reduce these

28-2 impacts. I prefure the west waste dump

Lenny Spencer,

Response to Letter 28

28-1 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

28-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 29

9-30-96

To Whom It May Concern:

29-1 After observing the picture of proposed locations + superimposed picture of dump sites, I would very much prefer to see the "West dump proposal" used.

29-2 I am concerned about the noise level in Diamond Valley when the winds are blowing from the south or southerly direction. From past experience this has been, + could be even more in the future, a problem that was not here when I bought my land. With temperature inversions this problem will be increased.

29-3 In general, I would like to see the noise + dust reduced to minimal as possible.

Thank You,

Roberta Strand

Response to Letter 29

29-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

29-2 Please refer to Response to Comment 17-4 for a discussion of estimated outdoor noise levels during mining operations for residences located north of the mine site.

29-3 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 30

Sept. 30, 1996

Dear BLM,

30-1 I prefer the West waste dump alternative.

30-2 The noise and dust is also one of my concerns. I know that Homestake can't eleminate all of the noise and dust, but due to its closeness to town I want Homestake to do whatever possible to reduce the noise and dust.

Ansel Bazm

Response to Letter 30

30-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

30-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 31

Bob Stephenson
N.B.A. Eureka Services
Box 269
Eureka NV
89316

Mr Stubbs –

31-1 I prefer the West waste area —

31-2 Also I believe the dust control measures should be spelled out in detail. The 49.8 percent you show can not be allowed – unless spelled out in detail I feel these limits would be exceed many many time.

31-3 Also I would like a closer look at the noise levels — would a berm or vegetation help keep the levels down in town — A constant level of 50 would almost be almost unbearable —

Thank You
Bob Stephenson

Response to Letter 31

31-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

31-2 Please refer to Response to Comment 3-3 for a discussion of the revised analysis of impacts to air quality, particularly PM_{10} (dust), and to Response to Comment 3-4 for a discussion of mitigation measures for PM_{10}.

31-3 Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

Letter 32

Mr. Stubbs, 9/30/96

32-1 I dont like Homestake's proposed alternative for the waste dumps. I'd rather see the West Waste Dump Alternative.

32-2 As a resident of Diamond Valley, I'm concerned about both the noise and dust levels, especially the noise during the winter with the temperature inversions. Please do all you can to make Homestake keep the noise and dust down ~~as~~ much as humanly possible

Thank you,

[illegible signature]

Response to Letter 32

32-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

32-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 33

To Whom it may Concern
Ruby Hill Project

33-1 As a citizen of Eureka, I am concerned about a noise and dust problem here in Eureka due to the mining project in evaluation. I along with many other citizens in Eureka want Homestake to take every possible measure to keeping Eureka a nice little quiet town.

33-2 Also after looking through the E.I.S. I would prefer the West waste Dump Alternative.

Concerned
Citizen,
D. [illegible]

Response to Letter 33

33-1 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

33-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 34

September 20, 1996

Dear Sir,

I was unable to attend the public meeting here on Tuesday the 17th because it wasn't widely published and I didn't learn of it until later.

34-1 My question conserns the use of tailings ponds to heap leach ore. What if these get leaks? I haven't seen the eis to see if this question was looked at, but how can you look at something without knowing what it will actually do on the site. I mean that there is no way to know what leaks will do to the site without it actually happening. And being so close to town.

Will you mail me a eis for the Ruby Hill project, as well as any of the other information and brochures handed out at the meeting.

Thank you in advance.

Tom Ross

Tom Ross
box 180
Eureka
Nevada 89316

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	X			9/27
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Response to Letter 34

34-1 Homestake does not propose a tailings pond. The heap leach pad is designed and would be constructed and operated according to State of Nevada Water Pollution Control Regulations (NAC 445A). These regulations do not allow for any process solution discharge to groundwater.

Letter 35

To Whom it may concern:

I am writing in regard to the proposed mining developments at Homestake's Ruby Hill Project.

35-1 It has been brought to my attention that noise and dust levels may become a problem. My family and I would like to be assured that these levels are monitored and controlled to stay within the industry standards.

35-2 We are also concerned that the "Waste Dump" be kept as far westerly as possible. So as to keep as much of the original veiw looking Southwest from the Fairgrounds as possible.

Thank you.

Clayton E. Nicholes

Clayton E. Nicholes

Melodie L. Nicholes

Melodie Nicholes

Response to Letter 35

35-1 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

35-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 36

September 29, 1996

To Whom it may concern

36-1 I am a resident of Eureka, Nevada. I prefer the

36-2 west waste dump alternative. I am also concerned about the noise and dust the mine may produce. I would like the BLM to do everything possible to insure Homestake keeps the noise and dust to a minimum.

I own the Keyhole Bar in the town of Eureka so I am concerned with an increase in business also, which will be very welcome.

Cecile Lowrey
P.O. Box 481
Eureka, NV 89316

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Response to Letter 36

36-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

36-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 37

September 25, 1996

Bureau of Land Management
Battle Mountain District Office
Ruby Hill ESI Project Managers
PO Box 1420
Battle Mountain, NV 89820

Gentlemen:

As a Eureka County land owner within view of the Ruby Hill Project I have the following concerns about the project.

37-1
- WATER: Our home and land are located less than 400 yards from the North well and we are concerned with the drawn down of the water.

37-2
- DUST: We are concerned about the East wind bringing great amounts of dust from the mine once it is in operation. Already there is a considerable amount of dust as construction crews travel past our home on Collingwood Lane to reach the construction site on the South end of the lane.

37-3
- NOISE: We do not know how much noise will reach our residence once the mine is in operation.

Sincerely,

[signature]
Clarisse Herrera

Bob & Clarisse Herrera

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[illegible] Library/Toss (circle one)				

Response to Letter 37

37-1 Nevada state well records (current through March 1996) were reviewed to identify wells within a 5-mile radius of the project area. However, information regarding the Herrera well was not found in the state well records, and thus was not provided in Table 3-14 or illustrated on Map 3-9 in the Draft or Final EIS. As discussed in the EIS, the drawdown at the Homestake well should not exceed 6 feet, and the drawdown in your well is expected to be between 2 and 5 feet. Also, please refer to Response to Comment 1-6 for a discussion of declining groundwater levels throughout Diamond Valley over the past 30 years.

37-2 As a result of your comment, calculated dust concentrations near your residence in Diamond Valley have been added to Table 3-6 in the Final EIS. Very little dust resulting from mining operations would be transported as far as the Collingwood Lane area.

37-3 Please refer to Section 3.16.2.1 and Appendix E in the Draft and Final EIS for a discussion of noise levels expected as a result of proposed mining operations.

Letter 38

Sept 30, 1996

To Whom it May concern.
Re: Ruby Hill Project

38-1 It looks to me as though the West Waste Dump Alternative would be the best choice for the waste dump site selection.

38-2 I also realize that the noise and dust from the Ruby Hill Project is going to impact the town of Eureka and Diamond Valley. I am hoping that the B.L.M. will make Homestake take all possible measures to reduce the noise and dust as much as economically possible.

Sincerely,

[signature]

Response to Letter 38

38-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

38-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 39

MR Stubb's

Please Accept This Letter As Personal Comments on The draft E.I.S. for The Rubyhill Project.

39-1 I Feel That A Child going To School is in A "Noise-Sensitive" Activitey At All Times. The Noise from mining is going To Affect A Child in School. Home-stake Should install some Type of Sound Protection That will Provide for Continuous Control of Noise Level's.

39-2 I Also Feel That The Location of The Dump will have An impact on Noise Level's in The Townsite. From The Alternative Dumpsites The West Waste Rock Site may make more Sense Than other's. It is going Away from Town And is not placing waste As close To Places That Are used By Local Group's.

39-3 MAP 2-10 Page 2-52 show's East Archimedes Pit As "Reasonably For-seeable". Homestake Should Adress The Placement of The Waste Rock in This Document or it may Become A Real issue in The Future.

Thank you

Leonard Fiorenzi

Response to Letter 39

39-1 Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

39-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

39-3 As a result of your comment, the text in Section 2.7 of the Final EIS has been expanded to clarify that approximately 60 million tons of waste rock would need to be placed as a result of the East Archimedes development. The location of this waste rock dump(s) has not been determined.

Letter 40

Dear BLM —

40-1 I've looked at the E.I.S. for the Ruby Hill Project and I don't like where Homestake proposes to put the two waste dumps. I would rather see them put all of ~~these~~ their waste at the West Waste Dump.

40-2 I also see that the noise and dust ~~is~~ definitely going to impact our community, and I would like to see very strong mitigation on the noise and dust to reduce the impacts as much as possible.

Norbert Walton

Response to Letter 40

40-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

40-2 Based on a number of comments, additional mitigation measures for noise and air quality have been developed. Please refer to Measure 1 in Section 3.1.4 and Measure 3 in Section 3.16.4 of the Final EIS. These measures address an advisory group facilitated by Homestake to work with interested agencies and citizens to ensure that public concerns about noise and dust are effectively responded to throughout the life of the project. Also, please refer to Response to Comment 3-4 for a discussion of air quality mitigation and monitoring, and Response to Comment 14-1 for a discussion of the noise berm.

Letter 41

41-1 I want the West waste dumps

Mr & Mrs Frank Kelsey

Response to Letter 41

41-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 42

Public Comments

Ruby Hill Mine
Draft Environmental Impact Statement

We invite and encourage you to comment on this Draft EIS and to participate throughout the EIS process. The Draft EIS public comment period closes on ***October 8, 1996***. Comments must be submitted by this date. You may make comments on this form and leave them on the table in the back of the room, or send written comments to:

Bureau of Land Management
Battle Mountain District Office
Attn: Christopher J. Stubbs and Lynn Ricci
Ruby Hill EIS Project Managers
P.O. Box 1420
Battle Mountain, Nevada 89820

Name: Eric J Pastorino

Address: Box 56, Eureka, Nev 89316

Affiliation (if any): Pastorino Rentals

Comment(s):

42-1 Would Like to see Waste Dump on split so it is on both West and EAST side of Pit

Would Like to see Dump on ~~Eas~~ EAST side kept smaller Than West side

Response to Letter 42

42-1 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

Letter 43

Public Comments

Ruby Hill Mine
Draft Environmental Impact Statement

We invite and encourage you to comment on this Draft EIS and to participate throughout the EIS process. The Draft EIS public comment period closes on ***October 8, 1996***. Comments must be submitted by this date. You may make comments on this form and leave them on the table in the back of the room, or send written comments to:

Bureau of Land Management
Battle Mountain District Office
Attn: Christopher J. Stubbs and Lynn Ricci
Ruby Hill EIS Project Managers
P.O. Box 1420
Battle Mountain, Nevada 89820

Name: Marie Hallmark **Address:** Eureka **Affiliation (if any):**

Comment(s):

43-1 Mining has been a tradition in Eureka for many decades and is hope that it will continue in the future

Response to Letter 43

43-1 Thank you for your comment. No response necessary.

Letter 44

Christopher Stubbs
Lynn Ricci
Bureau of Land Management
Battle Mountain District Office
P. O. Box 1420
Battle Mountain, NV. 89820

7 October 1996

RE: Draft Environmental Impact Statement - Ruby Hill Project

Dear Mr. Stubbs and Ms. Ricci:

44-1 I would like to begin my comments on the Ruby Hill Project DEIS by saying that I believe Homestake's Ruby Hill project represents one of the most environmentally benign mining ventures to be proposed within Nevada within the last ten years and that, for the most part, the DEIS honestly reflects this. Consequently, I see absolutely no reason why permits to allow mining at Ruby Hill should be denied. There are a number of things that the DEIS has brought to my attention that I would like to address.

44-2 To begin with I would like to suggest an additional alternative to the Waste Rock Dump proposals. I believe that the West Waste Dump Alternative (WWDA) is preferable to the East Alternative (EWDA) primarily for the reason that the EWDA places material adjacent to US 50 making it highly visible to the residents and tourists passing by and it blocks the pleasant view of the north end of the Fish Creek Mountains. Mines should attempt to be as innocuous as possible.

There is no need to hide the pit from the highway with the dump as any view of the pit from the highway (elev. 6480') will only see about 100 feet of the south high wall (elev. 6520+'). As that portion of the pit wall will consist only of alluvial gravel it will not have a strong, noticeable visual impact. 44-3 I do believe that a berm along the east-southeast side of the pit to limit noise in Eureka is a good idea. Furthermore, the planting of trees along the west side of the highway could also effectively shield the view of the mine, buildings, etc.

44-4 In addition, I think that the relocation of the WWD to the west side of Mineral Point would do a better job of hiding the waste. Also, the currently proposed, as shown in the DEIS, contouring of the WWD is at 90° to that of the surrounding terrain and will stand out as unnatural. A better method of blending the dump in with the surrounding hills would be to contour the dump with drainages that trend north-south not east-west. I have included an altered photocopy of Map 2-7 to illustrate my ideas (figure 1).

44-5 The proposed Partial Backfilling Alternative is a good idea but perhaps it could be taken a little further. Based upon the pit contours, as illustrated in Figure 2-6 page 2-44, it appears that the easternmost portion of the pit will be mined last and that the central portion of the pit will have

Response to Letter 44

44-1 Thank you for your comment. No response necessary.

44-2 Agency-Preferred Alternatives have been identified by the BLM. Please refer to Section 2.9 in the Final EIS for a discussion of these alternatives.

44-3 Please refer to Response to Comment 14-1 for a discussion of the noise berm. BLM has considered the mitigation effectiveness of planting trees along the west side of Highway 50 in the vicinity of the Eureka County Fairgrounds. However, it was determined that the growth of trees over the life of the project (about 10 years) would not be sufficient to form an effective noise or visual barrier. Concurrent reclamation of the waste rock dumps would begin to reduce visual contrasts while active mining is ongoing.

44-4 Homestake has encountered mineralization to the south of the West Waste Rock Dump. Homestake designed the West Waste Dump to avoid this area pending further evaluation. Therefore, the suggested waste dump design would not be practical.

44-5 Homestake designed the partial backfill to maximize the tonnage that could be backfilled. Additional backfilling would not be possible because waste rock quantities on the lower benches of West Archimedes would not be sufficient to substantially increase the backfill volume. Therefore, the suggested backfilling would not be practical.

Letter 44 Continued

44-5 been mined to its ultimate depth before the eastern portion is mined. Would it not be possible to increase the amount of backfilling up to the access roads into the pit (figure 2). I am not a mining engineer and can not be certain that this is a viable alternative but with some planning and scheduling of the mining program it would appear that some additional backfilling may be possible

44-6 Throughout the DEIS, whenever interrelated projects are mentioned or illustrated on a map the area about the Norse Windfall mine area is grossly over exaggerated and improperly located. First of all, the Windfall Venture and Norse Windfall mine(s) area is one in the same, not separate. Secondly, the Lookout Mountain mine is a wholly separate mine located nearly 3.5 miles south-southwest of the a common milling area with the Norse Windfall operation. The Norse Windfall mine complex consists of three small open pits (Windfall, Rustler and Paroni) and a common mill area in Windfall Canyon which also processed ore from the Lookout Mountain open pit (see figure 3). The area illustrated in the various maps throughout the DEIS is grossly over sized and does not realistically represent the disturbed areas about this mine complex.

Many of the Resource area concerns appear to be more than adequately addressed in the DEIS, such as : Air quality, Soils, Blasting vibrations, Range resources and Hazardous materials; and I have no comment on them. There are other concerns addressed by the DEIS that I believe should be commented on.

44-7 1. Water quality: The possible transport of arsenic into the groundwater was perceived as a major concern. Yet nowhere within the report is there a list of the identified arsenic minerals or compounds found within the rock , be it ore or waste. Knowing what these compounds are and their solubility under surface pressures, temperatures, and pH would allow you to determine precisely whether there is truly a concern or merely an unjustified emotional responses to the word "arsenic".

44-8 2. Woodland products: The BLM manages 600,000 woodland acres of Public Land (State of Nevada land) within Eureka County and yet has allowed only 20% of it (120,000 acres) to be accessible to the public. This is outrageous and clear evidence of mismanagement and closure of land to the public. Clearly, any anticipated short term losses of woodland products assignable to this project can be easily adjusted for by opening up other nearby areas.

44-9 The reported harvest figures for Christmas trees and Pine nuts is totally out of touch with reality. Over the next 35 years the projected loss of 24,000 to 34,000 Christmas trees is ridiculous. At best 100 trees a year are harvested from the study area by local residents and over the next 35 years that would only total 3500. The projected harvest of 5 pounds of Pine nuts per six foot tree from the study area is equally unrealistic. In 1993 the trees in the Eureka area had a harvest equivalent to your estimate. However, since that time the trees have yielded a tenth of that years abundance. Your estimates represent maximal harvests per tree for each year.

44-10 3. Wildlife Resources: Perhaps the major focus of the DEIS. Basically, my concern over this issue is the assumption by the writers / investigators that any disturbances in the project study area will have adverse impacts on wildlife. Wildlife is resilient and highly adaptable. If it was not it would not survive long in nature. The development of this project will have less impact on wildlife than any one of the numerous wildfires that occurred in Nevada this summer. Sure habitat will be

Response to Letter 44

44-6 Based on your comment, Map 2-8 in the Final EIS has been modified to more accurately illustrate the locations of and general areas of disturbance associated with the Norse Windfall, Windfall Venture, and Lookout Mountain Mines.

44-7 Arsenic is held in surface coatings on the oxide minerals. It is not found in a mineral phase and thus no thermodynamic properties are pertinent. Arsenic could be desorbed from the surface of the oxides by meteoric water.

44-8 Thank you for your comment. No response necessary.

44-9 As a result of your comment, the text in Section 3.7, Woodland Products, of the Final EIS has been revised to clarify the discussion of project-related woodland product losses. The basic conclusions presented in the Draft EIS have not changed.

44-10 The BLM believes the Draft and Final EIS accurately present potential impacts to wildlife. Protecting sensitive wildlife species (e.g., bats and raptors) during mining activities is required by various pieces of Federal legislation, including the Endangered Species Act and the Federal Land Policy and Management Act.

The breadth of the impact analysis of the EIS for Wildlife and Fisheries and Special Status Species is considered to be proportional with the anticipated level of effects from the Proposed Action compared to the sensitivity of the resources that would be impacted by the project. A number of key factors were part of this impact analysis, including habitat loss, human disturbance, and most importantly cumulative effects. The commentor's point about wildfires in Nevada supports the issues involved with the cumulative loss of habitat within the Great Basin from naturally occurring factors (e.g., wildfire, drought) and human-induced activities (e.g., mining, recreational uses, livestock grazing, wild horses). The long-term loss of habitats would displace animals, as discussed in the EIS, but it cannot be assumed that these individuals and populations would survive in adjacent areas, since these habitats are likely at or near their respective carrying capacities, given these factors.

The impact analysis for sensitive bat species is based on studies conducted in the western United States that have indicated that bat populations are declining throughout their ranges, primarily due to habitat loss and human disturbance. The BLM is pursuing a number of initiatives to preserve remaining habitats, even if they are man-made (e.g., historic mine shafts and adits), particularly since bats are considered keystone and indicator species of specific environmental conditions and hazards. Please refer to Response to Comment 5-8 for a discussion of the deletion of the mitigation measure for enhancing habitat within the pit walls following mine closure and refer to Response to Comment 5-2 for additional information on the mitigation measures identified for this project.

The primary emphasis of the raptor analysis was the impact to active ferruginous hawk nests in and near the mine area. Ferruginous hawks are numerous in Nevada, but their populations have been declining throughout the western United States. This hawk species is particularly susceptible to disturbance during early courtship and incubation and will abandon nests if disturbed during this period. It is true that adequate forage is critical to successful breeding, but nest location and human presence also are important. In addition, although other hawk species may more readily relocate, if disturbed, the loss of nest sites, breeding birds, or their eggs or young may be in violation of the Migratory Bird Treaty Act, which was enacted, due to the widespread loss of bird populations.

Letter 44 Continued

44-10 destroyed for a limited amount of time but it will rebound and in the mean time the wildlife will migrate elsewhere. This is a condition that has occurred throughout time and will continue to occur regardless of man's involvement or absence of.

I realize that this is an issue that the BLM is required to address in any EIS but often it its dealt with in the absence of common sense. For example, the concern over the "impacts" to bats within old mine shafts and workings. These bats are living in artificial (not natural) environments. Their populations are likely out of proportion for the area because they have found predator-free habitat. Concern about preserving this artificial habitat is foolish because natural habitat in this area is plentiful. Would the BLM concern themselves with the natural degradation of bat-occupied 100+ year-old mine shafts and workings if this project was not being proposed. No, of course not. Wasting time, money and energy (pit shelf areas) on this issue now is foolish because should the underground mines become unsuitable for the bats due to natural caving of the workings they would migrate elsewhere and continue to survive.

Similarly, if there was a fire in this area that destroyed raptor nesting sites would the BLM require (of themselves) to relocate or build new nest sites elsewhere. I doubt it. The raptors, while sensitive to disturbances, are quite adaptable. As long as the raptors main source of food (Diamond Valley agricultural areas) remains intact the birds will merely relocate. Relocation of Ferruginous Hawk nests is quite successful about mine sites as documented by the Sawtooth National Forest in Idaho about the Black Pine Gold Mine.

44-11 Regarding Biodiversity; who is the Council on Environmental Quality sited on page 3-139 ? Are they a federal agency or private group ? Why are their general principles deemed worthy of emphasis by land management agencies let alone mention in this DEIS ?

44-12 4. Visual Resources: As addressed earlier, I believe that the WWD area is a preferable alternative to the EWDA. Through judicious tree planting, berm construction and earth-tone paints much of the visual impact of the mine, leach pad and buildings could be hidden or camouflaged from view.

44-13 5. Cultural Heritage: In reviewing this chapter I have to wonder how much these surveys significantly added to the understanding of the recent and prehistoric past ? Most of these sites consist only of lithic scatter, trash dumps, prospects, mines and their dumps, charcoal platforms, a ditch and even rock cairns. Most of the historic past concerning the Eureka Mining District is well preserved and documented in the local museum. I doubt if anything significant, beyond what is already known, could have been gleaned from the piles of old cans that were studied in excruciating detail. Furthermore, what new and significant data was acquired from studying the prehistoric lithic fragments that was not already known? And if nothing new was discovered what qualifies them for eligibility beyond the need to merely document and retrieve data?

44-14 Concern for the preservation and registry of a portion of the long abandoned Lincoln Highway segment through the project area is laughable. It is a chunk of asphalt! If you want to recognize it then erect signs indicating its location similar to the Pony Express Trail (a much more important cultural feature).

44-15 It would seem to me that concern over the visual elements of the mining operation as it pertains to

Response to Letter 44

44-11 The President's Council on Environmental Quality is a part of the executive branch of the Federal government. The Council is responsible for developing the regulations for the implementation of the National Environmental Policy Act. Every Federal agency through its internal procedures is responsible for complying with these regulations. Thus, the Council's general principles on biodiversity are considered by the BLM in preparing environmental impact statements.

44-12 Thank you for your comment. Your concerns will be considered in the final decision-making process. Also, please refer to Response to Comment 44-3 for a discussion of planting trees to reduce visual impacts and Section 2.1.14.7 in the Draft and Final EIS regarding building colors.

44-13 The BLM is required by law to take into account the effects of its actions on archaeological and historic sites. In most cases, an archaeological survey must be conducted to find out what, if any, sites are present. Under the National Historic Preservation Act, these sites must be evaluated for National Register of Historic Places eligibility, a determination made as to the effect of a proposed action on eligible sites, and, if there is an effect, mitigation. Sites that have the potential to yield data about past cultures are usually determined eligible. Other sites may be eligible because they are important in local, regional, or national history; are associated with important historic persons, and/or are representative of a type of site or structure. Of over 200 sites recorded by archaeological surveys in support of the Ruby Hill Project, approximately 25 were determined National Register-eligible and only 17 sites within the direct impact area were submitted to further investigation and/or mitigation. Therefore, the majority of the prehistoric and historic sites in the area were not studied beyond the initial survey and recordation.

Contrary to popular belief, very little of the everyday lives of people gets recorded by historic documents. It remains for the archaeologist, and occasionally the oral historian, to fill in the gaps left by newspaper articles and contemporary accounts. Prehistory, by definition, lacks written accounts and can only be reconstructed through archaeology. Very little remained of prehistoric use of the area covered by the EIS; historic occupation had masked or destroyed what prehistoric sites were present. Only two prehistoric sites were considered intact enough to yield data about prehistoric lifeways. Limited excavations have been conducted at these two sites; analysis is currently in progress. In addition to documenting what prehistoric and historic remains exist within the area proposed for development, part of the mitigation included oral histories collected from living individuals that lived and worked at sites that will be destroyed. One may argue that this should be done whether or not a site is to be destroyed; however, in this case the pending destruction generated the need to talk to individuals that had knowledge about the area. The majority of "the piles of old cans" were not studied beyond initial recordation; only those that could be associated with domestic or industrial features were submitted to further analysis.

44-14 The Lincoln Highway is historically significant as the first established transcontinental motor route. The Lincoln Highway Association, with members from all over the United States, is active in preserving what remains of the historic road features. A road within the project area showed up on an early 20th Century map as the "Lincoln Highway"; this feature, listed as unevaluated in the Draft EIS, has been evaluated and found to be not significant and not eligible for the National Register of Historic Places. In fact, further research indicated that the map was in error and the road had probably never been part of the Lincoln Highway. (Portions of the historic Lincoln Highway elsewhere in the Battle Mountain District have been determined National Register-eligible and worthy of preservation.)

Letter 44 Continued

44-15 the historic business district is misguided. Sure, the historic district has a distinctive architectural style that ought to be preserved, and is. In the context of cultural and historic preservation the Ruby Hill mine will provide a focal point that brings attention to the past mining activities and provides a transition into the present and future of mining in Nevada /Great Basin, as well as, Eureka. The Ruby Hill Mine will provide a link to the past and could provide a spring board to educating the public about current and future mining practices and benefits to society.

44-16 While spending a fair amount of time in Eureka during th last two years complaints from contracted archeologists concerning the repeated, at least three, resurveying of sites insisted upon by SHPO were common place. As lead agency, the BLM should attempt to streamline these surveys and design them to be efficient. Repeated surveys of the same areas by direction of SHPO appears to have been deliberate and intended to delay progress of the project.

44-17 Who is the Advisory Council on Historic Preservation ? They are not listed in the DEIS as reviewer, consultant, coordinator or preparer. By what authority are they allowed to be involved in mitigation ? Are they a State, Federal or County agency ? If they are a volunteer, nonprofit or some similar organization why are they allowed to participate in mitigation and other similar organizations are not ?

44-18 6. Social and Economic Values: Housing problems documented in Eureka by the DEIS could be limited by the BLM by releasing suitable surrounding land to the county for house / apartment construction. This alternative should be seriously considered by the BLM.

44-19 The fiscal benefits to the town of Eureka by permitting the Ruby Hill project to proceed are huge and far outweigh the potential problems. Financial benefits acquired from the project would allow the town to improve community services, move ahead on planned preservation activities and provide time and money to establish more stable businesses and sources of income than agriculture, mining and tourism.

Sincerely,

Gregg Loptien

Gregg Loptien

Response to Letter 44

44-15 The National Historic Preservation Act requires federal agencies to take into account the effects of their actions on sites listed on, or eligible for listing on, the National Register of Historic Places. (Eureka is listed on the National Register of Historic Places as an Historic District.) Anything that might damage, or otherwise affect, National Register sites must be analyzed. If development introduces visual elements out of historic character, this could be considered an adverse effect. Blasting, and other activities causing seismic movement, could damage historic structures and thus have an effect. Commercial development could cause the demolition or inappropriate remodeling of historic structures.

44-16 The cultural work was done in four major phases: 1) identification of all historic and prehistoric sites within the project area; 2) evaluation of these sites for National Register of Historic Places eligibility; 3) development of a treatment plan to mitigate adverse affects to eligible properties; and 4) implementation of the treatment plan. In some cases phases 2 and 3 required additional field work; however, it was not necessary to resurvey the area for sites. Phase 4 by definition required additional field work. There were no "repeated surveys...by direction of SHPO." Most archaeologists working in Nevada have a good working relationship with the Nevada SHPO's office.

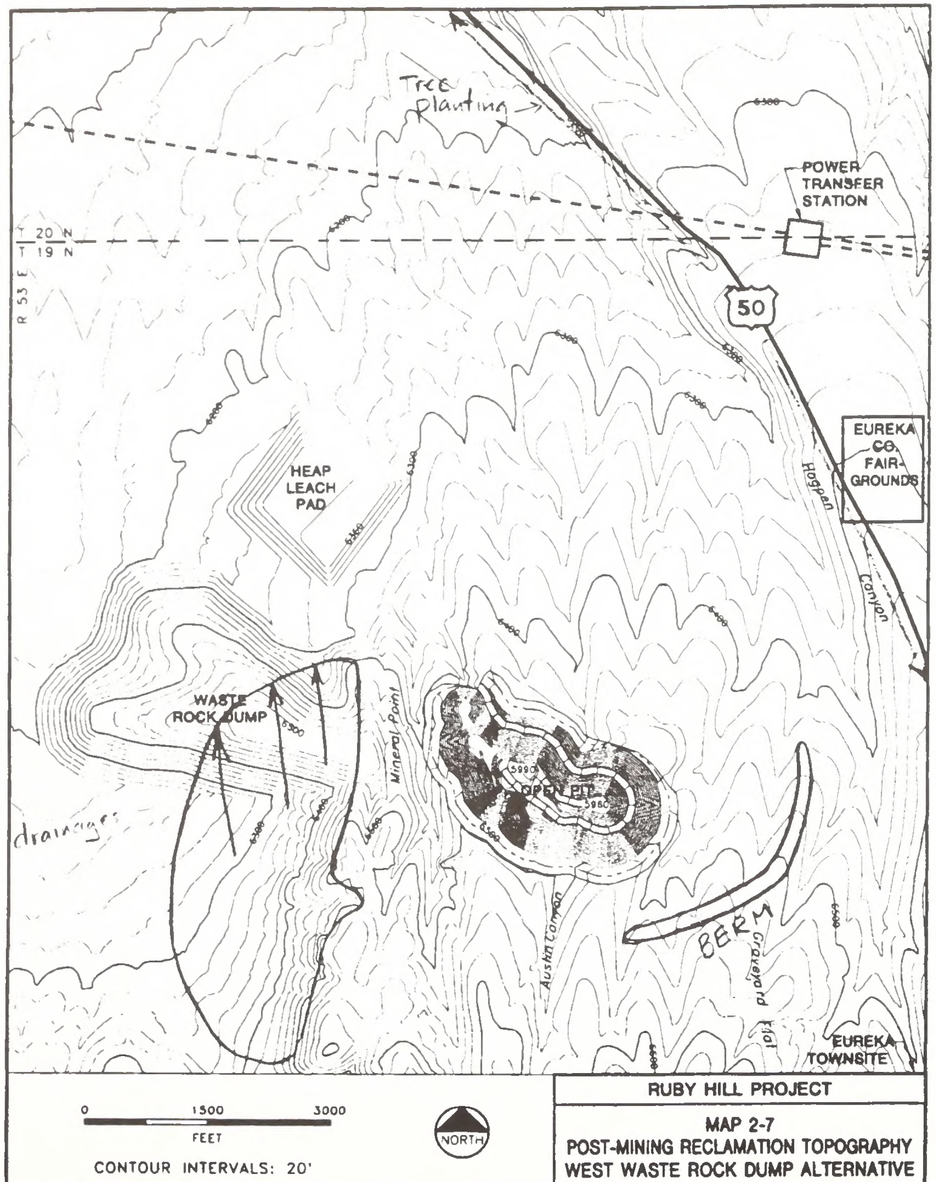
44-17 The Advisory Council on Historic Preservation (ACHP) was established by Title II of the National Historic Preservation Act and is appointed by the President. Under Title I, Section 106, of this act, Federal agencies must take into account the effects of any undertaking on historic properties and afford the ACHP a reasonable opportunity for comment on such an undertaking. In the case of Homestake Mining Company's Ruby Hill Project, this was formalized and streamlined by promulgation of a Programmatic Agreement between the BLM, Nevada State Historic Preservation Office (SHPO), ACHP, and Homestake Mining Company.

44-18 The BLM is processing Eureka County's request to purchase 145 acres of public land adjacent to the Eureka townsite. Eureka County, Homestake Mining Company, and the BLM have worked jointly on this proposal, and it is anticipated the sale will be completed by the end of 1996.

44-19 Thank you for your comment. No response necessary.

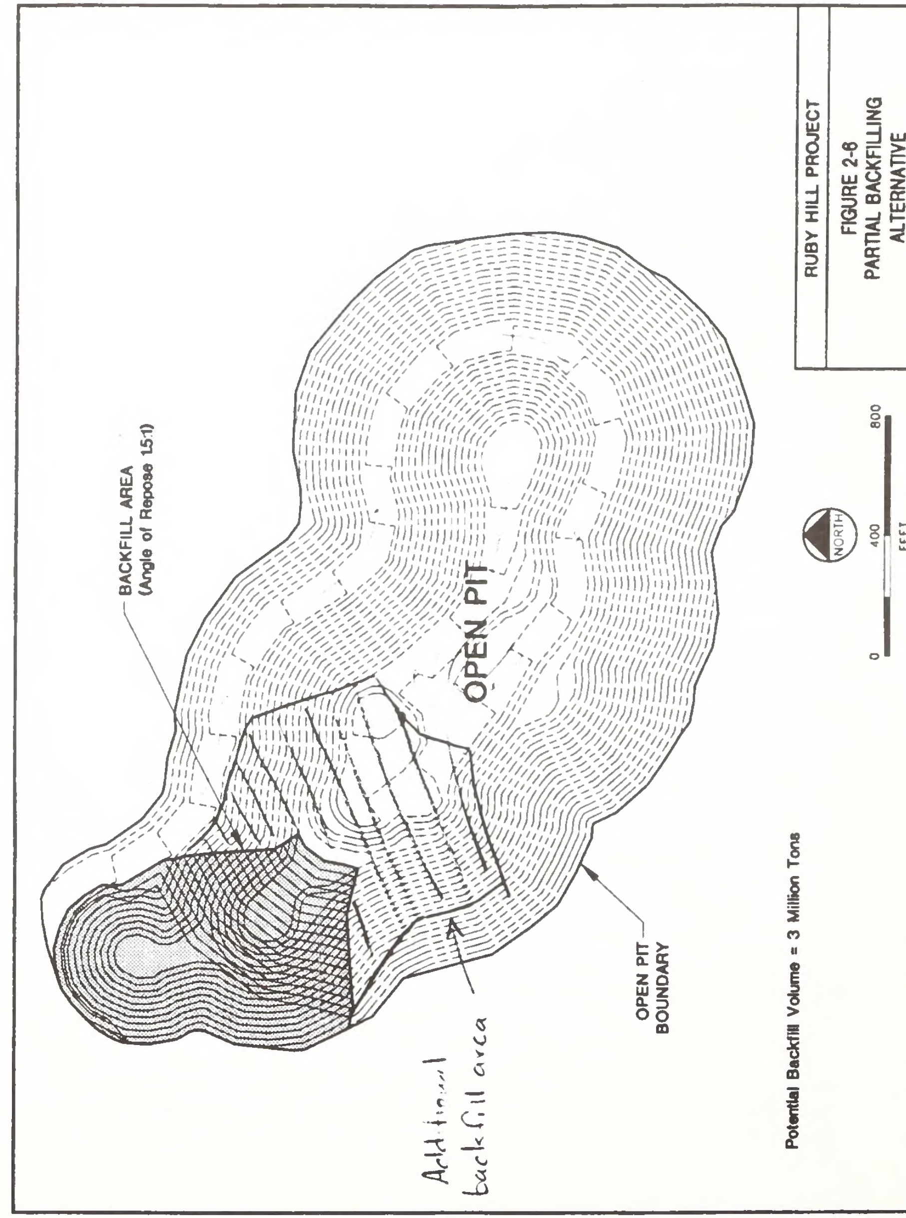
Letter 44 Continued

LOPTIEN FIG. 1



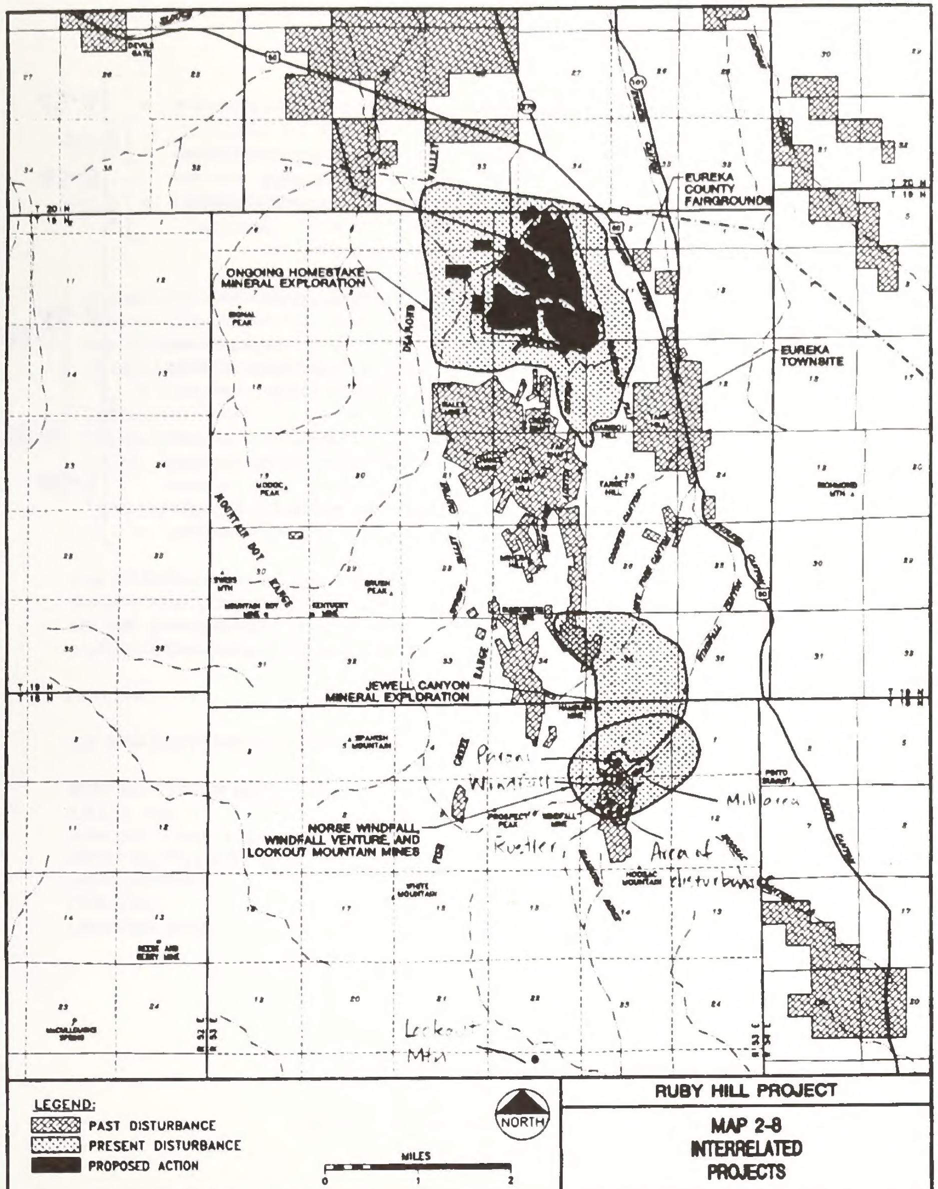
Letter 44 Continued

LOPTIEN FIG. 2



Letter 44 Continued

LOPTIEN FIG. 3



Letter 45

GREGORY McN. FRENCH
P.O. BOX 692
EUREKA, NEVADA 89316

10/7/96

Christopher Stubbs
Lynn Ricci
Project Managers
Bureau of Land Management
Battle Mtn. District Office
PO Box 1420
Battle Mtn., Nevada 89820

RE. Ruby Hill Project Environmental Impact Statement (EIS)

Dear Sirs,

I wish to comment on behalf of the Eureka County School Board of Trustees on the Draft Ruby Hill EIS. Several areas are either flawed or do not fully address the problem the proposed mine will have on the Eureka High School students. The following is a list of concerns found in section 3.16, the projects proposed noise levels:

45-1
- Baseline studies were conducted during a period of extensive exploratory drilling within the project area. The background noise level is artificially high and the perceived change in noise levels at the High School will greater than presented in the draft EIS. If this baseline noise level was used in modeling, then the data and conclusions are flawed.

45-2
- The noise modeling indicates that a noise level of 55 dbA "if exceeded, people could become irritated with such sounds". This level will be exceeded at times throughout the project life;
  - ⇒ 3 months during startup, phase II, and phase III
  - ⇒ temperature inversions
  - ⇒ 5 and 10 m/s north winds

45-3
- A blasting noise level of 70 dbA is almost reached at the High School with a north 5 m/s wind. While this does not exceed California's limits for such noise, other states would consider this exceeding safe levels for noise.

45-4
- Sensitive activities at the school are during the hours of instruction, 8am to 3pm.

Response to Letter 45

45-1 Please refer to Response to Comment 10-56 for a discussion of the factors considered in the use of the Environmental Noise Model.

45-2 According to the discussion on page 3-265 of the Draft EIS, outdoor noise levels in excess of 55 dBA, L_{eq}, would be present within the Town of Eureka during proposed mining operations only during "initial mining operations" when winds from the northwest exceed 10 meters/second (22 mph). However, the frequency of such an occurrence is extremely rare and was therefore not considered significant. Under no other conditions would noise levels from mining operation be expected to exceed 55 dBA, L_{eq}.

45-3 Noise levels from blasting within the open pit (as described on page 3-266 of the Draft EIS and shown in Appendix E) generally would not be expected to exceed the State of California's recommended outdoor maximum noise level (L_{max}) of 70 dBA for brief, impulse-type noises such as blasting (Nevada has no such ordinance). The only conditions under which this level is expected is when winds from the northwest exceed 10 meters/second, which would be extremely infrequent.

45-4 Thank you for your comment. Your concerns will be considered with the final decision-making process.

Letter 45 Continued

45-5
- The present draft has removed the only noise shielding Homstsake has proposed, the 5 dbA berm to the south.

45-6
- Modular classrooms at the High school are within line-of-site of the southern portion of the project. Unshielded noise activities will take place in this area.

45-7 On page 2-30 Homstake has stated that they will cooperate with the District to minimize noise when noise sensitive activities take place at the High School. The District has not been informed or consulted as to the proposed action plan should a problem arise. The Board will utilize all the options available to insure a quality education for the students of Eureka County.

45-8 The Board of Trustees feels this project will be good for the community, but we are very concerned that the present draft does not adequately address the possible effects on the students of Eureka County. **A good education is not a privilege but a right!**

Thank you very much for your time and consideration.

Sincerely,

Gregory M. French
School Trustee

Response to Letter 45

45-5 Please refer to Response to Comment 14-1 for a discussion of the noise berm.

45-6 Thank you for your comment. Your concerns will be considered with the final decision-making process.

45-7 Please refer to Response to Comment 10-57 for a discussion of noise mitigation.

45-8 Thank you for your comment. Your concerns will be considered with the final decision-making process.

5.0 LIST OF PREPARERS

5.0 LIST OF PREPARERS AND REVIEWERS

5.1 Bureau of Land Management EIS Team

Discipline	Name	BLM Office Location
Project Managers	Christopher Stubbs Lynn Ricci	Battle Mountain District Office
Soils Review	Lynn Ricci	Battle Mountain District Office
Reclamation/Mineral Resources	Josh Alpert	Battle Mountain District Office
Visual Resources	Walt Brown	Battle Mountain District Office
Wildlife and *Special Status Species* (Animals)	Kathy Graham	Battle Mountain District Office
Woodland Products, Soils, Air, and Surface Water	Mike Sondergaard	Battle Mountain District Office
Visual Resources, Woodland Products Review	Dave Davis	Battle Mountain District Office
Range Management and *Special Status Species* (Plants)	Rick Oyler	Battle Mountain District Office
Surface Water and Air Review	Barbara Hite	Battle Mountain District Office
Land Use Authorizations and Access	Kathy Sladish	Battle Mountain District Office
Cultural Resources/Native American Consultation/ Paleontology	Roberta McGonagle	Battle Mountain District Office
Land Use Authorization and Access Review	Mary Craggett	Battle Mountain District Office
Noise and Blasting Vibrations	*Christopher Stubbs*	*Battle Mountain District Office*
Administrative Support	*Dena Marriott*	*Battle Mountain District Office*
Recreation	Tracey Pharo *Steve Kramer*	Tonopah Field Office
Hazardous Materials	Steve Brooks	Winnemucca *District Office*
NEPA Review	Brian Amme	Nevada State Office
Water Resources	Tom Olsen	Nevada State Office
Socioeconomics	Paul Myers	Nevada State Office

5.2 ENSR EIS Team

Discipline	Name	Degree(s) and Experience
Project Manager	Drew Ludwig	M.S. Resource Planning and Conservation; B.S., M.S. Zoology; 23 years experience
Project Coordinator, Soils, Vegetation Resources, Range Resources	Jon Alstad	M.S. Range Science; B.S. Animal Science; A.A. Liberal Arts; 9 years experience
Cultural Resources, Native American Traditional Values, Paleontology	Karen Caddis-Burrell	B.A. Geography/Anthropology/Journalism; B.S. Resource Management; 11 years experience
Wildlife and Fisheries Resources, T&E Wildlife	Lori Nielsen	B.S. Wildlife Ecology/Management; 10 years experience
Air Quality	Vince ***Scheetz***	***M.S. Systems Management*** ***B.S. Mathematics*** ***22 years experience***
	Bob Hammer	***M.S. Meteorology*** ***B.S. Meteorology*** ***13 years experience***
Land Use Authorizations and Access, Recreation/Wilderness, Visual Resources, Woodland Products, Noise and Blasting Vibrations	Randy Rasmussen	M.S. candidate Natural Resources, Recreation, Tourism B.S. Physical Geography 8 years experience
Hazardous Materials	George Lewis	M.S. Chemical Engineering B.S. Electrical Engineering 7 years experience
Noise and Blasting Vibrations	Joe Sanders	M.S. Public and Occupational Health B.S. Physics 22 years experience
Geology and Hydrology	Bob Berry Shepherd Miller, Inc. Geology and Water Consultants Denver, Colorado	Ph.D. Geology and Geochemistry; B.S. Geology; Prof. Degree Hydrogeology; 19 years experience

5.2 ENSR EIS Team (Continued)

Discipline	Name	Degree(s) and Experience
Hydrology	Tim Runnells Shepherd Miller, Inc. Geology and Water Consultants Fort Collins, Colorado	B.S. Hydrogeology 4 years experience
Geochemistry	Sheila Murphy Shepherd Miller, Inc. Geology and Water Consultants Fort Collins, Colorado	M.S. Geosciences B.S. Geology 1 year experience
Socioeconomics	Ron Dutton Hammer Siler George Associates Denver, Colorado	M.S. Economics B.S. Economics 16 years experience

5.3 Cooperating Agencies

Eureka County

Nevada Department of Conservation and Natural Resources, Divsion of Wildlife

Nevada State Historic Preservation Office

U.S. Army Corps of Engineers

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ABBREVIATIONS

ABBREVIATIONS

BLM	Bureau of Land Management
cm/sec	centimeter per second
CO	carbon monoxide
dBA	decibels, A-weighted
EIS	environmental impact statement
dB L_{eq}	equivalent sound level
ft^2	square foot
gpm	gallons per minute
lbs/ac	pounds per acre
L_{dn}	day-night average sound levels
mg/L	milligram per liter
$\mu g/m^3$	micrograms per cubic meter
µm	micrometers
mph	miles per hour
NEPA	National Environmental Policy Act
ppm	parts per million
NO_2	oxides of nitrogen
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
SO_2	sulfur dioxide

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 Ruby Hill 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.
Class I Area	*The Clean Air Act established Class I to protect areas of special national concern, where the need to preserve the pristine atmosphere is greatest. Consequently, the most restrictive limits to allow additional emissions apply in Class I areas. Many National parks, National wilderness areas, and some National memorial areas exceeding certain sizes are included in Class I areas.*
Class II Area	*Class II areas are all areas that are designated as in attainment or unclassified with respect to National Ambient Air Quality Standards and are not in Class I. Almost all of Nevada is in Class II.*

Class III Area	*Class III area designation would permit more deterioration in air quality in specific areas designated by a State for higher levels of industrial development and emissions growth. Certain Class II areas could potentially be reclassified Class III, but there are presently no Class III areas in Nevada.*
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.
Historic context	Planning document that is used as a cultural resources management tool. It groups information about related important cultural resources based on a specific theme, geographic limits, and chronology with the purpose of providing subsequent identification and framework for evaluation of the eligibility or significance of resources located at a later time in the same area. Historic contexts aid in planning and evaluating future cultural research.
Horst	Elongated, uplifted crustal block bounded by faults on its long sides.
Hydraulic Conductivity	The rate at which a porous medium can transmit water (units of length/time).
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.
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.
Prills	Ammonium nitrate pellets.
Project Area	The area in the immediate vicinity of the Ruby Hill Project.
PSD	Prevention of Significant Deterioration
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.
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.
Transmissivity	A measure of the amount of water that can be transmitted horizontally by a porous medium (units of $length^2/time$).
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.
Wind rose	A wind rose is a graphical representation of wind direction and wind speed frequencies.

INDEX

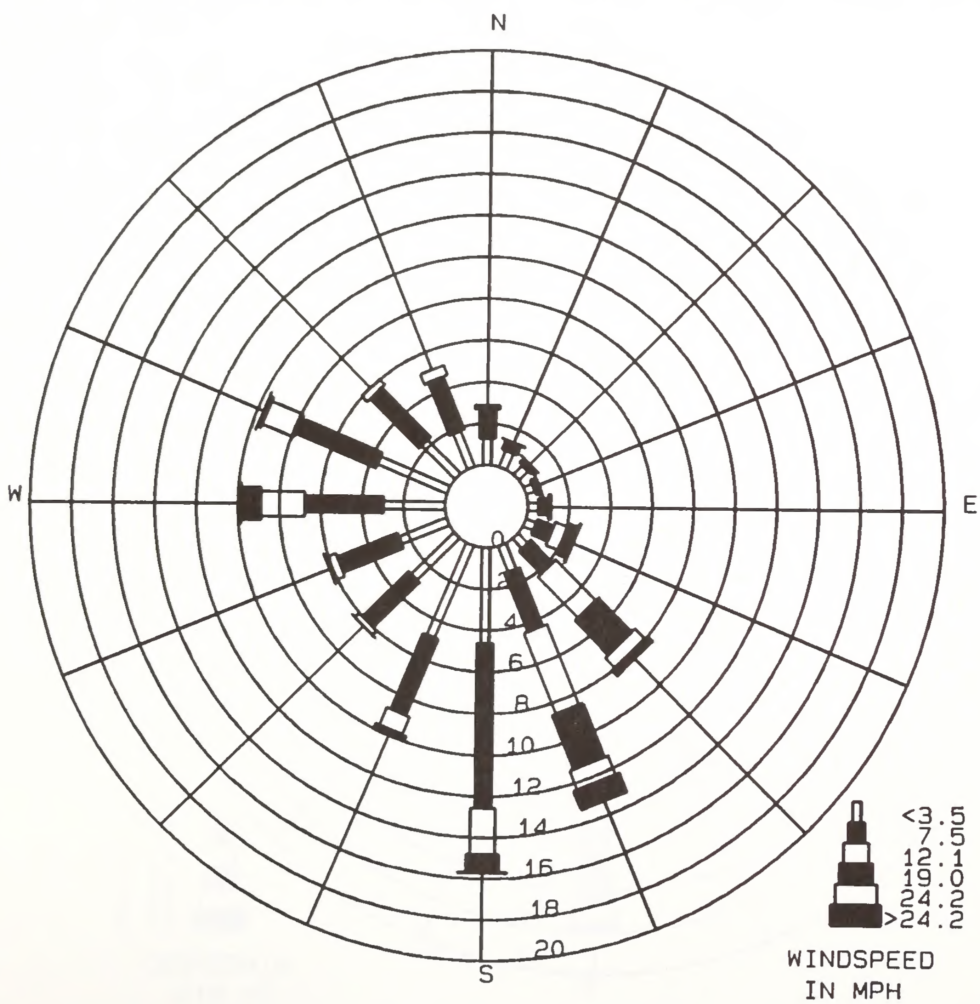
INDEX

APPENDIX A

WIND ROSES

Homestake Ruby Hill Monitoring Program
WIND ROSE ANALYSIS (PERCENT)
4/ 1/94 through 3/31/95
10 METER DATA

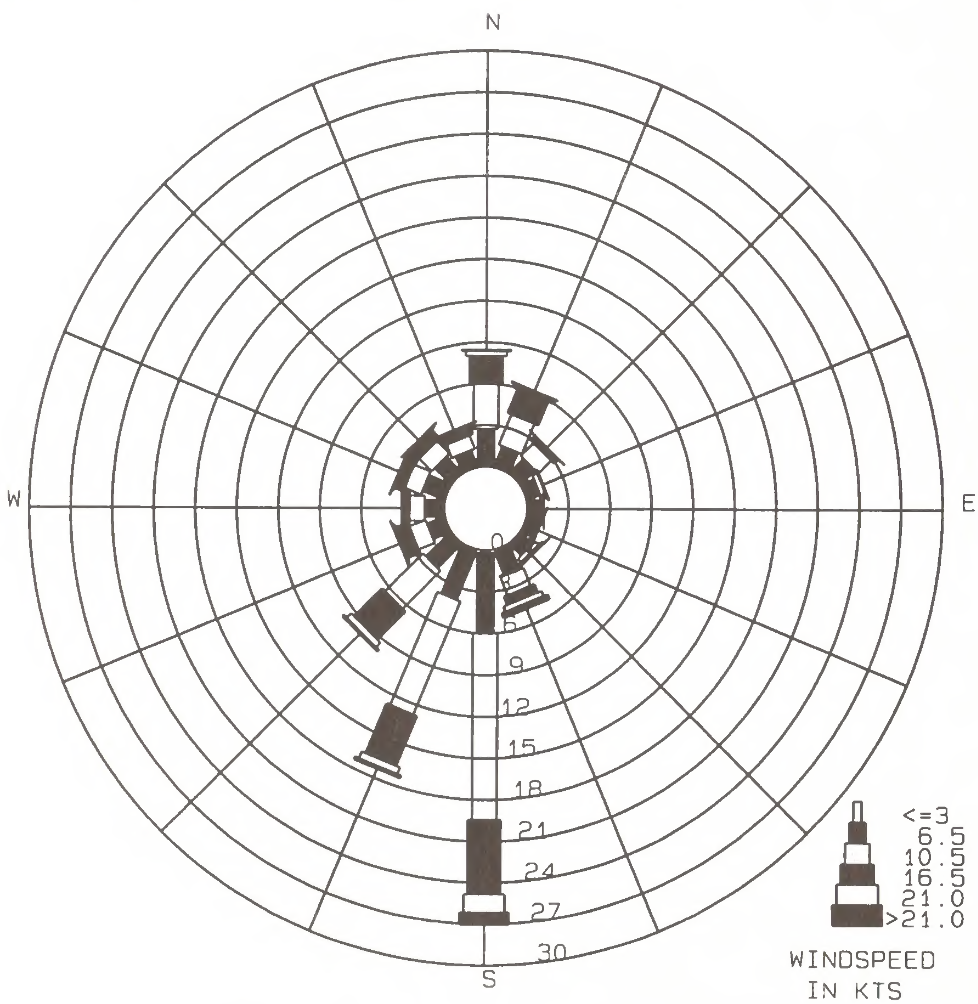
WIND DIRECTION	<= 3.5	<= 7.5	<=12.1	<=19.0	<=24.2	>24.2	TOTAL	AVG SPEED
N	1.28	1.44	0.20	0.00	0.00	0.00	2.91	4.02
NNE	0.83	0.48	0.02	0.00	0.00	0.00	1.34	3.09
NE	0.61	0.29	0.01	0.00	0.00	0.00	0.92	3.06
ENE	0.43	0.28	0.01	0.00	0.00	0.00	0.72	3.31
E	0.50	0.49	0.12	0.00	0.00	0.00	1.12	4.28
ESE	0.53	0.83	0.70	0.42	0.09	0.00	2.56	8.11
SE	0.65	1.52	2.76	2.31	0.66	0.38	8.28	11.76
SSE	1.32	3.05	4.16	2.80	0.97	0.99	13.30	11.44
S	4.61	7.95	2.22	0.87	0.04	0.01	15.70	5.43
SSW	4.83	3.96	0.91	0.17	0.00	0.00	9.87	4.24
SW	2.87	3.14	0.27	0.01	0.00	0.00	6.29	4.04
WSW	2.47	3.14	0.54	0.01	0.00	0.00	6.16	4.37
W	2.98	3.79	2.12	0.93	0.11	0.00	9.93	6.31
WNW	3.63	4.23	1.64	0.20	0.01	0.00	9.71	5.01
NW	2.27	3.39	0.37	0.00	0.00	0.00	6.02	4.20
NNW	1.84	2.75	0.50	0.00	0.00	0.00	5.09	4.54
CALM	0.07						0.07	
TOTAL	31.73	40.73	16.56	7.71	1.88	1.39	100.00	



Ruby Hill Annual Wind Rose - 1994-1995

MONITORING PROGRAM - ELY
WIND ROSE ANALYSIS (PERCENT)
1/ 1/84 through 12/31/88
10 METER DATA

WIND DIRECTION	WIND SPEED (KNOTS) <= 3.0	<= 6.5	<=10.5	<=16.5	<=21.0	>21.0	TOTAL	AVG SPEED
N	0.14	2.59	3.25	2.02	0.36	0.10	8.45	9.02
NNE	0.09	1.50	2.39	1.85	0.28	0.06	6.17	9.50
NE	0.09	1.38	1.30	0.42	0.03	0.00	3.22	7.39
ENE	0.08	0.95	0.36	0.10	0.00	0.00	1.49	6.06
E	0.10	0.84	0.21	0.05	0.00	0.00	1.21	5.50
ESE	0.09	0.72	0.22	0.06	0.01	0.01	1.10	5.85
SE	0.07	1.15	0.32	0.17	0.03	0.00	1.76	6.41
SSE	0.11	1.89	1.37	0.66	0.38	0.39	4.80	9.66
S	0.22	5.71	13.50	5.39	1.30	0.90	27.03	9.61
SSW	0.13	3.76	8.81	3.89	0.52	0.20	17.32	9.15
SW	0.13	2.39	3.85	2.86	0.46	0.15	9.83	9.57
WSW	0.07	1.27	1.26	0.97	0.14	0.02	3.73	8.76
W	0.10	1.31	1.09	0.52	0.07	0.01	3.11	7.78
WNW	0.10	1.60	1.38	0.60	0.11	0.01	3.80	7.82
NW	0.11	1.54	1.27	0.83	0.13	0.03	3.91	8.31
NNW	0.06	1.20	1.05	0.66	0.09	0.01	3.07	8.27
CALM	0.00						0.00	
TOTAL	1.70	29.80	41.63	21.06	3.91	1.90	100.00	



Ely Wind Rose 1984-1988

APPENDIX B

WATER RESOURCES DATA

Appendix B

Water Resources Data

Geochemical Testing

Whole rock analyses of four alluvium samples and two oxidized limestone samples were provided by WESTEC (1996d) and were used to evaluate the rock components that may be available for mobilization from waste rock and overburden (Table B-2). The results show that the alluvium and the oxidized limestone materials are composed chiefly of aluminum (0.79 to 1.33 percent), iron (0.50 to 0.79 percent), magnesium (0.55 to 2.15 percent), and calcium (4.2 to >15 percent). Additional dominant components of the calcareous alluvium and oxidized limestone materials are carbon and oxygen (not analyzed), which would comprise up to 60 percent of the mass for a sample of pure $CaCO_3$ and 71 percent of the mass for a sample of pure $MgCO_3$. All other constituents (29 total) individually comprised less than 0.1 percent of the rock mass with the exception of one sample of alluvium, which contained 0.15 percent barium, and two samples of oxidized limestone, which contained 0.12 and 0.20 percent phosphorus and 0.15 and 0.16 percent potassium.

Static acid-base accounting tests were conducted on 10 samples of alluvium and 9 samples of oxidized limestone using analytical procedures that comply with guidance documents issued by the Nevada Department of Environmental Protection (Table B-3) (Scanlan Engineering 1994a; WESTEC 1996d). These tests determined the acid neutralization potential and the acid-generating potential of the samples. According to the Nevada Department of Environmental Protection samples are considered to be potentially acid-generating when the acid neutralization potential to acid-generating potential ratio is less than 1.20, even when the samples are determined to be acid-neutralizing based on the difference between the acid neutralization potential and acid-generating potential potentials. The results of the static tests showed that the alluvial and oxidized limestone materials are acid-neutralizing (Table B-3) and have average acid neutralization potential to acid-generating potential ratios of 813 and 995, respectively. This is a conservative estimate, because the acid-generating potential of the sample is based on total sulfur content rather than on pyritic sulfide content alone.

Kinetic testing was performed by WESTEC (1996d) to evaluate leaching of dissolved constituents under accelerated weathering conditions. Kinetic tests involve the chemical weathering of a sample under controlled laboratory conditions to simulate time-varying chemical changes and to determine the potential of the sample to mobilize dissolved constituents and generate net acidity. The experiments were carried out in humidity cells using a 7-day cycle in compliance with guidance documents issued by the Nevada Department of Environmental Protection (Scanlan Engineering 1994a). The kinetic testing was run for 20 weeks of cycling for all samples. Weekly results were reported for pH, acidity, alkalinity, sulfate, Eh, and iron. In addition, an analysis of 33 elements was conducted on 4-week volume-weighted extract solution composites for weeks 4, 8, 12, 16, and 20 to track metals and other dissolved constituents in the leachates (WESTEC 1996d).

Kinetic testing was conducted on four alluvium samples and two oxidized limestone samples. Results show that the alluvium and the oxidized limestone will not produce acid leachate under accelerated weathering conditions (WESTEC 1996d). Cumulative results are given in Table B-4. The pH of the weekly extract solutions ranged from 6.69 to 8.72 for all samples. Alkalinity greatly exceeded acidity in all samples; after 20 weeks, the cumulative alkalinity ranged from 237.0 to 715.7 mg/kg as $CaCO_3$, while the cumulative acidity was zero except in HRH-1143, in which it was 1.7 mg/kg as $CaCO_3$. Sulfate concentrations in weekly extracts were low, and none of the extracts exceeded the EPA secondary drinking water maximum contaminant level (MCL) of 250 mg/L. The dissolved constituent concentrations in the 4-week extract composite solutions from all of the samples were all very low to non-detectable. Calcium, iron, magnesium, and sodium were present at low concentrations in all samples. Barium, beryllium, potassium, and zinc were present in some of the sample extract solutions at low concentrations. Those constituents for which primary drinking water standards have been established were not detectable in the extract solutions or were present at concentrations that approached detection limits (WESTEC 1996d).

The meteoric water mobility procedure was conducted on five alluvium samples and four oxidized limestone samples. The procedure conformed to guidance documents issued by the Nevada Department of Environmental Protection (Scanlan Engineering 1994a), and the procedure is used by Nevada Department of Environmental Protection and the Bureau of Mining Regulation and Reclamation as a means of characterizing mine samples. The purpose of the meteoric water mobility procedure test is to simulate conditions under which precipitation might leach constituents from the sample. Detection limits are different for individual analyses due to the fact that analytical procedures were conducted at different times by different EPA certified laboratories. In addition, the samples were analyzed prior to development of new drinking water standards; therefore, some constituents have detection limits that are greater than the applicable drinking water standards (WESTEC 1996d). The meteoric water mobility procedure results of the alluvium samples show that the pH values were within the acceptable range for drinking water and agricultural purposes (Table B-5). Most of the elemental concentrations in the lixiviant from the alluvial samples were below the Nevada primary drinking water standards, with the exception of arsenic and antimony. One sample had an arsenic concentration in the lixiviant (0.051 mg/L) that exceeded the Nevada standard of 0.050 mg/L, and one sample had an antimony concentration in the lixiviant (0.0069 mg/L) that exceeded the Nevada standard of 0.006 mg/L. The meteoric water mobility procedure results of the oxidized limestone samples show that the pH values of the lixiviant were within the acceptable range for drinking water and agricultural purposes (Table B-6). Most of the elemental concentrations in the lixiviant from the oxidized limestone were below the Nevada primary standards, with few exceptions. The mean arsenic concentration in the oxidized limestone lixiviant (0.052 mg/L) and the maximum arsenic concentration observed (0.095 mg/L) were greater than the Nevada standard of 0.050 mg/L. In addition, one sample of the oxidized limestone had an aluminum concentration in the lixiviant of 0.30 mg/L, which is slightly greater than the Nevada secondary standard of 0.20 mg/L for aluminum, and one sample had an antimony concentration of 0.012 mg/L, which exceeds the Nevada standard of 0.006 mg/L. The concentration of total dissolved solids in the lixiviant from one sample also exceeded the Nevada secondary standard, but the total dissolved solids values did not exceed the designated standards for agricultural use.

The purpose of the synthetic precipitation leach testing (Environmental Protection Agency Method 1312) is identical to the purpose of the meteoric water mobility procedure analysis; synthetic precipitation leach testing is an alternative method that simulates the conditions under which precipitation might leach constituents from the sample. The results of synthetic precipitation leach testing of the alluvial material and the oxidized limestone are shown in Tables B-5 and B-6. The pH values in the lixiviant from both the alluvium and the oxidized limestone were higher than those reported for the meteoric water mobility procedure analyses. All of the pH values exceeded the Nevada primary drinking water standard (maximum pH of 8.5) and exceeded the upper limit for agricultural use (pH of 9.0). Most of the dissolved constituents in the synthetic precipitation leach lixiviants listed in Tables B-5 and B-6 were below the Nevada primary standards (Table 3-10). One exception was for the arsenic concentrations in the two oxidized limestone lixiviants, which were 0.060 and 0.061 mg/L, slightly greater than the Nevada primary standard for arsenic of 0.050 mg/L, but below the standard listed for agricultural purposes. One sample from the oxidized limestone also had an aluminum concentration that exceeded the Nevada secondary standard for aluminum (Table B-6).

Analyses were conducted on two samples of leach residue material to determine the requirements for final neutralization of cyanide and to evaluate the chemistry of effluent derived from each residue (WESTEC 1996d). One sample of non-agglomerated (leach grade) and agglomerated leach residue was analyzed by: 1) rinse testing to neutralize cyanide, 2) analysis of final neutralization wash effluent, and 3) performing the meteoric water mobility procedure. Rinse testing was conducted for 48 days on the leach grade sample and 40 days on the agglomerated sample. The samples were rinsed with recirculated barren solution for 15 days, at which time ozone oxidation of the recirculation rinse was initiated. Cyanide concentrations and the pH of the rinse effluent were measured each day of the test. The pH of the effluent changed less than one pH unit during the duration of the test; effluent pH values ranged from 10.1 to 11.1 for the leach grade sample, and from 10.2 to 11.0 for the agglomerated sample. The Weak Acid Dissociable cyanide concentration decreased to less than the detection limit of 0.04 mg/L after the final rinse cycle (WESTEC 1996d). Samples of the final rinse effluent from the leach grade and agglomerated residues were collected and analyzed for the elements listed in Table B-7. Components in the final rinse effluent that exceeded drinking water standards were aluminum from the leach grade sample (3.9 mg/L), arsenic from the leach grade and agglomerated samples (6.2 and 4.4 mg/L, respectively), beryllium from the leach grade sample (0.061 mg/L), and mercury from the leach grade sample (0.003 mg/L). The pH values from the leach grade and agglomerated samples were 10.39 and 10.26, respectively. Results from the meteoric water mobility procedure test conducted on the leach grade and agglomerated residues are shown in Table B-5. The dissolved constituent concentrations were generally low to non-detectable in each sample. The pH values were 10.05 and 9.71 for the leach grade and agglomerated samples, respectively, and were above the acceptable ranges for drinking and agricultural purposes. The arsenic concentrations of 1.2 and 0.66 mg/L in the two samples also exceed the Nevada primary drinking water standards (Table B-7). All other constituents were below applicable concentration limits.

Table B-1

Groundwater Elevations in the Ruby Hill Project Area

Monitoring Point	Surveyed Elevation	8/9/95	8/10/95	8/15/95	8/17/95	8/22/95	8/25/95	9/1/95	9/8/95	9/15/95	9/22/95	11/2/95	11/7/95
MW-1	6498.63	6044.74	5997.68	6004.01	5993.33	5993.35	5993.46	5993.52	5993.63	—	—	—	—
MW-2	6472.06	6202.06	6202.45	6203.35	6203.50	6203.44	6205.38	6207.06	6207.06	—	—	—	—
MW-3	6188.33	5821.68	5820.98	5821.51	5821.64	5821.30	5820.99	5820.61	5820.63	—	—	—	—
MW-4	6274.38	5849.07	5849.07	5848.99	5849.08	5848.79	5849.04	5849.06	5848.98	5849.00	—	—	—
Col. South	6060.28	---	---	---	---	---	5901.48	---	---	—	5902.76	—	—
Col. North	6025.92	---	---	---	---	---	5907.47	---	---	—	5908.32	—	—
HRH-286	6496.38	---	5921.98	---	---	5920.23	5920.28	5920.18	5920.08	5920.10	5919.97	—	—
HRH-444	6398.18	---	5890.83	---	---	5888.53	5888.62	5890.26	5888.58	5888.66	5888.57	—	—
HRH-1141	6495.16	---	---	---	---	5916.96	5916.56	5916.87	5916.56	5916.58	5916.44	—	—
HRH-1142	6484.58	---	---	---	---	5915.83	5915.89	5915.96	5915.83	5915.86	5915.73	—	—
HRH-1143	6496.40	---	---	---	---	---	—	---	---	---	---	—	—
HRH-1144	6439.00	---	---	---	---	5915.22	5914.69	5914.64	5914.60	5914.60	5914.53	—	—
HRH-1200	6486.98	---	---	---	---	---	—	---	—	—	—	5917.57	5916.90
HRH-1205	6458.67	---	---	---	---	---	—	---	---	—	---	5917.62	5917.56
HRH-1206	6491.07	---	---	---	---	---	—	---	—	—	—	5918.36	5916.08

Source: WESTEC 1996c.

Table B-1 (Continued)

Monitoring Point	Surveyed Elevation	11/22/95	12/20/95	1/12/96	3/1/96	4/5/96	5/3/96
MW-1	6498.63	---	---	---	---	---	---
MW-2	6472.06	---	---	---	---	---	---
MW-3	6188.33	---	---	---	---	---	---
MW-4	6274.38	---	---	---	---	---	---
Col. South	6060.28	5903.83	5904.88	5904.98	5905.35	5905.38	5905.31
Col. North	6025.92	5909.47	5910.12	5910.58	5910.82	5911.00	5910.97
HRH-286	6496.38	5919.38	5919.13	5919.28	5918.77	5918.18	5918.04
HRH-444	6398.18	5889.20	5889.48	5889.28	5889.67	5890.08	5889.88
HRH-1141	6495.16	5915.93	5915.81	5915.82	5915.45	5914.80	5914.71
HRH-1142	6484.58	5914.93	5914.88	5914.94	5914.06	5913.83	5913.73
HRH-1143	6496.40	---	---	---	---	---	---
HRH-1144	6439.00	5913.91	5913.51	5913.62	5913	5912.58	5912.43
HRH-1200	6486.98	5917.03	5916.88	5917.07	5916.59	5916.23	5916.07
HRH-1205	6458.67	5918.17	5917.76	5917.77	5917.05	5916.56	5916.40
HRH-1206	6491.07	5916.13	5916.06	5915.97	5915.07	5914.83	5914.72

Source: Homestake Mining Company 1996.

Table B-2

Results of Whole Rock Analyses

Element	Comp 1 HRH-762 alluvium	Comp 2 HRH-787 alluvium	Comp 3 HRH-1143 alluvium	Comp 4 HRH-1144 alluvium	Comp 5 HRH-1144 oxidized limestone	Comp 6 HRH-787 oxidized limestone
Aluminum	5700	4800	6300	4300	3600	3400
Antimony	<2	<2	<2	<2	6	<2
Arsenic	42	32	46	20	388	282
Barium	740	330	360	1470	430	190
Beryllium	0.5	<0.5	<0.5	<0.5	0.5	0.5
Bismuth	2	2	<2	2	<2	2
Cadmium	<0.5	2.0	0.5	<0.5	<0.5	<0.5
Calcium	>150000	>150000	>150000	>150000	42000	>150000
Chromium	9	14	13	15	35	8
Cobalt	2	1	1	<1	3	3
Copper	5	7	10	12	13	5
Gallium	<10	<10	<10	<10	<10	<10
Iron	6600	5000	7900	6300	13300	9700
Lanthanum	<10	<10	<10	<10	<10	10
Lead	30	152	164	18	14	4
Magnesium	21500	5500	17700	21500	1000	1200
Manganese	360	395	310	185	435	680
Mercury	<1	<1	<1	<1	2	<1
Molybdenum	<1	<1	<1	<1	<1	<1
Nickel	4	3	4	7	11	9
Phosphorus	400	630	480	760	1230	2000
Potassium	900	900	1000	800	1600	1500
Scandium	1	1	1	<1	2	1
Selenium	<0.2	0.2	<0.2	0.2	<0.2	<0.2
Silver	<0.2	<0.2	<0.2	<0.2	0.2	<0.2
Sodium	100	100	100	100	<100	<100
Strontium	279	255	231	144	75	115
Thallium	<10	<10	<10	<10	<10	<10
Titanium	<100	100	100	100	<100	<100
Tungsten	<10	<10	<10	<10	<10	<10
Uranium	<10	<10	<10	<10	<10	<10
Vanadium	12	13	17	23	44	24
Zinc	54	84	86	60	118	48

Note: Units are mg/kg.

Table B-3

Results of Static Test Analyses

Sample Number and Depth (ft)	Rock Type	Sulfur (%)			Neutralization Potential (NP)[1]	Total Sulfur Acid Potential (AP)[1]	Sulfide Sulfur Acid Potential (AP)[1]	NP-AP (Sulfide)[1]	Total Sulfur NP:AP	Sulfide Sulfur NP:AP
		Total	Sulfate	Sulfide						
HRH-394 480-485'	alluvium	0.054	0.054	<0.001	800	1.7	<0.1	800	470	>8000
HRH-631 360-365'	alluvium	0.038	0.038	<0.001	886	1.2	<0.1	886	740	>8860
HRH-395 320-325'	alluvium	0.024	0.022	0.002	880	0.8	<0.1	880	1100	>8800
HRH-485 45-50'	alluvium	0.082	0.082	<0.001	570	2.6	<0.1	570	220	>5700
HRH-485 195-200'	alluvium	0.014	0.014	<0.001	739	0.4	<0.1	739	1800	>7390
HRH-466 430-435'	alluvium	0.076	0.076	<0.001	730	2.4	<0.1	730	300	>7300
HRH-762 300-360'	alluvium	0.018	0.017	0.001	770	0.56	<0.1	770	1400	>7700
HRH-787 75-110'	alluvium	0.016	0.015	0.001	606	0.50	<0.1	606	1200	>6060
HRH-1143 200-280'	alluvium	0.025	0.022	0.003	441	0.78	0.1	440.9	570	4410
HRH-1144 0-40'	alluvium	0.054	0.051	0.003	509	1.69	0.1	508.9	300	5090
HRH-393 555-560'	oxid. limestone	0.022	0.016	0.006	736	0.7	0.2	735.8	1100	3680
HRH-393 550-555'	oxid. limestone	0.018	0.014	0.004	760	0.6	0.1	759.9	1300	7600
HRH-631 630-640'	oxid. limestone	0.068	0.068	<0.001	747	2.1	<0.1	747	360	>7470
HRH-395 795-800'	oxid. limestone	0.030	0.030	<0.001	715	0.9	<0.1	715	790	7150
HRH-466 570-575'	oxid. limestone	0.020	0.012	0.008	885	0.62	0.2	884.8	1400	4425
HRH-465 495-500'	oxid. limestone	0.016	0.014	0.002	670	0.5	0.1	669.9	1300	6700
HRH-467 550-555'	oxid. limestone	0.020	0.018	0.002	575	0.6	0.1	574.9	960	5750
HRH-1144 65-80', 115-160'	oxid. limestone	0.020	0.016	0.004	112	0.63	0.1	111.9	180	1120
HRH-787 110-175'	oxid. limestone	0.014	0.012	0.002	697	0.44	<0.1	697	1600	>6970

[1]Units are tons $CaCO_3$/1,000 tons.

Table B-4

20-Week Cumulative Release from Humidity Cell Tests

Constituent	Comp1 HRH-762 (300'-360') alluvium	Comp2 HRH-787 (75'-110') alluvium	Comp3 HRH-1143 (200'-280') alluvium	Comp4 HRH-1144 (0'-40') alluvium	Comp5 HRH-1145 (85'-80',115'-160') oxidized limestone	Comp6 HRH-787 (110'-175') oxidized limestone
pH (std. units)	6.69	7.17	8.25	7.91	7.61	7.91
Acidity(as $CaCO_3$)	0.0	0.0	1.7	0.0	0.0	0.0
Alkalinity(as $CaCO_3$)	715.7	554.8	377.3	527.2	237.0	301.3
Sulfate	69.1	93.9	49.5	30.2	59.9	71.3
Total Iron	4.43	8.01	2.13	1.37	2.63	2.38
Aluminum	n/d	n/d	n/d	n/d	n/d	n/d
Antimony	n/d	n/d	n/d	n/d	n/d	n/d
Arsenic	n/d	n/d	n/d	n/d	n/d	n/d
Barium	1.34 [1]	0.89 [1]	0.43 [1]	1.33 [1]	n/d	0.44 [1]
Beryllium	0.14 [1]	n/d	n/d	n/d	n/d	n/d
Bismuth	n/d	n/d	n/d	n/d	n/d	n/d
Cadmium	n/d	n/d	n/d	n/d	n/d	n/d
Calcium	120.69	156.58	68.98	94.33	46.41	70.58
Chromium	n/d	n/d	n/d	n/d	n/d	n/d
Cobalt	n/d	n/d	n/d	n/d	n/d	n/d
Copper	n/d	n/d	n/d	n/d	n/d	n/d
Gallium	n/d	n/d	n/d	n/d	n/d	n/d
Iron	20.00	8.01	2.13	1.50	4.22	3.44
Lanthanum	n/d	n/d	n/d	n/d	n/d	n/d
Lead	n/d	n/d	n/d	n/d	n/d	n/d
Magnesium	55.84	37.15	17.28	36.45	16.49	7.56
Manganese	n/d	n/d	n/d	n/d	n/d	n/d
Mercury	n/d	n/d	n/d	n/d	n/d	n/d
Molybdenum	n/d	n/d	n/d	n/d	n/d	n/d
Nickel	n/d	n/d	n/d	n/d	n/d	n/d
Phosphorus	n/d	n/d	n/d	n/d	n/d	n/d
Potassium	n/d	37.22 [1]	n/d	n/d	n/d	n/d
Scandium	n/d	n/d	n/d	n/d	n/d	n/d
Selenium	n/d	n/d	n/d	n/d	n/d	n/d
Silver	n/d	n/d	n/d	n/d	n/d	n/d
Sodium	89.47	74.28	102.71	51.62	29.44	37.32
Strontium	n/d	n/d	n/d	n/d	n/d	n/d
Thallium	n/d	n/d	n/d	n/d	n/d	n/d
Titanium	n/d	n/d	n/d	n/d	n/d	n/d
Vanadium	n/d	n/d	n/d	n/d	n/d	n/d
Zinc	0.13 [1]	0.31 [1]	0.13 [1]	0.35 [1]	1.56 [1]	0.76 [1]

Units are mg/kg unless noted.

n/d Indicates that the element was not detected in any of the composited weekly extract solutions.

[1] For analytes that were not detected in the composited weekly extract solutions, calculations used a value of zero.

Table B-5

Mean and Range in Elemental Compositions for the Meteoric Water Mobility Procedure and the Synthetic Precipitation Leach Test (EPA Method 1312) Conducted on the Alluvium

Constituent	Meteoric Water Mobility Test				EPA Method 1312			
	n	Mean	Max	Min	n	Mean	Max	Min
pH (standard units)	5	8.07	8.30	7.90	4	9.26	9.38	9.16
Aluminum	5	NA	<0.25	<0.10	4	NA	<0.25	<0.25
Antimony	5	NA	<0.50	<0.50	4	NA	<0.50	<0.50
Arsenic	5	0.031	0.051	0.010	4	NA	0.008	<0.005
Barium	5	NA	0.30	<0.25	4	NA	0.32	<0.25
Beryllium	5	NA	<0.10	<0.10	4	NA	<0.05	<0.05
Cadmium	5	NA	<0.005	<0.005	4	NA	<0.005	<0.005
Chloride	5	17.1	21	6.3	4	NA	<5.0	<5.0
Chromium	5	NA	<0.05	<0.05	4	NA	<0.05	<0.05
Copper	5	NA	<0.10	<0.05	4	NA	<0.05	<0.05
Fluoride	5	0.49	0.64	0.37	4	0.17	0.20	0.14
Iron	5	NA	0.28	<0.10	4	NA	0.12	<0.05
Lead	5	NA	<0.05	<0.05	4	NA	<0.05	<0.05
Magnesium	5	8.40	14.0	3.15	4	2.10	2.9	1.1
Manganese	5	NA	<0.50	<0.10	4	NA	<0.50	<0.50
Mercury	5	NA	<0.005	<0.001	4	NA	<0.001	<0.001
Nickel	5	NA	<0.50	<0.10	4	NA	<0.50	<0.50
Nitrate	5	NA	<0.50	<0.10	4	NA	<0.50	<0.50
Selenium	5	NA	<0.005	<0.001	4	NA	<0.005	<0.005
Sulfate	5	23.2	32	13	4	NA	<10	<10
Silver	5	NA	<0.02	<0.0005	4	NA	<0.02	<0.02
TDS	5	285	430	137	4	52.5	70	42
Thallium	5	NA	<2.5	<1	4	NA	<2.5	<2.5
WAD Cyanide	1	NA	<0.005	<0.05	nm	------	------	------
Zinc	5	NA	0.089	<0.05	4	NA	<0.05	<0.05

NA = not applicable. Insufficient number of detectable values to calculate a mean.

nm = value not measured.

Units are mg/L unless noted.

Table B-6

Mean and Range in Elemental Compositions for the Meteoric Water Mobility Procedure and the Synthetic Precipitation Leach Test (EPA Method 1312) Conducted on the Oxidized Limestone

Constituent	Meteoric Water Mobility Test				EPA Method 1312			
	n	Mean	Max	Min	n	Mean	Max	Min
pH	4	7.79	8.32	6.75	2	9.14	9.14	9.14
Aluminum	4	NA	0.30	<0.10	2	NA	0.80	<0.25
Antimony	4	NA	<0.50	<0.50	2	NA	<0.50	<0.50
Arsenic	4	0.052	0.095	0.024	2	0.061	0.061	0.060
Barium	4	NA	0.20	<0.25	2	NA	<0.25	<0.25
Beryllium	4	NA	<0.10	<0.05	2	NA	<0.05	<0.05
Cadmium	4	NA	0.0002	<0.0002	2	NA	<0.005	<0.005
Chloride	4	19.9	63	4.4	2	NA	<5.0	<5.0
Chromium	4	NA	<0.05	<0.05	2	NA	<0.05	<0.05
Copper	4	NA	<0.10	<0.05	2	NA	<0.05	<0.05
Fluoride	4	0.43	0.58	0.20	2	0.16	0.18	0.14
Iron	4	NA	0.13	<0.10	2	NA	0.26	<0.05
Lead	4	NA	<0.002	<0.05	2	NA	<0.05	<0.05
Magnesium	4	8.80	14	3.4	2	1.65	2.3	1.0
Manganese	4	NA	<0.50	<0.10	2	NA	<0.50	<0.50
Mercury	4	NA	<0.001	<0.0005	2	NA	<0.001	<0.001
Nickel	4	NA	<0.50	<0.10	2	NA	<0.50	<0.50
Nitrate	4	NA	8	<0.50	----	NA	<0.50	<0.50
Selenium	4	NA	<0.005	<0.001	2	NA	<0.005	<0.005
Sulfate	4	42.3	114	12	----	NA	<10	<10
Silver	4	NA	<0.02	<0.0005	2	NA	<0.02	<0.02
TDS	4	452	1170	154	2	84	118	50
Thallium	4	NA	<2.5	<1	2	NA	<2.5	<2.5
WAD Cyanide	2	NA	<0.005	<0.005	nm	------	------	------
Zinc	2	NA	<0.10	<0.05	2	NA	<0.05	<0.05

NA = not applicable. Insufficient number of detectable values to calculate a mean.

nm = not measured.

Units are mg/L unless noted.

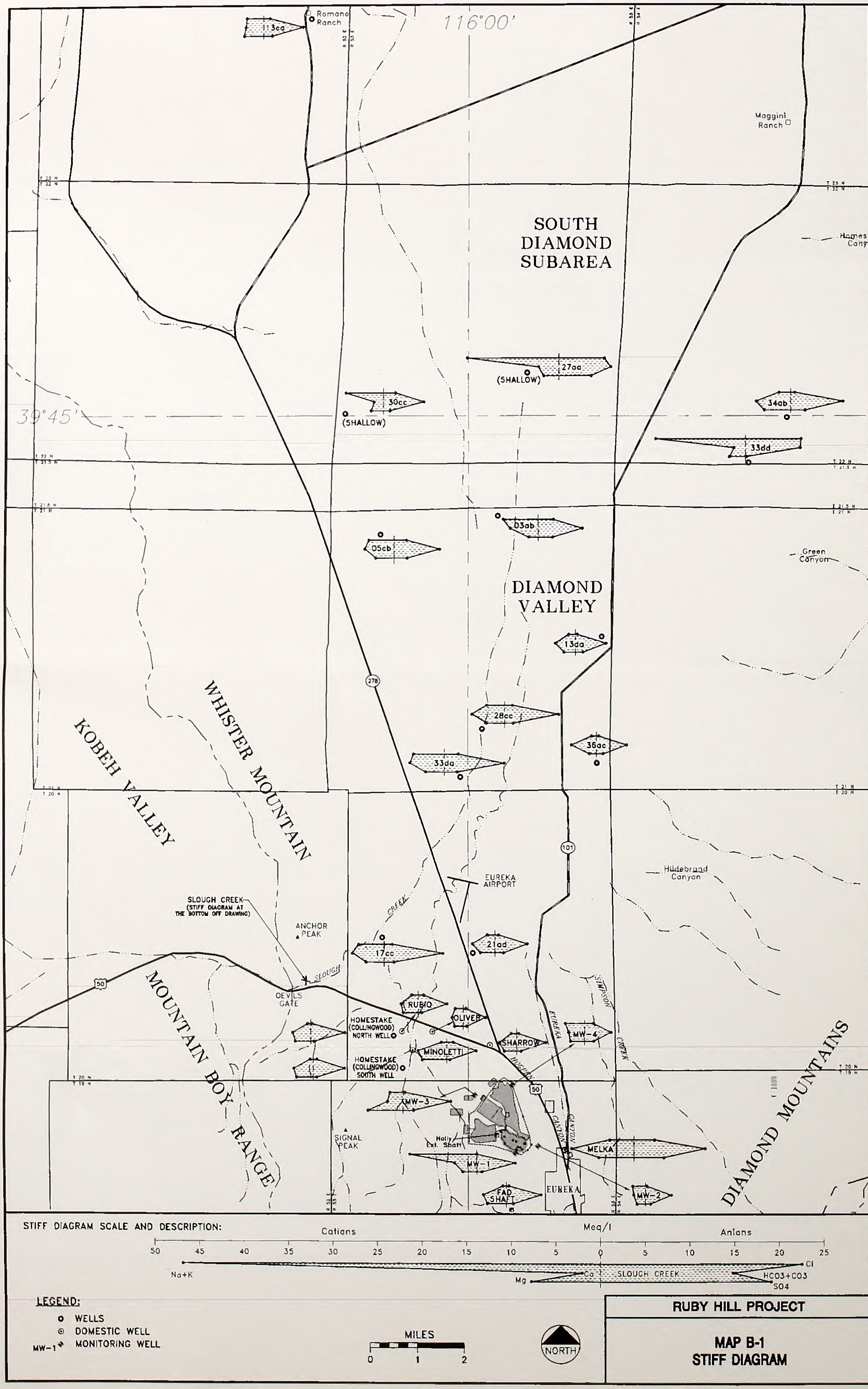
Table B-7

Results of Leach Residue Analyses

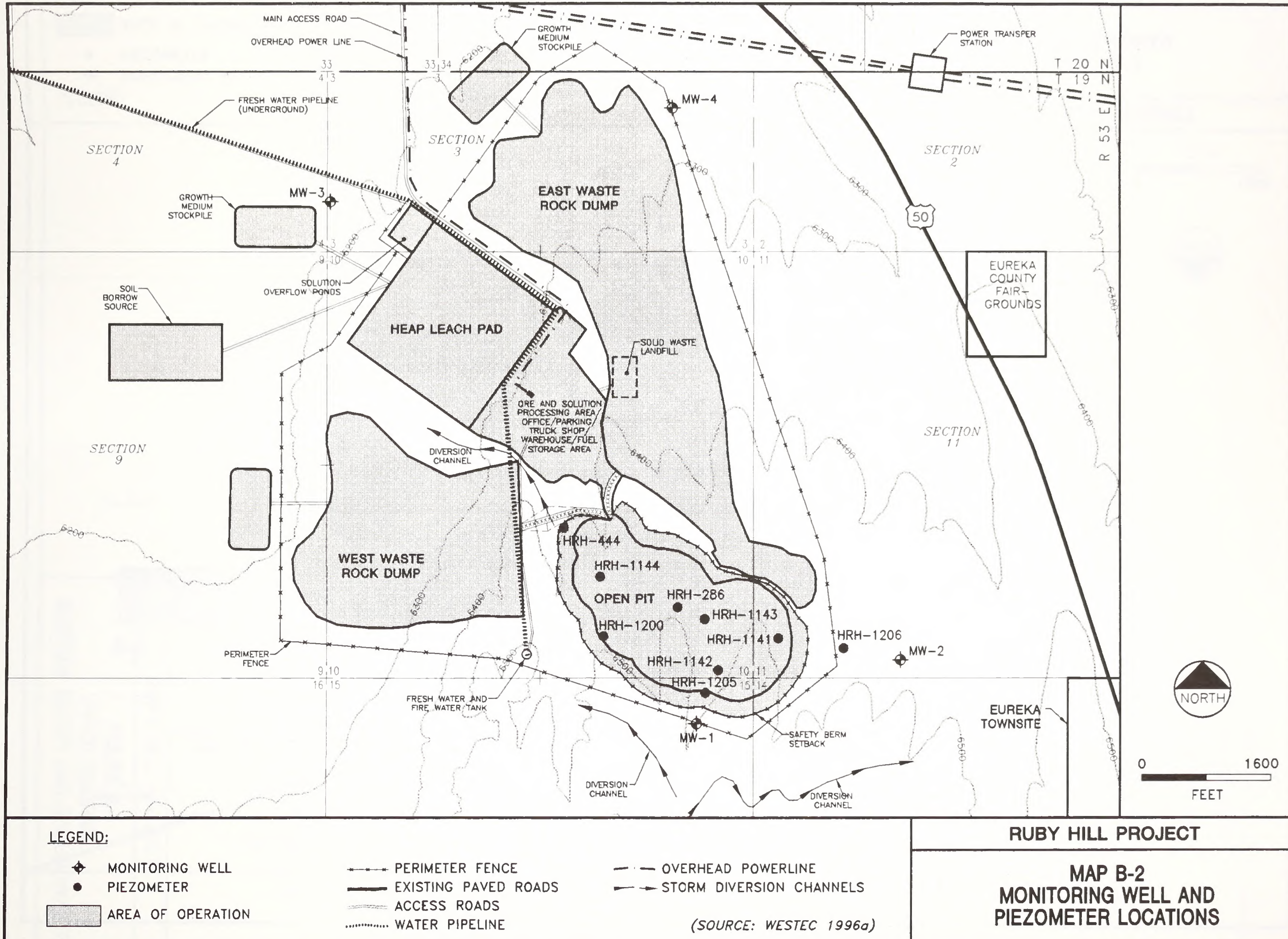
Constituent	Drinking Water Standard	Final Rinse Effluent		Leach Residue Meteoric Water Mobility Test	
		leach grade	agglomerated	leach grade	agglomerated
Alkalinity (as $CaCO_3$)	N/A	283	206	87	60
Aluminum	0.05 - 0.2	3.9	<2.5	<0.25	<0.25
Antimony	0.006	<0.5	<0.5	<0.5	<0.5
Arsenic	0.05	6.2	4.4	1.2	0.66
Barium	2.0	<0.25	<0.25	<0.25	<0.25
Beryllium	0.004	0.061	<0.05	<0.05	<0.05
Bismuth	N/A	<0.5	<0.05	<0.5	<0.5
Cadmium	0.005	<0.005	<0.005	<0.005	<0.005
Calcium	N/A	8.4	6.9	6.4	2.4
Chloride	250 - 400	15	24	9.0	<5.0
Chromium	0.1	<0.05	<0.05	<0.05	<0.05
Cobalt	N/A	<0.5	<0.5	<0.5	<0.5
Copper	1.3	<0.05	<0.05	<0.05	<0.05
Fluoride	2 - 4	0.88	0.53	0.29	0.20
Gallium	N/A	<0.5	<0.5	<0.5	<0.5
Iron	0.3 - 0.6	7.1	1.1	<0.05	0.95
Lanthanum	N/A	<0.5	<0.5	<0.5	<0.5
Lead	0.015	<0.05	<0.05	<0.05	<0.05
Lithium	N/A	<0.5	<0.5	<0.5	<0.5
Magnesium	125 - 150	1.2	0.58	<0.5	<0.5
Manganese	0.05 - 0.10	<0.5	<0.5	<0.5	<0.5
Mercury	0.002	0.003	0.001	<0.001	<0.001
Molybdenum	N/A	<0.25	<0.25	<0.25	<0.25
Nickel	0.1	<0.5	<0.5	<0.5	<0.5
Nitrate (as N)	10	2.5	1.9	<0.5	0.65
pH (standard units)	6.5 - 8.5	10.39	10.26	10.05	9.71
Phosphorus	N/A	<0.5	<0.5	<0.5	<0.5
Potassium	N/A	<2.5	<2.5	<2.5	<2.5
Scandium	N/A	<0.5	<0.5	<0.5	<0.5
Selenium	0.05	<0.005	<0.005	<0.005	<0.005
Silver	0.1	<0.02	<0.02	<0.02	<0.02
Sodium	N/A	110	86	44	24
Strontium	N/A	<0.5	<0.5	<0.5	<0.5
Sulfate	250 - 500	117	68	35	31
Thallium	0.002	<2.5	<2.5	<2.5	<2.5
Tin	N/A	<0.5	<0.5	<0.5	<0.5
Titanium	N/A	<0.1	<0.1	<0.1	<0.1
TDS	500 - 1,000	820	520	290	220
Vanadium	N/A	<0.15	<0.15	<0.15	<0.15
WAD Cyanide	0.2	<0.04	<0.04	<0.04	<0.04
Zinc	5.0	0.12	<0.05	<0.05	<0.05

Units are mg/L unless noted.

NA = not applicable.

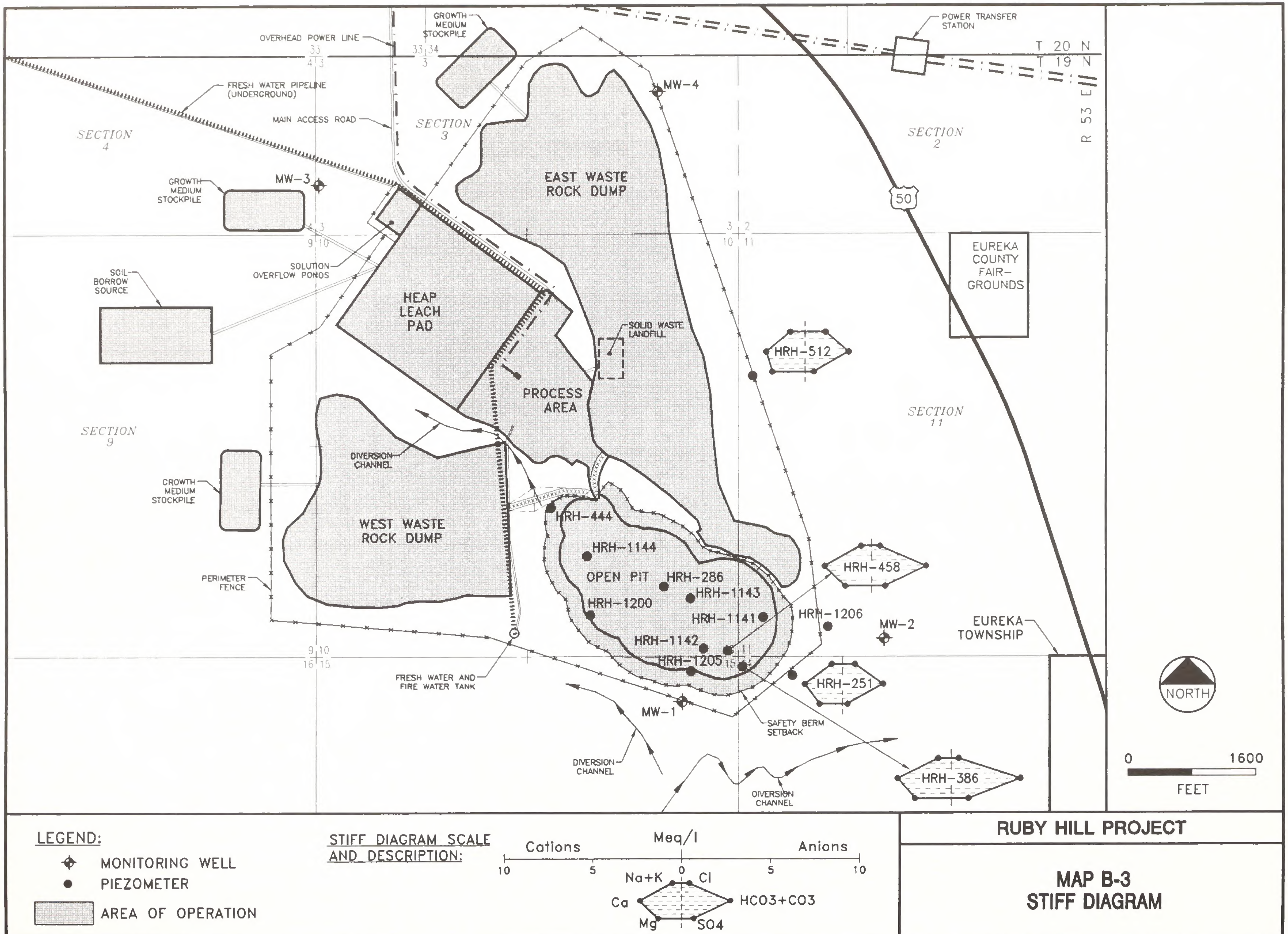


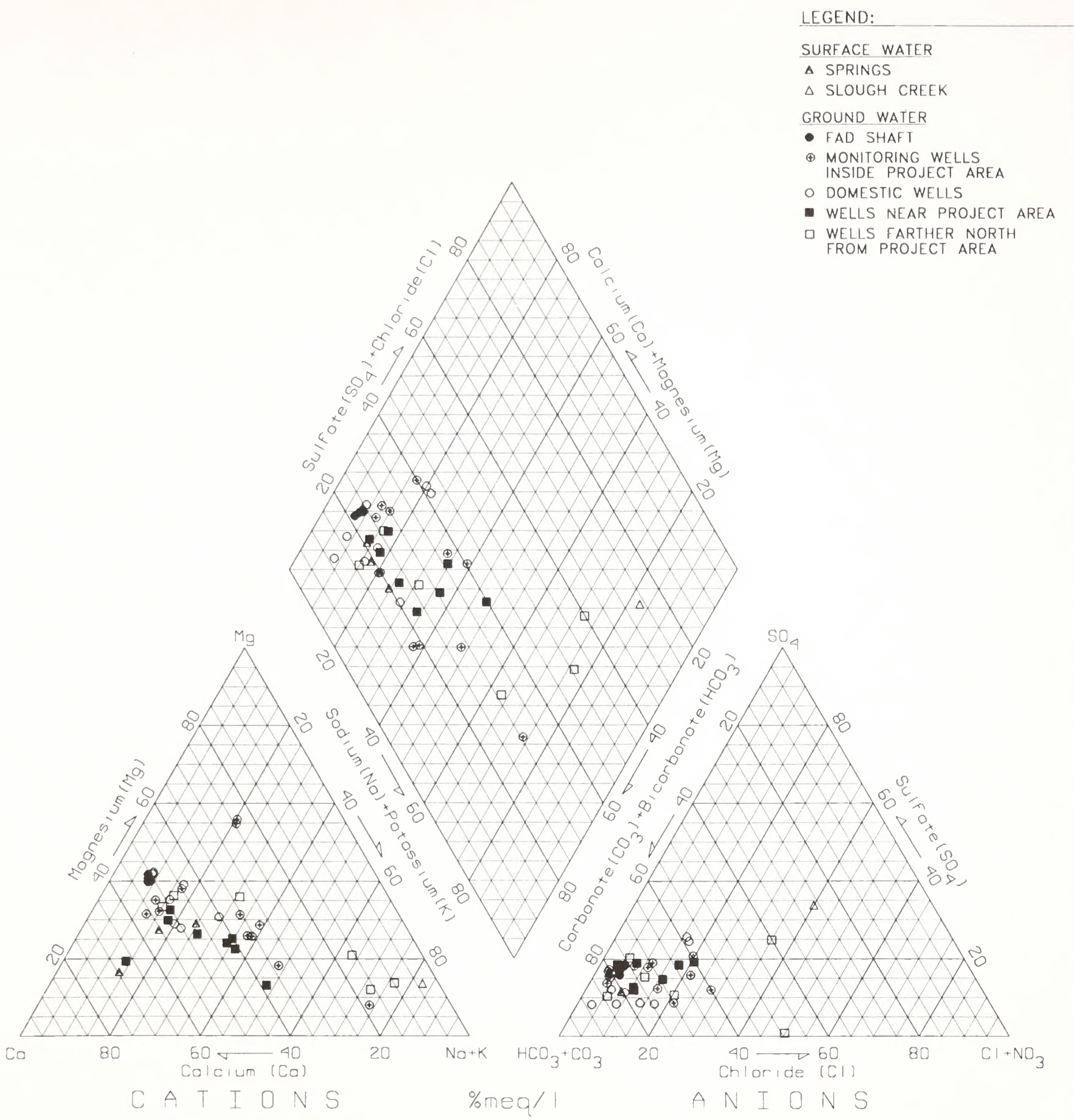
Romano Ranch
116°00'
113ca
Maggini Ranch
SOUTH DIAMOND SUBAREA
27aa
(SHALLOW)
30cc
(SHALLOW)
39°45'
34ab
33dd
03ab
05cb
DIAMOND VALLEY
13da
Green Canyon
278
28cc
36ac
33da
WHISTER MOUNTAIN
KOBEH VALLEY
101
EUREKA AIRPORT
Hildebrand Canyon
SLOUGH CREEK (STIFF DIAGRAM AT THE BOTTOM OFF DRAWING)
ANCHOR PEAK
CREEK
17cc
21ad
SLOUGH
50
DEVILS GATE
MOUNTAIN BOY RANGE
RUBIO
OLIVER
HOMESTAKE (COLLINGWOOD) NORTH WELL
SHARROW
MW-4
SIMPSON CREEK
EUREKA
MINOLETTI
HOMESTAKE (COLLINGWOOD) SOUTH WELL
HOGPEN
50
MW-3
SIGNAL PEAK
Holly Ext. Shaft
CANYON
MELKA
MW-1
DIAMOND MOUNTAINS
FAD SHAFT
EUREKA
MW-2
STIFF DIAGRAM SCALE AND DESCRIPTION:
Cations
Meq/l
Anions
50 45 40 35 30 25 20 15 10 5 0 5 10 15 20 25
Na+K
Cl
Ca
SLOUGH CREEK
Mg
HCO3+CO3
SO4
LEGEND:
WELLS
DOMESTIC WELL
MW-1 MONITORING WELL
MILES
0 1 2
NORTH
RUBY HILL PROJECT
MAP B-1
STIFF DIAGRAM



RUBY HILL PROJECT

**MAP B-2
MONITORING WELL AND
PIEZOMETER LOCATIONS**


OVERHEAD POWER LINE
GROWTH MEDIUM STOCKPILE
POWER TRANSFER STATION
T 20 N
T 19 N
R 53 E
FRESH WATER PIPELINE (UNDERGROUND)
MAIN ACCESS ROAD
SECTION 4
SECTION 3
SECTION 2
SECTION 9
SECTION 11
MW-3
MW-4
MW-2
MW-1
50
EAST WASTE ROCK DUMP
WEST WASTE ROCK DUMP
HEAP LEACH PAD
PROCESS AREA
SOLID WASTE LANDFILL
SOLUTION OVERFLOW PONDS
SOIL BORROW SOURCE
EUREKA COUNTY FAIR-GROUNDS
DIVERSION CHANNEL
PERIMETER FENCE
FRESH WATER AND FIRE WATER TANK
SAFETY BERM SETBACK
EUREKA TOWNSHIP
OPEN PIT
HRH-512
HRH-444
HRH-1144
HRH-286
HRH-1143
HRH-1200
HRH-1141
HRH-1142
HRH-1205
HRH-1206
HRH-458
HRH-251
HRH-386
NORTH
0
1600
FEET
LEGEND:
MONITORING WELL
PIEZOMETER
AREA OF OPERATION
STIFF DIAGRAM SCALE AND DESCRIPTION:
Cations
Meq/l
Anions
10
5
0
5
10
Na+K
Cl
Ca
HCO3+CO3
Mg
SO4
RUBY HILL PROJECT
MAP B-3
STIFF DIAGRAM



RUBY HILL PROJECT

FIGURE B-1
PIPER DIAGRAM
SURFACE WATER AND GROUNDWATER

APPENDIX C

BLM VISUAL CONTRAST RATING WORK SHEETS

Appendix C

BLM Visual Contrast Rating Work Sheets

The following BLM Visual Contrast Rating Worksheets were used to described the characteristic (existing) landscape and Proposed Activities as viewed from each key observation point. Descriptions of the characteristic landscape are summarized for major elements within foreground (F), middleground (M), and background (B) viewing zones. No entry is made for foreground and background viewing zones for descriptions of Proposed Activities since the project area occurs entirely within the middleground (M) viewing zone of each key observation point; changes to elements within the foreground and background would not occur. Contrast ratings for the Proposed Activities are given for the Ruby Hill Mine at height of mining as this scenario represents the maximum visual contrast. The waste rock dump(s) and leach pad for each alternative were considered landforms for the purposes of this contrast rating.

Proposed Action

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996
District Battle Mountain, NV
Resource Area
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name
Homestake Ruby Hill Mine

2. Key Observation Point #1

3. VRM Class III

4. Location
Township 19N
Range 53E
Section 11

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F - flat/indistinct M - flattened & narrow B - rolling & regular	F - horizontal strip, jagged M - regular & indistinct B - regular	F - short, linear & parallel M - none B - none
LINE	F - horizontal & straight M - horizontal & gently sloping B - horizontal & undulating	F - undulating to jagged M - horizontal & gently sloping B - curving & irregular	F - vertical & parallel, horizontal & flat M - none B - none
COLOR	F - light brown M - tan to light brown (where visible) B - tan to light brown	F - muted gold & yellow, avacado to dark olive M - medium to dark olive B - dark olive & blue green	F - green & white, grey M - none B - none
TEXTURE	F - Smooth M - smooth B - moderate	F - coarse M - moderately fine B - fine	F - sharp, smooth M - none B - none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M - flat & slightly irregular	M - indistinct/patchy	M - none
LINE	M - horizontal & relatively straight	M - indistinct	M - none
COLOR	M - white, muted yellow, tan, grey & reddish brown	M - indistinct	M - none
TEXTURE	M - Smooth	M - lightly stippled	M - none

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	LAND/WATER BODY (1) Strong	Moderate	Weak	None	VEGETATION (2) Strong	Moderate	Weak	None	STRUCTURES (3) Strong	Moderate	Weak	None
Form			✓			✓						✓
Line			✓			✓						✓
Color	✓					✓						✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
R. P. Rasmussen	6-4-96

Proposed Action

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996

District Battle Mountain, NV

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Homestake Ruby Hill mine
2. Key Observation Point: #2
3. VRM Class: III/IV

4. Location
Township: 20N
Range: 53E
Section: 27/34

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F- flat/indistinct M- rolling & mounded B- rolling & mounded to triangular	F- regular M- regular to small, circular & patchy B- irregular	F- rhomboidal M- vertical & rectangular B- small & geometric
LINE	F- horizontal, straight & diffuse M- horizontal & straight to undulating B- undulating to diagonal & straight	F- irregular M- horizontal & broken B- straight, diagonal & irregular	F- straight, vertical & converging M- short, vertical & geometric B- indistinct
COLOR	F- indistinct (covered w/ vegetation) M- light tan to light brown B- light grey & light brown	F- muted gold, beige, grey-green M- medium to dark olive B- blue green & dark olive	F- dark grey, white, muted yellow M- dark brown B- grey
TEXTURE	F- smooth M- moderately smooth B- smooth to jagged	F- moderately smooth M- smooth to moderate B- smooth, uneven/random	F- very smooth M- sharp & sparse B- smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M- moderately tall & mounded, elongated trapezoid	M- indistinct to patchy	M- none
LINE	M- rounded, convex & horizontal to straight & diagonal	M- indistinct to horizontal & broken	M- none
COLOR	M- white, muted yellow, tan, grey	M- medium to dark olive, grey green	M- none
TEXTURE	M- smooth	M- smooth & patchy	M- none

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form		✓					✓					✓
Line			✓				✓					✓
Color		✓					✓					✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☒ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen

Date: 6-4-96

Proposed Action

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996

District Battle Mountain, NV

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Homestake Ruby Hill Mine
2. Key Observation Point: #3
3. VRM Class: III / IV

4. Location
   - Township: 20N
   - Range: 53E
   - Section: 27/30

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F- flat/indistinct M- elongated rhomboid B- rolling to rugged	F- regular w/ elongated strip M- flat w/ irregular edges B- patchy & amorphous	F- rectangular, triangular & small M- none B- none
LINE	F- horizontal & straight M- horizontal, straight & converging B- horizontal & undulating	F- indistinct w/ some straight horizontal M- irregular, straight & horizontal B- indistinct / diffuse	F- short & parallel M- none B- none
COLOR	F- indistinct (covered w/ vegetation) M- light tan B- light tan to light brown	F- muted gold, beige, grey green M- grey green to dark olive B- blue green to dark olive	F- white, slateblue, royalblue, red M- none B- none
TEXTURE	F- smooth M- smooth B- moderate	F- smooth to moderate M- smooth & uneven B- smooth & sparse	F- moderately coarse M- none B- none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M- flattened trapezoids	M- indistinct to patchy	M- small & geometric
LINE	M- horizontal & straight to rounded, straight & diagonal	M- indistinct to straight & horizontal	M- indistinct
COLOR	M- tan, brown, grey	M- grey green to dark olive	M- tan
TEXTURE	M- smooth	M- smooth & uneven	M- smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓					✓				✓
Color		✓						✓				✓
Texture				✓				✓				✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
R. P. Rasmussen	6-4-96

East Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996
District Battle Mountain, NV
Resource Area
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name
Homestake Ruby Hill Mine
2. Key Observation Point #1
3. VRM Class III

4. Location
Township 19N
Range 53E
Section 11

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F - flat/indistinct M - flattened & narrow B - rolling & regular	F - horizontal strip, jagged M - regular & indistinct B - regular	F - short, linear & parallel M - none B - none
LINE	F - horizontal & straight M - horizontal & gently sloping B - horizontal & undulating	F - undulating to jagged M - horizontal & gently sloping B - curving & irregular	F - vertical & parallel, horizontal & flat M - none B - none
COLOR	F - light brown M - tan to light brown (where visible) B - tan to light brown	F - muted gold & yellow, avacado to dark olive M - medium to dark olive B - dark olive & blue green	F - green & white, grey M - none B - none
TEXTURE	F - Smooth M - smooth B - moderate	F - coarse M - moderately fine B - fine	F - sharp, smooth M - none B - none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M - prominent elongated trapezoid	M - indistinct / patchy	M - none
LINE	M - horizontal, bold & straight	M - indistinct	M - none
COLOR	M - white, muted yellow, tan, grey & reddish brown	M - grey green & medium to dark olive	M - none
TEXTURE	M - Smooth	M - stippled / patchy	M - none

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1.

DEGREE OF CONTRAST	LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
ELEMENTS	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
Form	✓					✓						✓
Line		✓				✓						✓
Color	✓						✓					✓
Texture			✓			✓						✓

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No
(Explain on reverse side)

3. Additional mitigating measures recommended
☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen
Date: 6-4-96

East Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996
District Battle Mountain, NV
Resource Area
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Homestake Ruby Hill mine
2. Key Observation Point: #2
3. VRM Class: III/IV
4. Location: Township 20N; Range 53E; Section 27/34
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F- flat/indistinct M- rolling & mounded B- rolling & mounded to triangular	F- regular M- regular to small, circular & patchy B- irregular	F- rhomboidal M- vertical & rectangular B- Small & geometric
LINE	F- horizontal, straight & diffuse M- horizontal & straight to undulating B- undulating to diagonal & straight	F- irregular M- horizontal & broken B- straight, diagonal & irregular	F- straight, vertical & converging M- short, vertical & geometric B- indistinct
COLOR	F- indistinct (covered w/ vegetation) M- light tan to light brown B- light grey & light brown	F- muted gold, beige, grey-green M- medium to dark olive B- blue green & dark olive	F- dark grey, white, muted yellow M- dark brown B- grey
TEXTURE	F- smooth M- moderately smooth B- smooth to jagged	F- moderately smooth M- smooth to moderate B- smooth, uneven/random	F- very smooth M- sharp & sparse B- smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M- tall & mounded, elongated trapezoid	M- indistinct to patchy	M- Small & geometric
LINE	M- rounded, convex & horizontal, straight & diagonal	M- indistinct to horizontal & broken	M- indistinct
COLOR	M- white, muted yellow, tan, grey, reddish brown	M- medium to dark olive, grey-green	M- tan
TEXTURE	M- smooth	M- smooth & uneven	M- smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form		✓					✓				✓	
Line			✓				✓					✓
Color	✓						✓				✓	
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☐ Yes ☒ No (Explain on reverse side)

3. Additional mitigating measures recommended ☒ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen
Date: 6-4-96

East Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996

District Battle Mountain, NV

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Homestake Ruby Hill Mine
2. Key Observation Point: #3
3. VRM Class: III / IV
4. Location: Township 20N; Range 53E; Section 27/30
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F - flat/indistinct M - elongated rhomboid B - rolling to rugged	F - regular w/ elongated strip M - flat w/ irregular edges B - patchy & amorphous	F - rectangular, triangular & small M - none B - none
LINE	F - horizontal & straight M - horizontal, straight & converging B - horizontal & undulating	F - indistinct w/ some straight horizontal M - irregular, straight & horizontal B - indistinct / diffuse	F - short & parallel M - none B - none
COLOR	F - indistinct (covered w/ vegetation) M - light tan B - light tan to light brown	F - muted gold, beige, grey-green M - grey green to dark olive B - blue green to dark olive	F - white, slate blue, royal blue, red M - none B - none
TEXTURE	F - smooth M - smooth B - moderate	F - smooth to moderate M - smooth & uneven B - smooth & sparse	F - moderately coarse M - none B - none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M - elongated trapezoids	M - indistinct to patchy	M - none
LINE	M - straight & horizontal to diagonal	M - indistinct to straight, horizontal & irregular	M - none
COLOR	M - tan, brown, grey	M - grey green to dark olive	M - none
TEXTURE	M - smooth	M - smooth & uneven	M - none

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form			✓					✓				✓
Line			✓					✓				✓
Color		✓						✓				✓
Texture			✓					✓				✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen

Date: 6-4-96

West Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996
District Battle Mountain, NV
Resource Area
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name: Homestake Ruby Hill Mine
2. Key Observation Point: #1
3. VRM Class: III
4. Location
   - Township: 19N
   - Range: 53E
   - Section: 11
5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F - flat/indistinct m - flattened & narrow B - rolling & regular	F - horizontal strip, jagged m - regular & indistinct B - regular	F - Short, linear & parallel m - none B - none
LINE	F - horizontal & Straight m - horizontal & gently sloping B - horizontal & undulating	F - undulating to jagged m - horizontal & gently sloping B - curving & irregular	F - vertical & parallel, horizontal & flat m - none B - none
COLOR	F - light brown m - tan to light brown (where visible) B - tan to light brown	F - muted gold & yellow, avacado to dark olive m - medium to dark olive B - dark olive & blue green	F - green & white, grey m - none B - none
TEXTURE	F - Smooth m - smooth B - moderate	F - coarse m - moderately fine B - fine	F - sharp, smooth m - none B - none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	m - flattened & narrow	m - regular to indistinct	m - short cylindrical, rectangular
LINE	m - horizontal & gently sloping	m - rounded & horizontal to indistinct	m - short, parallel & perpendicular
COLOR	m - white, tan, grey	m - olive grey to indistinct	m - tan
TEXTURE	m - smooth	m - fine to moderately fine	m - smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form			✓				✓				✓	
Line			✓				✓				✓	
Color		✓				✓						✓
Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen
Date: 6-4-96

West Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996
District Battle Movatain, NV
Resource Area
Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name
Homestake Ruby Hill mine

2. Key Observation Point #2

3. VRM Class III/IV

4. Location
Township 20N
Range 53E
Section 27/34

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F-flat/indistinct M-rolling & mounded B-rolling & mounded to triangular	F-regular M-regular to small, circular & patchy B-irregular	F-rhomboidal M-vertical & rectangular B-Small & geometric
LINE	F-horizontal, straight & diffuse M-horizontal & straight to undulating B-undulating to diagonal & straight	F-irregular M-horizontal & broken B-straight, diagonal & irregular	F-straight, vertical & converging M-Short, vertical & geometric B-indistinct
COLOR	F-indistinct (covered w/ vegetation) M-light tan to light brown B-light grey & light brown	F-muted gold, beige, grey-green M-medium to dark olive B-blue green & dark olive	F-dark grey, white, muted yellow M-dark brown B-grey
TEXTURE	F-smooth M-moderately smooth B-smooth to jagged	F-moderately smooth M-Smooth to moderate B-smooth, uneven/random	F-very smooth M-sharp & sparse B-Smooth

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M-Small, terraced triangle & long mounded rhomboid	M-indistinct to patchy	M-short & rectangular
LINE	M-straight, diagonal & parallel to straight, horizontal & rounded	M-indistinct to straight, horizontal & continuous	M-Short, parallel & perpendicular
COLOR	M-white, light grey, tan to dark brown	M-dark olive, grey-green	M-tan
TEXTURE	M-smooth to moderate	M-smooth & patchy	M-smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		Strong	Moderate	Weak	None	Strong	Moderate	Weak	None	Strong	Moderate	Weak	None
ELEMENTS	Form		✓					✓				✓	
	Line			✓				✓				✓	
	Color			✓					✓				✓
	Texture			✓				✓					✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names	Date
R. P. Rasmussen	6-4-96

West Waste Rock Dump Alternative

Form 8400-4
(September 1985)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

VISUAL CONTRAST RATING WORKSHEET

Date June 4, 1996

District Battle Mountain, NV

Resource Area

Activity (program)

SECTION A. PROJECT INFORMATION

1. Project Name Homestake Ruby Hill Mine
2. Key Observation Point #3
3. VRM Class III/IV

4. Location
Township 20N
Range 53E
Section 27/30

5. Location Sketch

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	F- flat/indistinct M- elongated rhomboid B- rolling to rugged	F- regular w/ elongated strip M- flat w/ irregular edges B- patchy & amorphous	F- rectangular, triangular & small M- none B- none
LINE	F- horizontal & straight M- horizontal, straight & converging B- horizontal & undulating	F- indistinct w/ some straight horizontal M- irregular, straight & horizontal B- indistinct/diffuse	F- short & parallel M- none B- none
COLOR	F- indistinct (covered w/ vegetation) M- light tan B- light tan to light brown	F- muted gold, beige, grey green M- grey green to dark olive B- blue green to dark olive	F- white, slate blue, royal blue, red M- none B- none
TEXTURE	F- smooth M- smooth B- moderate	F- smooth to moderate M- smooth & uneven B- smooth & sparse	F- moderately coarse M- none B- none

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	M- flattened trapezoids	M- indistinct to patchy	M- small & geometric
LINE	M- horizontal & straight to rounded, straight & diagonal	M- indistinct to horizontal & curving	M- indistinct
COLOR	M- tan, brown, grey	M- grey-green to dark olive	M- tan
TEXTURE	M- smooth	M- smooth & uneven	M- smooth

SECTION D. CONTRAST RATING ☒ SHORT TERM ☐ LONG TERM

1. DEGREE OF CONTRAST

ELEMENTS	Land/Water Body (1) Strong	Moderate	Weak	None	Vegetation (2) Strong	Moderate	Weak	None	Structures (3) Strong	Moderate	Weak	None
Form			✓				✓					✓
Line			✓					✓				✓
Color		✓						✓				✓
Texture				✓				✓				✓

2. Does project design meet visual resource management objectives? ☑ Yes ☐ No (Explain on reverse side)

3. Additional mitigating measures recommended ☑ Yes ☐ No (Explain on reverse side)

Evaluator's Names: R. P. Rasmussen

Date: 6-4-96

APPENDIX D

CULTURAL RESOURCES LEGISLATION DESCRIPTIONS

Appendix D

Cultural Resources *Legislation* Descriptions

The Antiquities Act of 1906 was the first general act providing protection for cultural resources. It provided for protection of all historic or prehistoric ruins or monuments or any object of antiquity on Federal lands, and established criminal sanctions against the injury, destruction, or unauthorized excavation of such resources. The Archaeological Resources Protection Act supplements the provisions of the Antiquities Act of 1906 in securing the protection of archaeological resources and sites on public lands. It stipulates that no person may excavate, remove, damage, or otherwise alter or deface any archaeological resource on public lands unless such activity has been permitted in accordance with the Act. The Act also calls for the notification of Native American tribes before archaeological excavation permits may be granted, particularly if an excavation or collection may have an effect on a culturally important site.

The National Historic Preservation Act established the National Register of Historic Places and the Advisory Council on Historic Preservation. In Section 106 of the National Historic Preservation Act, a five-stage process, which involved the appropriate State Historic Preservation Officer, Advisory Council, and appropriate Federal agency, was detailed to ensure that effects on historic properties are fully considered in the planning and execution of Federal projects (defined as projects involving Federal lands, funding, or licensing). Executive Order 11593 of 1971 specifically invoked the National Historic Preservation Act and directed Federal agencies to inventory their lands for cultural properties and make appropriate nominations to the National Register of Historic Places.

Consideration for listing on the Register is given to "districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association" and: a) that are associated with events that have made a significant contribution to the broad patterns of history; or b) that are associated with the lives of persons significant in our the past; or c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or d) that have yielded, or may be likely to yield, important information in prehistory or history (Parker and King no date). Burials are not generally eligible to the Register by definition, but are protected under other regulations.

The American Indian Religious Freedom Act mandated that Federal agencies and departments protect and preserve Native American religious cultural rights and values. In practice, the American Indian Religious Freedom Act has established a set of procedures where tribal representatives are notified and asked to comment on Federal actions that may adversely affect known sites of religious or cultural value. The Archaeological Resources Protection Act specifically references the American Indian Religious Freedom Act with respect to protection of culturally significant sites.

The Native American Graves Protection and Repatriation Act was implemented to ensure proper and timely repatriation of Native American human remains and objects housed in museums and other institutions. The Native American Graves Protection and Repatriation Act also mandates that Federal agencies establish procedures for responding to unanticipated or new discoveries of human remains and related cultural materials on Federal and tribal lands. Graves on private land are not protected under the Native American Graves Protection and Repatriation Act; however, they are protected under the Nevada Indian Burial Protection Act (Nevada Revised Statute 383.150), which outlines procedures regarding treatment of human burials on State or privately-owned land in Nevada.

APPENDIX E

SUPPLEMENTAL NOISE AND VIBRATION INFORMATION

Table E-1

Noise Terminology and Symbols

Symbol	Term	Definition
	Noise	Unwanted sound; one that interferes with one's hearing of something; a sound that lacks agreeable musical quality or is noticeably unpleasant.
dBA	A-weighting	The most commonly used frequency-weighting measure; simulates human sound perception and correlates well with human perception of the annoying aspects of noise.
	Ambient Noise	Total, all-encompassing noise associated with a given environment and time.
	Background Noise	Noise from all sources other than a particular sound of interest (e.g., other than mining noise if mining noise was being measured).
dB	Decibel	Unit of measure of sound pressure and sound power levels. Expresses relative difference in power between two signals equal to 10 times the logarithm (base 10) of the ratio of the two levels.
L_{dn}	Day-Night Average Sound Level	L_{eq} for a 24-hour, midnight to midnight period with 10 dBA added to the sound levels from 10 p.m. to 7 a.m.
L_{eq}	Equivalent Continuous Sound Level	Level of steady state sound that, in a specific time period, has an equal amount of sound energy as the time-varying sound.
L_{max}	Maximum Sound Level	The greatest sound level measured on a sound level meter during a designated time interval or event using **fast** time averaging on the meter.
L_{50}		Sound level exceeded 50 percent of the time during a given period; the median sound level.
L_{90}		Sound level exceeded 90 percent of the time during a given period; sometimes used as an approximation for background noise.

Table E-2

Relative Scale of Various
Noise Sources and Effect on People

Public Reaction		Noise Level (dBA)	Common Indoor Noise Levels	Common Outdoor Noise Levels
		110	Rock Band	Jet Flyover at 1,000 ft.
Local Committee Activity with Influential or Legal Action		100	Inside Subway Train (New York)	Gas Lawn Mower at 3 ft.
Letters of Protest	4 times as loud	90	Food Blender at 3 ft.	Diesel Truck at 50 ft.
Complaints Likely	Twice as loud	80	Garbage Disposal at 3 ft. Shouting at 3 ft.	Noisy Urban Daytime
Complaints Possible Reference		70	Vacuum Cleaner at 10 ft.	Gas Lawn Mower at 100 ft.
			Normal Speech at 3 ft.	Commercial Area Heavy Traffic at 300 ft.
Complaints Rare	½ as loud	60	Large Business Office	
		50	Dishwasher Next Room	Quiet Urban Daytime
		40	Small Theater, Large Conference Room (Background)	Quiet Urban Nighttime
				Quiet Suburban Nighttime
			Library	
		30	Bedroom at Night Concert Hall (Background)	Quiet Rural Nighttime
		20	Broadcast and Recording Studio	
		10	Threshold of Hearing	
		0		

Source: Hatano 1980.

Table E-3

Surveyed Structures and Estimated Vibration Limits

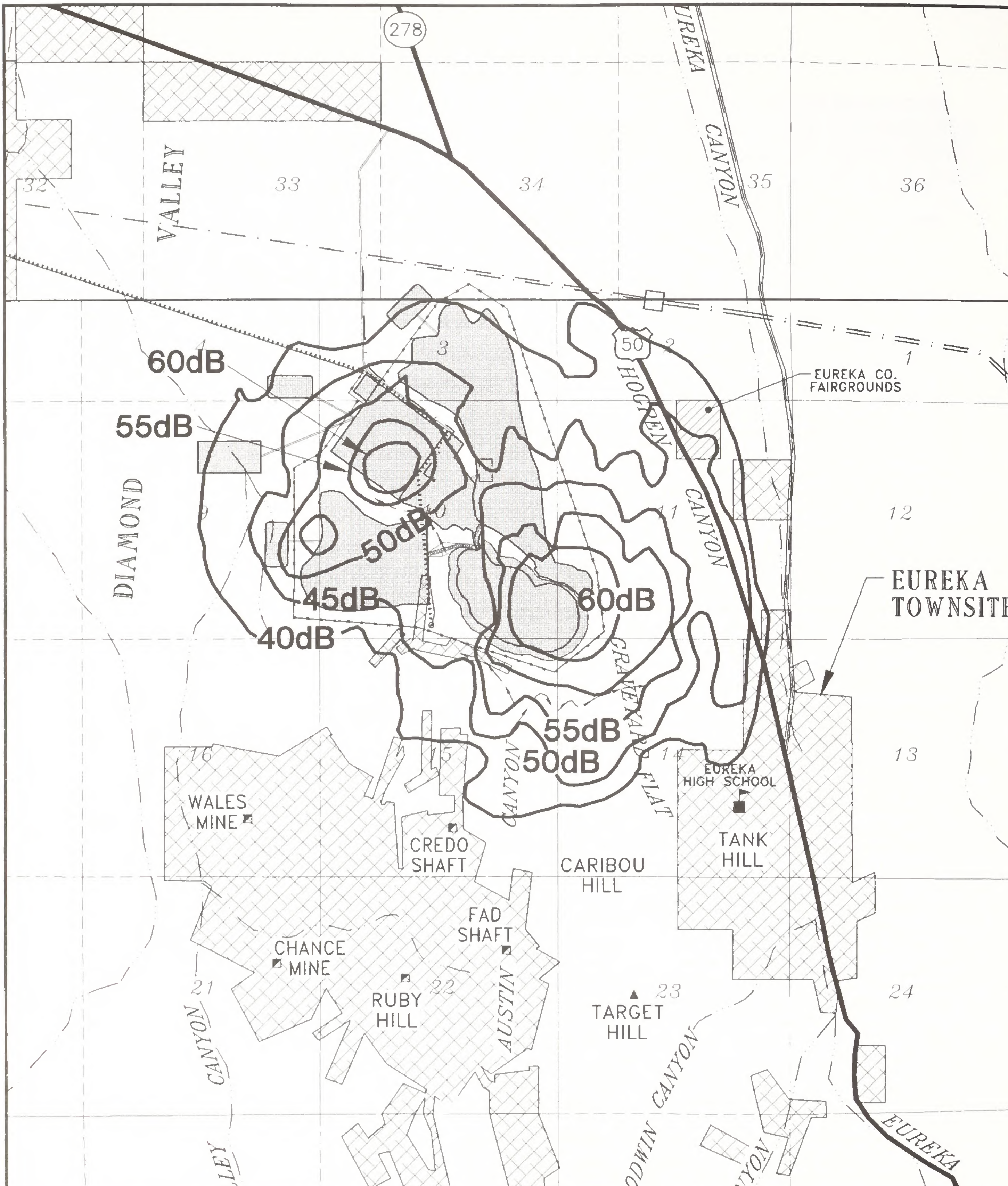
Structure	Year Built	Address	Crack Guages	Vibration Limit
Al's Hardware & Sporting Goods	1870	10273 Main Street		0.50
Alpine Lodge & Bar	1880	10248 Main Street		0.50
Ambulance Building				0.50
Baseball Field, North				1.00
Baseball Field, South				1.00
BLM Office, North		Highway 50	1	1.00
BLM Office, Town (Admin Building)		Spring Street	2	1.00
BLM Office, Town (Maintenance Building)		Spring Street		1.00
BLM Office, Town (Powder Mag)		Spring Street		1.00
BLM Office, Town (Storage)		Spring Street		1.00
Booster Tank & Pump (Booster Pump)		Hog Pen Canyon Road		1.00
Booster Tank & Pump (Booster Tank)		Hog Pen Canyon Road		1.00
Brick Building (Castorlube)	1879	10279 Main Street		0.50
Brown Residence		NW corner of Ryland and Nob Hill	2	0.50
Colonnade Hotel	1880	10240 Monroe Street		0.50
Diamond Valley Pump Houses (North)				1.00
Diamond Valley Pump Houses (South				1.00
Eureka Co. Maintenance (Shed)				1.00
Eureka Co. Maintenance (Shop)				1.00
Eureka Dog Pound				1.00
Eureka Elementary School	1994	10280 Adams Street		1.00
Eureka Firehall		Main Street		1.00
Eureka High School (Main Building)	1968	13832 Mathew Street		1.00
Eureka Jail/Justice Facility	1989	Main Street		0.50
Eureka Medical Clinic		10166 Main Street		1.00
Eureka Opera House and Theater	1880	10201 Main Street	3	1.00
Eureka Post Office	1880	10199 Main Street	3	1.00

Table E-3 (Continued)

Structure	Year Built	Address	Crack Guages	Vibration Limit
Eureka Public Library	1981	Monroe Street	2	1.00
Eureka Public Swimming Pool		NW corner of Mathew and Sheridan	2	1.00
Eureka Senior Center	1880	Main Street	2	1.00
Fairground Concession Stand		Northeast side of town		1.00
Fairground Grandstand		Northeast side of town		1.00
Fairground Stage Area		Northeast side of town		1.00
Fairground Main Building		Northeast side of town		1.00
Firehall Clubhouse				2.00
First Interstate Bank	1879	10243 Main Street	3	0.50
Fowley-Rickard-Johnson-Remington Building	1879	Main Street		0.50
General Store	1882	Main Street		0.50
Jackson House	1877	10209 Main Street	3	1.00
Jim and Lorraine's Cafe and Bar (Rendezvous Rest.)	1873	Main Street		1.00
Louie's Lounge	1874	Main Street		0.50
Masonic Building	1872	NE Corner of Main and Clark		0.50
Methodist Church (Private Residence)	1881	Spring Street		1.00
Mobile Home 1		10502 Nob Hill Avenue		2.00
Mobile Home 2		10504 Nob Hill Avenue		2.00
Mobile Home 3		10508 Nob Hill Avenue		2.00
Mobile Home 4		10510 Nob Hill Avenue		2.00
Mobile Home 5		10516 Nob Hill Avenue		2.00
Mobile Home 6		Lot 10A Nob Hill Avenue		2.00
Nevada Club Bar	1880	10235 Main Street		1.00
Nob Hill Firehouse	1870	SW Corner of O'Neil and Clark		0.50
Old Elementary/High School	1871	Mathew Street and Monroe Street	3	1.00
Owl Bar and Steak House	1870s	10231 Main Street		1.00

Table E-3 (Continued)

Structure	Year Built	Address	Crack Guages	Vibration Limit
Parsonage House	1886	Spring Street		1.00
Pipeline		Hog Pen Canyon Road		2.00
Presbyterian Church (Eureka Bible Church)	1873	Edwards Street		1.00
Raine's Market	1879	10239 Main Street		1.00
Red Brick Building	1880	Main Street		0.50
Ryland Building	1870s	14029 Bateman Street		1.00
Sadler House	1879	10254 Monroe Street	1	0.50
Saint Brendan's Catholic Church	1874	O'Neil Street	4	1.00
Saint James Episcopal Church	1872	Spring Street		1.00
San Francisco Brewery (Homestake)	1870s	NE corner of Main and Gold Streets	2	1.00
Sara Residence		10212 O'Neil Avenue		1.00
Sentinel Museum	1879	Ruby Hill Avenue & Monroe Street		0.50
Skillman House	1870	SE corner of Paul and Clark		0.50
State Highway Buildings (Office/Shop)		Main Street	1	0.50
State Highway Buildings (Shed/Storage)		Main Street		0.50
Stone Building		NE corner of Paul and Clark		0.50
Tannehill Log Cabin	1865	Main Street		0.50
The Hanging Tree	1870s	Main Street	1	1.00
Tognini and Company Building	1877	Main Street		0.50
Tommyknocker	1879	11 Main Street		1.00
Vacant Building (3 fire doors building)		10251 Main Street		1.00
Watertank Hill (750k gallon Tank)		Tank Hill		2.00
Watertank Hill (80k gallon Underground Tank)		Tank Hill		2.00
Watertank Hill (under construction)		Tank Hill		2.00
Watertank South		SE side of town		2.00
Zadow and Morrison House	1886	SW corner of Edwards and Galena		1.00



LEGEND:

- PEAK HOUR NOISE CONTOUR (A-WEIGHTED DECIBELS)
- PRIVATE LAND
- PUBLIC LAND
- PROPOSED ACTION AREAS
- EUREKA COUNTY LAND

NORTH

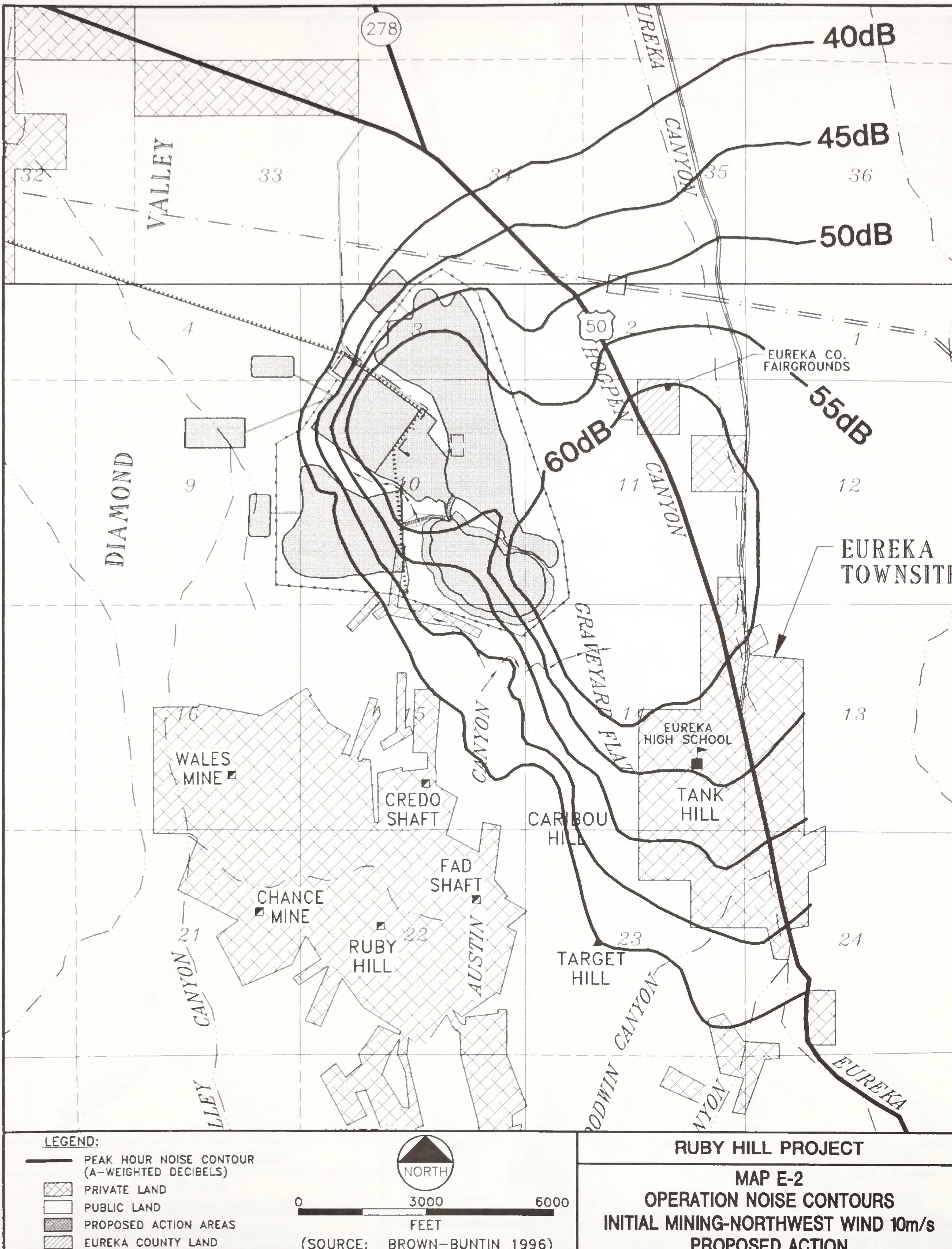
0 3000 6000

FEET

(SOURCE: BROWN-BUNTIN 1996)

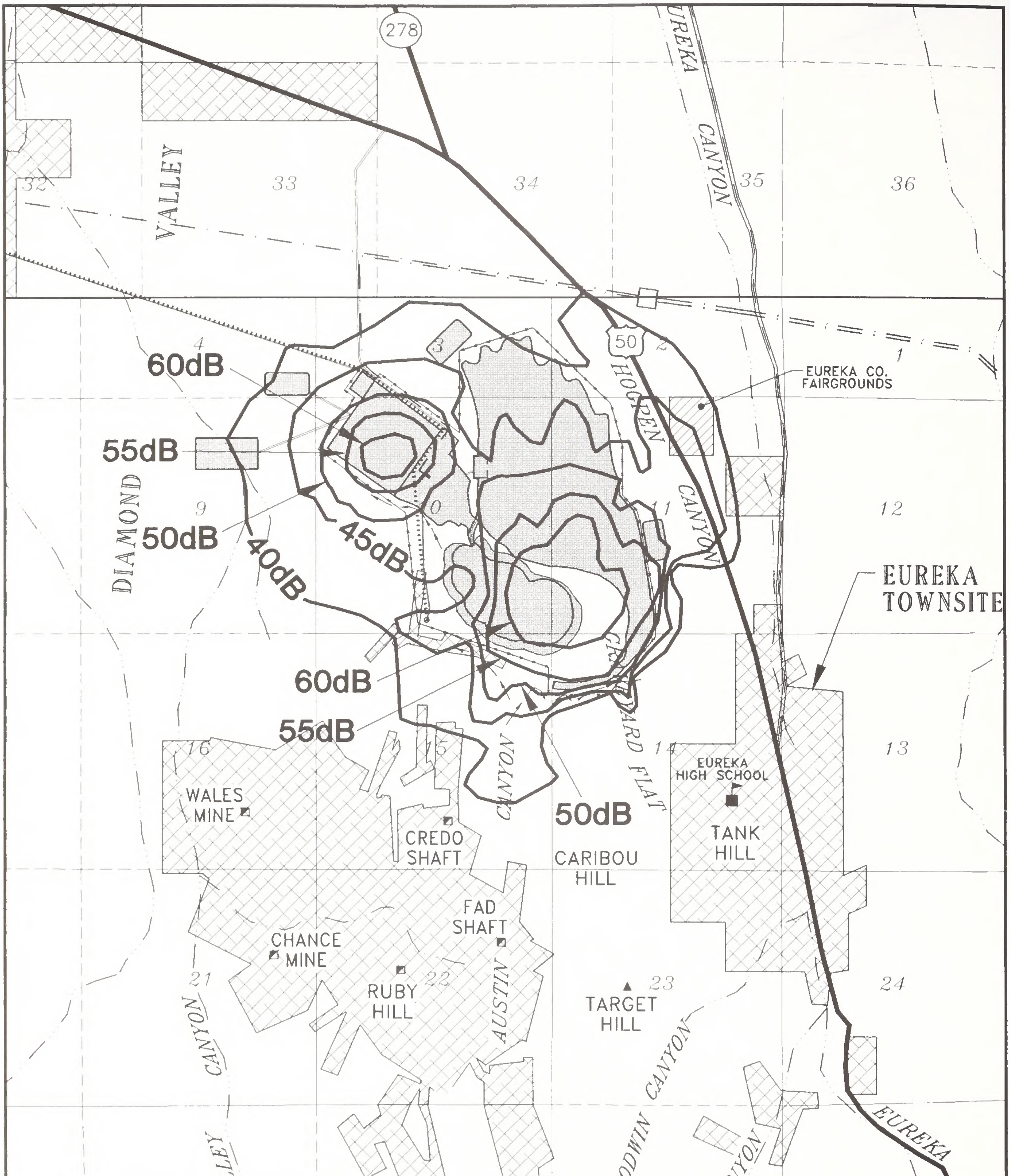
RUBY HILL PROJECT

MAP E-1
OPERATION NOISE CONTOURS
INITIAL MINING-NO WIND
PROPOSED ACTION



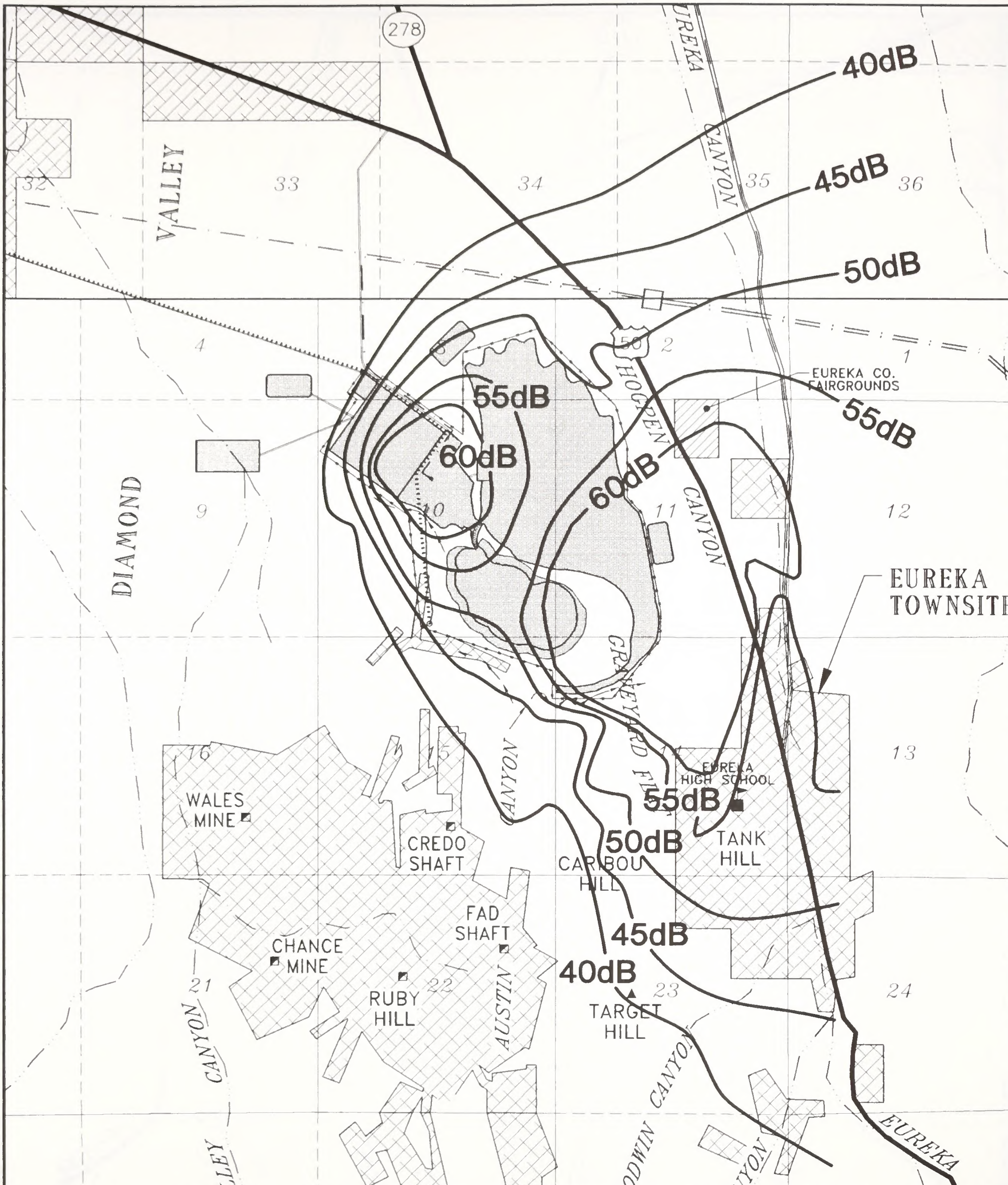
RUBY HILL PROJECT

MAP E-2
OPERATION NOISE CONTOURS
INITIAL MINING-NORTHWEST WIND 10m/s
PROPOSED ACTION



RUBY HILL PROJECT

MAP E-3
OPERATION NOISE CONTOURS
INITIAL MINING-NO WIND
EAST WASTE ROCK DUMP ALTERNATIVE



LEGEND:

- PEAK HOUR NOISE CONTOUR (A-WEIGHTED DECIBELS)
- PRIVATE LAND
- PUBLIC LAND
- PROPOSED ACTION AREAS
- EUREKA COUNTY LAND

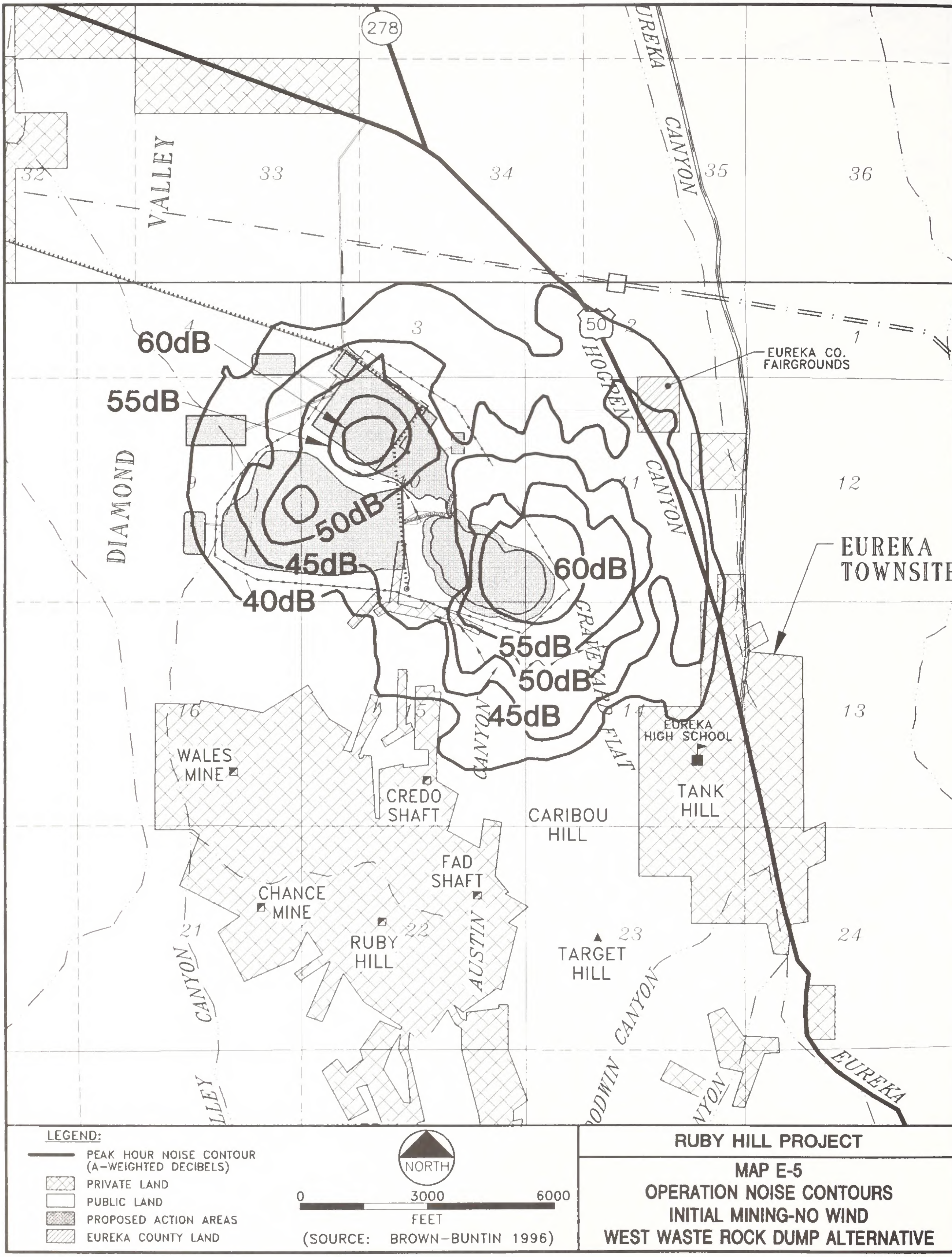
NORTH

0 3000 6000
FEET

(SOURCE: BROWN-BUNTIN 1996)

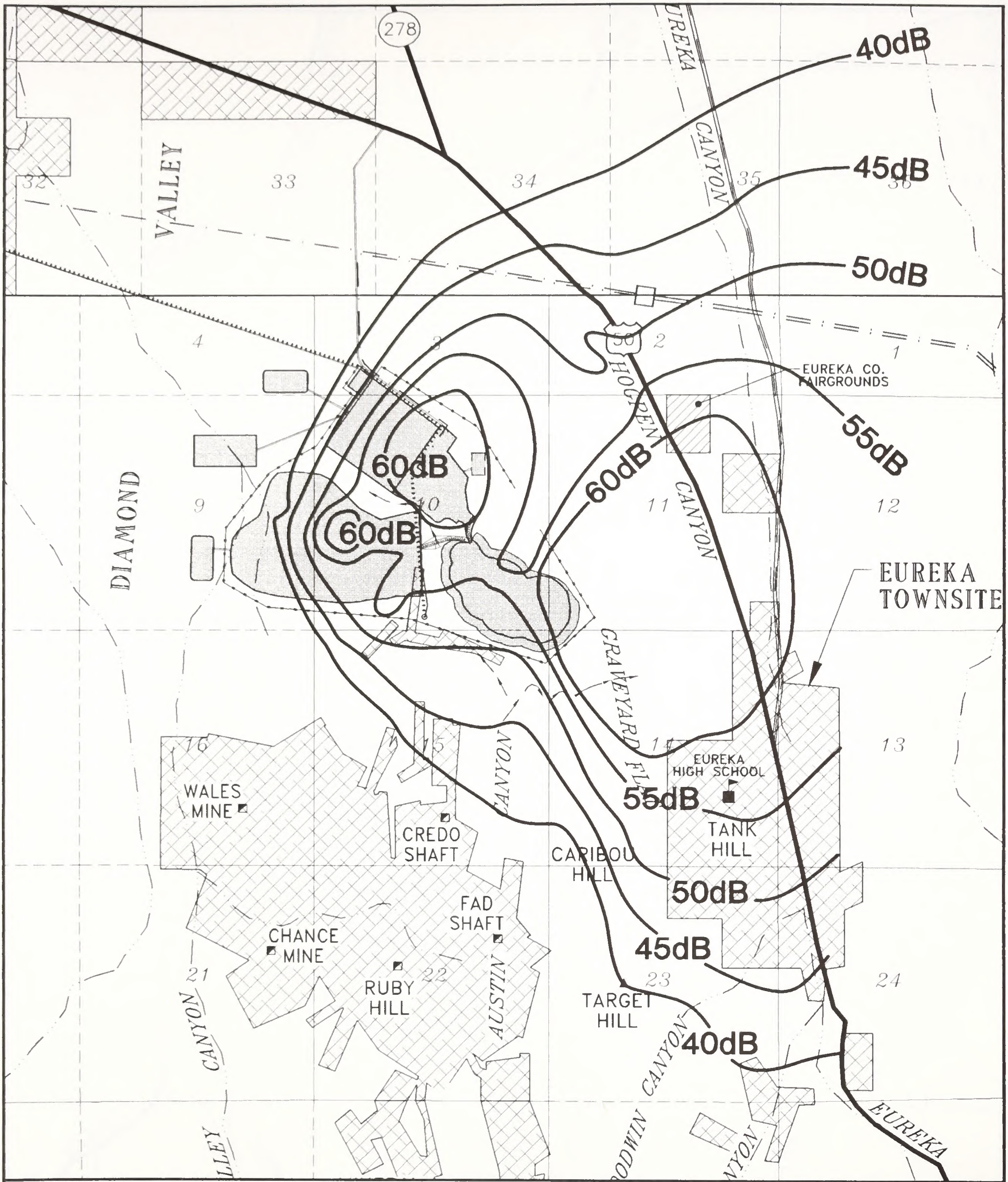
RUBY HILL PROJECT

MAP E-4
OPERATION NOISE CONTOURS
INITIAL MINING-NORTHWEST WIND 10m/s
EAST WASTE ROCK DUMP ALTERNATIVE



RUBY HILL PROJECT

MAP E-5
OPERATION NOISE CONTOURS
INITIAL MINING-NO WIND
WEST WASTE ROCK DUMP ALTERNATIVE



LEGEND:

- PEAK HOUR NOISE CONTOUR (A-WEIGHTED DECIBELS)
- PRIVATE LAND
- PUBLIC LAND
- PROPOSED ACTION AREAS
- EUREKA COUNTY LAND

NORTH

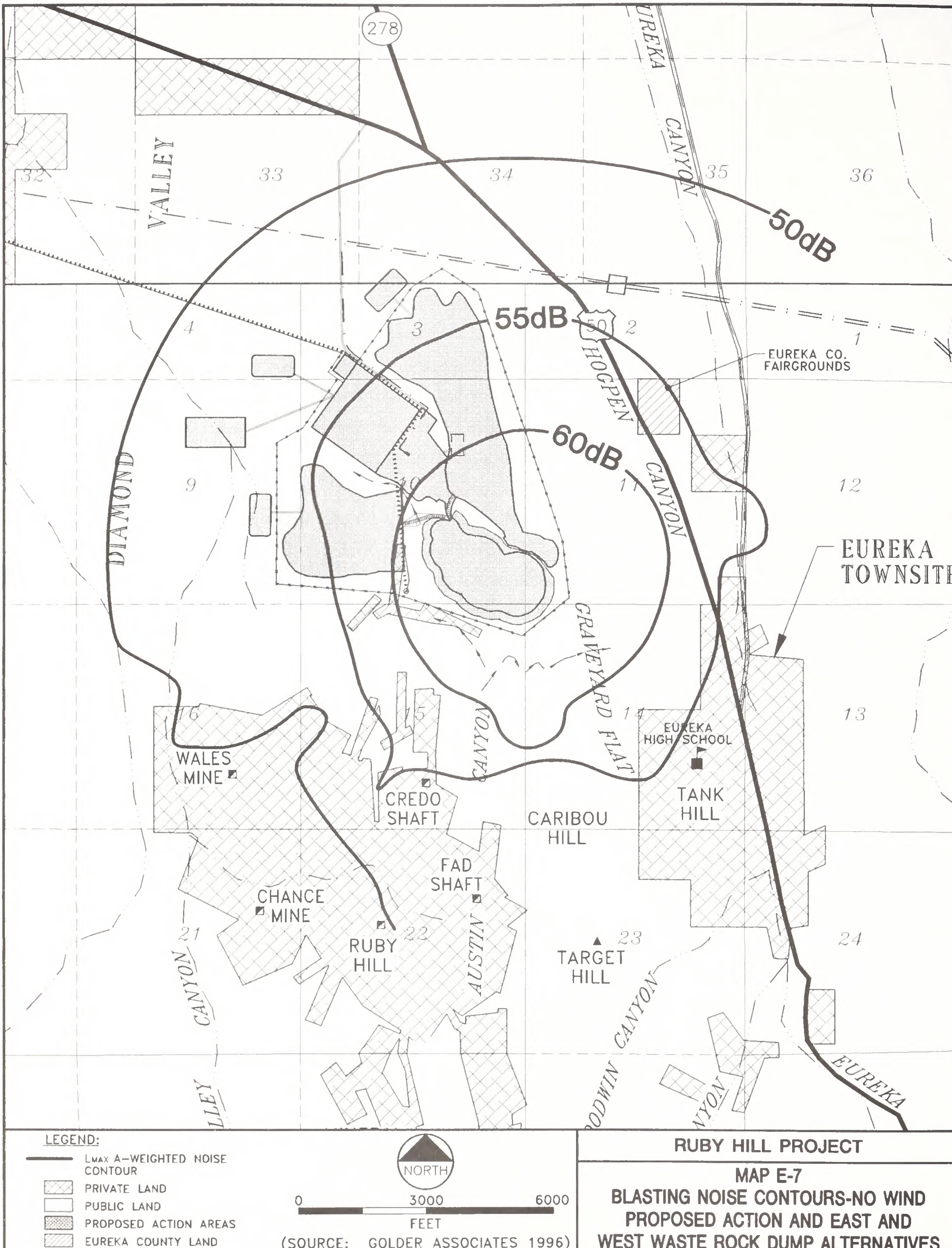
0 3000 6000

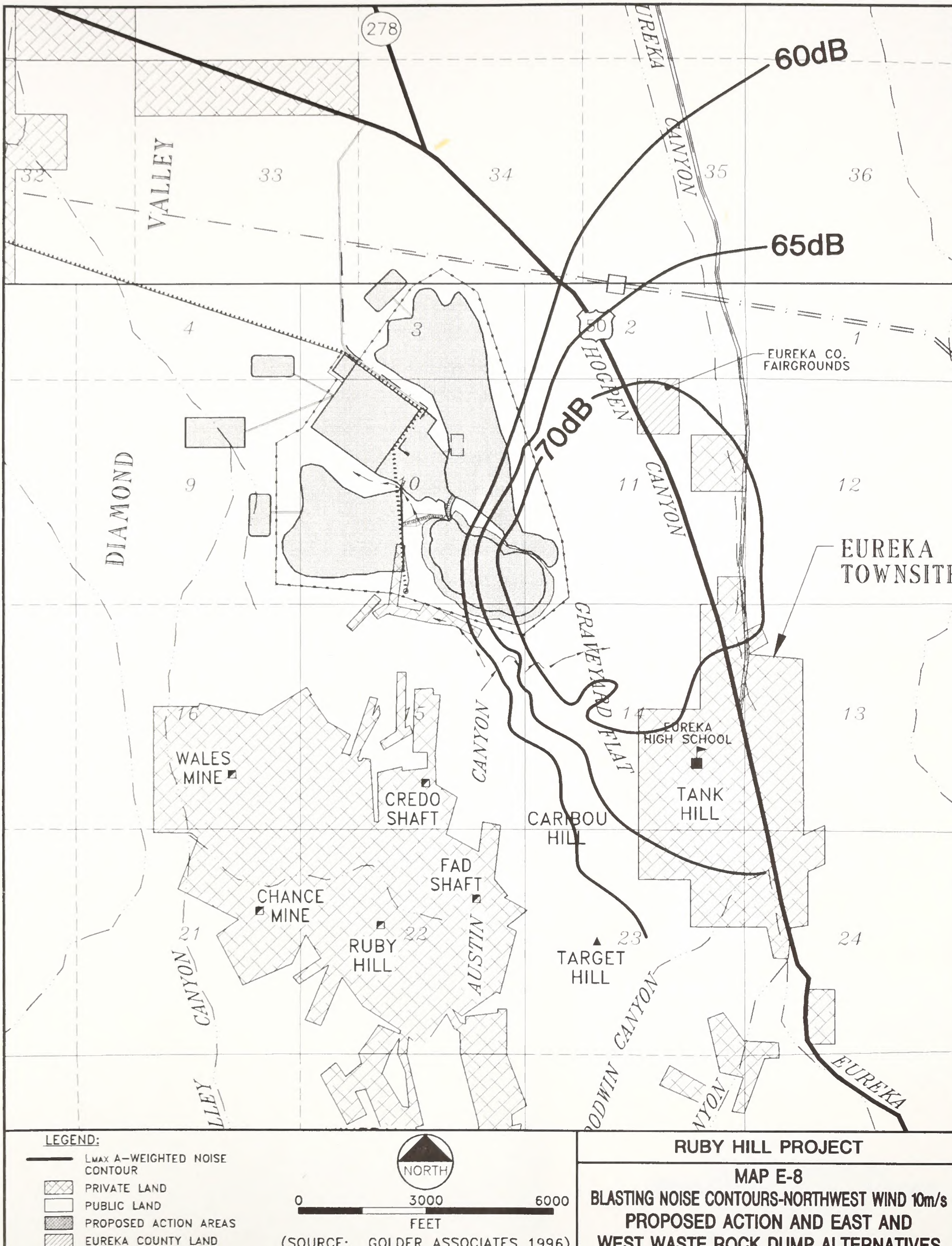
FEET

(SOURCE: BROWN-BUNTIN 1996)

RUBY HILL PROJECT

MAP E-6
OPERATION NOISE CONTOURS
INITIAL MINING-NORTHWEST WIND 10m/s
WEST WASTE ROCK DUMP ALTERNATIVE


278
EUREKA CANYON
VALLEY
DIAMOND
32
33
34
35
36
50dB
55dB
60dB
50
3
4
2
1
EUREKA CO. FAIRGROUNDS
HOGPEN CANYON
9
10
11
12
EUREKA TOWNSITE
GRAVEYARD FLAT
16
15
14
13
CANYON
WALES MINE
CREDO SHAFT
CARIBOU HILL
EUREKA HIGH SCHOOL
TANK HILL
FAD SHAFT
CHANCE MINE
RUBY HILL
21
22
23
24
AUSTIN
TARGET HILL
CANYON
GOODWIN CANYON
EUREKA
LEGEND:
LMAX A-WEIGHTED NOISE CONTOUR
PRIVATE LAND
PUBLIC LAND
PROPOSED ACTION AREAS
EUREKA COUNTY LAND
NORTH
0
3000
6000
FEET
(SOURCE: GOLDER ASSOCIATES 1996)
RUBY HILL PROJECT
MAP E-7
BLASTING NOISE CONTOURS-NO WIND
PROPOSED ACTION AND EAST AND
WEST WASTE ROCK DUMP ALTERNATIVES



(SOURCE: GOLDER ASSOCIATES 1996)

RUBY HILL PROJECT

MAP E-8

BLASTING NOISE CONTOURS-NORTHWEST WIND 10m/s

PROPOSED ACTION AND EAST AND WEST WASTE ROCK DUMP ALTERNATIVES

BUREAU OF LAND MANAGEMENT
BATTLE MOUNTAIN DISTRICT OFFICE
50 BASTIAN ROAD
BATTLE MOUNTAIN, NV 89820