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United States Department of the Interior
Bureau of Land Management

Battle Mountain District September 1996

FINAL

MULE CANYON MINE

Environmental Impact Statement

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.

Index No. BLM/WM/PL-96/028+1793

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
N64-92-001P

September 16, 1996

Dear Reader:

Enclosed is the Final Environmental Impact Statement for Santa Fe Pacific Gold Corporation's Mule Canyon Mine, prepared by the Bureau of Land Management (BLM), Battle Mountain District. This Final Environmental Impact Statement is presented in abbreviated format and, as such, is to be used together with the Mule Canyon Mine Draft Environmental Impact Statement, issued April 30, 1996.

The Final Environmental Impact Statement responds to comments received on the Draft Environmental Impact Statement during the public comment period. The comments received include 21 letters and one public meeting transcript, which are reproduced in their entirety 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 agency response.

Publication of the U.S. Environmental Protection Agency's Notice of Availability for this Final Environmental Impact Statement initiates a 30-day availability period, after which a Record of Decision will be issued. Questions or comments should be directed to: Christopher J. Stubbs, Mule Canyon EIS Project Manager, Bureau of Land Management, Battle Mountain District, P.O. Box 1420, Battle Mountain, Nevada 89820, (702) 635-4000.

Sincerely,

for Gerald M. Smith
District Manager

Enclosure as stated

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FINAL
ENVIRONMENTAL IMPACT STATEMENT
MULE CANYON MINE

Lead Agency:	U.S. Department of the Interior Bureau of Land Management Battle Mountain District Battle Mountain, Nevada
Project Location:	Lander and Eureka Counties, Nevada
Correspondence on this EIS should be directed to:	Christopher J. Stubbs, EIS Project Manager Bureau of Land Management Battle Mountain District 50 Bastian Road Post Office Box 1420 Battle Mountain, Nevada 89820 (702) 635-4000
Date DEIS filed with EPA:	May 10, 1996
Date FEIS filed with EPA:	September 27, 1996

ABSTRACT

The Final Environmental Impact Statement (FEIS) provides responses to comments received by the Bureau of Land Management (BLM) during the public comment period on the Draft Environmental Impact Statement (DEIS) and includes, as appropriate, corrections or revisions to the DEIS based on these responses. The DEIS analyzed potential impacts associated with a proposal to develop, operate and reclaim a new surface gold mine and related facilities in north-central Nevada. The Proposed Action includes: 1) Development and operation of five open pits; 2) Dewatering of mine pits; 3) Construction of up to 14 overburden and interburden disposal areas; 4) Construction and operation of gold milling, processing, and tailings disposal facilities; 5) Construction and operation of required support and ancillary facilities and roads; and 6) Reclamation of mining-related disturbance and facilities. The responses and revisions include mitigation measures to prevent, control, or reduce potential project-related environmental impacts identified and discussed in the DEIS. The Agency Preferred Alternative is Alternative B, the Proposed Action, with incorporation of specific mitigation measures as stipulated by the BLM.

Responsible Official for the EIS:

Michael C. Mitchell for
Gerald M. Smith
District Manager

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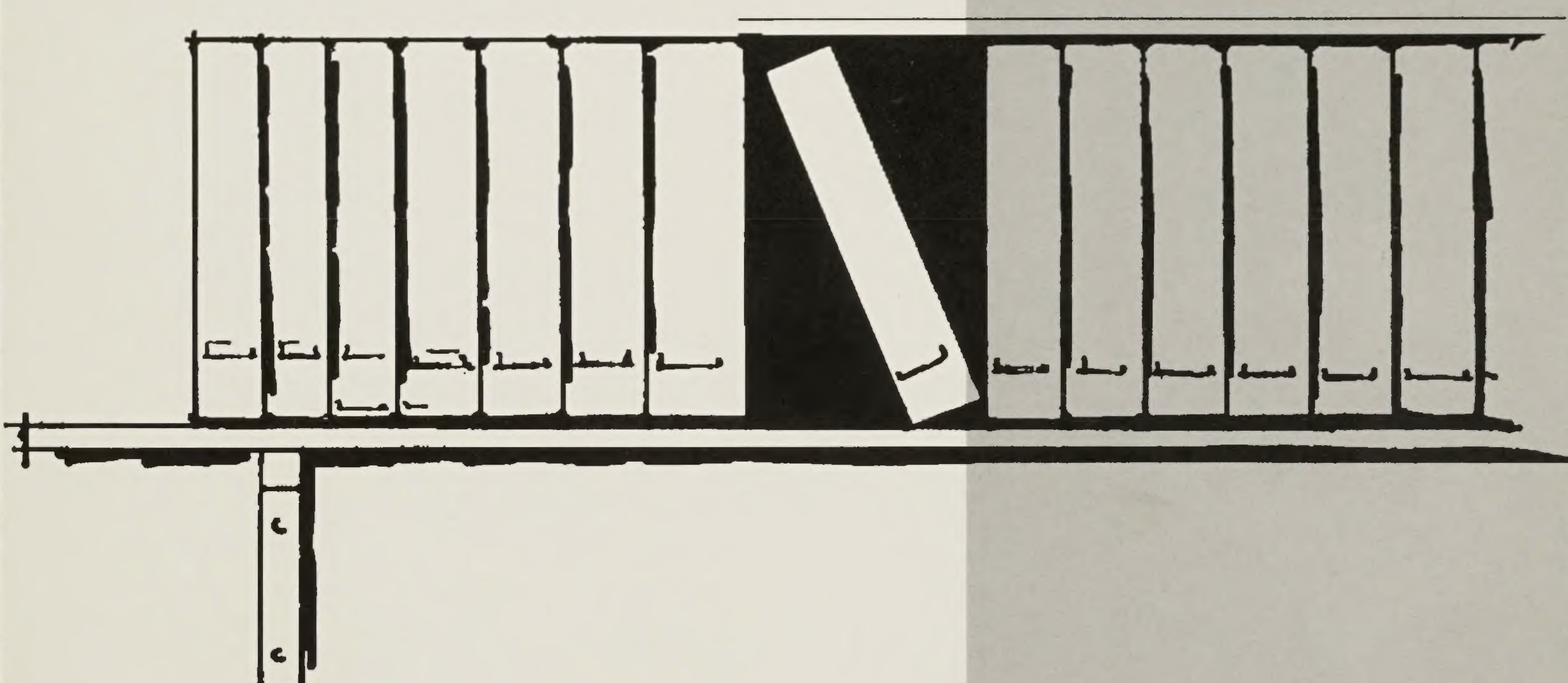

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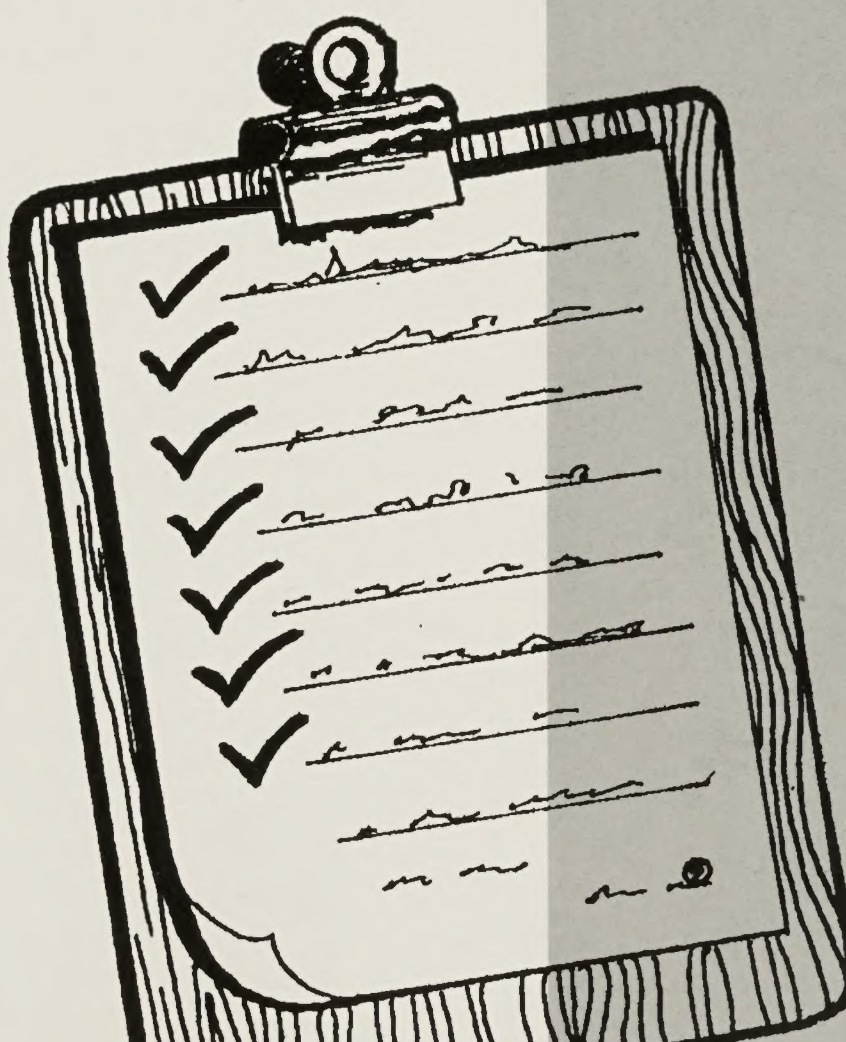
EIS INTRODUCTION



MULE CANYON MINE ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 1 - EIS INTRODUCTION

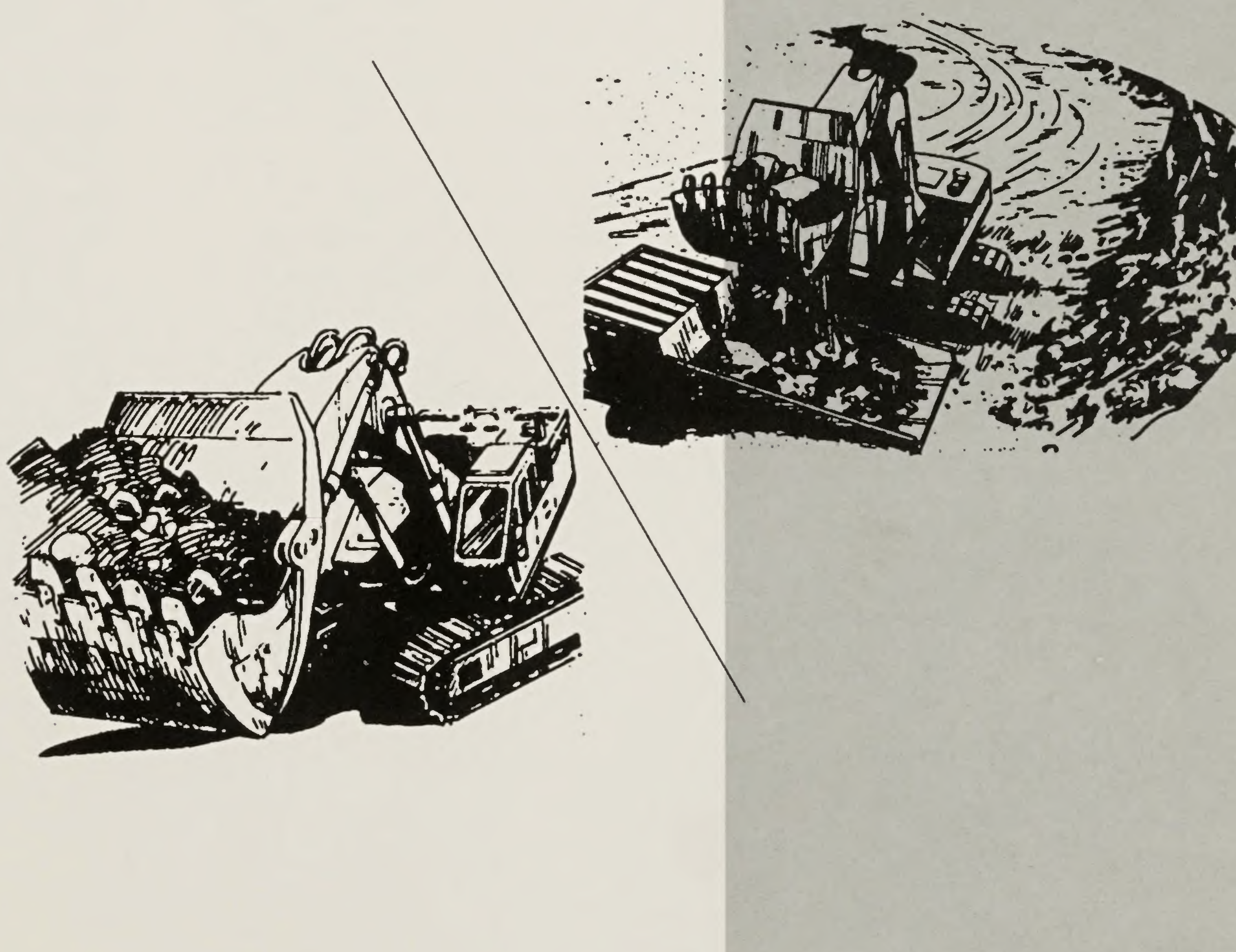
This Final Environmental Impact Statement (FEIS) has been prepared for Santa Fe Pacific Gold Corporation's proposed Mule Canyon Mine which would be located in north-central Nevada. The FEIS provides corrections, clarifications, and supplemental information relative to the environmental analysis previously provided in the Draft Environmental Impact Statement (DEIS), in response to comments received on the DEIS, and under applicable provisions of 40CFR 1503.4. Together, the DEIS and FEIS constitute the complete environmental analysis for the Proposed Action and alternatives required under the National Environmental Policy Act (NEPA).

The Mule Canyon Mine DEIS was distributed and made available for public review and comment on May 10, 1996. The BLM held one public meeting in Battle Mountain, Nevada on June 5, 1996 to receive comments and also received written comments on the DEIS through the end of the statutory public comment period on July 10, 1996. None of the comments on the DEIS required major modification or significant expansion of the environmental analysis presented in the DEIS, no new alternatives were identified which would require independent supplemental analyses, and no issues were raised which would alter the basic conclusions presented in the DEIS. The information presented in the DEIS, therefore, remains valid and has not been duplicated in the FEIS except for that information which has been revised to correct errors, provide necessary clarification, or provide relevant supplemental information. These revisions are included in the Errata and Addenda section of the FEIS. Given these considerations, the FEIS is designed and intended to be utilized in conjunction with the Mule Canyon Mine DEIS previously released for public review on May 10, 1996.

The FEIS is presented in an abbreviated format and includes a brief description of the Agency Preferred Alternative (Chapter 2); Documentation of comments received during the public comment period for the DEIS and responses to all substantive comments (Chapter 4); and any resulting corrections, revisions, and additions to the environmental analysis presented in the DEIS (Chapter 3). The FEIS responds to comments received during the public review period on the DEIS and, together with the DEIS and the included Errata and Addenda section, provides comprehensive mitigation plans included as components of the BLM's preferred alternative or to be stipulated by the BLM as conditions of approval of the Mule Canyon Plan of Operations. The mitigation plans are specifically designed to prevent, control, or reduce potential project-related environmental impacts as identified and discussed in the DEIS and the responses to public comment. Specific mitigation activities are identified for each resource category in Chapter 4 of the DEIS and for ease of reference, the proposed mitigation measures are also summarized in Appendix F of this FEIS.

CHAPTER 2

AGENCY PREFERRED ALTERNATIVE



MULE CANYON MINE ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 2 - AGENCY PREFERRED ALTERNATIVE

For this FEIS, the Agency Preferred Alternative is the Proposed Action as identified on page ES-10 and described in Section 2.2.5.2 of the DEIS, with modifications as necessary to incorporate supplemental mitigation measures as stipulated by the BLM. Specifically, the Agency Preferred Alternative would result in implementation of all components of the Proposed Action with the following modifications:

1) Stipulation that based on the results of postmining water quality monitoring, the areas of shallow ponding projected to occur in the southern portion of the West Pit and the central portion of the South Pit would be partially backfilled to preclude ponding if water quality would pose a hazard to wildlife based on the analysis methods utilized in the Risk Assessment (SMI, 1996)

2) Stipulation that if long-term ponding or poor water quality became a problem in the mine pits which remain following completion of mining, SFPGC will mitigate the problem by ripping to alleviate compaction, partial backfilling to eliminate ponding, or other appropriate measures.

3) Stipulation that until such time as a mill and associated facilities are constructed, the project fenceline would enclose only those areas to be disturbed consistent with air emissions boundary requirements, in order to maintain continued grazing access and livestock and wildlife access to unaffected springs

4) Stipulation that SFPGC would, in consultation with the BLM, NDOW, and affected grazing permittees develop and implement appropriate mitigation measures to replace flow or volume losses and mitigate any impacts to access or associated resources for any affected springs or seeps

5) Stipulation that SFPGC would modify final reclaimed configurations for overburden and interburden disposal area outslopes to address visual impact concerns while assuring compliance with applicable stability, drainage, and reclamation requirements

The stipulated mitigation provisions along with those mitigation activities included as components of the proposed action are described in Chapter 4 of the DEIS and summarized in Appendix F of this FEIS.

CHAPTER 3

ERRATA AND ADDENDA

MULE CANYON MINE
ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 3 - ERRATA AND ADDENDA

In response to comments received by the BLM during the public comment period for the Mule Canyon Draft Environmental Impact Statement (DEIS), the DEIS has been reviewed, responses have been developed for all substantive comments, and as appropriate, the information presented in the DEIS has been revised to correct any errors, provide necessary clarification, or provide relevant supplemental information. For reference, both the public comments received by the BLM and corresponding responses are provided in Chapter 4 of this Final Environmental Impact Statement (FEIS).

Revisions to the DEIS, as provided in this Chapter, are presented as revised pages with the same page numbers as the corresponding pages in the DEIS. Where necessary, due to expanded or additional text discussions, text from a given page may have shifted to a subsequent page(s). In this case, the page numbering sequence has been modified to include addendum pages (ie: page 4-24 as revised now includes pages 4-24 and 4-24a). The summary presented in the following pages summarizes the revisions to the DEIS included in this section.

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Appendix E	New Information
Appendix F	New Information

- Process facilities including: crushing, milling, oxidation, gold recovery circuits, and tailings storage facilities

- Heap leach pads and associated solution tanks

- Related support and ancillary facilities

In addition to the proposed mining-related activities, the Proposed Action includes separate BLM realty actions for construction and modification of the west access (Beacon Light) road, and construction of a required gasline, waterline, and substation and powerline.

Following project development and construction, which would occur over a period of approximately 12 months, the mine would enter the active production phase, producing from 0.5 to 2.5 million tons of gold ore and requiring the removal and placement in disposal areas of 3.0 to 14.0 million tons of overburden and interburden annually for a period of nine years. Over the active mine life, it is estimated that nine to 11 million tons of ore would be recovered and 90 to 100 million tons of overburden and interburden would be removed and either placed in permanent disposal areas or backfilled. Total project-related surface disturbance over the mine life would be approximately 2,688 acres, including approximately 450 to 580 acres of disturbance outside the project fenceline for access roads and borrow sources. Mine construction would employ an estimated 100 people for a period of 12 months, and the production work force would include a maximum of approximately 180 to 200 full-time employees for the life of the mine. Mine reclamation would begin during the period of active mining for those areas where mining has been completed and continue for approximately 4 years after all mining has ceased. Total mine life including the construction, operation, and reclamation phases would be approximately 14 years.

PROJECT ALTERNATIVES

Formulation and comparative evaluation of project alternatives are the foundation of the EIS process. As defined by applicable NEPA provisions (40 CFR Part 1502.14) and BLM guidelines (H-1790-1, Chapter IV), the EIS must specifically evaluate the Proposed Action and No-Action Alternatives as well as a reasonable range of alternatives addressing significant project issues as identified through the scoping process. Alternatives identified and evaluated in this EIS include the following:

Alternative A, No-Action Alternative - Under the No-Action Alternative, the Proposed Action and other actions would not occur; existing resource values would remain in their current condition subject, however, to the actions and impacts of natural forces and ongoing mineral exploration and other previously approved activities; and project-related impacts as well as benefits would be precluded.

Alternative B, Proposed Action - The Proposed Action involves development, construction, operation, and reclamation of a new surface gold mine. The mine and related facilities would include the west access road; five open pits; 14 overburden and interburden disposal areas including the Main Pit; surface drainage systems; pit dewatering sumps and associated piping and holding ponds; an ore stockpile; a heap leach pad and associated solution tanks; a mill facility; a tailings disposal facility; support facilities; a water supply wellfield and associated storage and distribution systems; and on-site utility installations, haulage and access roads.

Alternative C, East Access Alternative - The East Access Alternative includes essentially the same components and options as Alternative B with the exception that the west access which is a component of Alternative B, would be replaced or supplemented by one of two potential eastern access routes.

Alternative D, Overburden and Interburden Disposal Area Configuration Alternative - The Overburden and Interburden Disposal Area Configuration Alternative provides for evaluation of several potential modifications in and interburden disposal structures which are included as a component of the Proposed Action (Alternative B). The modifications considered and evaluated under Alternative D include elimination of benching on the pile outslopes, changes in final outslope angles for

Grazing and Range Management

The Proposed Action will result in direct grazing and range management impacts including: 1) Temporary loss of access and grazing use for the approximately 2,900 acres or 290 Animal-Unit-Months (AUMs) for the interim case of deferred mill construction or 6,635 acres or 670 Animal-Unit Months (AUMs) for full project build-out within the project fenceline, and 186 acres or 19 AUMs outside the fenceline; and 2) Permanent loss of approximately 170 acres or 17 AUM's for the remaining open pits and road disturbance which would not be reclaimed following mining. Reduction of the fenced area until such time as the mill is constructed will serve as interim mitigation allowing continued use of approximately 3,735 acres or 374 AUMs and continued access to four springs (until the springs are impacted by mine dewatering).

Potential indirect grazing impacts would be limited to: 1) Reductions in utilization of areas outside the project fenceline as a result of disruption or reduction in spring flows as a potential livestock watering source; and 2) Adjustment of allotments to compensate for temporary and permanent reductions or increases in the areas and resources available for grazing use.

No other existing, proposed, or reasonably foreseeable development projects fall within the boundaries of the affected grazing allotments, consequently no cumulative impacts are anticipated.

Potential direct, indirect, and cumulative impacts on grazing and range management would be similar for all project alternatives except the No-Action Alternative. Alternative C, the East Access Alternative, would result in an incremental increase in total disturbance and a consequent increase in the AUMs affected. Alternative D, the Overburden and Interburden Pile Configuration Alternative, could result in a minor increase or decrease in total disturbance depending on the configuration option considered. Selection of a slope reduction option could increase the utility of reclaimed areas for grazing use.

Anticipated direct, indirect, and cumulative grazing and range management impacts would be partially addressed through the comprehensive reclamation and revegetation plans included as a component of the Proposed Action and alternatives.

Wildlife

Direct impacts to wildlife which would result from the Proposed Action include: 1) Temporary or permanent loss of wildlife habitat; 2) Loss of non-mobile wildlife; and 3) Displacement or loss of mobile wildlife. No loss of critical or important habitat for any Federally listed Threatened, Endangered, Candidate, or Sensitive species would occur under the Proposed Action. However, habitat loss has the potential to affect four formerly listed Federal Candidate and BLM Sensitive species (spotted bat, western small-footed myotis, pygmy rabbit, and ferruginous hawk), raptors, and three game species (mule deer, chukar, and sage grouse).

Potential indirect wildlife impacts would be limited to impacts to springs and seeps and associated riparian values as a result of disruption or localized drawdown of the ground water table associated with these springs.

Cumulative impacts to wildlife and wildlife habitat would involve potential temporary shifts in use patterns and wildlife movements.

Potential direct, indirect, and cumulative impacts to wildlife resources would be similar for all project alternatives except the No-Action Alternative. Alternative C, the East Access Alternative, would decrease the risk of deer/vehicle collisions. Alternative D, the Overburden and Interburden Pile Configuration Alternative, would result in minor changes to the disturbance footprint.

Anticipated direct, indirect, and cumulative wildlife impacts would be controlled through implementation of proposed operational control and reclamation measures under the NDEP Reclamation Plan and the Nevada Division of

Wildlife (NDOW) Industrial Artificial Pond Permit which include specific plan provisions for revegetation and reestablishment of wildlife habitat values and measures to minimize wildlife exposure to potentially toxic materials.

source of traffic-related dust emissions, but it is anticipated that the incremental increase in dust emissions would be at least partially offset by a reduction in traffic and related dust emissions on the west access road.

Anticipated direct, indirect, and cumulative air quality impacts would be addressed through operational control measures and implementation of the NDEP Air Quality Bureau Permit to Operate. This permit is designed to effect compliance with all applicable Federal and State air quality regulations and standards. Compliance with applicable regulatory standards and provisions would effectively prevent or minimize any adverse air quality impacts.

Visual Resources

Direct and indirect impacts to visual resources which would result from the Proposed Action would be consistent with existing visual resource management (VRM) objectives for this area. Project disturbances would generally not be visible from the west because ridges would intervene and there are no regional population centers east of the site from which the site can be seen. Views of the site from the north and from the south are generally blocked by ridges and escarpments.

Cumulative effects to visual resources include the area visible from Interstate 80 within 20 miles of the site. Potential direct, indirect, and cumulative impacts to visual resources would be similar for all project alternatives except the No-Action Alternative, and Alternaive D, which could result in discernable differences dependent on viewpoint and perspective.

Anticipated direct, indirect, and cumulative visual resource impacts would be minimal and would be addressed through final reclamation and revegetation measures. The color and texture of mine disturbance areas four to six years after being revegetated would be very close to the appearance of the grass-dominated areas presently occupying the mountain slopes. Linear contrasts would result from benching of final reclaimed slopes on overburden and interburden disposal areas. The BLM is stipulating that SFPGC modify final slope designs to address this concern.

Land Use and Recreation

Direct impacts to land use and recreation resources which would result from the Proposed Action include a temporary shift in land use for the Project Area, focusing on mineral exploration and development use and precluding other uses including grazing, wildlife habitat, and dispersed recreation during the period of active mining and reclamation procedures. Due to the physical distance between the Project Area and any Wilderness or Wilderness Study Areas, direct project-related impacts on these areas are not anticipated.

The Proposed Action would have indirect impacts on both developed and dispersed recreational resources in the general area due to project-related increases in population, with increased utilization and demand for recreational opportunities associated with the influx of new workers.

Foreseeable cumulative development and exploration projects within the Study Area would impact land uses in the affected areas. This impact, however, would not be considered significant. The influx of population may affect the aesthetic experience of outdoor recreationists in more popular recreation areas. Because of the vast amount of public lands available for recreation activities, cumulative impacts to recreation and wilderness from foreseeable projects would be considered minimal.

Potential direct, indirect, and cumulative impacts to land use and recreational resources would be similar for all project alternatives except the No-Action Alternative.

Anticipated direct, indirect, and cumulative impacts to land use, recreational and wilderness resources would be addressed through implementation of the NDEP Reclamation Plan and through the ongoing resource management efforts of the BLM. The NDEP Permit

CHAPTER 5 - CONSULTATION AND COORDINATION

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CHAPTER 8 - GLOSSARY, ABBREVIATIONS AND ACRONYMS

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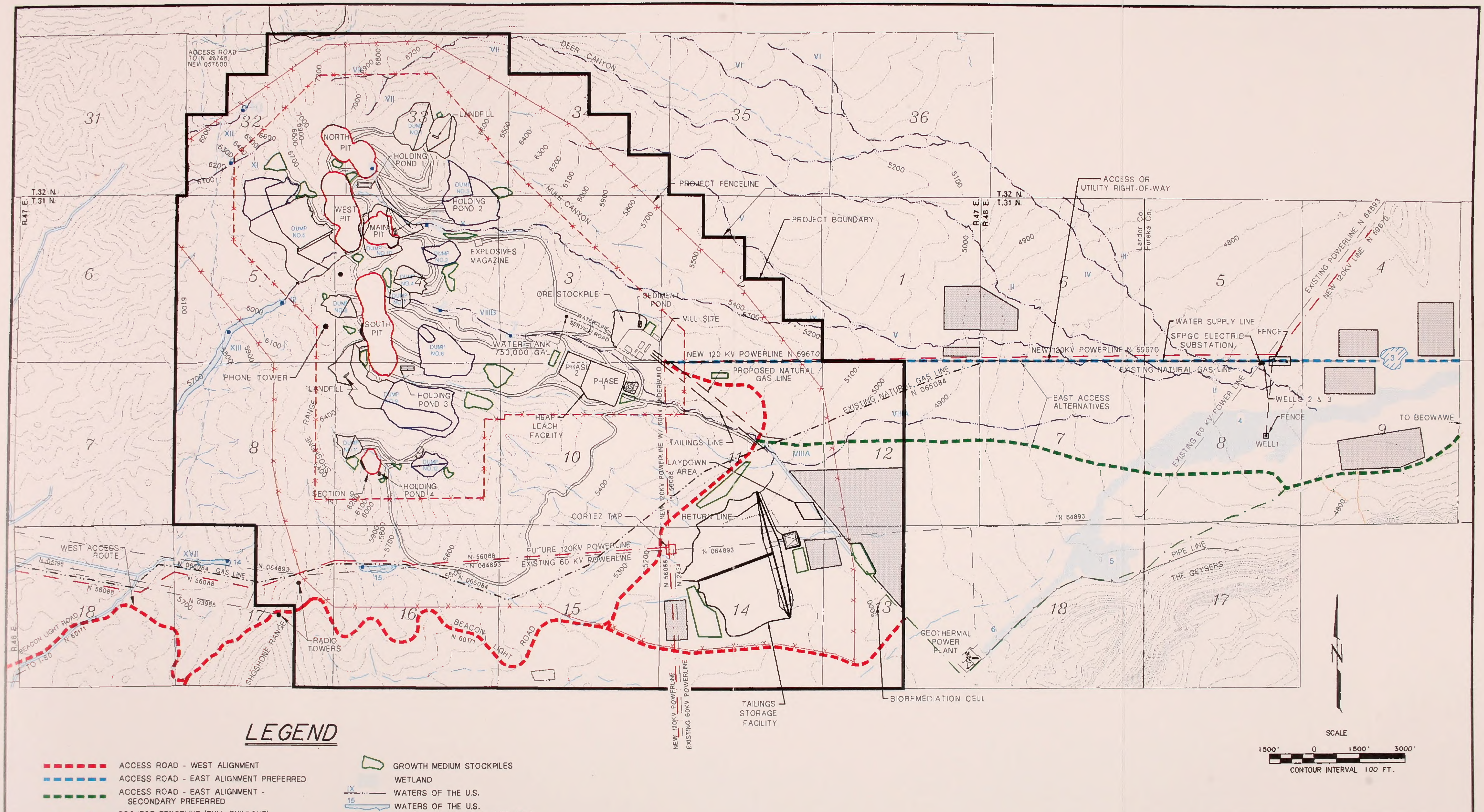


MULE CANYON MINE

FIGURE 1-2
PROPOSED ACTION
MINING RELATED FACILITIES
(BACKFILL OPTION)

REVISED 8-96

Source: Shepherd Miller Inc., May, 1995.

File: MCPAMRF2.DWG

> *information must be of high quality. Accurate scientific analysis, expert agency comments, and public scrutiny are essential to implementing NEPA. Most important, NEPA documents must concentrate on the issues that are truly significant to the action in question..."*

The NEPA process is graphically illustrated by Figure 1-4.

1.4 REQUIRED AGENCY ACTIONS AND APPROVALS

The primary agency actions and approvals required to allow project implementation include the PO approval and right-of-way approvals required by the BLM and Reclamation Plan approvals required by the NDEP. It should be noted that preparation of NEPA documents and resultant agency determinations are related to but distinct from the permitting process for various project activities and components. The NEPA process identifies and describes various project alternatives and evaluates the significance of potential environmental impacts as they relate to these alternatives.

Under the MMPA and FLPMA, the BLM is required to review the project proponent's PO to assure that:

1) Adequate provisions are included to minimize, where feasible, adverse environmental impacts

2) Measures are included to provide for reclamation, where practicable

3) Control, mitigation, and reclamation measures are adequate to prevent unnecessary or undue degradation

4) The proposed operations would comply with all applicable Federal, State, and local laws and regulations.

BLM approvals are also required for any rights-of-ways on Federal lands for road and utility construction associated with the Proposed Action. Right-of-way approvals require an environmental analysis with consideration of the same items as noted above.

NDEP responsibilities are defined by the Nevada Administrative Code which includes similar provisions. Other required permit approvals addressing specific resource or operational components and the responsible jurisdictional agencies are identified by Table 1-1. Copies of all required permit applications and any permit approvals obtained to date are included in the Project File.

1.5 PUBLIC SCOPING

Under applicable NEPA provisions (40 CFR Parts 1500.1(b), 1500.2(d), 1501.7(a)(1), 1502.19(c) and (d), 1503.1(a)(4), and 1506.6), public involvement in the NEPA process is encouraged and reasonable opportunity for public involvement must be provided.

The initial opportunity for public involvement in the NEPA process is project scoping, which for the Mule Canyon Project occurred during April 1992 and May 1995. Project scoping included several public meetings. The public was also given the opportunity to provide written comments to be considered in the scoping process.

Other opportunities for public involvement include notification and transmittal of draft and final NEPA documents for review and comment. Given the determination that an EIS will be required, the public also has the opportunity to participate in formal public/agency comment, including public comment meetings and the receipt of and response to written comments.

As part of the scoping process, applicable NEPA requirements direct that scoping should be used to;

> *"Determine the scope and the significant issues to be analyzed in depth ..."* (40 CFR Part 1501.7(a)(2)); and *"Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review ..."* (40 CFR Part 1501.7(a)(3)).

TABLE 1-1
SUMMARY OF POTENTIAL REQUIRED PERMITS

Permit/Approval	Responsible Agency(s)/ Oversight Responsibility	Primary Applicable Laws and Regulations	Project Components Addressed
FEDERAL REQUIREMENTS			
1) Plan of Operations Approval	USDI Bureau of Land Management (BLM)/EPA	Mining and Minerals Policy Act (MMPA) Federal Land Policy and Management Act	Overall project
2) Right of Way Approvals	BLM	Federal Land Policy and Management Act	Road and utility right-of-way
3) Project EIS	BLM/EPA, USFWS	National Environmental Policy Act (NEPA) National Historic Preservation Act (NHPA) American Indian Religious Freedom Act (AIRFA) Endangered Species Act	Overall project
4) Wetlands/Waters of the U.S. Permit (404 Permit)	U.S. Army Corps of Engineers (COE)	Clean Water Act	Disturbance within drainage and wetland areas
5) Explosive Storage and Handling Plan	Bureau of Alcohol, Tobacco and Firearms (BATF)		Storage and handling of explosives
6) Mine Identification Number	Mine Safety and Health Administration (MSHA)		Overall project
7) Radioactive Materials License	Nuclear Regulatory Commission (NRC)		Radioactive sources on continuous monitoring devices
8) Communications License	Federal Communications Commission (FCC)		Mine dispatch and communications system
STATE REQUIREMENTS			
9) Reclamation Plan Approval	Nevada Division of Environmental Protection (NDEP)	State Regulations	Overall project
10) Water Pollution Control Permit	NDEP Water Quality Bureau	State Regulations	Process, tailings, and leach facilities
11) NPDES Stormwater Permit	NDEP Water Quality Bureau	State Regulations	Stormwater runoff from mine disturbance areas
12) Spill Prevention Control and Countermeasures Plan	NDEP/EPA	Clean Water Act	Storage and handling of toxic and hazardous materials and petroleum products
13) Dam Safety Permit	Nevada Division of Water Resources (NDWR) - State Engineer	State Regulations	Pond embankments meeting size criteria
14) Air Quality Permits	NDEP Air Quality Bureau	State Regulations	All particulates combustion, and fugitive dust emissions
15) Solid Waste Disposal Permit	Nevada Division of Health (NDH)	State Regulations	On-site solid waste landfill

TABLE 2-1
ALTERNATIVE DEVELOPMENT

Components	Options	Text Reference	Alternatives			
			A	B	C	D
Ongoing Exploration	• Previously permitted activity	2.4.1	✓	✓	✓	✓
Facility Location and Configuration	• Proposed location/configuration • Benched pits with 15-30 foot benches and 45-55° slopes	2.4.2		✓ ✓	✓ ✓	✓ ✓
Site Access	• West access • East access	2.4.3		✓	(X) ✓	✓
Facility Construction	• Proposed construction sequence and schedule	2.4.4		✓	✓	✓
Mining Operations	• 5 pits with shovel/loader/truck • North & Main Pits, West, South & Section 9 Pits • Open Pit Surface	2.4.5		✓ ✓ ✓	✓ ✓ ✓	✓ ✓ ✓
Operating and Production Schedule	• Mine 2-10 hr shifts; Mill 24 hrs • Overburden and interburden 10 to 13 million tons per year (mmtpy), Ore - 1.1 to 2.5 mmtpy	2.4.6		✓ ✓	✓ ✓	✓ ✓
Mine Dewatering and Surface Drainage Control	• In-pit sumps and surface holding ponds	2.4.7		✓	✓	✓
Overburden and Interburden Disposal	• Backfilling/Main Pit and Stockpiling in 14 disposal area • Stockpiling in 12 disposal areas • Alternate disposal area configurations	2.4.8		✓ ✓ ✓	✓ ✓ ✓	✓
Ore Processing	• Milling and Heap Leach with Application Using Sprinkler and Solution Tanks • Application Using Drip Emitters	2.4.5		✓ ✓	✓	✓
Gold Recovery	• Zadra Process	2.4.10		✓	✓	✓
Cyanide Destruction	• Caro's Acid to <10 parts per million (ppm)	2.4.11		✓	✓	✓
Tailings Disposal	• Designed Tailings Facility	2.4.12		✓	✓	✓
Waste Disposal	• Class III waiver land disposal sites	2.4.13		✓	✓	✓
Water Supply	• Well Fields with 1,000 gallons per minute (gpm) capacity	2.4.14		✓	✓	✓
Utility Installations	• Sierra Pacific 60/120 kV Line	2.4.15		✓	✓	✓
Handling of Chemicals and Potentially Hazardous Materials	• In compliance with applicable regulations	2.4.16		✓	✓	✓
Transportation	• Use of West and/or East Routes for Employees, Materials, Equipment, and Supplies	2.4.17		✓	✓	✓
Monitoring	• Erosional, Stability, Water Quality/Quantity, and Process Fluids	2.4.19		✓	✓	✓
Reclamation	• Restoration to Proposed Postmining Land Uses	2.4.20		✓	✓	✓

be justified by the incremental benefits associated with partial or total pit backfilling.

Given the practical operational, environmental and economic constraints associated with the alternative of totally backfilling all mine pits upon completion of mining, and consideration of partial or total backfilling of some pits as an option under the Proposed Action, the alternative of totally backfilling all pits was eliminated from detailed analysis.

2.2.4.4 Alternative H - West Access Routing

Several alternatives were considered in selecting the proposed west access route. In addition to the proposed route as outlined in Section 2.4.3, these alternatives included the following:

- Routing traffic from the mine from the Beacon Light Road east on the I-80 frontage road to the Argenta Interchange to access I-80
- Contruction of a new interchange to access I-80 directly from the Beacon Light Road
- Upgrade of the existing road connecting the Beacon Light Road with the I-80 frontage road (avoiding the Skyline Drive area) and routing of traffic east on the frontage road to the Argenta Interchange
- Upgrade of the I-80 frontage road (Airport Road) west from the Beacon Light Road to include widening, paved shoulders, and school bus turnouts

The factors of existing traffic levels, traffic safety, proximity to residences, and road construction requirements and costs were considered in reviewing the routing alternatives.

The first and third alternatives were eliminated because the existing Argenta Interchange is neither designed for nor is it adequate for the projected heavy truck traffic associated with the mine. While the Argenta Interchange could be modified to meet anticipated traffic loads, the cost of required major modifications could not be justified since the existing I-80 frontage road to the west and the East Battle Mountain Interchange are adequate to handle the anticipated traffic with minor upgrades and modifications. Similar economic considerations would apply to the second alternative of constructing a new interchange at the Beacon Light Road. Conversations with NDOT indicate that the upgrades proposed by the final alternative are either being addressed or are not necessary. In conjunction with ongoing road maintenance and upgrades, NDOT is scheduled to overlay the I-80 frontage road during summer 1996. Widening and turnouts on the frontage road are not necessary since the road is designed and has been constructed to meet applicable specifications for State Highways which are consistent with the anticipated mine related traffic loads.

2.2.5 Project Alternatives Analyzed in Detail

The project alternatives formulated from the selected project options to address significant issues identified through the scoping process are described in this section. Potential environmental and socioeconomic effects which may result from implementation of the project alternatives are identified and discussed in Chapter 4.

2.2.5.1 Alternative A - No-Action Alternative

The No-Action Alternative serves as the baseline for evaluation of the potential effects of all other project alternatives. Under this alternative, the Proposed Action and other action alternatives would not occur, and development and use of lands within the project boundaries would be limited to the existing uses of livestock grazing, wildlife habitat, dispersed recreation, and ongoing permitted mineral exploration activities. Upon completion of mineral exploration the associated disturbance areas would be reclaimed consistent with the provisions of the approved exploration permits. Existing resource values would remain in their current condition subject, however, to the actions and impacts of natural forces and ongoing mineral exploration and other previously approved activities. Any potential impacts related to the Proposed Action and alternatives would be precluded, but associated benefits would also be lost.

2.2.5.2 Alternative B - Proposed Action

The Proposed Action involves development, construction, operation, and reclamation of a new surface gold mine and associated process and support facilities. The Proposed Action is consistent with the PO Amendment (N64-92-001P) submitted to the BLM in November 1994 and subsequent plan refinements resulting from BLM review and supplemental planning efforts. Mine and related facilities would include five open pits; up to fourteen overburden and interburden disposal areas including the Main Pit; surface drainage systems; pit dewatering sumps and associated piping and holding ponds; an ore stockpile; a heap leach pad and associated solution tanks; ore haulage to the Twin Creeks mill or a mill facility; a tailings disposal facility; support facilities; a water supply wellfield and associated storage and distribution systems; and on-site utility installations and haulage/access roads. These structures and facilities are shown on Figure 1-2. The individual components which comprise the Proposed Action are identified and basic design, operating and reclamation considerations are described in Sections 2.4.1 through 2.4.20 and summarized by Table 2-2.

Proposed operations would be scheduled up to 24 hours per day, 365 days per year, employing up to 100 people for facility construction over a period of twelve months and up to 200 full-time employees over the projected mine life of nine years.

Under the Proposed Action, the existing Beacon Light Road which is currently being upgraded and extended would be utilized as the main access. Road modifications and related impacts have been addressed under a BLM Right-of-Way Application (N-60171) and EA (NV64-EA96-05). Operational traffic impacts are addressed in this EIS.

The Proposed Action includes the option of partially or completely backfilling the Main Pit or other pit areas with non-sulfide overburden and interburden from other pits during progressive mine development. Overburden and interburden disposal areas would be

TABLE 2-2
SUMMARY, ALTERNATIVE B - PROPOSED ACTION

General Project Components			
Site Access	West access route, 12 miles		
Pit Configuration	Five pits - North, Main, West, South, Section 9		
Mining Method	Open pit surface mining		
Operating Schedule			
- Mine	20-24 hrs/day, 365 days/yr.		
- Mill (Possible Future)	24 hrs/day, 365 days/yr.		
Production Schedule			
- Mining sequence	North/Main Pits, West Pit, South/Section 9 Pits		
- Total overburden/interburden	98,200,000 tons		
- Total ore	10,800,000 tons		
Mine Dewatering	15-110 gpm (annual average-all pits) to four holding ponds		
Surface Drainage Control	100-year, 24-hour		
Overburden and Interburden Disposal	14 (backfill option) or 12 (no-backfill option) permanent disposal areas including the Main Pit and possibly other pit areas, 125 to 475 feet high with 2.3 or 2.5H: 1V sideslopes, separate oxide and sulfide disposal with isolation of sulfides		
Ore Processing			
- Heap Leach	100 foot high leach pile with 2.5H:1V sideslopes followed by carbon-in-column, sprinkler application, solution tanks		
- Conventional Milling (Initial Twin Creeks, Possible Future - Mule Canyon)	Grinding followed by autoclave and carbon-in-leach, 3,500 tons/day capacity		
- Gold Recovery	Zadra process followed by electroplating and retort		
Cyanide Destruction	Caro's acid to weak acid dissociable (WAD) level of <10 ppm		
Tailing Disposal (Possible Future)	10 million ton capacity, 105 foot high embankment, subaerial deposition, soil liner with seepage collection to double-lined pond		
Waste Disposal	Two Class III waiver land disposal sites		
Water Supply	Three ground water wells, 1,000 gpm capacity with recycle from mine dewatering and tailings facility		
Power Supply	60/120 kV trunkline from Sierra Pacific Power mainline		
Ongoing Exploration	Exploration drilling and associated road construction		
Monitoring	Erosional/stability, overburden and interburden characterization, water quality, tailings facility, fluid management system, revegetation		
Reclamation	Backfilling, grading, growth media replacement, revegetation - Main pit could be backfilled, other pits remain open, a 100 foot deep pit lake would form in the south end of the South Pit and shallow (10-20 foot) ponds would form in the central portion of the South Pit and southern portion of the West Pit, other pits remain dry.		
EMPLOYMENT			
	Temporary		Full-Time
Construction	90		10
Operations	40		160
LAND OWNERSHIP			
	Project Area	Disturbed	Reclaimed
Fee Lands	3,474 acres	1,072	
Public Lands	4,812	1,312	
Split Estate Lands	950	304	
Total	9,236	2,688	2,340/2,357

constructed adjacent to the active pit areas. Sulfide disposal areas and the south and west facing slopes of all other overburden and interburden disposal areas would be constructed with 2.5H:1V outslopes. North and east facing slopes of non-sulfide disposal areas would be constructed with 2.3H:1V outslopes. All overburden and interburden disposal areas would have 10 to 20-foot catch benches at intervals of approximately 50 vertical feet.

The Proposed Action would involve phased mine development. Phase 1 would include construction of basic mine support facilities; development of and mining operations in the proposed mine pits; construction of associated overburden and interburden disposal areas; and construction and operation of the heap leach facility. Construction and operation of the proposed mine mill and associated tailings facility would be deferred until Phase 2. Until such time as production economics and/or total ore reserves would justify mill construction, mill grade ore would be hauled from the Mule Canyon Mine to the existing Twins Creeks Mill northeast of Winnemucca for processing. Ore haulage would involve 55 round-trip truck trips daily. If and when construction of a mill can be justified, Phase 2 would be implemented with construction of the Mule Canyon Mill and tailings facility. Processing of mill grading ore would shift from the Twin Creeks Mill to Mule Canyon following mill completion.

The Proposed Action would result in maximum surface disturbance of approximately 2,688 acres, including approximately 1,312 acres of public lands, 1,072 acres of private lands, and 304 acres of split estate lands. Of the total surface disturbance, approximately 2,357 acres (backfill option) or 2,340 acres (no-backfill option) would be reclaimed and returned to productive use consistent with the proposed postmining land uses of wildlife habitat, livestock grazing, dispersed recreation, and mineral exploration and development. The remaining open pit areas (approximately 162 acres (backfill option) or 182 acres (no-backfill option), would not be reclaimed following mining and reclamation. Given a projected mine life of ten years, including mine development and construction, and an active reclamation period of four years following completion of mining, potential impacts would be limited to a time interval of approximately 14 years.

2.2.5.3 Alternative C - East Access Alternative

The East Access Alternative includes essentially the same components and options as the Proposed Action with the exception that the main west access (Beacon Light Road) would be replaced as the primary mine access road or supplemented by one of two potential eastern access routes. This alternative responds to the issues of potential socioeconomic impacts relative to distribution of the mine workforce, specific environmental impacts associated with each of the potential access routes, and traffic levels resulting from transportation of mine employees, materials, and supplies. Either of the potential eastern access routes would involve less new road construction relative to the proposed west access and lower overall road gradients. Right-of-way constraints and potential impacts on cultural resources, Waters of the United States, and potential wetlands areas could, however, be greater for an eastern access route. Local government entities for both Lander County and Battle Mountain have also indicated strong support for the west access route which would encourage local economic development. The alternative eastern access routes are shown on Figure 1-3. The individual components which comprise the East Access Alternative are summarized by Table 2-3.

The preferred eastern access route would originate at State Route 306 near Beowawe and follow existing roads for a distance of approximately 6.1 miles to the point where the existing County Road crosses over a high-pressure steamline from the Beowawe Geothermal Plant. The initial 6.1 miles of existing roads would be widened and upgraded to adequately handle anticipated mine-related traffic. From the point where the existing County Road crosses the steamline, approximately 4.5 miles of new road running

TABLE 2-3 SUMMARY, ALTERNATIVE C - EAST ACCESS ALTERNATIVE			
General Project Components			
Site Access	West **and/or East access routes,** 12/10.6 miles		
Pit Configuration	Five pits - North, Main, West, South, Section 9		
Mining Method	Open pit surface mining		
Operating Schedule			
- Mine	20-24 hrs/day, 365 days/yr.		
- Mill (Possible Future)	24 hrs/day, 365 days/yr.		
Production Schedule			
- Mining sequence	North/Main Pits, West Pit, South/Section 9 Pits		
- Total overburden/interburden	98,200,000 tons		
- Total ore	10,800,000 tons		
Mine Dewatering	15-110 gpm (annual average-all pits) to four holding ponds		
Surface Drainage Control	100 yr./24 hr.		
Overburden and Interburden Disposal	14 (backfill option) or 12 (no-backfill option) permanent disposal areas including the Main Pit and possibly other pit areas, 125 to 475 feet high with 2.3 or 2.5H: 1V sideslopes, separate oxide and sulfide disposal with isolation of sulfides		
Ore Processing			
- Heap Leach	100 foot high leach pile with 2.5H:1V sideslopes followed by carbon-in-column, sprinkler application, solution tanks		
- Conventional Milling (Initial Twin Creeks, Possible Future - Mule Canyon)	Grinding followed by autoclave and carbon-in-leach, 3,500 tons/day capacity		
- Gold Recovery	Zadra process followed by electroplating and retort		
Cyanide Destruction	Caro's acid to WAD level of <10 ppm		
Tailing Disposal (Possible Future)	10 million ton capacity, 105 foot high embankment, subaerial deposition, soil liner with seepage collection to double-lined pond		
Waste Disposal	Two Class III waiver land disposal sites		
Water Supply	Three ground water wells, 1,000 gpm capacity with recycle from mine dewatering and tailings facility		
Power Supply	60/120 kV trunkline from Sierra Pacific Power mainline		
Ongoing Exploration	Exploration drilling and associated road construction		
Monitoring	Erosional/stability, overburden and interburden characterization, water quality, tailings facility, fluid management system, revegetation		
Reclamation	Backfilling, grading, growth media replacement, revegetation - Main Pit could be backfilled, other pits would remain open, a 100 foot deep pit lake would form in the south end of the South Pit and shallow (10-20 foot) ponds would form in the central portion of the South Pit and southern portion of the West Pit, other pits would remain dry.		
EMPLOYMENT			
	Temporary		Full-Time
Construction	90		10
Operations	40		160
LAND OWNERSHIP			
	Project Area	Disturbed	Reclaimed
Fee Lands	3,474 acres	915	
Public Lands	4,812	1,466	
Split Estate Lands	950	303	___
Total	9,236	2,684	2,340/2,350

TABLE 2-4 SUMMARY, ALTERNATIVE D - OVERBURDEN/INTERBURDEN DISPOSAL AREA CONFIGURATION ALTERNATIVES			
General Project Components			
Site Access	West access route, 12 miles		
Pit Configuration	Five pits - North, Main, West, South, Section 9		
Mining Method	Open pit surface mining		
Operating Schedule			
- Mine	20-24 hrs/day, 365 days/yr.		
- Mill (Possible Future)	24 hrs/day, 365 days/yr.		
Production Schedule			
- Mining sequence	North/Main Pits, West Pit, South/Section 9 Pits		
- Total overburden/interburden	98,200,000 tons		
- Total ore	10,800,000 tons		
Mine Dewatering	15-110 gpm (annual average-all pits) to four holding ponds		
Surface Drainage Control	100 yr./24 hr.		
Overburden and Interburden Disposal	14 (backfill option) or 12 (no-backfill option) permanent disposal areas including the Main Pit and possibly other pit areas heights vary from 125 to more than 475-foot **with 2.3H to 3.0H:1V sideslopes, outslope benches may be eliminated**, separate oxide and sulfide disposal with isolation of sulfides.		
Ore Processing			
- Heap Leach	100 foot high leach pile with 2.5H:1V sideslopes followed by carbon-in-column, sprinkler application, solution tanks		
- Conventional Milling (Initial Twin Creeks, Possible Future Mule Canyon)	Grinding followed by autoclave and carbon-in-leach 3,500 tons/day capacity		
- Gold Recovery	Zadra process followed by electroplating and retort		
Cyanide Destruction	Caro's acid to WAD level of <10 ppm		
Tailing Disposal (Possible Future)	10 million ton capacity, 105 foot high embankment, subaerial deposition, soil liner with seepage collection to double-lined pond		
Waste Disposal	Two Class III waiver land disposal sites		
Water Supply	Three ground water wells, 1,000 gpm capacity with recycle from mine dewatering and tailings facility		
Power Supply	60/120 kV trunkline from Sierra Pacific Power mainline		
Ongoing Exploration	Exploration drilling and associated road construction		
Monitoring	Erosional/stability, overburden interburden characterization, water quality, tailings facility, fluid management system, revegetation		
Reclamation	Backfilling, grading, growth media replacement, revegetation - Main Pit would be backfilled, other pits could remain open, a 110 foot deep pit lake would form in the south end of the South Pit and shallow (10-20 foot) ponds would form in the central portion of the South Pit and southern portion of the West Pit, other pits would remain dry.		
EMPLOYMENT			
	Temporary		Full-Time
Construction	90		10
Operations	40		160
LAND OWNERSHIP			
	Project Area	Disturbed	Reclaimed
Fee Lands	3,474 acres		
Public Lands	4,812		
Split Estate Lands	950		
Total	9,236	2,680-2,700 acres	2,330/2,370 acres

TABLE 2-5
COMPARISON OF ALTERNATIVES AND SUMMARY OF POTENTIAL IMPACTS
Page 2 of 6

Resource Category Issue	Alternatives			
	A No-Action	**B** Proposed Action	**C** East Access	**D** OB/IB Config.
GROUND WATER HYDROLOGY				
Ground water usage[1]	None	Water supply wellfield (max. capacity 1,000 gpm) supplemented by ground water from pit dewatering sumps	Same as Proposed Action	Same as Proposed Action
Effects on ground water table[1]	Negligible	Localized drawdown; no regional effects	Same as Proposed Action	Same as Proposed Action
Loss of springs/seeps[1]	Minimal	Excavation of two springs (MCS-3A and MCS-3B); expected reduction in discharge from four springs (MCS-A, MCS-2, MCS-4 and MCS-10); possible discharge reduction in four additional springs (MCS-6, MCS-7A, MCS-8 and MCS-11)	Same as Proposed Action	Same as Proposed Action
Ground water quality degradation[1]	Continuous discharge from existing exploration adit	Negligible; possible minor degradation from leaching	Same as Proposed Action	Same as Proposed Action
Effects on geothermal system[1]	None	None	None	None
Recharge/discharge/storage[1]	Negligible discharge (3 to 5 gpm)	Minimal impacts from ground water inflow to open pits; maximum estimated total discharge rate of 110 gpm	Same as Proposed Action	Same as Proposed Action
SOILS				
Surface disturbance area	200 acres (Exploration Disturbance)	2,690 acres	2,680 acres	2,680 - 2,700 acres
Erosion potential	Minimal	Limited impacts above natural levels prior to revegetation	Same as Proposed Action	Slight increase relative to Proposed Action
Availability of growth media for reclamation[1]	Yes; no estimate available	3,900,000 yd^3	Same as Proposed Action	Same As Proposed Action

[1]Significant Issues

project area. Discovery of additional economically recoverable reserves could extend the effective life of the Mule Canyon Mine with mining from the additional reserve areas and continued use and operation of the associated milling and support facilities.

Under the Proposed Action, existing exploration permits covering areas both within and outside the proposed Project Area would be modified to exclude those areas within the project boundaries. Ongoing exploration and any continuing associated reclamation within the project boundaries would, therefore, become part of the Proposed Action. Ongoing exploration activities under the Proposed Action would include construction and maintenance of required exploration roads and drill pads; exploration drilling, sampling, and related activities; and reclamation of exploration disturbance. Total future exploration disturbance within the project boundaries is estimated at approximately 200 acres.

Exploration disturbance would be reclaimed following completion of each annual exploration program. Reclamation would involve plugging all drillholes, removing all solid waste materials for disposal, draining and allowing sumps to dry out and consolidate, backfilling sumps, grading roads and drill pads, replacing growth media, and reseeding with a blend of native and introduced species.

2.4.2 Facility Location and Configuration

The proposed Mule Canyon Mine would be approximately 15 miles southeast of Battle Mountain, Nevada and 10 miles west of the small town of Beowawe. Proposed mine pits would be on the eastern slope of the Shoshone Range near the crest of the range with related mine, process, and support facilities on the lower mountain slopes and extending into the western portion of Whirlwind Valley as shown on Figure 1-2. The proposed Project Area, which encompasses a total area of approximately 9,236 acres, includes approximately 4,812 acres of public lands, 3,474 acres of fee lands, and 950 acres of lands which are public surface and fee mineral lands. All mining related disturbance would occur within the project fenceline (approximately 2,159 acres) except access road and borrow source disturbance outside the project fenceline (approximately 529 acres), resulting in total disturbance of approximately 2,688 acres (1,312 acres - public lands; 1,072 acres - fee lands; and 304 acres - split estate). A detailed breakdown of proposed disturbance areas and corresponding ownership is presented as Table 2-6.

Layout and design of open pit mining operations are based primarily on the location, depth, areal extent, and nature of ore occurrence. Generally pit boundaries are defined by both the limits of economically recoverable ore and reasonable engineering and operational limits for pit slopes in the overlying overburden materials.

For the proposed Mule Canyon Mine, the limits of economically recoverable ore have been defined by extensive exploration drilling, sampling, and mapping of the resulting data. The five separate pits, which are the basis of the proposed Mule Canyon operations are shown by Figure 1-2.

Figures 2-2 through 2-4 correspond to five separate zones of mineralization having adequate ore grades to support economic recovery. Areas surrounding the proposed pit areas may show some evidence of gold mineralization but at grades well below reasonable economic recovery cut-off grades or at overburden ratios which exceed reasonable mining limits.

Since the ore reserves are not exposed at the ground surface it is necessary to remove the overlying overburden to expose the ore for excavation and recovery. As a practical operational consideration, the overburden must be removed progressively in stepped benches to access the ore. Bench width must be adequate to safely accommodate the large mobile equipment utilized for mining operations, and the intervening slopes between each of the bench levels must be established at heights and slope angles consistent with both operational and long-term slope stability and the operational limitations of the proposed mining equipment. Strength testing of ore and overburden materials and geotechnical analysis of the proposed mining plans resulted in design bench heights of 15 to 30 feet, bench widths of 15 feet, inter-bench slopes of 30 to 55 degrees, and overall bench slope angles (includes benching) of 45 to 55 degrees.

The proposed pit configuration represents an optimal pit scenario based on existing available ore reserve and geotechnical information. General information on the configuration and limits of the proposed open pits is provided by Table 2-7.

TABLE 2-7
SUMMARY OF PROPOSED PIT CONFIGURATIONS

Pit Designation	Area (acres)	Bottom of Pit Elevation
North Pit	40[a]	6300
Main Pit	20[b]	6260
West Pit	50[c]	6220
South Pit	64[d]	5640
Section 9 Pit	8[e]	5800

Notes:
[a] 16 acres public land, 24 acres split estate land.
[b] All acres public land.
[c] 39 acres public land, 11 acres split estate land.
[d] 56 acres public land, 8 private land.
[e] All acres public land.

Source: Shepherd Miller, Inc., November 1994

While the location and general configuration of mine pits are fixed by the location and extent of ore occurrence, there is some flexibility in determining the location and configuration of other mining, processing, and support facilities. Generally, existing site topography, surface ownership, existing surface drainage patterns, proximity to proposed mining areas, and the existence of any significant resource values were the primary considerations for location and layout of project facilities. To the extent possible, major facilities such as the mill, ore stockpile, and overburden and interburden disposal areas were located and configured to utilize fee lands, thereby avoiding unnecessary disturbance of public lands; and to avoid excessively steep terrain, major drainages, and any significant resource values. Several alternative locations were evaluated for each major facility prior to selecting the preferred facility locations as shown on Figure 1-2.

Location and configuration of overburden and interburden disposal areas were determined primarily by proximity to corresponding mining areas. Other important considerations included elevation relative to overburden and interburden source areas (with a flat or downhill haul being preferable), avoidance of excessively steep terrain and natural drainages, compatibility with the existing natural terrain, and avoidance (where possible) of existing springs and seeps.

Location and configuration of the heap leach and tailings facilities were dictated by the need for relatively large, flat areas for these facilities, foundation conditions compatible with facility design requirements, and avoidance of major drainages.

The location of the water supply wells was determined by local hydrologic conditions, with the proposed well field location reflecting the availability of adequate quantities of shallow, unappropriated ground water in the nearby Whirlwind Valley Basin. Location and routing of water supply lines, power transmission lines, and natural gas pipelines were determined by the necessary tie-in locations, site topography, and the availability of other proposed disturbance corridors, such as roads which could be utilized for utility routing to minimize overall disturbance.

2.4.3 Site Access

The primary mine access route would be from the west, utilizing the Beacon Light Road, which originates at the frontage road paralleling Interstate 80, runs south along the eastern edge of the Reese River Valley, then crosses over the Shoshone Range near the southwest corner of the project area, and is currently being extended to the proposed mill site as shown by Figure 1-3. The travel distance from Battle Mountain to the mine using Interstate 80 and the Beacon Light Road would be approximately 22 miles.

From Interstate 80 to the proposed mill site, the west access route would cover approximately 12 miles and would involve an elevation change of approximately 1,580 feet. To the extent possible, the proposed west access utilizes existing roads. Approximately the first six miles of existing road requires upgrading including widening, improved drainage, limited reconstruction of the road base, and surfacing. The remaining six miles of the west access road would involve construction of a new road since existing roads over the Shoshone Range are limited to narrow, steep, dirt roads which cannot be modified to meet practical design and safety standards. The west access route would be an all-weather, two-lane gravel-surfaced road with a travelled width of approximately 36-feet, and dirt shoulders. Total road width would include shoulders, cut fill slopes, and borrow ditches. Maximum road grades would be 10 percent or less. The road design incorporates consideration of access requirements for an autoclave if a mill is constructed in the future.

Lander County, with supplemental funding from SFPGC, is in the process of completing all necessary road modifications and supplemental construction required to establish the west access route as a County road. Under a contract with the County, SFPGC would be responsible for road maintenance during the period of active operations. The level and frequency of road maintenance would, at a minimum, be consistent with applicable NDOT and County requirements to assure safe road conditions and effective dust control. Road maintenance activities would include periodic grading, inspection and repair of drainage structures, and repair or replacement, as necessary, of road surfacing materials. Dust would be controlled by removal of debris during grading operations, periodic watering, application of dust control agents, or paving.

Lander County has obtained a Right-of-Way (N-60171) from the BLM for the modifications and construction required to upgrade the existing Beacon Light Road to handle anticipated mine-related traffic. The width of the road right-of-way varies with terrain averaging 122.5 feet. Potential environmental impacts associated with road construction modification have been evaluated separately as a related action under BLM EA NV64-EA96-05. Operational impacts of mine-related traffic on the Beacon Light Road are, however, evaluated as a component of the Proposed Action in this EIS. Since the right-of-way approval process was completed prior to initiation of mine construction and development, construction aspects of the west access route are not a component of the Proposed Action or Alternatives.

Options for site access would include access from the east utilizing existing roads. Both of the proposed eastern access alternatives are options which could affect the nature and magnitude of potential environmental impacts and mine operations and economics. These options have, therefore, been identified as a project alternative which is described in detail in this EIS as Alternative C, East Access Alternative (Section 2.2.5.3). The two potential eastern access routes have been evaluated as either alternative or supplemental access to the proposed west access route.

2.4.4 Facility Construction

Facility construction and development activities have been designed to proceed in a logical sequence as follows:

- Recover and stockpile available growth media
- Establish access roads and construction facilities areas
- Construct drainage control structures as needed
- Proceed with site preparation and grading
- Complete foundation preparation and installation for major facilities

- Initiate mine development
- Construct required mine facilities
- Complete utility installations

SFPGC is proposing phased construction of the Mule Canyon Mine to defer capital investment, take advantage of existing or proposed facilities at other nearby SFPGC operations, and improve overall project economics.

The initial development phase would involve construction of required support and ancillary facilities and development and operation of mine water supply and distribution systems, required mine utilities, mine pits, overburden and interburden disposal areas, and a heap leach facility. During the initial development phase, leach-grade ore would be treated by conventional heap leaching on-site, and mill-grade ore would be loaded and transported by highway tractor-trailer units to SFPGC's Twin Creeks Mill northeast of Winnemucca, Nevada, for processing. Given the substantial capital cost of constructing a new mill and associated tailings facility at the Mule Canyon Mine, mill construction would be deferred until the related capital expenditures could be justified by either identification of significant additional Mule Canyon reserves or increased processing requirements for ores from other SFPGC operations or other nearby mines. If justified, the proposed milling, tailings, and related facilities would be constructed and operated as Phase 2 of the Mule Canyon project development plan.

Generally, proposed initial facility construction and development are expected to take approximately 12 months and would involve a maximum of approximately 100 workers. The construction workforce would include approximately 90 temporary contractor employees, who would complete preliminary site work, facility construction, and utility installation, and 10 SFPGC employees who would be involved in mine development and project supervision.

The projected duration of the construction period is based on the nature and complexity of the required construction and development activities and SFPGC's previous experience with similar activities. SFPGC has obtained all necessary permits to proceed with proposed activities on private lands and may initiate construction of certain facilities prior to general mine construction. This option would probably not significantly affect the total construction period but could move the date for construction completion forward.

Construction and mine development activities would be preceded by construction of required diversion ditches and recovery and stockpiling of growth media for use in future site reclamation. Based on projected growth media replacement depths and coverage areas, growth media recovery would include both topsoil and other suitable surficial materials to assure adequate replacement volumes. Any supplemental materials to be utilized as growth media would be sampled prior to use to verify suitability. As required, low permeability clays and selected granular materials would be obtained from designated borrow sources within and outside the Project Area. These materials would be utilized primarily for construction of engineered structures such as the ore stockpile base, heap leach pad, and tailings facility liner and embankment where construction specifications designate material characteristics. Available soil materials would be recovered from borrow areas prior to excavation for use in reclamation of these areas. Excavation of borrow material would be limited to a maximum depth of 10 feet which would be well above the watertable in the designated borrow areas. These areas would be reclaimed by grading them to blend with the surrounding terrain and promote effective drainage, replacing available soil material, and seeding to complete reclamation.

Where surface disturbance and construction activities might result in local erosion and sedimentation problems, temporary drainage control measures would be utilized as appropriate and could include construction of temporary ditches, berms, and sediment traps

Pit dewatering requirements were determined by evaluating the two potential components of inflow to active mining areas; surface drainage inflows from areas within the mine pits; and ground water inflow from water-bearing strata. Surface runoff flows to the mine pits would be limited to runoff from any precipitation in the immediate pit area by diversions which would route any upgradient drainage around the active pits. Calculated surface inflow volumes range from 20 gpm to 195 gpm for individual pit areas and up to approximately 580 gpm for all pits. Calculated ground water inflow rates for individual pits range from 0 to 50 gpm as indicated by Table 2-9, with total inflows for all pits ranging from 15 to 110 gpm (24 to 177 acre-feet per year) on an annually averaged basis. Based on the sum of the two pit inflow components, pumping requirements were determined for each pit to keep water levels at or below the lowest working level for each pit area.

TABLE 2-9
PROJECTED ANNUAL MINE INFLOW RATES (gpm)

Year	North Pit	Main Pit	West Pit	South Pit	S9 Pit	Totals
1996	NM	15	NM	NM	NM	15
1997	5	10	10	25	NM	50
1998	15	15	5	10	NM	45
1998	5	15	50	30	NM	100
2000	10	10	50	40	NM	110
2001	15	10	30	50	NM	105
2002	25	10	35	20	NM	90
2003	15	10	30	45	0	100
2004	15	10	35	20	0	90
2005	15	10	30	20	0	75

Notes: (gpm) = Gallons per minute
NM = Not mined this year or no significant inflow

Source: SMI/BCI, 1995

Based on the calculated pit dewatering volumes and available hydrologic data, three potential dewatering options were evaluated; 1) Dewatering wells on the perimeter of each pit; 2) Sumps and pumping systems within the pits; and 3) A combination of Options 1 and 2. Available ground water information indicates that the rock units in the immediate pit areas have such low permeabilities that dewatering wells would not be effective. A large number of wells, each having a relatively limited area of influence, would be necessary to achieve the required drawdown. In addition, there would be a significant time lag between initiation of pumping and actual drawdown, and the total area of drawdown and resulting pumping volumes would be increased. Given these considerations, mine dewatering plans have focused on the use of in-pit sumps, pumps, transmission pipelines, and holding ponds adjacent to active pit areas.

Mine dewatering would begin concurrently with initial pit development and continue during the period of active pit operations. One or more sumps would be established in low areas of the pit depending on its size. It is anticipated that one sump each would be required for the Main and Section 9 Pits, two each for the North Pit, and three each for the West and South Pits. Sumps would range in size from 0.6 to 2.2 acre-feet. They would be located out of active operating and traffic areas, and would be relocated or reestablished as necessary with progressive mine development. All sumps would have sufficient capacity to contain design runoff and pit inflows with adequate excess capacity to accommodate local variances in ground water storage and inflow rates.

Although not anticipated to be a significant problem, there may be areas where fractures, alteration products, and other geologic conditions could either hinder or promote increased ground water inflow. In areas where ground water does not readily drain from the pit slopes the potential build-up of hydrostatic pressure could adversely affect pit slope stability. If such conditions are encountered during mining, small diameter horizontal relief drains would be drilled into the pit slope to promote effective dewatering. In areas where above average ground water inflows occur, temporary berms or ditches could be necessary to control and direct the inflows through or around active working areas to the sumps.

High capacity portable submersible pumps would be utilized to discharge water

Construction of overburden and interburden disposal areas would involve removal and stockpiling of available soil materials from the pile foundation areas, construction of upslope diversion ditches, placement of an oxide material drainage layer (sulfide areas only), progressive placement of the overburden and interburden material as a series of successive benches, surface grading to establish the permanent outslope configuration and promote surface drainage, placement of oxide cover materials (sulfide areas only), replacement of growth media on the disposal area surface and outslopes, and revegetation.

Overburden and interburden disposal areas would vary in height from 125 to 475 feet and would initially be established at the natural angle of repose, with sideslopes of approximately 1.5Horizontal:1Vertical (H:V). During final grading, outslopes would be flattened to approximately 2.5H:1V for south and west-facing slopes and all sulfide disposal area outslopes, and to approximately 2.3H:1V for north and east- facing slopes. Intermediate benches 10 to 20 feet wide would be established approximately every 50 vertical feet on the outslopes to enhance overall stability and breakup overland flow on the pile slopes to limit erosion. Approximately every third bench would be graded to drain laterally toward the edges of the pile to limit runoff volumes and velocities on the outslopes. Upper disposal area surfaces would be regraded during final grading operations to establish a minimum gradient of at least 1.0 percent to promote effective drainage off the pile, prevent ponding, and limit infiltration potential. General configurations for both oxide and sulfide disposal areas are illustrated on Figure 2-6. As a result of concerns related to linear contrasts due to benching on disposal area outslopes, the BLM is stipulating that SFPGC develop modified outslope designs which could be implemented where appropriate. All regraded upper and outslope surfaces would be covered with a minimum of 1 foot of growth media and reseeded to stabilize these surfaces, minimize erosion, and further limit infiltration.

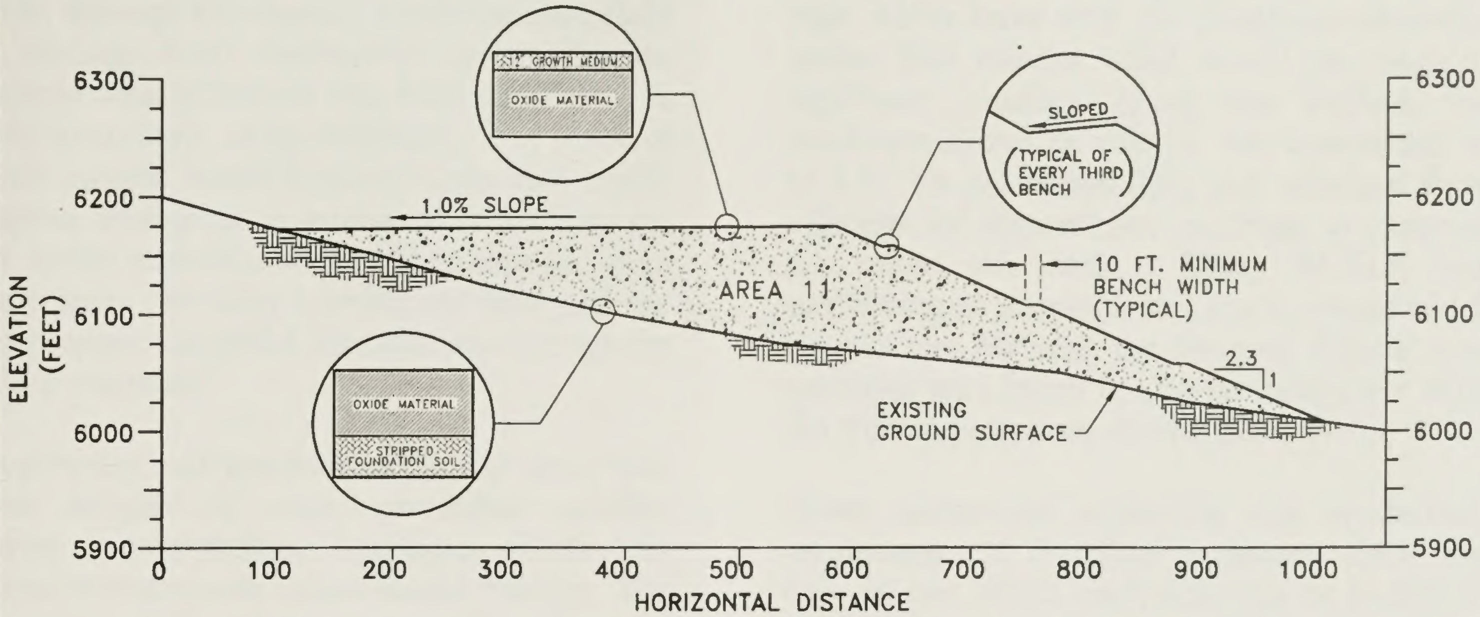
Results from extensive sampling, analysis, and kinetic testing of ore and overburden and interburden indicate that some of these materials may have the potential to generate ARD. ARD potential is normally correlated to the sulfur content of the material and specifically to pyritic sulfur which can oxidize, producing sulfuric acid. Total sulfur values were found to decline with increasing distance from the orebody. This is an important consideration, since most of the material with the highest sulfur values is ore which would be processed through the mill and would be thermally oxidized in order to recover the contained gold.

Potential acid producing material, designated as sulfide overburden and interburden, has been identified as any material having a total sulfur content greater than 0.9 percent and an Acid Neutralization Potential/Acid Generation Potential (ANP/AGP) Ratio of less than 1.2. Sample analysis data were correlated to the block model used in developing the proposed mine plans for each pit to identify blocks and tonnages of sulfide material requiring selective handling and disposal. Preliminary overburden and interburden designations will be verified through ongoing operational sampling and analysis to provide for operational control and routing of overburden and interburden to appropriate disposal locations.

In order to minimize the potential for generation of ARD and associated environmental impacts, overburden and interburden materials which are potentially acid-producing would be selectively handled and placed in separate overburden and interburden disposal sites designed to minimize the potential for acid generation and to provide for effective drainage control and monitoring.

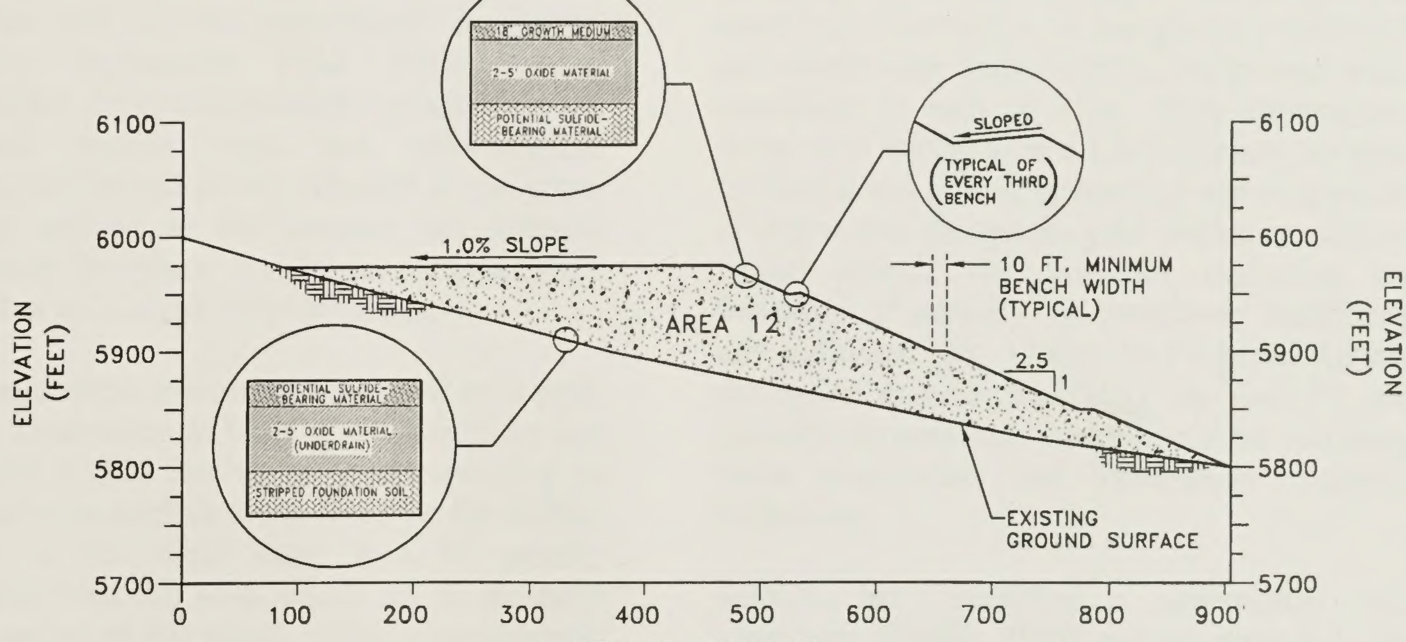
Engineered diversion ditches would prevent runon to overburden and interburden disposal areas from upgradient areas. Grading of disposal area surfaces to promote drainage, placement of 5 feet of oxide material and 1.5 feet of growth media over all sulfide disposal areas, and reestablishment of an effective vegetative cover, would minimize infiltration, oxidation, and leaching. By nature, the sulfide materials commonly occur in conjunction with clay alteration zones and consequently have relatively high inherent clay content. With exposure to moisture, clay constituents in column leach samples of the overburden and interburden materials were observed to expand and become paste-like in texture which would effectively limit further infiltration and reduce downward movement of water through the samples. In overburden and interburden disposal areas, these characteristics would similarly limit infiltration and groundwater movement.

OVERBURDEN/INTERBURDEN DISPOSAL CONFIGURATION (OXIDE MATERIAL)



Scale: 1" = 200'

OVERBURDEN/INTERBURDEN DISPOSAL CONFIGURATION (SULFIDE MATERIAL)



Scale: 1" = 200'

MULE CANYON MINE

FIGURE 2-6

PROPOSED ACTION - TYPICAL OVERBURDEN/INTERBURDEN DISPOSAL CONFIGURATION (OXIDE MATERIAL/SULFIDE MATERIAL)

REVISED 8/96

Source: Shepard Miller, Inc., june 1995

File: FIG2-8A.DWG

Testing and characterization of the clay materials also indicate relatively high percentages of smectite clays which can partially attenuate or adsorb any acidic drainage and elevated metals concentrations in drainage from overburden and interburden disposal areas (Chermak and Runnells, 1994). A continuous layer of approximately 2 to 5 feet of oxide material would be placed under each sulfide disposal area to act as a physical buffer between the sulfide material and underlying soils and as an underdrain, providing a preferential flow path for any precipitation which may infiltrate through the sulfide materials.

Overburden and interburden disposal areas have been designed to assure operational stability during construction, long-term stability as permanent structures, and erosional stability. The structural stability of proposed configurations was analyzed using the limiting equilibrium method for both static and pseudostatic (seismic movements) conditions. The stability evaluations were designed to determine both the maximum height and maximum allowable slope angles for the overburden and interburden disposal areas consistent with allowable factors of safety of 1.5 for static and 1.0 for pseudostatic conditions. Stability evaluations took both natural topographic slopes and foundation materials in the proposed deposit areas into consideration. Ground configuration was reflected in the cross-sections utilized in the analysis and strength parameters for typical foundation materials were utilized as an analysis input parameter.

The pseudostatic evaluation was based on a peak seismic acceleration of 0.42g (g = acceleration due to gravity = 32.2 feet/sec/sec), corresponding to the maximum credible event (based on the seismic history of this area, there is a 90 percent probability that this event would not be exceeded over a period of 100 years). Using a pseudostatic "k" factor of one-half of the peak acceleration, the design heights and outslopes for all overburden and interburden disposal areas are well under the maximum height and slope limits for both static and pseudostatic conditions as defined by the allowable factors of safety (SMI, 1994).

Erosional stability of the proposed overburden and interburden disposal areas was evaluated using both the permissible velocity method and the Revised Universal Soil Loss Equation (RUSLE). The permissible velocity method compares the velocity of runoff resulting from the 100-year, 24-hour storm event with the maximum allowable surface flow velocity which would not result in significant erosion. Using this method, the maximum allowable velocity was determined to be 1.75 feet per second (fps), and calculated flow velocities for disposal area outslopes as designed are below this limit. Using RUSLE and establishing an acceptable soil loss threshold of 1.0 ton per acre per year, the designed disposal area outslopes were found to also be compatible with the erosion protection criteria (SMI, 1994).

Given operational sequencing and production requirements as described in Section 2.4.6, the only pit area which could definitely be backfilled would be the Main Pit. Backfilling of the Main Pit would not interfere with ore recovery, significantly affect the proportion of oxide and sulfide materials going to the overburden and interburden disposal areas, or alter the quantity and grade of ore feed to the mill and leach facilities. As operations progress, operational sampling and monitoring would provide additional information on ore grades, overburden and interburden characteristics, and ground water conditions in each pit area. This information, along with information on any relevant advances in mining and process technology and projections of short-term changes in gold market conditions would provide the basis for evaluating the feasibility of partially or completely backfilling any additional pits. Under the Proposed Action, the option exists of backfilling the Main Pit and partially or completely backfilling other pits using oxide overburden and interburden materials exclusively.

SFPGC has completed a preliminary risk assessment (ENSR, 1995) and an expanded risk assessment (SMI, 1996) to evaluate potential environmental hazards associated with establishment of shallow ponds in the South and West Pits following completion of mining. The expanded risk assessment, as summarized in Appendix E, indicates some potential for adverse wildlife impacts due to exposure to water contained in the two shallow ponds. In order to address the potential impacts, the BLM is stipulating that these areas be partially backfilled to prevent ponding contingent on the results of postmining water quality monitoring.

Backfilling would potentially reduce the total surface disturbance area by reducing the size and number of required overburden and interburden disposal areas. It would also allow reclamation and future utilization of the backfilled pit areas consistent with planned postmining land uses while eliminating potential hazards associated with retention of open pits.

Generally, the decision of whether or not to backfill the Main Pit or other pits would depend on the following considerations:

- On completion of ore removal, would other nearby pit areas which are being developed or actively mined represent a reasonable source of overburden and interburden backfill material

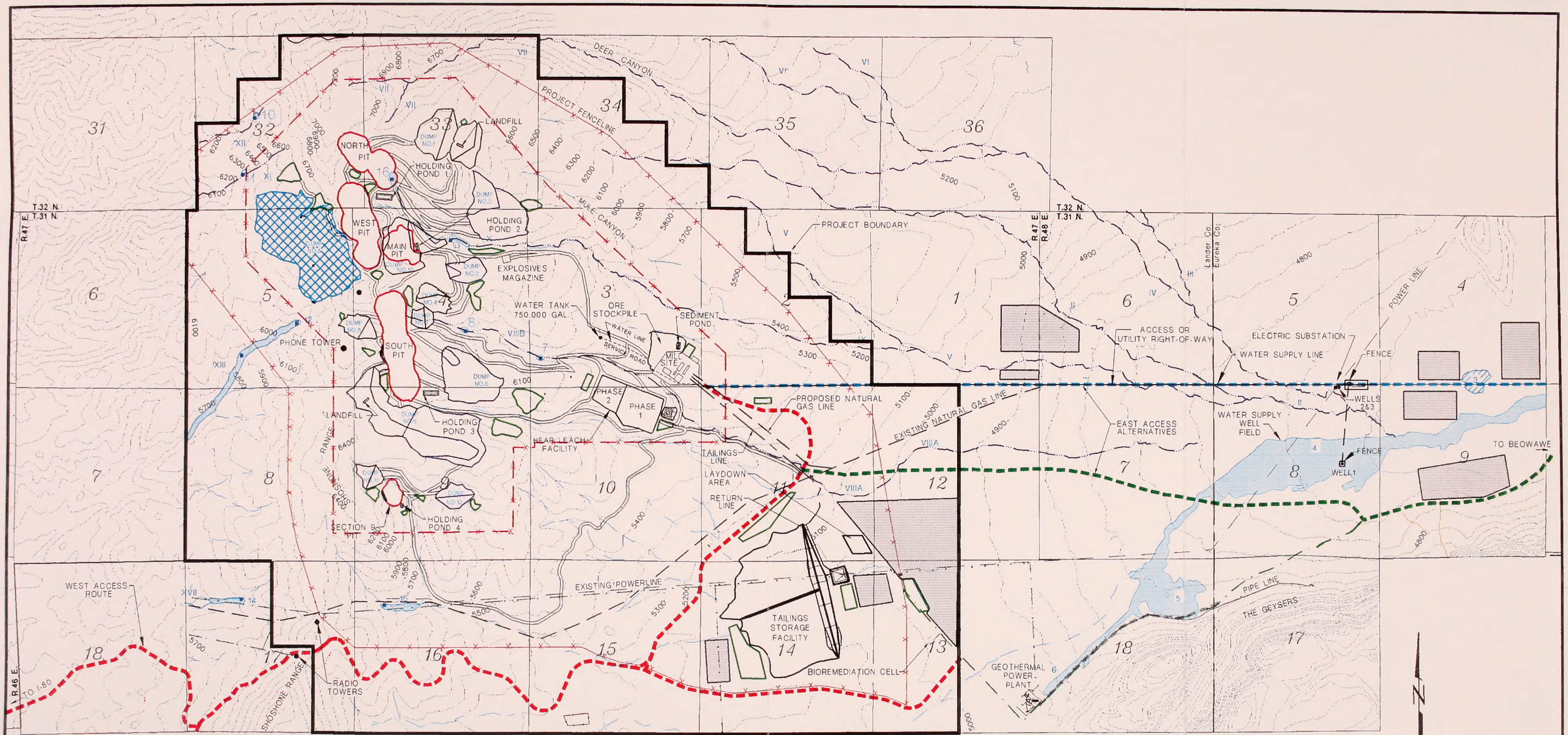
- Would backfilling prevent or limit access to remaining mineral resources which could not be economically recovered at the time but might reasonably be recoverable in the future

- Would adequate non-sulfide material be available from ongoing operations to meet both disposal area drainage layer and cover and backfilling requirements

As a component of the Proposed Action, the options of backfilling or not backfilling the Main Pit are graphically illustrated by Figures 1-2 and 2-7. If not backfilled, the Main Pit would remain as an open pit with a surface area of approximately 20 acres, and approximately 8.7 million tons of material would be added to Disposal Area 5, increasing the associated surface disturbance by approximately nine acres. The number of overburden and interburden disposal areas would be reduced from 14 to 12. Disposal Area 10, corresponding to the Main Pit would eliminated, and Disposal Areas 5 and 5B2 would be replaced by Disposal Area 5D, reducing associated surface disturbance by approximately six acres. The net total surface disturbance for all overburden and interburden disposal areas under the Main Pit backfill option would increase by approximately three acres.

Hydrologic modeling indicates that long-term postmining water levels would be below the lower mining limit in the Main Pit, North Pit, and Section 9 Pit. SFPGC, however, has elected to limit potential pit backfilling to oxide material to preclude any potential adverse ground water quality impacts from exposure of backfill materials to oxidation and leaching within the backfilled pit. Backfilling, if feasible, would occur in a manner similar to construction of the overburden and interburden disposal areas with placement of overburden and interburden in the pit(s) beginning at the bottom of the pit(s) and progressing upward in successive fill benches. Generally, fill would be placed in the pit(s) by tail-dumping from upper benches. Backfill stability would not be a concern since the fill would be enclosed within the pit.

Options for overburden and interburden disposal include elimination of pit backfilling, backfill of additional pits, and changes in the location and configuration of the proposed overburden and interburden disposal areas. Elimination of pit backfilling (which would result in all five mine pits remaining open following completion of mining), and partial or complete backfilling of other pits, are considered as options under the Proposed Action. Potential optional locations for disposal sites were evaluated to determine the preferred locations as previously discussed in this section. Alternate disposal area configurations are options which could affect the nature and magnitude of potential environmental impacts and mine operations and economics. These options have, therefore, been identified as a project alternative which is evaluated in detail in this EIS as Alternative D, Overburden and Interburden Disposal Area Configuration Alternative.



LEGEND

- ACCESS ROAD - WEST ALIGNMENT
- ACCESS ROAD - EAST ALIGNMENT PREFERRED
- ACCESS ROAD - EAST ALIGNMENT - SECONDARY PREFERRED
- PROJECT FENCELINE (INTERIM)
- PROJECT FENCELINE (FULL BUILD-OUT)
- PROJECT BOUNDARY
- SPRING
- EXISTING ACCESS ROAD
- PIT AREA
- GROWTH MEDIUM STOCKPILES
- IX WETLAND
- WATERS OF THE U.S.
- 15 WATERS OF THE U.S. INCLUDING ADJACENT WETLANDS
- OTHER WATERS OF THE U.S.
- OXIDE OVERBURDEN/INTERBURDEN DISPOSAL AREAS
- SULFIDE OVERBURDEN/INTERBURDEN DISPOSAL AREAS
- BORROW SOURCE
- BIOREMEDIATION CELL

File: MC-NBA2.DWG

Source: Shepherd Miller Inc., May, 1995

MULE CANYON MINE

FIGURE 2-7

PROPOSED ACTION
MINING-RELATED FACILITIES
(NO-BACKFILL OPTION)

operational controls to prevent blowing trash and bird or rodent infestations.

2.4.14 Water Supply and Storage

The Proposed Action would require a reliable fresh water supply source to provide process make-up water, supply both the domestic and fire-fighting water systems, and to supplement other sources for operational and road dust control. The main water supply source would supply the initial process make-up water for both the milling process and the heap leach circuits. Since these circuits are both designed as closed-loop systems relative to solution control, future make-up water requirements would be limited to the additional volume required to compensate for evaporative losses and moisture retained in the leach heap and tailings. Generally, pit dewatering discharge and tailings solution recycle would supply the majority of the required process make-up water and supplemental contributions from the main water supply system would be minimized.

The main water supply source would be a wellfield located in the western portion of Whirlwind Valley as shown on Figure 1-2. Well location, depth, construction, and pumping rates were determined through review of ground water characterizations for this area and simulation of various well configurations using a numerical ground water model reflecting site-specific conditions. The well configuration selected would minimize short and long-term ground water drawdown and both the consequent spatial extent and magnitude of potential aquifer impacts. The wellfield would consist of three ground water wells, with one existing well (Well 2) completed in the confined aquifer zone at a depth of approximately 580 feet and two proposed wells (Wells 1 and 3) to be completed at depths of 480 and 220 feet, respectively. Well 1 would draw from both the confined and unconfined zones while Well 3 would be limited to the unconfined aquifer zone. Each of the three wells would be capable of supplying 375 gpm on a sustained basis although pumping for each well would be monitored and controlled consistent with water supply requirements and drawdown considerations and total system capacity would be limited to a maximum of 1,000 gpm. The use of three wells in the system would provide necessary system backup in the event that a pump malfunction or other problem would temporarily limit flow from one of the wells. Use of three wells would also distribute pumping and drawdown effects between the two separate aquifer zones.

Multi-stage pumps in each of the water supply wells would transfer water through 8-inch PVC pipelines to a booster station where a 250 horsepower pump would discharge to a 10-inch buried pipeline running approximately 4.1 miles to a 750,000 gallon storage tank located near the mill facility. The water supply pipeline would be installed within a right-of-way 58 to 66 feet wide which would contain the pipeline, valve installations, and a two-lane service road. SFPGC has filed a Right-of-Way Application for the proposed waterline (N-60250) with the BLM. The waterline right-of-way follows the preferred east access route as described in Section 2.2.5.3 and shown of Figure 1-3. Surface disturbance for the proposed waterline would coincide with disturbance and related impacts for the preferred east access route. Potential impacts due to waterline construction would therefore, be similar to those discussed in Chapter 4 for Alternative C, East Access Alternative, but of lesser magnitude, and are not analyzed separately. Within the Project Area, surface and underground pipelines, booster pumps, valves, and control systems would transfer and supply fresh water to the various facility locations where it would be utilized.

Source water quality would generally meet applicable drinking water standards with chlorination. Chlorinated domestic water supply requirements would be limited to drinking and sanitary uses. Total potable and non-potable water supply requirements are estimated to average 900 gpm, however, the main water supply source has been designed to provide 1,000 gpm to address normal fluctuations in usage and to accommodate any potential future expansion. Pit water contributions were not considered in the water supply analysis and would represent a significant supplemental non-potable supply source.

2.4.15 Other Utility Installations

Existing Sierra Pacific Power Company (SPPC) powerlines would be extended or trunklines from the existing transmission lines would be established to meet mine electrical power requirements.

Initially, SFPGC would construct a new substation in the vicinity of the proposed water supply wellfield as shown on Figure 1-2 to supply power for wellfield installations. The substation would connect to the existing SPPC 60 kV line to the east of the Project Area. The connecting 60 kV dropline, the new substation, and the 4,160 volt powerline from the substation would be within a 30 foot right-of-way for which SFPGC has filed a right-of-way application (N-60249) with the BLM.

SPPC is constructing a new 120 kV line from the existing Falcon Substation which would terminate in Section 2, T31N, R47E. SPPC has obtained a 90-foot right-of-way (N-59670) from the BLM. Potential environmental impacts associated with the SPPC powerline right-of-way have been evaluated separately as a related action under BLM NV64-EA9604. If SFPGC proceeds with construction of a mill at some point in the future, a connection from the Falcon 120 kV line would be extended to the SFPGC substation in the mill facilities area using the same poles and within the same right-of-way (N-59670) as the 60 kV line. As appropriate, the substation and electrical transmission, control, and distribution equipment will be upgraded for the increased voltage.

Power will be supplied for initial mine operations from a SPPC 60 kV powerline which will extend northward from the Cortez Tap to the terminal pole located in the southwest quarter of Section 2, T31N, R47E, with a distribution line extending west from this point to a new SFPGC substation located in the mill facilities area in Section 3. The 60 kV line will be underbuilt on the same poles as the 120 kV connector running from the terminus of the 120 kV powerline from the Falcon Substation in Section 2, T31N, R47E to the Cortez Tap. All construction will be within the existing SPPC right-of-way (N-59670) which will be amended to include the 60 kV line.

In order to minimize the potential for and hazards related to bird contacts with electrical transmission lines, all new power transmission lines would be raptor proof. All ground-level transformer and switching installations would be fenced and gated, with locked gates and appropriate signage warning of potential electrical hazards to minimize the potential for wildlife or human contacts with electrical equipment.

The existing Southwestern Gas natural gas pipeline runs through the southeast corner of the proposed Project Area as shown on Figure 1-3. This existing pipeline would be tapped and a short supply line run to the mill facilities area. SFPGC has filed a Right-of-Way Application (N-60251) with the BLM for the connecting gas supply line. The proposed supply line, tap, and associated metering equipment would be constructed, installed, and reclaimed by SFPGC. Dependent on the tap point, however, the pipeline may be operated and maintained by either SFPGC or the gas supplier. Because it would fall within the Project Area, surface disturbance associated with the proposed gas pipeline has been considered as a component of the Proposed Action and related impacts are evaluated in Chapter 4 under Alternative B.

2.4.16 Handling of Chemicals and Potential Hazardous Materials

A number of chemicals and chemical compounds would be utilized in conjunction with the proposed mining, ore processing, gold recovery, maintenance, and related operations. All chemicals used in conjunction with the proposed operations would be transported, stored, used, and disposed of in accordance with manufacturers recommendations and all applicable Federal and State regulations and guidelines. Any potentially toxic or hazardous liquid chemicals and all petroleum products would be stored in appropriate containers or bulk storage tanks within secure containment areas. Secondary containment for liquid chemical or petroleum storage areas would provide sufficient capacity to retain 110 percent of the contents of the largest storage container or tank enclosed plus accumulations of precipitation if the facility is an outside storage area. SFPGC has developed a Spill Prevention, Control, and Countermeasures (SPCC) Plan to guide spill control, clean-up, and reporting activities in the unlikely event of a spill.

- Overburden and Interburden Characterization (initial and operational)

- Water Supply Monitoring (Monitoring of water withdrawal rates consistent with permitted appropriations)

- Operational Water Quality Monitoring (Monitoring of fresh water supply, pit dewatering discharge)

- Heap Leach Facility Monitoring (Monitoring of piping and lined trenches, heap leach and overflow pond leak detection systems, upgradient and downgradient ground water)

- Tailings Facility Monitoring (Monitoring of cyanide destruction system, piping and lined trenches, seepage collection system discharge, seepage collection pond water quality, seepage collection pond leak detection system, tailings solution pond area and depth, upgradient and downgradient ground water)

- Fluid Management System Monitoring (Monitoring of process plant piping, secondary containment)

- Reclamation Monitoring (Monitoring of vegetative reestablishment and revegetation success)

Erosional and stability monitoring are designed to identify any potential erosional or stability concerns on a timely basis in order to allow development and implementation of appropriate measures to correct any problems.

Erosional monitoring would include regular observation of general conditions in active operating areas and annual inspection of all disturbance areas for any indications of excessive erosion such as significant rilling and gullying, head-cutting in drainages, washouts on slopes, or significant sediment accumulations. On a site specific basis and as appropriate based on conditions, local erosion control measures, such as regrading, alteration of drainage patterns, and placement of erosion control fabric, riprap, or straw bales, would be implemented to address any significant problems identified.

- Regular observation of pit slopes, benches, overburden and interburden disposal area outslopes, road fills, and other areas

- Monthly inspection of the tailings embankment outslopes for any signs of movement or instability

- Annual inspection of all berms and diversion ditches for instability or excessive erosion

- Monthly measurement of water levels in the tailings embankment piezometers.

Stability monitoring would include:

Piezometer water level readings would be recorded and evaluated to identify any significant change in hydraulic head in the tailings embankment which could influence embankment stability. Any potential stability concerns identified through ongoing monitoring would be further evaluated and remediation plans developed and implemented in cooperation with jurisdictional agencies as appropriate.

As described in Section 2.4.8, overburden and interburden materials would be evaluated relative to acid producing and acid neutralizing potential by an ongoing operational monitoring program utilizing chip samples from production blasthole drilling operations. The resulting overburden and interburden material characterization would be used to modify, as appropriate, placement plans for overburden and interburden materials in order to minimize the potential for generation of ARD.

Withdrawal rates for water supply sources, including the primary water supply wellfield and the pit dewatering holding ponds, would be monitored for compliance with approved appropriation rates. In addition, water quality from these sources would be monitored for any uses other than process water make-up to verify suitability for the intended use. Operational water supply monitoring would include initial and annual sampling and water quality analysis for the primary wellfield and periodic sampling and analysis of water prior to use of pit dewatering holding ponds if the water is to be utilized for purposes other than process water make-up.

Proposed monitoring for the heap leach facility is designed to verify continued effective operation and to identify any leakage or other system concerns. Monitoring would include daily inspections of all exposed system piping and lined collection trenches for any leaks, tears or other damage; daily inspection of the leak detection system discharge pipe for any flow; weekly inspection of the overflow pond leak detection system discharge sump for any solution accumulations; and quarterly sampling and water quality analysis for ground water wells located upgradient and downgradient from the heap leach facility. Monitoring information would be utilized to identify and develop corrective plans to address any potential system leakage or other problems.

Tailings facility monitoring activities are designed to address the same considerations as noted for the heap leach facility; verify continued effective operation and to identify any leakage or other system concerns. Monitoring would include sampling and analysis of tailings discharge prior to and following cyanide destruction to evaluate system effectiveness and guide any necessary modifications. Daily inspections would include all exposed system piping (includes delivery and reclaim pipelines) and lined collection trenches for any leaks, tears or other damage; and the tailing solution ponds to determine their areal extent. The seepage collection system discharge pipe would be checked for flow variation and the seepage collection pump for fluid accumulations on a weekly basis. Monthly monitoring would include the depth of the tailings solution ponds at the decant structures. Quarterly sampling and water quality analysis would include the seepage collection pond and ground water wells located upgradient and downgradient from the heap leach facility. Monitoring information would be utilized as the basis for control of tailings placement and solution management and to identify and develop corrective plans to address any potential system leakage or other problems.

General process plant monitoring and maintenance would include daily inspections of all exposed system piping for leaks or damage and inspection of all secondary containment areas for any leakage or accumulations of process fluids, petroleum products, or precipitation. Any problems identified by inspection of fluid management systems would be addressed through timely repair, replacement, and cleanup of any fluid accumulations. Specific measures for containment, reporting, and cleanup of chemical or petroleum product spills are defined by the Emergency Response and SPCC plans developed for the facilities and submitted to appropriate jurisdictional authorities.

In order to assure effective revegetation consistent with the overall reclamation objectives and the proposed postmining land uses of wildlife habitat, livestock grazing, dispersed recreation, and mineral exploration and development, the success of revegetation efforts would be monitored for a minimum of three years following reseeding. Revegetation monitoring would involve sampling the reestablished communities annually to evaluate vegetative cover and production, with comparison of the resulting sampling data to similar data obtained from selected reference areas having the same general directional and slope aspects. Revegetation would be deemed successful if perennial vegetative cover and production for the reclaimed areas are at least 50 percent of similar values for the selected reference areas at a 90 percent statistical confidence level consistent with the NDEP's Interim Standards for Successful Revegetation (NV-94026). If sampling results indicate problems relative to vegetative reestablishment, appropriate remedial actions, potentially including supplemental fertilization, erosion control measures, reseeding, and other measures, would be implemented.

The locations of proposed monitoring facilities are shown on Figure 2-11. Essentially all project monitoring requirements are consistent with sound operating practices and respond to specific regulatory monitoring and reporting requirements.

2.4.20 Reclamation of Project Disturbance Areas

Following completion of mining and related activities mine disturbance areas would be reclaimed. To the extent possible, reclamation of areas where mining activities have been completed would occur concurrently with ongoing mining operations in other areas. Areas where this may be feasible would include the Main Pit and any other pits which would be partially or fully backfilled, completed overburden and interburden disposal areas, and associated roads and drainage features. The proposed reclamation schedule is illustrated by Table 2-13. Generally, reclamation would be initiated as soon as operationally feasible following completion of active operations in a given area. Seasonal scheduling of reclamation activities is not critical except that growth media placement should occur immediately before seeding takes place to minimize the potential for loss or erosion of the growth media. Seeding would be scheduled if possible during late fall to allow the seed to winter-over and germinate in the spring when snowmelt and warm temperatures result in optimal soil moisture and climatic conditions for germination and initial growth. The objectives of mine reclamation would be to:

- Utilize proven reclamation techniques to assure effectiveness and long-term success
- Reduce or eliminate adverse environmental impacts
- Restore disturbed areas to a condition similar to their pre-disturbance condition
- Establish a stable, self-sustaining, diverse vegetation community composed primarily of indigenous perennial species consistent with postmining land uses
- Minimize potential adverse off-site environmental impacts
- Minimize undesirable visual impacts
- Assure public safety

2.4.20.1 General Reclamation Considerations

Generally, reclamation of mine disturbance areas would involve removal of structures and facilities; regrading disturbance areas to eliminate depressions, establish the final reclamation design configuration, and blend with the surrounding terrain; establishing effective drainage; incorporating fertilizer into the surficial material to serve as an effective sub-grade for revegetation; replacing a uniform layer of growth media; and seeding and mulching to establish an effective vegetative cover. Following completion of reclamation, the only mining related disturbance which would remain would be any mine pits which are not backfilled and the Beacon Light Road, which will be a County Road. The reclaimed configurations for the Proposed Action (both the backfill and no-backfill options) are illustrated by Figures 2-12A and 2-12B. For all alternatives, the overall reclaimed configuration would be essentially the same as that shown for the Proposed Action. Due, however, to site specific variations for individual alternatives, certain facility specific reclamation measures would be required to achieve the reclamation objectives for each major facility category.

All reclaimed areas are designed to assure effective long-term stability. Mine pit slopes, overburden and interburden disposal area outslopes, heap leach outslopes, and the tailings facility embankment have been designed and would be constructed consistent with engineered designs which have been evaluated using accepted stability analysis methods to verify long-term stability under both static and pseudostatic conditions. Facility designs incorporate consideration of final reclamation with minimal regrading or other modification required to establish the reclamation design configuration.

Four separate seed mixtures have been developed for reclamation seedings, with selection of species and amounts based on the natural vegetation species occurring in the area, species adaptability and vigor, suitability for specific site conditions, and compatibility with the proposed postmining land uses. The four selected seed mixtures presented in Tables 2-14, 2-15, 2-16, and 2-17, have been specifically formulated for; 1) Relatively flat areas; 2) North and east facing slopes; 3) South and west facing slopes; and 4) A temporary mixture for growth media stockpiles, road embankments and the tailings embankment outslope (SMI, 1994). SFPGC may modify the proposed seed mixtures to reflect the results of ongoing revegetation success evaluations once reclamation begins on completed mining areas.

Seeding would occur as soon as operationally feasible following growth media replacement, with most areas to be broadcast seeded but reserving the option of hydromulching steep slope areas where necessary to promote effective revegetation. Seeded areas would be mulched with either weed-free hay or straw (flat or low gradient areas) or wood-fiber hydromulch (steep-slope areas) to protect the growth media, retain the seed, and minimize erosion until vegetation can become established.

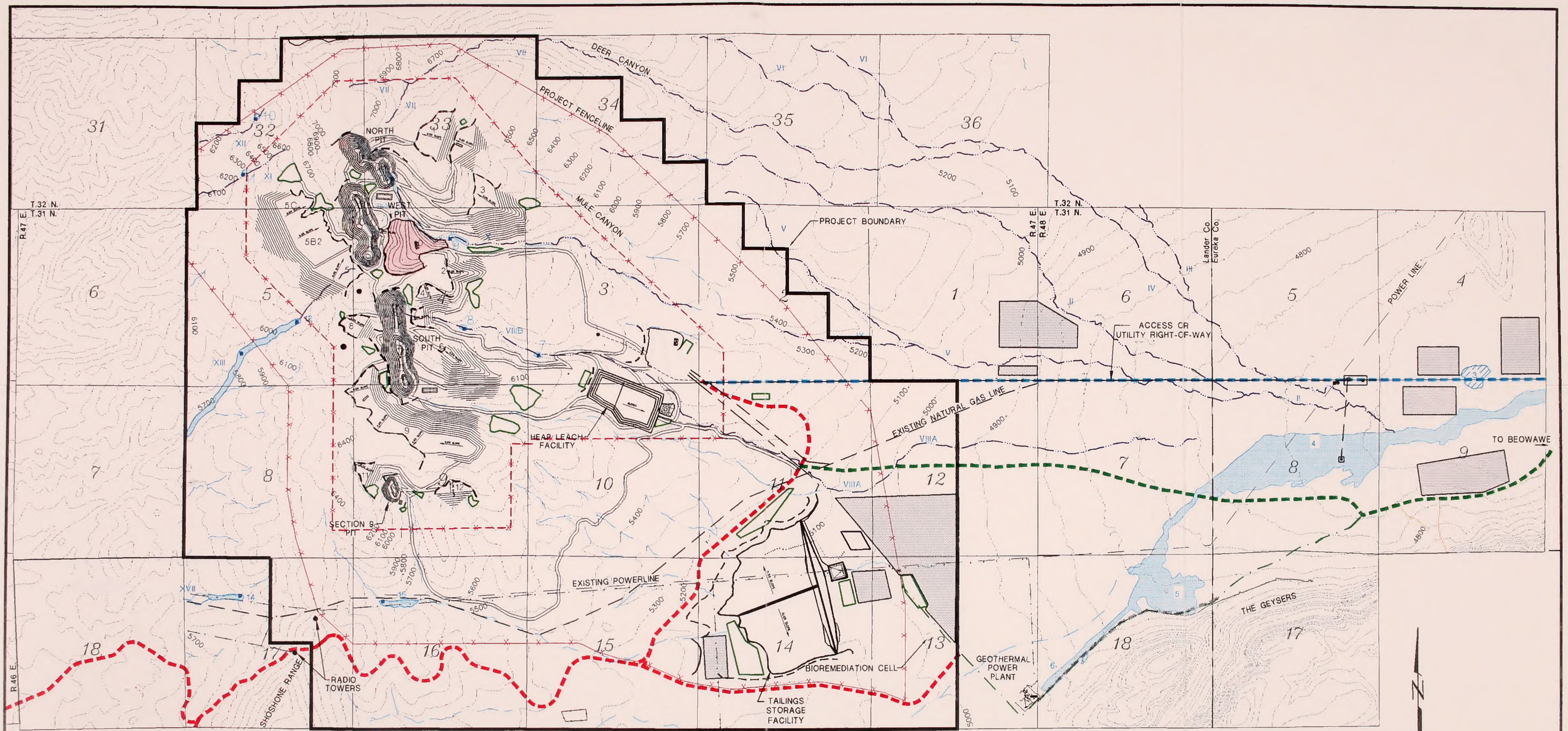
The Proposed Action and other action alternatives assume that mining and related operations would continue until available economic reserves are depleted, at which time final site reclamation would be completed. Various factors beyond the control of SFPGC such as major changes in gold markets or significant modifications of applicable environmental regulations could however, seriously impact the economic viability of the mine resulting in temporary cessation of operations. In the unlikely event that temporary cessation becomes necessary, any disturbed areas which would not be redisturbed would be regraded, growth media would be replaced, and the areas would be reseeded with the appropriate revegetation seed mixture. In addition, local erosion and sediment control measures would be implemented as necessary, surface drainage structures would be inspected and maintained to assure that they can safely pass design storm runoff, and any other maintenance and monitoring necessary to minimize health and safety hazards and prevent undue environmental degradation would continue during the period of temporary cessation.

Under applicable regulatory provisions, as administered by the NDEP and the BLM, SFPGC has completed detailed reclamation bonding calculations. Consistent with the calculated reclamation liability, SFPGC would provide appropriate reclamation guarantees and supporting financial surety prior to initiation of operations. The bond calculations reflect a maximum disturbance scenario. As a condition of required permit approvals, adequate financial surety is required to provide for reclamation of all mining related disturbance in the unlikely event that the operator is unable to meet its reclamation commitments and obligations. The bond reclamation calculations are based on the premise that, under a reclamation bond forfeiture situation, bids would be issued for completion of any remaining reclamation work by an independent third-party contractor.

2.4.20.2 Specific Reclamation Considerations

The following summarize proposed reclamation measures for individual facility categories under the Proposed Action and other action alternatives.

Mine Pits - With the exception of the Main Pit and any other pits which may be fully or partially backfilled with non-sulfide overburden



LEGEND

- ACCESS ROAD - WEST ALIGNMENT
- ACCESS ROAD - EAST ALIGNMENT PREFERRED
- ACCESS ROAD - EAST ALIGNMENT - SECONDARY PREFERRED
- PROJECT FENCELINE (INTERIM)
- PROJECT FENCELINE (FULL BUILD-OUT)
- PROJECT BOUNDARY
- SPRING
- EXISTING ACCESS ROAD
- BACKFILL PIT AREA
- GROWTH MEDIUM STOCKPILES
- WETLAND
- IX WATERS OF THE U.S.
- 15 WATERS OF THE U.S. INCLUDING ADJACENT WETLANDS
- OTHER WATERS OF THE U.S.
- BORROW SOURCE
- BIOREMEDIATION CELL

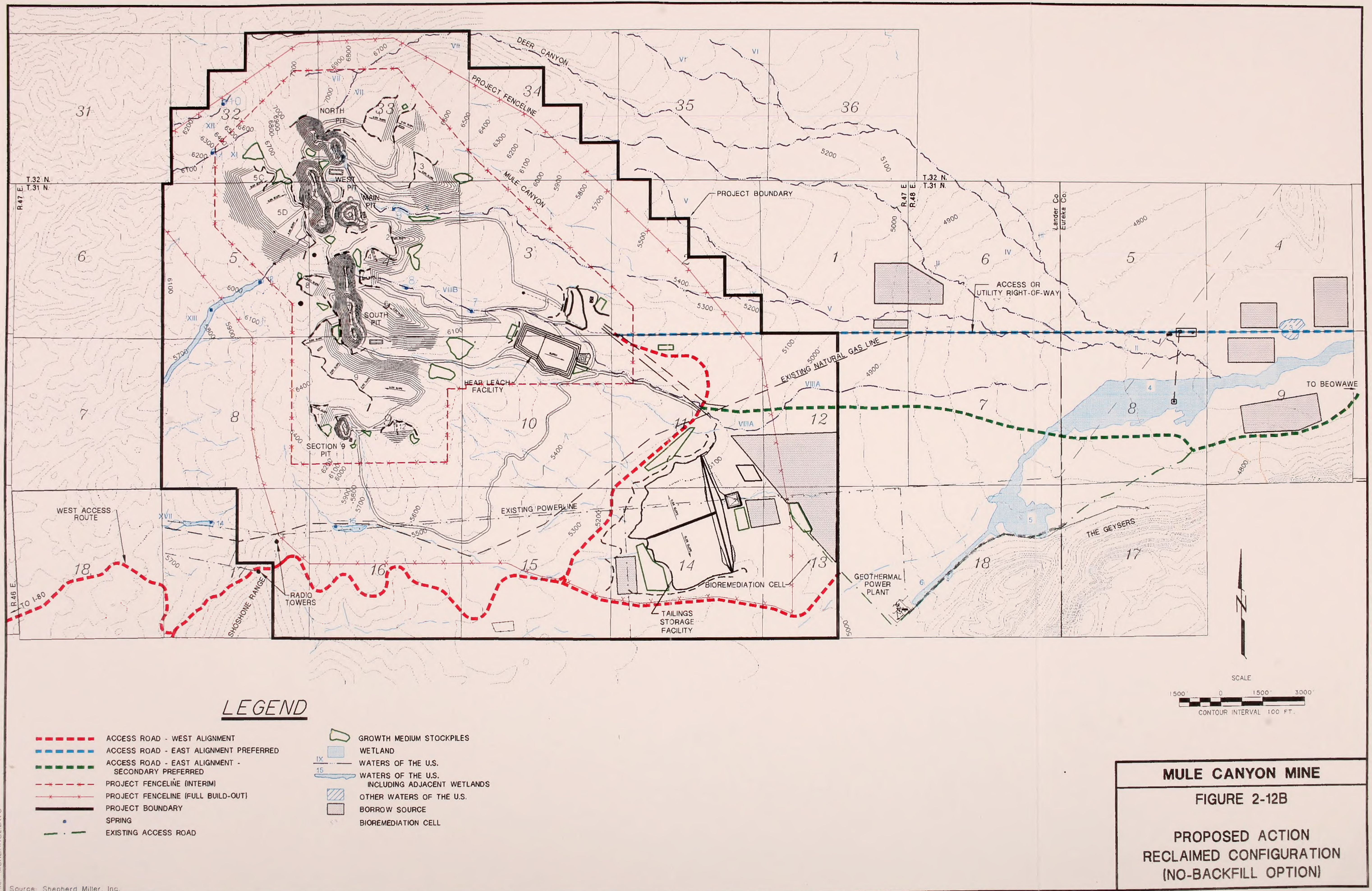
MULE CANYON MINE

FIGURE 2-12A

PROPOSED ACTION
RECLAIMED CONFIGURATION
(BACKFILL OPTION)

Source: Shepherd Miller Inc.

File: MC-PARC2.DWG



MULE CANYON MINE

FIGURE 2-12B

PROPOSED ACTION
RECLAIMED CONFIGURATION
(NO-BACKFILL OPTION)

TABLE 2-14
SEED MIXTURE FOR FLAT SURFACES

Species	Seeds/lb	Seeds/ft^2	Lbs PLS/A
Bluebunch wheatgrass *Agropyron spicatum*	140,000	10	3.0
Western wheatgrass *Agropyron smithii*	115,000	6	2.3
Sandberg bluegrass *Poa secunda*	925,000	6	0.3
Basin wildrye *Elymus cinereus*	140,000	4	1.2
Indian ricegrass *Oryzopsis hymenoides*	162,000	3	3.0
Gooseberryleaf globemallow *Sphaeralcea grossulariaefolia*	500,000	3	0.3
Northern sweetvetch *Hedysarum boreale*	264,000	3	0.5
Palmer penstemon *Penstemon palmeri*	600,000	4	0.3
Western yarrow *Achillea lanulosa*	600,000	2	3.0
Lewis flax *Linum lewisii*	60,000	3	0.2
Small burnet *Sanguisorba minor*	55,000	5	0.2
Big sagebrush *Artemisis tridentata tridentata*	2,500,000	10	0.2
Fourwing saltbush *Atriplex canescens*	55,000	5	0.2
Winterfat *Ceratoides lanata*	330,000	5	0.2
Rubber rabbitbrush *Chrysothamnus naueosus*	600,000	3	0.2
TOTAL		72	20.0

TABLE 2-15
SEED MIXTURE FOR SOUTHERN AND WESTERN EXPOSURES

Species	Seeds/lb	Seeds/ft^2	Lbs PLS/A
Bluebunch wheatgrass *Agropyron spicatum*	140,000	16	5.0
Western wheatgrass *Agropyron smithii*	115,000	9	3.4
Thickspike wheatgrass *Agropyron dasystachyum*	150,000	12	3.5
Sandberg bluegrass *Poa secunda*	925,000	7	0.4
Basin wildrye *Elymus cinereus*	140,000	7	2.2
Indian ricegrass *Oryzopsis hymenoides*	162,000	5	1.3
Gooseberryleaf globemallow *Sphaeralcea grossulariaefolia*	500,000	5	0.4
Northern sweetvetch *Hedysarum boreale*	264,000	5	0.9
Palmer penstemon *Penstemon palmeri*	600,000	6	0.4
Small burnet *Sanguisorba minor*	55,000	7	5.5
Big sagebrush *Artemisis tridentata tridentata*	2,500,000	15	0.3
Fourwing saltbush *Atriplex canescens*	55,000	7	5.5
Winterfat *Ceratoides lanata*	330,000	7	0.9
Rubber rabbitbrush *Chrysothamnus naueosus*	600,000	5	0.4
TOTAL		116	30.0

TABLE 2-16
SEED MIXTURE FOR NORTHERN AND EASTERN EXPOSURES

Species	Seeds/lb	Seeds/ft2	Lbs PLS/A
Bluebunch wheatgrass *Agropyron spicatum*	140,000	16	5.0
Western wheatgrass *Agropyron smithii*	115,000	9	[illegible].4
Slender wheatgrass *Agropyron trachycaulum*	135,000	7	2.3
Streambank wheatgrass *Agropyron riparium*	160,000	8	1.6
Sandberg bluegrass *Poa secunda*	925,000	8	0.4
Gooseberryleaf globemallow *Sphaeralcea grossulariaefolia*	500,000	5	0.[illegible]
Northern sweetvetch *Hedysarum boreale*	264,000	6	1.0
Palmer penstemon *Penstemon palmeri*	500,000	6	0.4
Western yarrow *Achillea lanulosa*	600,000	4	[illegible].9
Lewis flax *Linum lewisii*	60,000	4	[illegible].9
Small burnet *Sanguisorba minor*	55,000	6	1.[illegible]
Big sagebrush *Artemisis tridentata tridentata*	2,500,000	15	0.9
Fourwing saltbush *Atriplex canescens*	55,000	5	3.9
Winterfat *Ceratoides lanata*	330,000	4	0.9
Rubber rabbitbrush *Chrysothamnus naueosus*	500,000	3	0.2
Antelope bitterbrush *Purshia tridentata*	20,000	1	2.2
TOTAL		108	30.0

TABLE 2-17
SEED MIXTURE FOR GROWTH MEDIA STOCKPILES

Species	Seeds/lb	Seeds/ft2	Lbs PLS/A
Bluebunch wheatgrass *Agropyron spicatum*	140,000	13	4.0
Western wheatgrass *Agropyron smithii*	115,000	11	4.0
Slender wheatgrass *Agropyron trachycaulum*	135,000	13	4.0
Basin wildrye *Elymus cinereus*	140,000	13	4.0
Cicer milkvetch *Astragalus cicer*	135,000	13	4.0
TOTAL		63	20.0

and interburden material, the mine pits would not be reclaimed and would remain as open excavations. If a determination is made to fully backfill the Main Pit or any other pit areas, they would be backfilled to approximately the same elevation as the original ground surface prior to mining and the surface would be graded to eliminate any depressions which would impound water and to blend with the surrounding terrain. Approximately 12-inches of growth media would be replaced over the prepared sub-grade. The area would then be seeded with a selected revegetation seed mixture and mulched to stabilize the surface, minimize erosion, and prevent growth media loss until adequate vegetative cover could be established.

With the exception of the South Pit and West Pit all other mine pits are expected to remain dry, except for short-term temporary accumulations of runoff, based on the numerical ground water model utilized to evaluate postmining ground water conditions. Any surface runoff to these pits and minor ground water flows from the exposed pit walls would either evaporate or infiltrate through the exposed pit bottoms. The ground water table in these areas is consequently expected to remain below the lower-most mining limits. The ground water table in the South and West Pits, however, is expected to rise above the pit bottom and ground water inflows and runoff inputs are expected to result in development of a permanent pit lake in the central portion of the South Pit and small ponds in the southern portion of the South Pit and the West Pit. Those pits which remain open would retain the mining benched configuration with overall slopes of 45 to 55 degrees and intermediate benches at approximately 60-foot intervals. As a safety consideration, berms would be established a short distance from the crest of all remaining open pits, warning signs would be posted at regular intervals, and the access roads to the pit areas would be eliminated and reclaimed.

Overburden and Interburden Disposal Areas - Overburden and interburden disposal areas have been designed to assure long-term stability and minimize final grading requirements. In conjunction with ongoing overburden and interburden material placement, completed sulfide disposal areas would be capped with 5-feet of oxide material and 1-foot of growth media and revegetated to minimize infiltration, oxidation, and leaching. Revegetation will be a critical element in minimizing infiltration since effective revegetation will result in maximum surface water loss through evapotranspiration. Final grading would be limited to reducing outslopes to 2.5H:1V (south and west facing slopes and all sulfide disposal area outslopes) or 2.3H:1V (north and east facing slopes). Benches would also be established approximately every 50 vertical feet on the outslopes, the crest and edges of the disposal areas would be rounded, and the top surface would be graded at approximately 1.0 percent away from the crest to eliminate any depressions which would impound water and minimize drainage over the outslope. As a result of concerns related to linear contrasts due to benching on disposal area outslopes, the BLM is stipulating that SFPGC develop modified outslope designs which could be implemented where appropriate.

Grading and rounding would blend the top and edges of the disposal areas with the surrounding terrain. Permanent diversion channels designed for the 100-year, 24-hour event would be established along the disposal area margins to carry drainage from the top surface and drainage catch benches downslope. Growth media would be replaced over the prepared sub-grade, and seeded with the appropriate revegetation seed mixture(s) and mulched. Fertilizer application rates and growth media replacement depths would vary depending on whether the disposal area contains oxide or sulfide materials. Oxide dumps would receive approximately 1-foot of growth media and nitrogen and potassium application rates would be increased.

Sulfide disposal areas would receive approximately 1.5 feet of growth media. Both upper disposal area surfaces and outslopes would then be revegetated by seeding the prepared surfaces with the selected revegetation seed mixtures as previously described in Section 2.4.20.1.

Heap Leach Facility - The primary reclamation consideration for the heap leach facility is elimination or neutralization of any residual cyanide or leach solutions remaining in the

CHAPTER 3 - AFFECTED ENVIRONMENT

3.1 INTRODUCTION

In order to provide a reasonable basis for evaluation of the potential effects of the project alternatives as described in Chapter 2 it is necessary to identify and characterize existing resources and values which could potentially be affected and to define the area(s) over which potential impacts could occur. This chapter describes existing conditions and resource values as the basis for the discussion of environmental consequences presented in Chapter 4. To facilitate discussion and understanding of existing resource values, resource discussions are organized under the following resource sections:

3.2	Physiographic Setting
3.3	Geology
3.4	Geochemistry
3.5	Surface Water Hydrology
3.6	Ground Water Hydrology
3.7	Soils
3.8	Vegetation
3.9	Grazing and Range Management
3.10	Wildlife
3.11	Cultural/Ethnographic/ Paleontological Values
3.12	Socioeconomic Factors
3.13	Transportation
3.14	Air Quality
3.15	Visual Resources
3.16	Land Use/Recreation

The BLM NEPA Handbook (H-1790-1) identifies the following critical elements of the human environment which must be considered in all EISs. As noted, these elements are either not applicable for the proposed Project Area or are addressed in the referenced resource sections:

- Air Quality (addressed in Section 3.14)
- Areas of Critical Environmental Concern (none exist in or adjacent to the proposed Project Area - not applicable)
- Cultural Resources (addressed in Section 3.11)
- Prime or Unique Farmlands (none exist in or adjacent to the proposed Project Area - not applicable)
- Floodplains (addressed in Section 3.5)
- Native American Religious Concerns (addressed in Section 3.11)
- Threatened or Endangered Species (addressed in Sections 3.8 (T&E plants) and 3.10 (T&E wildlife))
- Hazardous or Solid Wastes (addressed in Sections 2.4.13 and 2.4.16)
- Drinking or Ground Water Quality (addressed in Section 3.6)
- Wetlands and Riparian Zones (addressed in Section 3.8)
- Wild and Scenic Rivers (none exist in or adjacent to the proposed Project Area - not applicable)
- Wilderness (no Wilderness or Wilderness Study Areas exist in, adjacent to, or in proximity to the proposed Project Area - not applicable)

In addition, wild horses were identified as a potential project issue during scoping, however, no wild horse use has been documented within the project CEA and there are no wild horse herd use areas in the vicinity of the Project Area (BLM, 1983).

The area of potential effects may vary significantly for different resources dependent on the nature of both the affected resource and the magnitude and duration of the effect. For certain resources, such as soils and vegetation, potential effects are generally limited to the area of actual physical disturbance. For other resource categories, such as air quality and hydrology, potential effects may extend well beyond the area of actual physical disturbance. Generally, the area of potential effects has been defined for each resource category based on both the direct and indirect impacts of the identified project alternatives. In this chapter, area definitions including; Project Fenceline, Project Area, Study Area, and Cumulative Effects Area, as defined in the Glossary, are used to describe the affected environment.

The resource discussions presented in this chapter are based on research of published and unpublished documents, communication with agency personnel and individuals having specific knowledge of the area, detailed field studies, laboratory analysis and testing, and extensive modeling of hydrologic and other natural systems. Resource investigations were guided by Technical Data Adequacy Standards developed by the BLM.

As appropriate, relevant research and studies are summarized and referenced in the following resource discussions; more detailed discussions and relevant data are available in the study reports included in the Project Planning File which is available for review at the location(s) identified in the transmittal letter for this document. All relevant information utilized in developing this EIS is identified in Chapter 6.

3.2 PHYSIOGRAPHIC SETTING

The Project Area is approximately 15 miles southeast of Battle Mountain, Nevada on the eastern side of the northern Shoshone Range and the western edge of Whirlwind Valleys. General area topography as illustrated by Figure 3-1A, reflects the structural trends of the Basin and Range Physiographic Province. Area topography is characterized by north-northeast trending subparallel mountain ranges separated by broad valleys with the valleys vertically displaced downward relative to the adjoining mountain ranges. In the immediate Project Area, site topography is strongly influenced by local structural features with the northern Shoshone Range bounding the area on the west; the Argenta Rim separating the area from the Humboldt River Valley on the north; and the Whirlwind Valley, which is bounded by the Malpais Escarpment, separating the area from Crescent Valley to the southeast.

The Project Area is characterized by relatively steep, barren mountain slopes with significant surface exposures of igneous rock and grass or low brush cover. The lower mountain slopes are covered with extensive alluvial fans which grade into extensive flat-lying alluvial deposits in the Whirlwind and Crescent valleys to the east and the Reese River Valley to the west. Elevations in the Project Area range from approximately 4,800 to 7,300 feet and slope gradients range from relatively flat (3 to 5 percent) on the lower slopes to moderately steep (up to 50 percent or more) near the crest of northern Shoshone Range.

A small portion of the Project Area extends over the drainage divide formed by the crest of the northern Shoshone Range and drains to the Reese River Valley. The majority of the Project Area, however, drains to Whirlwind Valley to the east. Any minor flows from the western portion of the Project Area would flow to four unnamed ephemeral drainages on the western slope of the mountains. Normally, minor flows which reach the base of the mountains infiltrate into the extensive alluvial fans, with little or no surface flow reaching the Reese River which lies approximately 9 miles to the west of the range front in this area.

Most site drainage flows are collected by four small, steep-sided canyons; Deer Canyon, Mule Canyon, and two unnamed canyons which flow to the east into Whirlwind Valley, as shown on Figure 3-1B. Due to generally arid site conditions and the limited drainage area, the canyons exhibit an ephemeral flow pattern, flowing only in response to snowmelt or major thunderstorms and remaining dry over much of the year. Whirlwind Valley is an elongated basin approximately 10 miles long and up to 4 miles wide. The valley trends to the northeast with the steep cliffs of the Malpais Escarpment to the southeast and the more gradual mountain slopes of the Argenta Rim to the northwest bounding the relatively flat valley bottom.

These forces resulted in development of broad alluvial fan deposits along the lower mountain slopes and deposition of significant thicknesses of alluvial/colluvial material in the inter-range basins.

3.3.2 Stratigraphy

The stratigraphy, or sequence of rock units, in the Study Area is generally consistent with regional stratigraphy as illustrated by Figures 3-2, 3-3A, 3-3B, 3-3C, and 3-4. The following units, listed in ascending order from oldest to youngest, are found in the Study Area. Generally, the ages of the rock units correspond to their relative positions in the stratigraphic sequence, with the oldest rock units occurring near the base and the youngest units near the top.

Ordovician Valmy Formation (OV) — Siliceous clastic sedimentary rocks, marine cherts, and greenstones; estimated regional thickness 20,000 to 25,000 feet.

Silurian Elder Sandstone (SE) — Fine-grained, silty sandstone with moderate cementation; estimated regional thickness 2,000 to 4,000 feet.

Devonian Slaven Chert (DSL) — Black nodular marine chert with associated carbonaceous shales, greenstones, and barite deposits; estimated regional thickness 2,000 to 3,000 feet.

Oligocene Caetano Tuff (Ct) — Welded volcanic tuff composed primarily of quartz latite with phenocrysts of quartz, biotite mica, sanidine, and minor angular rock fragments; estimated thickness in the Project Area 0 to 100 feet.

Tertiary Mule Canyon Formation (MC) — Layered sedimentary rocks with interbedded basalt flow units overlain by lapilli-ash tuff; interbedded welded pyroclastic deposits, basalt and dacite flow units, and non-welded pyroclastic units; this formation is the primary host sequence for the Mule Canyon ore minerals; thickness up to approximately 300 feet in the Project Area.

Upper Mule Canyon Sequence (MCU) — Three separate capping flow-banded or shear-banded basalt and dacite flow units; the Red Cliffs, Beacon Light, and Horse Heaven Formations, total thickness approximately 480 feet in the Project Area.

Tertiary Basaltic Andesites (TBA) — Regionally extensive basalt, andesite, and dacite flow units; thickness up to approximately 1,300 feet in the Project Area.

Quaternary Alluvium (QAL) — Regionally extensive alluvial and colluvial deposits including limited, shallow deposits in ephemeral and intermittent drainages; extensive alluvial fans on the lower mountain slopes with thicknesses of up to several hundred feet; and extensive deposits in basin areas ranging up to 500 feet in thickness in the Project Area; material grain size may be highly variable ranging from large, angular colluvial outwash and mass wasting fragments through gravels, sands, and silts to fine clay materials; deposits range from unconsolidated to well consolidated with varying degrees of cementation.

Outcrops in the actual mining area are generally limited to those units comprising the Mule Canyon, Upper Mule Canyon, and Basaltic Andesite sequences. On the extreme western edge of the Project Area and on the western slope of the northern Shoshone Range the underlying Paleozoic Slaven Chert, Elder Sandstone, and Valmy Formation are exposed at the surface. The Valmy Formation also outcrops east of the Dunphy Pass Fault and on the Malpais Rim. On the lower portion of the eastern slope of the range, where some of the proposed mine facilities, including the tailings facility, would be located, the basalt and dacite units are overlain by geologically recent alluvium. Previous hydrothermal alteration and more recent long-term exposure and erosion, which have resulted in extensive weathering and alteration of the exposed units, are reflected in the lack of unaltered rock outcrops.

3.3.3 Structure and Seismicity

Structural features in the Study Area are generally related to one or more of the following periods of tectonic activity:

> Late Paleozoic — Large-scale faulting and major thrust movements during the Antler Orogeny (Roberts Mountain Thrust) associated with the occurrence of Paleozoic siliceous sedimentary rocks unconformably overlying Paleozoic carbonate rocks; lateral movements of 90 miles or more have been inferred.
>
> Middle Tertiary (Oligocene/Miocene) — Faulting and rifting along the Oregon-Nevada Lineament and Northern Nevada Rift with accompanying formation of numerous northwest-trending faults and dikes and the local formation and movement of horsts and grabens; vertical displacements of up to 50 feet have been measured along the northwest-trending faults in the Project Area and displacement along the graben faults may be as great as 1,500 feet.
>
> Late Tertiary (Miocene) — Extensive regional Basin and Range faulting and displacement with development of regional sub-parallel faults generally trending east-northeast in this area.

Essentially all of the major structural features in the Study Area are related to one or more local or regional fault systems. The northern Shoshone Range is a north-trending block between the main body of the Shoshone Range to the south and the Argenta Rim to the north. This block slopes to the southeast, consistent with the natural dip of the bedrock units, and is bounded on the west by a steep west-dipping basin-bounding fault at the margin between the northern Shoshone Range and the Reese River Valley basin (Gilluly and Gates, 1965). Both the Argenta Rim and the Malpais Escarpment are block features associated with an east-northeast-trending fault set. Displacements along the Malpais fault have been measured at approximately 1,250 feet.

The Whirlwind Valley represents an intermediate graben between the sub-parallel Argenta and Malpais block faults and the Dunphy Pass fault to the east, which is also associated with the structural constriction previously noted in the central portion of Whirlwind Valley. The gold minerals which are the target of the proposed mining operations are believed to be associated with intrusion and alteration along the western margin of the Whirlwind Valley graben (Thomson et al, 1993). The Beowawe geothermal area is located at the intersection of the east-northeast trending Basin and Range fault which forms the northern margin of the Malpais escarpment and the northwest trending Dunphy Pass fault system. The intersecting faults are believed to be responsible for localization of geothermal flows (Zoback, 1979).

The Basin and Range Physiographic Province is seismically active with numerous recorded surface ruptures and earthquakes (Slemmons, 1980). Recorded seismic events of Richter magnitude 4.0 or greater occurring within a 60 mile radius of the Project Area are shown on Figure 3-5, and the location and relevant information for each of these recorded events are summarized by Table 3-1. The historic record indicates a total of 32 events of magnitude 4.0 or greater within the period of record (90 years). Six events of magnitude 5.0 or greater occurred within a radius of 60 miles, including one event with a magnitude of 6.1 and one 7.3 magnitude event (U.S. Geological Survey (USGS) National Earthquake Information Service). The closest recorded seismic event was a magnitude 5.1 earthquake in 1945 centered approximately 9 miles east of the Project Area near the town of Beowawe. This event did not result in any significant structural damage and did not involve any documented surface rupture.

The potential for future seismic activity and related ground movements in the Project and Study Areas is directly related to the existence and relative proximity of any active or potentially active faults.

TABLE 3-1
SUMMARY OF SEISMIC ACTIVITY WITHIN 60 MILES OF THE PROJECT AREA

Number[(1)]	Year	Richter Magnitude	Distance From Mule Canyon Mine Site (km)
1	1901	5.0	85
2	1915	6.1	71
3	1915	7.3	71
4	1915	4.3	77
5	1929	4.6	69
6	1936	4.5	69
7	1936	4.7	57
8	1945	5.1	14
9	1946	5.1	50
10	1950	4.2	64
11	1956	4.7	75
12	1958	4.6	86
13	1960	4.4	62
14	1962	4.6	58
15	1962	4.9	71
16	1965	4.6	91
17	1966	4.1	31
18	1968	4.5	77
19	1968	4.1	90
20	1968	5.1	77
21	1970	4.4	76
22	1971	4.0	40
23	1972	4.3	92
24	1974	4.2	60
25	1974	4.1	43
26	1974	4.1	59
27	1976	4.3	88
28	1978	4.6	59
29	1979	4.5	54
30	1980	4.0	68
31	1987	4.1	41
32	1987	4.2	99

Note: (1) Numbers are keyed to epicenter locations shown in Figure 3-5.

While there is extensive evidence of historic seismicity in the Study Area, many of the existing known faults show no evidence of movement within recent geologic time. Generally, faults are considered active if they show evidence of rupture within recent geologic time (Holocene), and potentially active if the evidence indicates rupture during the Pleistocene or later. Based on these criteria, the closest potentially active fault is a basin-bounding fault along the western edge of the northern Shoshone Range, which displaces Quaternary alluvial units. This fault is located approximately 3 miles from the western limit of the Project Area and 5 to 6 miles from proposed surface facilities which could be impacted by seismically induced ground movements.

Determination of potential seismically induced ground accelerations in the Project Area as a basis for both mine slope and facility design and evaluation of seismic impacts was based on both existing published studies and empirical calculations. Regional mapping of potential peak horizontal accelerations (PHA) based on historic seismic records (Algermissen et al, 1990) indicates a probable PHA for the site of 0.30g. The statistical basis utilized in developing this mapping indicates a 90 percent probability that the indicated PHA values would not be exceeded within a recurrence period of 50 years. A site-specific seismic evaluation (Payne, 1991), taking into account the proximity and length of the closest potentially active fault to the Project Area, resulted in projection of the Maximum Credible Earthquake (MCE) as a magnitude 7.0 event. The MCE is the maximum seismic event which would result if movement and surface rupture were to occur for a given fault or fault system. The estimate of the MCE is consistent with other previous studies for the general project area (Albee and Smith, 1966; Greensfelder, 1974). The MCE would generate a PHA of approximately 0.42g for the Project Area.

Given the projected life of the proposed mining operations, the Maximum Probable Earthquake (MPE) with a recurrence interval of 100 years represents a more appropriate basis for both design and seismic evaluation. Based on an MCE of magnitude 7.0, the MPE was calculated, assuming rupture along one-half the total fault length (Albee and Smith, 1966), as a magnitude 6.4 seismic event. For the MPE, the corresponding PHA utilized for both design and seismic impact evaluation was calculated at approximately 0.22g. This value is consistent with recommendations for development of a pseudostatic earthquake design factor using 50 to 80 percent of the PHA corresponding to the MCE (Leps, 1988).

3.3.4 Alteration and Mineralization

The gold minerals which are the target of the proposed mining operations occur within a relatively thick sequence of interbedded sedimentary rocks, basalt flows, pyroclastic deposits, and ash tuffs designated locally as the Mule Canyon Formation. This rock sequence is extensively faulted and fractured with structurally controlled mineralization having occurred along the closely spaced northwest-trending faults, associated fracture zones, and adjacent alteration zones. Available evidence indicates that mineralization followed, and was also closely associated with faulting and emplacement of mafic dikes during the Miocene, with multiple episodes of intrusion and mineralization.

Gold and related minerals include free gold and silver, electrum, and minor amounts of pyrite and marcasite occurring in stockwork quartz veins. These minerals also occur in association with disseminated microscopic gold contained in extensive clay alteration zones, with the disseminated gold dominating. Sulfide minerals, including pyrite, arsenopyrite, marcasite, and other minerals are generally associated with the alteration zones and comprise approximately 85 percent of the identified ore reserves. Oxide minerals are generally associated with the quartz stockwork deposits and upper weathered and oxidized zones within 15 to 75 feet of the ground surface. Due to variations in mineralization, most of the identified oxide reserves are found in the northern pit areas.

Alteration is directly associated with and appears to have played an important part in mineralization. Alteration is a natural process where reactions between the components of the host rock and superheated mineralizing solutions result in changes in the character of the host rock. Site alteration has been characterized as intermediate argillization (Thomson et al., 1993) accompanied by silicification with alteration of feldspars in the host rock and replacement by clay minerals. Silicification appears to be confined to the quartz stockwork veins and mineralized breccias with deposition of chalcedony and opal and recrystallization to quartz.

Based on the results of extensive exploration drilling, clays may comprise as much as 80 percent of the altered rock units and the clay alteration pattern shows a distinct zonation outward from mineralized breccias and stockwork veins. The inner zone of intense alteration immediately adjacent to the stockwork veins and mineralized breccias is dominated by illite and smectite clays with arsenopyrite as the primary gold-bearing mineral. An intermediate alteration zone is characterized by iron-rich smectite clays

Mule Canyon Project were analyzed for total metals (SMI/BCI, 1995a) including:

- 138 overburden and interburden samples
- 9 ore samples

Total metals analysis results are presented in Appendix A-3a. Review of the total metals data indicates that, compared to average concentrations for igneous rocks (Hem,1985), most rock materials which would be excavated and/or exposed as a result of the proposed mining operations would contain elevated total concentrations of arsenic, antimony, copper, mercury, molybdenum, nickel, silver, thallium, and zinc. The occurrence of these trace elements at relatively high concentrations is typical of this type of mineralized ore deposit.

3.4.5.2 Short-term Leachability by Precipitation

The MWM Procedure was performed to evaluate potential impacts from short-term leaching of mine materials by natural precipitation and consequent infiltration and percolation. A total of 36 rock samples from the Mule Canyon Project were analyzed by the MWM Procedure (SMI/BCI, 1995a) including:

- 28 overburden and interburden samples
- 8 ore samples

Leachates generated by the MWM procedure were analyzed for the Nevada Profile II parameters list and the results compared to appropriate standards. The MWM procedure results are presented in Appendix A-3b.

Comparison of the MWM procedure results to NDEP standards suggests that short-term leaching of mine materials by precipitation may represent a potential environmental impact. Ten of the 36 samples produced leachate concentrations for various constituents which exceeded NDEP standards. The samples of concern included 5 of the 28 overburden and interburden samples (18 percent), and 5 of the 8 ore samples (63 percent). Elements whose concentrations exceeded the NDEP criteria included aluminum (1 ore sample), iron (5 ore samples), manganese (4 ore, and 3 overburden and interburden samples), nickel (one overburden and interburden sample), selenium (2 overburden and interburden samples), and thallium (3 ore samples). It is important to note that the ore would be subject to mineral processing which typically results in oxidation, decomposition of sulfide minerals, formation of insoluble compounds, and extraction of precious and other metals. These process mechanisms may limit the potential for leaching and release of metals and other potentially deleterious components.

3.4.5.3 TCLP Characterization

The TCLP (EPA Method 1311) was performed on selected samples to evaluate the potential toxicity of mine materials. A total of 29 rock samples from the Mule Canyon Project were analyzed by the TCLP (SMI/BCI, 1995a) including:

- 28 overburden and interburden samples
- 1 ore sample

Leachates generated by the TCLP were analyzed for eight trace metals and the results compared to maximum containment levels (MCLs) for these parameters. For reference, the TCLP results are included in Appendix A-3c. Mine wastes are excluded from classification as hazardous wastes under the Resource Conservation and Recovery Act (RCRA) by the Bevill Amendment. Under RCRA classification standards, however, none of the TCLP samples would be classified as hazardous.

3.4.5.4 Acid Generation Potential

The potential for mine materials to generate ARD was evaluated by completing ABA calculations using sample analysis results. A total of 281 rock samples were evaluated using ABA (SMI/BCI, 1995a) including:

- 260 overburden and interburden samples
- 21 ore samples

The ABA results are presented in Appendix A-3d, and summarized in Table 3-2. Listed in the table for each mine material are the number of samples tested, ranges of ABA values and their medians, and the percentage of samples that exceed certain ABA evaluation criteria.

The potential to release ARD is generally lower if the acid neutralization potential of the mine material substantially exceeds its acid generation potential (Steffen, Robertson & Kirsten (SRK, 1989).

As previously described, acid generation can occur from the oxidation of sulfide minerals exposed during mining. Acid neutralization can occur from the dissolution and/or alteration of minerals that neutralize acid such as carbonates and, to a lesser extent, basic silicates.

Two criteria are commonly used to evaluate ABA test data; Net Neutralization Potential (NNP) and the ratio ANP to Acid Generating Potential (AGP). As stated in the technical report *Acid Mine Drainage Prediction* (EPA,1995):

> If the difference between ANP and AGP is negative then the potential exists for the waste to form acid. If it is positive then there may be lower risk. Prediction of the acid potential when the NNP is between -20 and 20 (T/KT) is more difficult.
>
> If the ratios are used, when the ratio of a sample's ANP and AGP is greater than 3:1, experience indicates that there is a lower risk for acid drainage to develop (Brodie et al, 1991). For ratios between 3:1 and 1:1, referred to as the zone of uncertainty, additional kinetic testing is usually recommended. Those samples with a ratio of 1:1 or less are more likely to generate acid.

In comparison to the EPA guidelines, the State of Nevada considers a material to be non-acid generating if the ANP:AGP ratio is greater than 1.2:1 (NDEP, 1990). Criteria for interpreting NNP values are not provided by the NDEP.

Based on the data summarized in Table 3-2, the following conclusions can be drawn regarding the potential for mine materials at the Mule Canyon Project to generate acid:

- Approximately 52 percent of the overburden and interburden samples tested have a low potential to generate acid based on NNP criteria. Using ANP/AGP approximately 81 percent of the overburden and interburden samples tested have a low acid-generation potential.

- Ore has, on average, a high potential to generate acid using both the NNP and ANP/AGP criteria. From 10 to 38 percent of the ore samples tested had a low acid generation potential depending on which criteria are used.

There was no apparent correlation between the ABA results and rock lithology, carbonate content, or most total metal concentrations (SMI/BCI, 1995a). A weak correlation was found between NNP values and visible sulfide and clay content and between ANP/AGP ratios and sample depth and location. Rocks with high sulfide or clay content generally had more negative NNP values. Lower ANP/AGP values were generally associated with samples collected from lower elevations and the southern ore zones.

Regardless of the ABA criteria used, one or more samples collected from each mine material was found to have a high potential to generate acid. This would suggest that zones of material with high acid-generation potential could occur in the proposed overburden and interburden disposal areas, the heap leach pad, ore stockpiles, and along the end walls and base of the open pits. It should be noted, however, that ABA testing does not account for the rate of acid generation or neutralization which, in many cases, is the primary factor which determines whether a material will actually produce ARD under field conditions. The rate of acid neutralization can also be affected by factors such as grain size, coatings on mineral surfaces and the presence of certain types of clays which may adsorb acid and other constituents.

3.4.5.5 Rate of Acid Generation and Long-Term Quality of Mine Leachate

To evaluate the rate of acid generation and neutralization and estimate the long-term quality of mine leachates, humidity cell and parameters, perhaps as a result of the occurrence of localized zones of mineralization.

Column Test Results

Column test data generally confirmed the humidity cell results and suggest that most materials to be mined would not be acid generating. Of the 14 column tests performed, only one (Column 2) produced extracts with pH values below 5. This column was prepared with ore material from the Main ore zone and generated extracts with pH values ranging from 1.58 (pore volume 1) to 2.31 (pore volume 5).

Like the humidity cells, column test results also suggest that certain trace element contaminants could be leached from the mine materials with long-term exposure. Extracts from all column samples exceeded drinking water quality standards for one or more parameters. Parameters that exceeded drinking water quality standards in column test extracts were generally the same as those detected in the humidity cell tests and included antimony (6 ore columns), arsenic (2 ore columns), cadmium (1 ore and 4 overburden and interburden columns), iron (2 ore and 4 overburden and interburden columns), manganese (6 ore and 7 overburden and interburden columns), pH (1 ore and 3 overburden and interburden columns), selenium (all columns tested), sulfate and TDS (all columns tested), and zinc (1 ore and 1 overburden and interburden column) (SMI/BCI, 1995a). Extracts from the ore column determined to be acid generating also exceeded drinking water quality standards for aluminum and copper.

It should be noted that extract concentrations from the columns typically declined with successive flushings of the sample material and for some parameters including manganese, selenium, sulfate, and TDS, extract concentrations from the column tests were generally higher than those from the humidity cell tests.

Correlation Between Kinetic Test Data and Geologic Factors

There was no apparent correlation between the humidity cell and column extract concentrations and either sample lithology or degree of alteration. A weak inverse correlation was, however, observed between manganese, selenium, and sulfate extract concentrations and NNP values. Also, and perhaps most significant, samples with total sulfur concentrations greater than 0.9 percent produced most of the kinetic test extracts that exceeded drinking water quality standards. Total sulfur concentration was consequently identified as the primary criterion for selective handling of overburden and interburden materials during mining operations (SMI/BCI, 1995a).

Finally, it is important to note that the kinetic tests generally indicated a lower magnitude of potential impacts than did the static tests. One or more factors could account for this difference including reaction kinetics which limit the rate of sulfide oxidation and/or the high smectite clay content of the highly altered rocks in the project area. The latter may be significant because smectite clays are capable of adsorbing significant amounts of acid and dissolved constituents (Chermak and Runnells, 1994).

3.5 SURFACE WATER HYDROLOGY

For surface water resources, the Study Area corresponds to the area utilized for modeling project-related surface and ground water impacts as shown by Figure 3-7. It encompasses the surface drainage basins to the east and west of the Project Area but excludes any areas to the north of Interstate 80. The CEA is essentially the same as the Study Area and encompasses all areas which fall within the potentially affected surface water drainage basins.

The description of surface water hydrology presented in this section is based on and summarizes existing published studies and the results of site meteorological monitoring; evaluation of surface drainage patterns using both regional USGS mapping and aerial mapping of the Project Area and adjacent areas; modeling of surface drainage flows; field spring and seep surveys; research of surface water rights in the area; and sampling and analysis of surface water flows where feasible.

3.5.1 General Surface Water Environment

The Project Area lies on and near the northern Shoshone Range crest, which acts as a drainage divide. Surface drainage from the Project Area flows to two separate drainage basins; the Whirlwind Valley to the east (drainage from areas east of the divide); and the Reese River Valley to the west (drainage from areas west of the divide). About 7,620 acres of the Project Area (82.5 percent) are located on the eastern side of the drainage divide and drain downslope through low gradient ephemeral drainages to Whirlwind Valley. About 1,620 acres of the Project Site (17.5 percent) are located on the western side of the divide and drain toward the Reese River Valley through several small ephemeral channels.

Generally, surface flow to the west infiltrates into the extensive alluvial fan deposits at the base of the mountains and never actually reaches the Reese River.

Climatological factors influence the surface water regime regionally as well as in the Project Area. With the exception of snowmelt runoff and storm events, the only contribution to surface water in the area comes from springs and seeps. Discharge from the springs and seeps is lost quickly to evapotranspiration and infiltration, and rarely results in sustained downgradient flows. Those springs, ponds, and wells known to exist in the general project area are listed on Table 3-3.

3.5.2 Climatology

The mean annual precipitation at Beowawe is 8.26 inches per year (in/yr) based on 43 years of record from 1949 to 1991 as indicated by Table 3-4. In recent years (1987 - 1991), average precipitation has risen slightly to 9.33 in/yr. In the Study Area, precipitation increases with elevation consistent with normal regional precipitation patterns for the Basin and Range Province of northern Nevada (Maxey and Eakin, 1949). Based on a widely used empirical relationship for estimating precipitation in mountainous areas in Nevada (Maxey and Eakin, 1949), the distribution of precipitation with varying elevations is estimated at:

- 8.26 in/yr below 5,000 feet above Mean Sea Level (AMSL)
- 10.33 in/yr between 5,000 and 6,000 feet AMSL
- 12.39 in/yr above 6,000 feet MSL

Precipitation occurs throughout the year, but larger and more frequent storm events occur during the winter months. Average annual snowfall is 10 inches at Beowawe (SMI/BCI, 1995). Site-specific precipitation data have been recorded since March 1992 at a monitoring station at an elevation of approximately 4,880 feet within the Project Area. The site-specific precipitation data are summarized by Table 3-5.

The mean annual temperature recorded at the Beowawe meteorological station is 42.7°F, based on the period 1988 through 1992. July is usually the hottest month of the year and January is the coldest. Recorded high and low temperatures are 108° and -30°F measured at Beowawe on July 27, 1975 and December 11, 1972, respectively. Temperature data, including monthly minimum and maximum temperatures, have been recorded by the on-site monitoring station during the period from September 1991 through August 1995 as summarized by Table 3-5.

TABLE 3-4 CLIMATIC DATA - BEOWAWE STATION			
Month	Average Daily Maximum Temperature (°F)	Average Daily Minimum Temperature (°F)	Mean Monthly Precipitation (Inches)
January	41.7	13.7	0.68
February	46.8	20.5	0.58
March	53.1	23.9	0.73
April	63.7	29.3	0.79
May	72.6	36.8	1.11
June	80.1	43.0	0.85
July	91.0	48.8	0.30
August	89.4	45.6	0.48
September	80.4	36.0	0.52
October	69.6	28.3	0.61
November	55.0	21.1	0.81
December	42.3	16.0	0.80
MEAN ANNUAL	74.2	31.6	8.26
Source: SMI/BCI, 1995			

TABLE 3-5
CLIMATIC DATA
MULE CANYON STATION
SEPTEMBER 1991 - AUGUST 1995

Month	Daily Average Temperature (°F)	Average Daily Maximum Temperature (°F)	Average Daily Minimum Temperature (°F)	Mean Monthly Precipitation (Inches)	Mean Monthly Relative Humidity
January	30.2	49.6	9.4	1.02	74.7
February	35.8	54.8	16.0	0.87	69.1
March	43.4	64.9	22.4	0.96	59.7
April	49.1	72.5	28.1	0.90	46.8
May	59.6	79.4	34.7	2.33	42.9
June	65.6	88.3	38.8	0.45	31.9
July	74.4	83.8	46.6	0.19	18.9
August	74.9	98.7	54.0	0.28	17.8
September	65.9	92.6	45.1	0.45	24.2
October	52.7	83.8	35.3	0.63	39.2
November	33.5	62.2	17.8	1.43	65.8
December	29.6	51.4	12.7	0.43	74.0
MEAN ANNUAL	52.7	76.1	31.6	9.64	47.1

Significant evaporation occurs during the warmer months of April through October, averaging 50.2 in/yr based on 42 years of record for the Ruby Lake Station near Elko (Air Sciences Inc., 1993). Given close correlation between temperature and precipitation data for Beowawe and Ruby Lake, the pan evaporation data from the Ruby Lake Station are inferred to be applicable for the Project Area. Based on typical Nevada climatic conditions, the annual pan evaporation rate is estimated at 62.5 in/yr when evaporative losses during the winter months are included (National Oceanic and Atmospheric Administration (NOAA, 1982a)). Using a pan coefficient of 0.72 to relate the pan data to lake evaporation yields, mean annual free water surface evaporation rates are estimated at approximately 45 in/yr in Whirlwind Valley and approximately 37 in/yr at the mine site (NOAA, 1982a and 1982b; SMI/BCI, 1995a).

3.5.3 Regional Surface Water Hydrology

The Project Area is in the northern Shoshone Range, within the boundaries of Lander and Eureka Counties. The Humboldt River, a perennial stream, is the primary drainage for the general region surrounding the Project Area. The headwaters of the Humboldt River originate in northeastern Nevada, north of the town of Wells. The Humboldt River flows in a westerly and southerly direction and terminates in the Humboldt Sink located in western Nevada, about 18 miles southwest of the town of Lovelock, Nevada. The Humboldt River is a major source of irrigation water in the area.

Major perennial tributaries to the Humboldt River in the general project vicinity include Maggie Creek, Marys Creek and Susie Creek which join the Humboldt River between Carlin and Palisade; Rock Creek which enters the Humboldt River upstream from the Town of

Battle Mountain; and the Reese River which enters the Humboldt downstream from Battle Mountain. A number of other minor tributaries flow to the Humboldt River, however, these tributaries are ephemeral flowing only for short periods in the spring in response to snowmelt runoff or after major local summer thunderstorms (U.S. Department of Agriculture - Soil Classification System (USDA-SCS), 1980). The relationship of the Humboldt River to its major tributaries and the locations of existing stream gaging stations are shown by Figure 3-7. Stream flow data for various locations along the Humboldt River in the general project area (USGS, 1994) exists for an extended period of record. Documentation exist for the following gaging stations:

- Humboldt River near Carlin (Carlin)
- Humboldt River at Palisade (Palisade)
- Humboldt River at Dunphy (Dunphy)
- Humboldt River at Battle Mountain (Battle Mountain).

The Carlin Station is approximately 5 miles upstream from the confluence of Susie Creek with the Humboldt River. The average discharge over a 51-year period of record (1944 to 1994) is 369 cfs. The maximum instantaneous discharge was recorded as 8,250 cfs on May 17, 1984 and the minimum daily mean was recorded as 0.2 cfs on August 9, 1959.

The Palisade Station is approximately 0.5 mile downstream from the Town of Palisade and about 22 miles upstream from Whirlwind Valley on the Humboldt River. Flow records for this station are available for the periods from 1902 to 1906, and from July 1911 to the present. The mean annual discharge is 390 cfs. The maximum instantaneous peak discharge was 7,870 cfs on May 13, 1984. The minimum daily mean discharge was 2.0 cfs on August 25, 1931.

The Dunphy Station is located downstream from the confluence of Coyote Creek and the Humboldt River. The station was installed relatively recently and records are available from February 1991 to the present. The average discharge over a 3-year period of record was 210 cfs. The maximum instantaneous discharge was 2,720 cfs on March 29, 1993, and the minimum daily mean discharge was 1.6 cfs on August 13, 1992.

The USGS operated a gaging station at Argenta, 15.5 miles east of Battle Mountain, from February 1946 through September 1982 when gaging was discontinued. The average discharge for this 37-year period of record was 336 cfs. The maximum discharge was 6,000 cfs on February 15, 1962 and the minimum discharge was 0.17 cfs on September 28, 1981.

The Battle Mountain Station is located two miles north of Battle Mountain on the Humboldt River. The Reese River enters the Humboldt several miles downstream, and Rock Creek enters upstream of this Station. The average discharge at the Battle Mountain Station for a 42 year period of record (May 1896 to December 1897, March 1921 to April 1924, October 1945 to September 1981, and February 1991 to 1994) is 338 cfs. The maximum instantaneous discharge was recorded as 5,800 cfs on May 3, 1952 and the minimum daily mean discharge was recorded as no flow during several extended periods (August through October for the years 1948, 1949, 1959, 1981, and 1991).

Average monthly flows in the Humboldt River near the Project Area are lowest during the late summer and early autumn months of August, September, and October. Average monthly flows then increase slightly through late autumn and winter, peaking during the spring with snowmelt and resulting spring runoff. Peak discharge normally occurs in May or June, although high flows have occurred from November through March as a result of major thunderstorm events or mixed rain and snow (USGS, 1994). Long-term stream flow monitoring records indicate that over 60 percent of the average annual flow occurs during spring runoff in the months of April, May, and June.

3.5.4 Project Area Surface Water Hydrology

Drainage Configuration

Most of the Project Area lies on the eastern slope of the northern Shoshone Range and a small portion extends over the crest on the western side. Ten small ephemeral drainages originate along the ridge in the western portion of the Study Area as shown by Figure 3-8. Four of these are small unnamed ephemeral drainages which drain west to the Reese River Valley. These drainages consist of about four miles of steep rocky canyons that discharge onto the alluvial fans along the western face of the Shoshone Range. As the streams leave the mountains, they disperse into several smaller channels and lose their identity as individual streams. Most flows infiltrate into the alluvial fans; only flows from extreme flood events would reach the Reese River approximately nine miles to the west. Portions of the four northern unnamed small ephemeral drainage basins (Basins A1, A2, B1, and B2 on Figure 3-8) are included in the flood hydrology analysis.

The six remaining ephemeral drainages, which originate on the ridgeline (Drainage Basins H, E1, D1, D3, C1 and C3 on Figure 3-8), join with several other ephemeral tributaries originating on the eastern slope (Drainage Basins F, E2, E3, E4, E5, D2, D4, C2, C4, C5, G, and I, on Figure 3-8) to become a single downstream watercourse about two miles east of the Project Area boundary. This single watercourse, which retains the ephemeral character of the small tributaries, enters the west end of Whirlwind Valley about two miles farther downstream and disappears as a distinct drainage as the valley widens and flattens into a playa.

All of these drainages are ephemeral, although several exhibit intermittent flows for short from distances immediately downgradient from active springs and seeps. Under normal flow conditions, ephemeral drainages in the Project Area do not have a direct hydrologic connection with, and do not contribute flow to, the Humboldt River. Most of the normal runoff from this area infiltrates into the shallow surficial soils and is rapidly lost to evapotranspiration. Larger runoff events may result in increased infiltration, temporary ponding in playa areas, and probably provide some recharge to the local ground water system (Olmstead and Rush, 1987).

Elevations range from 7,320 feet at Argenta Peak to 4,800 feet along the western toe of the northern Shoshone Range in the Reese River Valley, and to about 4,700 feet at the Narrows in the Whirlwind Valley. Typical drainage gradients are moderate to steep, ranging from approximately four percent in the unnamed drainage immediately south of Mule Canyon, to approximately eight percent in the drainage east of Water Canyon to the north of the Project Area. The drainages in the western portion of the Project Area are second-order streams; Water Canyon, which drains a small area in the northern portion of the Project Area contains a first-order stream; and the drainage which collects flows from the ephemeral tributaries on the eastern slope of the mountains and discharges to Whirlwind Valley is a fourth-order stream.

Based on topographic information from the USGS The Geysers, Nevada 7.5 Minute Quad Sheet (Provisional Edition, 1985), surface water flows from Mule Canyon and the other ephemeral tributaries in the immediate project vicinity terminate in the Whirlwind Valley at about elevation 4,670 feet, approximately five miles west of the Humboldt River. There is no defined channel shown on the map between this drainage terminus and the Humboldt River. The five mile distance was measured along a line from the terminus in a north/northeast direction to the location where Coyote Creek appears to originate. In this area, the Coyote Creek channel passes through a small saddle defined by two 4,670 foot contour lines.

From the drainage terminus for a distance of approximately two and one-half miles to the northeast, the mapped topography is essentially flat with no surface flow gradient and includes an area of alkali flats about 4,000 feet long.

Hydrologic Analysis

Given the ephemeral nature of area drainages, regular monitoring of stream flows for these drainages was not feasible. In order to characterize potential peak flow conditions for these drainages, the U.S. Army Corps of Engineers (COE) HEC-1 computer model was used to estimate the peak flows resulting from a 100-year, 24-hour storm event. This model utilizes specific drainage basin parameters to predict the rainfall-runoff relationship for each basin. These parameters include drainage area, longest basin flow length (hydraulic length), and average basin slope. The HEC-1 model also requires an estimate of lag time, which is a function of the basin hydraulic length, USDA-SCS Curve Number, and average basin slope. The SCS Curve Number is dependent upon soil characteristics, land use type, and antecedent moisture conditions. Higher curve numbers correspond to increased runoff (SMI/BCI, 1995a).

The premining drainage basins are shown on Figure 3-8. Basin input parameters used in the HEC-1 analyses are summarized by Table 3-6. The calculated peak flow resulting from the 100-year, 24-hour storm event which would discharge to the western end of Whirlwind Valley is 2,382 cfs. The corresponding flow depth would be approximately 0.31 feet. Table 3-7 summarizes the results of the HEC-1 analyses for all drainage basins in the Study Area.

3.5.5 Springs and Seeps

Twenty-three cold water (non-thermal) springs have been identified in the Project Area including (SMI/BCI, 1995a):

- 15 springs at or near the proposed mine
- 4 springs southwest of the mine
- 2 springs north of the mine
- 2 springs northeast of the mine

The locations of these springs are shown or referenced on Figure 3-9. Springs which would potentially be impacted by mining and related activities have been sampled on a quarterly basis since March or April 1994. Table 3-8, provides a list of the springs and general information on spring location, availability of discharge and water quality data, and current water rights and use.

Discharge data are available for ten springs. Discharge measurements are summarized in Table 3-9. Review of this table indicates that discharges were generally highest during the spring and lowest during mid to late summer, fall, or early winter. Spring discharge ranged from 0 (no flow) to 18.6 gpm. Changes in discharge correspond, and are probably related to, seasonal variations in precipitation. For reference, precipitation data for the area are summarized by Table 3-5.

With the exception of four sites, the springs monitored in the Project Area exhibited perennial flows with some discharge throughout the year. Springs MCS-4 and MSC-10 were intermittent and no flow was observed during October 1994 and December 1994/January 1995, respectively. Springs MCS-5 and MCS-6 were monitored only during May 1994 and both were found to be dry at that time.

Geologic and spring discharge monitoring data suggest that springs in the Project Area probably originate under one of the following conditions (SMI/BCI, 1995a):

- Where the ground surface intersects the water table
- At or near the contact between bedrock units of different permeability
- Along or near a relatively permeable bedrock fault or fracture
- From vesicular zones in local volcanic units

TABLE 3-7 PREMINING PEAK FLOWS - PROJECT AREA			
Basin	**Node**	**Premining Peak Flow**	**Premining Flow Depth**
A1	JA1	168	1.77
A2	JA2	299	2.09
B1&2	JB1&2	230	1.56
C	JC5	958	3.29
D	JC5	779	0.47
E	JE4&5	230	2.93
D	JF	162	1.52
C	JG	91	0.47
H	JH	52	1.77
H	JI	1515	1.11
C, D, G & I	JCDGI	2382	0.31
Source: SMI/BCI, 1995			

Observed seasonal changes in discharge suggest that the springs are fed by a shallow ground water source. Most of these springs occur at, or just below, the local ground water table. Springs north and northeast of the proposed mine area may be fed by perched zones as indicated by elevation differences between springs and inferred ground water levels.

3.5.6 Surface Water Quality

Due to the arid climate, and ephemeral nature of area drainages, the surface water quality data available for the Project Area are limited. Data are available from three regional surface water stations on the Humboldt River and a nearby irrigation canal. Surface water quality data for the Humboldt River area were reported by Desert Research Institute (DRI) (DRI, 1979), Day (Day, 1987), and the USGS (USGS, 1994). The main stem of the Humboldt River has been assigned specific water quality criteria in the form of numerical standards which apply between defined control points. Each standard is set to protect the beneficial use which is most sensitive with respect to that standard.

Designated beneficial uses for the Humboldt River include:

- Irrigation
- Livestock watering
- Aquatic recreation
- Other recreation
- Industrial supply
- Municipal and/or domestic supply
- Propagation of aquatic life, including warm water fisheries
- Propagation of wildlife

Irrigation return flows have reportedly affected the quality of Humboldt River and, as a result, the State of Nevada has identified TDS and chloride as contaminants of concern (SMI/BCI, 1995a). Annual average and single value effluent standards for the Humboldt River at the Battle Mountain and Palisade gaging stations have been established at 425 and 520 mg/l for TDS and 50 and 70 mg/l for chloride, respectively (NAC 445a.205, 1994). In addition, toxic material standards have been adopted which apply to all designated waters.

These standards for trace elements, metals, and organic compounds apply to the beneficial uses of Municipal or Domestic Supply, Aquatic Life, Irrigation, and Watering of Livestock. The applicable standard varies with respect to the beneficial use.

During the 1994 water year (covering the period from October 1993 through September 1994), the USGS collected and analyzed four water quality samples at Battle Mountain and two at Dunphy.Surface water samples collected from the Humboldt River near the project site were moderately alkaline, with pH values ranging from 8.2 to 8.9. Surface water temperatures at the sampling stations ranged from 10.5 to 23 degrees Celcius (°C) and silica concentrations ranged from 24 to 34 milligrams per liter (mg/l). Sodium and calcium were the dominant cations and bicarbonate was the dominant anion measured in the samples, indicating a sodium/calcium bicarbonate surface water type. TDS and chloride concentrations were somewhat variable and ranged from 237 to 540 mg/l and 7.7 to 35 mg/l, respectively. Several factors probably account for this variability including evaporation during dry months, irrigation return flows, and increased runoff during the wet season. The highest TDS and chloride concentrations were measured during the late summer when stream temperatures were also highest.

Concentrations of other constituents measured in the surface water samples were also variable, including fluoride and boron. Fluoride concentrations ranged from <0.1 to 0.6 and boron concentrations ranged from 0.16 to 0.42 mg/l. Limited trace-element data were available for the Humboldt River near the Project Area. Available data show that trace elements generally occur in the river at relatively low concentrations compared to area ground waters. Constituents frequently detected above laboratory detection limits included arsenic (0.005 to 0.01 mg/l), barium (0.06 to 0.11 mg/l), iron (0.01 to 0.02 mg/l), lithium (0.02 to 0.08 mg/l), manganese (0.01 mg/l), and strontium (0.24 to 0.43 mg/l).

3.5.7 Water Rights and Use

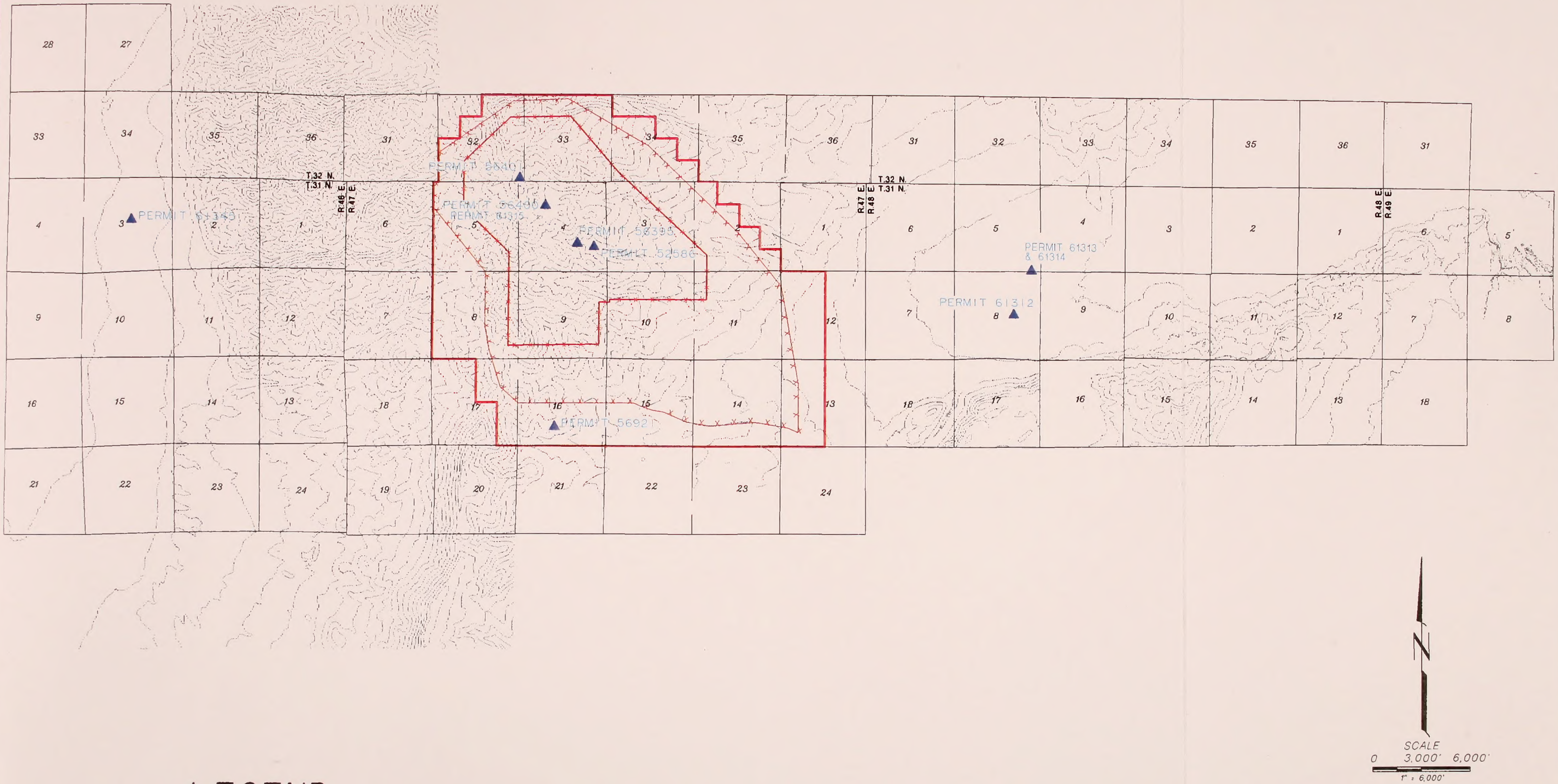
Surface and ground water rights in the immediate Project Area are summarized in Table 3-10, (RCI, 1995), and water right locations are shown on Figure 3-10 (RCI, 1995).

The Hospah Coal Company, a subsidiary of SFPGC, has three existing water rights permits (Nos. 52586, 56400, and 56401) on file with the Nevada Division of Water Resources. Permit No. 52586 is for a ground water well and is granted for 3.0 cfs, not to exceed 20 acre-feet annually. Permits 56400 and 56401 are for 3.0 cfs, not to exceed 2,172 acre-feet annually. As the surface owner and current holder of the Hospah Coal Company water rights by right of succession, SFPGC has filed Application Nos. 61312, 61313, and 61314 to change the point of diversion for existing Permit 56401, and Application No. 61315 to change the point of diversion for existing Permit 56400. These applications were filed with the Nevada Division of Water Resources in July 1995 and approvals were recently received. In addition T. Sansinena, a local landowner, has filed two water rights applications (Nos. 56395, and 56921) which are also currently pending and Julian Tomera Ranches has filed Proofs of Appropriation 07561, 07562, 07563, 07564, 07582, and 07583.

Existing water use in the general project area is for irrigation, stock watering, and geothermal energy. Other water rights and uses in the general project vicinity include several deep geothermal wells in Sections 17 and 18, T31N, R48E, and the southeast quarter of Section 13, T31N, R47E; a shallow ground water well in Section 26, T31N, R47E where a windmill is used to pump water for stock watering; a ground water well in Section 32, T32N, R48E which is also used for stock watering; and several shallow alluvial wells along the Humboldt River which provide irrigation water.

TABLE 3-10
WATER RIGHTS SUMMARY

ID No.	Owner of Record	Point of Diversion					Cubic Feet Per Second	Duty	Use	Place of Use	Units of Acres	Remarks
		1/4	1/4	S	T	R						
Permits:												
52586	Hospah Coal Company	NE	SE	4	31	47	3.0	651' MGA	mining milling domestic	Within Sections 4,5,8,16, & 17, T31N R47E and within Sections 32 & the W1/2 of Section 33, T32N, R47E		
56400	Hospah Coal Company	NW	NW	4	31	47	3.0	2172'AFA	mining milling domestic	Sections 1-5, 8-15, & 23, T31N, R47E and Sections 32-34 & 36, T32N, R47E		Pending Application to Change 61315
56401	Hospah Coal Company	SE	SE	32	42	47	3.0	2172'AFA	mining milling domestic	Same Place of Use as Permit 56400		Pending applications to Change 61312, 61313, & 61314
Applications:												
56395	Teresa A. Sansinena	NW	SE	4	31	47	0.01	--	stockwater	SE¼ Section 4, T31N, R47E	200 cattle	Spring
56921	Teresa A. Sansinena	SW	NW	16	31	47	0.01	--	stockwater	SW¼ NW¼ Section 16, T31N, R47E	200 cattle	Beacon Spring BLM letter 1/2/92 indicates 161 cattle are licensed 3/16-12/31
61312	Santa Fe Pacific Gold Corporation - Mule Canyon Mine	SE	NE	8	31	48	3.0	--	mining milling domestic	Secs. 27,28,33 & 34, T32N, R46E Secs. 3/10,11,13,14 & 24, T31N, R46E Secs. 8,17,20,28-34, 36 & the E½ & E½ W½ of Sec. 18, T32N, R47E Secs. 1-23 & 26-30, T31N, R47E Sec. 36, T32N, R48E Secs. 1-12 17 & 18, T31N, R48E Sec. 31, T32N, R49E Sec. 5-8, T31N, R49E		Underground App. to Change Permit 56401. Return for correction sent 7/11/95
61313	Santa Fe Pacific Gold Corporation - Mule Canyon Mine	NE	NE	8	31	48	3.0	--	mining milling domestic	Same Place of Use as Application 61312		Underground App. to Change Permit 56401. Return of correction sent 7/11/95.
61314	Santa Fe Pacific Gold Corporation - Mule Canyon Mine	NE	NE	8	31	48	3.0	--	mining milling domestic	Same Place of Use as Application 61312		Underground App. to Change Permit 56401. Return of correction sent 7/11/95.
61315	Santa Fe Pacific Gold Corporation - Mule Canyon Mine	NW	NW	4	31	47	3.0	--	mining milling domestic	Same Place of Use as Application 61312		Underground App. to Change Permit 56400. Return of correction sent 7/11/95.



LEGEND

- PROJECT FENCELINE (INTERIM)
- PROJECT FENCELINE (FULL BUILD-OUT)
- PROJECT AREA BOUNDARY
- PERMIT 56400 ▲ WATER RIGHT PERMIT

MULE CANYON MINE

FIGURE 3-10

WATER RIGHTS LOCATIONS

File: MC-WRL.DWG

Source: HYDRO GEO

3.6 GROUND WATER HYDROLOGY

For ground water resources, the Study Area corresponds to the area utilized for modeling project-related surface and ground water impacts as shown by Figure 3-11, and encompasses the ground water basin to the east and a shallow ground water zone to the west of the Project Area.

The description of ground water hydrology presented in this section is based on and summarizes existing published studies and the results of site meteorological monitoring; documentation of ground water occurrence and flows in exploration drillholes; data from drilling, installation, and testing of ground water wells in the area; ground water sampling and analysis data; field spring and seep surveys; extensive ground water flow characterization and modeling; and research of ground water rights in the area.

3.6.1 Regional Hydrogeology

The Project Area is in the Nevada portion of the Basin and Range Physiographic Province. This arid to semiarid region has low precipitation, high evaporation, and the major river systems all drain to closed basins. The Project Area lies within the 16,000 square mile Humboldt River basin subregion which drains to the Humboldt Sink and could potentially affect two hydrographic areas; the Lower Reese River Valley and Whirlwind Valley.

In the Humboldt River basin, ground water typically occurs in one of the following regional hydrogeologic units:

- Valley fill deposits
- Volcanic rocks
- Clastic sedimentary rocks
- Carbonate rocks
- Intrusive and metamorphic rocks

Only the valley fill deposits and carbonate rock units form major aquifers, with the potential for well yields from 100 to 2,000 gpm. The other hydrogeologic units typically yield less than 10 gpm to wells. It is important to note that well yields for all units can increase significantly where highly fractured bedrock zones exist. The first two hydrogeologic units listed above are the principal units of interest relative to the Project Area.

The regional hydrogeologic units are subdivided into a series of local hydrostratigraphic units with distinct characteristics as illustrated by Figure 3-12. The following hydrostratigraphic units have been identified in the Project Area (SMI/BCI, 1995a).

- Alluvium
- Upper Tertiary effusive sequence
  - Capping Basalts
  - Dunphy Pass Formation
  - Beowawe Formation
  - Horse Heaven Formation
- Lower Tertiary flow sequence
  - Beacon Light Formation
  - Red Cliffs Member
  - Late Mule Canyon Formation
  - Lapilli-Ash Tuff
  - Early Mule Canyon Formation
- Paleozoic Basement

The local hydrostratigraphy as defined in the vicinity of the proposed mine pits consists of 11 units as shown on Figure 3-12. Because ground water flow is primarily influenced by the physical characteristics and morphology of the bedrock geologic units, the boundaries of the local hydrostratigraphic units closely match the boundaries of geologic formations. The surficial deposits that comprise the uppermost hydrostratigraphic unit are generally referred to as alluvium even though they typically include the thin veneer of locally derived colluvium and alluvial and eolian sediments in the gullies and major canyons extending up the mountain slopes.

The lower flow units of the Mule Canyon Formation and the Oligocene Caetano Tuff are grouped into a single hydrostratigraphic unit that defines the base of the Tertiary volcanic rocks in the area of the proposed mine pits. This unit consists largely of medium to coarse-grained basaltic andesites interbedded with laminated lacustrine sedimentary rocks.

LEGEND

INTERPRETED WATER LEVEL ELEVATION CONTOURS IN FEET ABOVE MSL.

WATER TABLE SURFACE AND RIVER CONTROL POINTS

PROJECT AREA BOUNDARY

N

SCALE
0 7,500' 15,000'
FEET

MULE CANYON MINE

FIGURE 3-11

STUDY AREA
GROUND WATER ELEVATION MAP

Source: Adapted From SMI/BCI, 1995a

File: MC-SAGWE.DWG

Where it has not been eroded away, the Caetano Tuff is represented by a thin basal layer of moderately sorted gravels interbedded with rhyolitic tuffs.

The lower-most hydrostratigraphic unit is represented by the Paleozoic basement complex throughout this area. The Paleozoic rocks exposed along the western slope of the northern Shoshone Range, the Malpais Rim, and east of Dunphy Pass consist chiefly of the siliceous siltstones of the Valmy Formation which also contain significant amounts of quartzites, bedded cherts, and siliceous sandstones, and conglomerates. This unit is deeply buried beneath the project area, and its hydrologic properties in this part of Nevada are laregely unknown. The estimated values used in this EIS represent midrange values for fractured metamorphic rocks as discussed in a widely used text on ground water flow (Freeze and Cherry, 1979).

A more detailed description of these hydrostratigraphic units can be found in the project hydrogeology report (SMI/BCI, 1995a).

3.6.2 Site Hydrogeologic Characteristics

Ground water occurs primarily in unconsolidated valley fill deposits (alluvium) and volcanic bedrock (upper and lower Tertiary sequences). Presented below is a description of these hydrostratigraphic units as well as the characteristics of the Beowawe geothermal system which occurs in the eastern portion of Whirlwind Valley.

Alluvial Aquifers

Valley fill aquifers occur in the Reese River, Boulder, and Whirlwind Valleys. Locally, thicknesses of these aquifers can reach up to 500 feet. Only the valley fill aquifers in Whirlwind Valley would be potentially affected by the Mule Canyon project and are considered here.

Ground water characteristics within the Whirlwind Valley basin were defined through extensive investigations conducted to evaluate and complete development plans for the Beowawe geothermal resource (Oesterling, 1962; Marine et al 1974; Garside and Shilling, 1979; Zoback, 1979; Iovenitti 1980; Chevron, 1985; and Olmsted and Rush, 1987). The Whirlwind Valley is a structurally controlled basin extending from its western limit, which is approximately two miles east of the eastern project boundary, to the Humboldt River approximately eight miles northeast of the Project Area. The Whirlwind Valley basin is divided into two subbasins, an eastern and western subbasin, by a surface expression of the Dunphy Pass Fault designated locally as the Narrows which crosses the valley in a north-south direction. The eastern subbasin contains coarse sediments deposited by the Humboldt River at a time when its channel extended farther to the west. The western subbasin, which receives surface drainage from the Project Area, contains unconsolidated outwash sediments from the eastern slope of the Shoshone Range up to 500 feet thick (Zoback, 1979). A schematic hydrogeologic cross-section through the Whirlwind Valley showing conceptual hydrogeologic relationships is shown on Figure 3-13.

Ground water in the unconsolidated sediments of the western Whirlwind Valley subbasin occurs in two distinct aquifers; a near-surface unconfined aquifer; and a deeper confined aquifer. The confining layer between the two aquifers is composed of low permeability silts and clays. The unconfined aquifer also extends into the eastern subbasin. The depth to water in the unconfined aquifer was measured in several shallow wells (B-2, B-6, B-8, U-1, U-2 and WSO-3) and ranges from 5 to 10 feet below the ground surface in portions of the subbasin. The deeper confined aquifer is composed primarily of basal gravels and the ground water contained in this aquifer is under pressure. The potentiometric surface of this aquifer was 100 feet above ground surface in well WSP-1, located in Section 8, T31N, R48E at the time aquifer testing was conducted (ESI, 1992). The direction of ground water flow in the unconfined aquifer follows the local topography, with a slight gradient to the northeast.

The hydraulic properties of the valley fill aquifers were evaluated and characterized by several investigators (ESI, 1992; DRI, 1979). In the unconfined alluvial aquifer, reliable hydraulic conductivity estimates can be made from well yield relationships as documented through a number of historic aquifer tests performed by previous investigators. Hydraulic conductivities as measured in the unconfined alluvium vary by approximately two orders of magnitude as indicated by Table 3-11.

In the western subbasin of the Whirlwind Valley, the hydraulic conductivity of the unconfined alluvium tends to be lower (K=9.6 ft/day) than it is in the eastern subbasin (K=24.2 ft/day). This variation in hydraulic conductivity results from finer-grained, less permeable alluvial deposits west of the Narrows than in the eastern subbasin. The alluvial aquifer in the eastern subbasin exhibits considerably higher permeabilities (up to 165 feet per day (ft/day)) in areas where coarser-grained, well-sorted gravels and sands have been deposited by the Humboldt River.

The hydraulic conductivity of the confined alluvial aquifer in the western Whirlwind Valley is approximately 13.7 ft/day. The hydraulic conductivity of this aquifer was calculated from a pressure drawdown test conducted at flowing well WSP-1 (ESI, 1992), and a pump test conducted in well DRI-B5 (DRI, 1979). Previous studies (DRI, 1979) indicated that the transmissivity of the unconfined shallow alluvial aquifer in western Whirlwind Valley is approximately 1,200 square feet per day (ft^2/day), and the transmissivity of the unconfined eastern Whirlwind Valley aquifer is approximately 24,000 ft^2/day. Aquifer recharge occurs from precipitation and limited infiltration and seepage from the ephemeral streams which drain to Whirlwind Valley from the west.

TABLE 3-11
ESTIMATED HYDRAULIC PROPERTIES OF ALLUVIAL AQUIFERS

Aquifer Unit	Hydraulic Conductivity (ft/day)	Storage Factor (unitless)	
		Storativity	Specific Yield
Unconfined Alluvium West Whirlwind Valley	K geom = 9.6 K max = 35 K min = 1.5	--	0.10
Unconfined Alluvium Undifferentiated	K geom = 24.2 K max = 165 K min = 1.7	--	0.10
Aquitard West Whirlwind Valley	0.004	2×10^{-4}	0.10
Confined Alluvium West Whirlwind Valley	K geom = 13.7 K max = 15.8 K min = 11.9	2×10^{-4}	0.10
SMI, BCI, 1995a			

Substantial recharge to the alluvial aquifer from perennial stream flow occurs over much of the year in the extreme eastern portion of the Whirlwind Valley and north and east of Whirlwind Valley near the Humboldt River. Aquifer recharge within Whirlwind Valley was calculated by Olmsted and Rush (1987) and SMI/BCI (1995a). Olmsted and Rush's calculations are based on the assumption that the ground water basin is approximately 70.7 square miles and that infiltration into the ground water system ranges from 0 to 15 percent of annual precipitation, depending on the land surface elevation. Below an elevation of 5,000 feet, recharge was assumed to be zero. Based on these assumptions, mean annual recharge for the entire basin was calculated as 4.5 percent of the average annual precipitation (10.6 inches), which corresponds to $7.77 \times 10^7 ft^3$/year or 1,106 gpm.

According to Olmsted and Rush (1987), ground water discharge from Whirlwind Valley occurs in the following forms:

- Evapotranspiration - 65.4 percent of discharge
- Springs - 5.6 percent of discharge
- Outflow to the Humboldt River Valley -15 percent of discharge
- Outflow to the lower Crescent Valley - 14 percent of discharge

The calculated ground water budget for the Whirlwind Valley, as presented by Olmsted and Rush (1987), shows an imbalance between recharge and discharge, with recharge being 24 percent less than the calculated discharge.

SMI/BCI (1995a) also calculated the water balance for the general Project Area. In their study, the Project Area was divided into three subsystems; Whirlwind Valley, Boulder Valley, and Reese River Valley. The calculation of water balance for the Whirlwind Valley Subsystem, with an area of 82.3 square miles, indicated a recharge of 1,408 gpm and discharge of 1,683 gpm, with a difference between recharge and discharge of 20 percent. According to SMI/BCI (1995a) discharge from the Whirlwind Valley ground water subbasin occurs in the following forms:

- Evapotranspiration - 71.6 percent of discharge
- Well pumping - 21.3 percent of discharge
- Discharge to Humboldt River - 6.8 percent of discharge
- Discharge to Boulder Valley - 0.3 percent of discharge

Although both referenced water balance studies used different approaches and assumptions, the results are similar.

Volcanic Bedrock Aquifer

The area where the proposed mine pits and most of the related mine facilities would be located is underlain by a thick sequence of volcanic rocks. Ground water occurs in the volcanic rocks primarily in vesicular zones and zones of secondary permeability associated with fracture networks. Ground water flow is governed by the local topography and structural features. The general direction of ground water flow follows the hydraulic gradient as indicated by ground water elevation contours on Figure 3-11, and generalized flow arrows on Figure 3-13.

Depth to ground water in the bedrock aquifer was measured using numerous exploration boreholes, monitoring wells, and test wells. Springs and seeps on both the east and west slopes of the northern Shoshone Range also provided an indication of the local ground water table of the bedrock aquifer at several points in and surrounding the Project Area. Depth to ground water from the ground surface ranges from zero at the spring locations to 125 feet at bedrock well MCR-330.

Recharge to the bedrock aquifer originates from direct infiltration of precipitation. Recharge potential within the area of the proposed pits is influenced by greater precipitation at the higher elevation and the weathered nature of surficial material. The recharge area is also limited due to the proximity of this area to the drainage divide formed by the crest of the northern Shoshone Range as shown on Figure 3-13.

Discharge from the bedrock aquifer within the Project Area occurs from springs, through evapotranspiration, and as recharge to, and flow within, the lower bedrock units in the Whirlwind Valley basin. Estimated recharge and discharge volumes for the Whirlwind Valley ground water basin were summarized in the previous description of the alluvial aquifer system.

Bedrock permeability is dominated by flow through fractures and vesicular zones in the bedrock matrix. Hydraulic parameters (hydraulic conductivity, transmissivity, and storage) for the bedrock aquifer were characterized through a series of pumping tests, packer permeability tests, observations of water levels and discharge into the exploration adit, and specific capacity tests performed in wells and during drilling of exploration boreholes. The estimated hydraulic properties of the bedrock aquifer unit are presented in Table 3-12. The results of aquifer testing and characterization indicate hydraulic conductivity values ranging from 0.01 to 24.0 ft/day. Ground water flow in the west-east direction within the ore zone is evidently influenced by the presence of clay alteration zones. These clay alteration zones are less permeable than the adjacent rock units and tend to locally increase the hydraulic gradient resulting in a "stepped" ground water surface and locally perched ground water conditions with local discharge of ground water through surface seeps and springs. Lateral flow characteristics across these fracture and alteration zones are highly variable and are dependent on width, orientation, degree and type of alteration, and a number of other factors. Due to this variability, numeric characterization of lateral flow is impractical. General factors affecting flow characteristics are, however, as discussed above.

Values of the storage coefficient for the bedrock aquifer were obtained during a pumping test in well MCR 289. Results of the pumping test in this well, with observation wells MCR 328, MCR 329, and MCR 330, indicated storativity in a range from 1×10^{-6} to 3.5×10^{-3}. These values are representative of a confined or semiconfined aquifer. The results of the pumping tests were presented in several reports (ESI, 1992a; SMI/BCI, 1995).

Beowawe Geothermal System

The Beowawe geothermal system is in Whirlwind Valley southeast of the Mule Canyon Project Area. This system is one of the highest temperature hydrothermal areas in Nevada. The Beowawe geothermal system is located in a structurally complex region, along the Oregon-Nevada lineament rift zone and the Roberts Mountain thrust. Locally, three sets of faults trending N 55-75 degrees E, N 15-30 degrees W, and due east appear to control the geothermal system. The main upward conduit for hydrothermal fluids within this system is related to the N 15-30 degrees W trending Dunphy Pass fault zone which includes the White Canyon, Dunphy, and Narrows faults. The Dunphy Pass fault zone is an expression of the Oregon-Nevada lineament (Olmsted and Rush, 1987). The N 75-80 degrees E fault zone is also an important conduit for upward hydrothermal flows and includes the Whirlwind and the Malpais faults along which the Beowawe Geyser issues.

The deep circulating hydrothermal water and the shallow ground water in the Quaternary deposits and Tertiary volcanic and sedimentary rocks were considered by some authors to be part of a single ground water system (Garside and Schilling, 1979). The quality of the geothermal waters, however, is distinctly different from the non-thermal waters and suggests different aquifer systems. The total dissolved solids concentration of the thermal waters is much greater than that of the non-thermal waters (average 300 to 1,100 mg/l).

This reflects a high silica concentration, the result of contact with more soluble material or longer residence time. The greater percentage of sodium in thermal water (>90 percent compared to 50 percent in non-thermal water) may indicate cation exchange if, in fact, the thermal and non-thermal water share a common source (Olmsted and Rush, 1987).

TABLE 3-12
ESTIMATED HYDRAULIC PROPERTIES OF BEDROCK AQUIFER UNITS IN THE PROPOSED MINE PIT AREAS

Aquifer Unit	Hydraulic Conductivity (ft/day)	Storage Factor (unitless)	
		Storativity	Specific Yield
Capping Basalts	0.4	5×10^{-5}	0.01
Dunphy Pass Fm.	0.4	5×10^{-5}	0.01
Beowawe Fm.	0.4	5×10^{-5}	0.01
Horse Heaven Fm.	0.4	5×10^{-5}	0.01
Beacon Light Fm.	0.4	5×10^{-5}	0.01
Red Cliffs Member	0.014	5×10^{-5}	0.01
Late Mule Canyon Formation Flows	2.1 0.4 10.7 20.9 24.0	-- -- -- -- 5×10^{-5}	-- -- -- 0.02 --
Lapilli-Ash Tuff	0.01	5×10^{-5}	0.01
Early Mule Canyon Formation Flows and Lake Beds	0.5	5×10^{-5}	0.01
Paleozoic Basement	0.05	5×10^{-5}	0.01
SMI/BCI, 1995a			

In addition, isotope data presented by SMI/BCI (1995a) suggest that the source of water for these aquifer systems is different. There is evidence, as described in Section 3.6.4, that ground water historically discharged from the geothermal system via wells and geysers mixed with shallow ground waters, locally altering the chemistry of the valley fill aquifers.

The source of recharge to the Beowawe geothermal system is believed to be precipitation at higher elevations in the northern Shoshone Range to the north and west. In addition, limited recharge may result from infiltration of ephemeral stream flow which comes in contact with rock outcrops, faults, or fracture zones along canyons on the eastern slope of the northern Shoshone Range.

A general water balance, developed by Garside and Schilling (Garside and Schilling, 1987), suggests that under steady-state conditions, recharge within the drainage basin surrounding the Beowawe geothermal area is probably sufficient to account for thermal, as well as non-thermal ground water discharges.

A study of the potential impacts of Whirlwind Valley well field operation on geothermal resources (BCI, 1995) concluded that the Beowawe geothermal flow system and the regional ground water flow systems are separate entities with no significant interaction between them. This conclusion is based on the clear separation in oxygen and hydrogen stable isotope analyses obtained from ground water, surface water and geothermal water samples collected in the vicinity of the Beowawe geothermal area (Day, 1987). The hydrogen and oxygen stable isotope data collected near Beowawe Geothermal Site since 1987 did not show any information to dispute the interpretation that Whirlwind Valley ground water system is separated from the geothermal system. The separation of the two ground water systems was also confirmed by a more recent study of ground water re-injection from the Beowawe Geothermal Plant (Benoit and Stock, 1993).

3.6.3 Seasonal Variations in Ground Water Levels

Regional ground water elevation records spanning eight or more consecutive years between 1984 and the present are available for a number of wells and piezometers located in Whirlwind Valley. These records provide a reasonable basis for characterizing long-term seasonal variations in ground water levels as well as the general trend of regional water table variations observed during this period. Selected hydrographs showing ground water elevations plotted as a function of time in the western, central, and eastern portions of Whirlwind Valley are shown on Figures 3-14A and 3-14B. As indicated by these Figures, certain hydrographs show a slight decline in the regional water table as measured during the period of record. The hydrograph for Monitoring Well U-1, which shows typical annual variations of two to four feet in ground water elevations and a regional decline of approximately five feet, is representative of conditions in the western subbasin of Whirlwind Valley. This trend is exaggerated in Well U-7, located along the gently-dipping eastern slopes of the northern Shoshone Range. Water elevations in U-7 have declined over 100 feet since March 1986. However, in the last two years, the approximately 15-foot seasonal variation in the water table measured at this well during the late 1980's has decreased to about four feet.

Typical ground water elevations as monitored in the eastern subbasin of Whirlwind Valley are represented by the hydrograph for Piezometer P-6. Similar to the trend noted for the western subbasin, a slight decline in the regional water table is discernible for the period of record, however, seasonal variations (approximately two feet) in ground water levels are less than those documented for the western subbasin due to the absence of a significant water table gradient in the eastern subbasin. The hydrograph for the Connelly Well (Conn #54) located at Beowawe, indicates a seasonally-stable water table extending east from Whirlwind Valley to the Humboldt River.

3.6.4 Ground Water Quality

Ground water quality data for the Mule Canyon Project Area are available from the following sampling sites:

- 16 bedrock wells, 12 bedrock springs, and 1 exploration mine adit in the Project Area
- 36 alluvial wells in Whirlwind Valley
- 18 wells, 13 springs, and 5 surface water bodies in the Beowawe geothermal area

The sampling sites are listed on Table 3-13. Included in this table are sampling site designations, sample collection dates, data sources, and map location numbers. A map showing the location of the sampling sites is presented as Figure 3-15.

In order to obtain detailed site-specific ground water quality information to establish site baseline conditions and as a basis for operational design and planning, SFPGC initiated quarterly water quality monitoring at selected sites in the Project Area during March and April 1994. Quarterly sampling continued for five quarters, through mid-1995, for the following sites, and ongoing monitoring of these sites continues under the NDEP Water Pollution Control Permit.

- 14 bedrock wells, 7 bedrock springs, and 1 exploration mine adit in the proposed mine area

- 3 alluvial wells in the Whirlwind Valley

The quarterly monitoring sites are shaded in Figure 3-15, to distinguish them from the other sampling sites previously described. A detailed description of the procedures used to collect and analyze the quarterly samples, including Quality Assurance/Quality Control (QA/QC) procedures, is provided in the baseline reports (SMI/BCI, 1995a, and WESTEC, 1994a, 1994b, 1995a, and 1995b).

Appendix B, includes copies of the current baseline water quality database for the Mule Canyon Project. Note that samples collected before 1991 were analyzed for limited water quality parameters that generally included:

- pH
- Temperature
- Total Dissolved Solids
- Major Cations (calcium, magnesium, potassium, and sodium)
- Major Anions (bicarbonate, carbonate, chloride, fluoride, and sulfate)
- Nutrients (nitrate and nitrite)
- Silica
- Selected trace elements including arsenic, boron, and lithium

Since 1991, samples collected from the Study Area have been analyzed for a more complete list of water quality parameters that includes the parameters on the Nevada Profile II list.

Results from baseline water quality monitoring at Mule Canyon are summarized in the following sections. For comparison and reference when reviewing these sections, applicable water quality standards for various uses are summarized in Table 3-14.

Bedrock Ground Water Quality in Proposed Mine Area

Ground water quality samples have been collected from 16 wells and an exploration adit in the proposed mine area. Data from the wells and adit are described separately below.

Well Data - Ground water samples from wells in the proposed mine area were neutral to slightly alkaline with pH values ranging from 7.0 to 8.8. Ground water temperatures ranged from 1.6 to 24.8°C and TDS concentrations ranged from 166 to 516 mg/l. Sodium or calcium were the dominant cations and bicarbonate or sulfate were the dominant anions. Silica concentrations ranged from 29 to 60 mg/l, fluoride concentrations ranged from 0.2 to 2.1 mg/l, and boron concentrations ranged from 0.05 to 0.2 mg/l. Nutrient levels were more variable, with nitrate and nitrite concentrations ranging from <0.02 to 6.2 mg/l (as N) and phosphorous concentrations ranging from <0.005 to 1.9 mg/l.

Dissolved trace element concentrations were generally at or below laboratory detection limits in most of the well samples. Trace elements that were frequently detected included the following:

- Aluminum (<0.008 to 4.03 mg/l)
- Arsenic (<0.001 to 0.07 mg/l)
- Barium (<0.01 to 0.26 mg/l)
- Iron (<0.006 to 64 mg/l)
- Lithium (<0.02 to 0.05 mg/l)
- Manganese (<0.001 to 0.34 mg/l)
- Strontium (0.05 to 0.32 mg/l)

Less frequently detected trace elements included antimony, selenium, thallium, titanium, vanadium, and zinc. Some trace elements that occurred at higher concentrations, including aluminum, iron, and manganese, may reflect the presence of colloidal material in the water samples and/or contamination during sample collection.

The lack of seasonal variability of ground water quality in the proposed mine area is demonstrated by recent quarterly sampling results. Each of the 16 wells was sampled on a quarterly basis from March and April 1994 to May 1995. Review of the quarterly data shows ground water quality was remarkably stable over this period for most parameters. Although some distinct seasonal trends in ground water temperature can be observed, no significant trends are seen in concentrations of other parameters analyzed including TDS, silica, fluoride, nutrients, and trace elements.

Data on the variability of ground water quality with aquifer depth were available from six wells that comprise two sets of nested wells. Review of data from well nest WMU-2 suggests that some decrease in TDS and increase in pH occurs with increasing aquifer depth. Similarly, TDS was noted to decrease with aquifer depth at well nest WMU-3, although this may be due to contamination from bentonite in the drilling fluids that reportedly occurred during well completion (SMI/BCI, 1995a).

Finally, the occurrence of mineralized zones in the proposed mining area does appear to have had some effect on local ground water quality. For example, sulfate concentrations were typically higher in this area and, in some samples, were greater than bicarbonate. Also, the higher TDS concentrations were generally associated with lower pH values (SMI/BCI, 1995a). Both observations indicate some reaction between ground waters and sulfide rock units.

<u>Adit Data</u> - Water quality samples have been collected from within and at the portal of a flowing exploration adit located in the west ore zone. This adit has since been sealed under an NDEP approved closure plan with a bulkhead seal. Although discharge from the adit still occurs, it is typically seasonal and limited to minor seepage around the seal.

Analysis of the adit samples indicates that adit discharge has a distinct chemical signature. The chemical signature of adit samples and other water samples collected from the Project Area are illustrated by Figure 3-16.

Review of available data indicates that the quality of the adit water is extremely variable. Depending on the time of the year and/or the sampling location, adit samples have ranged from very acidic to slightly alkaline with pH values ranging from 3.1 to 8.3, concentrations of TDS have ranged from 137 to 5884 mg/l, sulfate from 110 to 3,780 mg/l, silica from 27 to 75 mg/l, fluoride from 0.2 to 2.6 mg/l, and water temperatures from 6 to 28.3°C.

Nutrient concentrations were also variable with nitrate and nitrite concentrations ranging from <0.02 to 3.4 mg/l and phosphorous concentrations ranging from <0.005 to 12.8 mg/l.

Dissolved trace element concentrations in the adit were generally the highest measured in the Project Area, but were also quite variable. The following summarizes trace element analysis results:

- Aluminum (<0.05 to 20.3 mg/l)
- Antimony (0.002 to 0.014 mg/l)
- Arsenic (0.006 to 20.8 mg/l)
- Barium (0.01 to 2.34 mg/l)
- Beryllium (<0.001 to 0.007 mg/l)
- Cadmium (<0.002 to 0.278 mg/l)
- Chromium (<0.01 to 0.13 mg/l)
- Cobalt (<0.02 to 0.84 mg/l)
- Copper (<0.01 to 0.16 mg/l)
- Iron (0.03 to 865 mg/l)
- Lead (<0.001 to 0.102 mg/l)
- Lithium (<0.02 to 0.05 mg/l)
- Boron (0.07 to 0.10 mg/l)
- Manganese (0.13 to 32.2 mg/l)
- Mercury (<0.0002 to 0.0008 mg/l)
- Molybdenum (<0.01 to 0.13 mg/l)
- Nickel (<0.02 to 0.59 mg/l)
- Selenium (<0.001 to 0.143 mg/l)
- Silver (0.0006 to 0.016 mg/l)
- Strontium (0.7 to 2.44 mg/l)
- Titanium (<0.005 to 0.082 mg/l)
- Vanadium (<0.007 to 0.08 mg/l)
- Zinc (<0.01 to 4.1 mg/l).

The relatively low pH values and high concentrations of TDS, sulfate and trace elements in the adit samples are indicative of ARD. ARD conditions were observed behind the adit bulkhead during the winter and at the adit portal during the spring. This suggests that zones of sulfidic rock were locally exposed in the adit and, during the springtime, sulfide oxidation products were flushed out of the adit. Downgradient from the bulkhead and at the adit portal during other times of the year, adit water quality generally met drinking water standards, being similar to ground water samples from wells and springs in the Project Area. This suggests that the adit waters were diluted with inflows of relatively fresh ground water.

Low pH drainage in the exploration adit had the lowest quality of any waters sampled during the project baseline evaluations. Given that the adit is in the ore zone, which has the highest concentrations of total sulfur and is subject to oxidizing conditions, adit water quality reflects a combination of the primary conditions which contribute to acid formation. It is expected that water which collects in mine pits during and after mining would have an intermediate quality as a result of mixing with relatively dilute ground water (SMI/BCI, 1995a).

Further discussion of potential water quality impacts from the proposed mining operation is provided in Chapter 4 of this EIS.

<u>Spring Water Quality in Proposed Mine Area</u>

Water quality data are available for 12 bedrock springs in the proposed mine area. Review of these data indicates that spring water quality is generally similar to that of the ground water samples collected from area bedrock wells. The spring waters were near neutral to moderately alkaline with pH values ranging from 7.1 to 10.1. Ground water temperatures ranged from 4.4 to 31.7°C and TDS concentrations ranged from 114 to 456 mg/l. Calcium was the dominant cation and bicarbonate was the dominant anion in the spring samples. Silica concentrations ranged from 25 to 58 mg/l, fluoride from 0.2 to 0.8 mg/l, and boron from 0.07 to 0.2 mg/l. Nutrient levels were more variable, with nitrate and nitrite from <0.01 to 9.3 mg/l (as N) and phosphorous concentrations ranging from <0.005 to 0.1 mg/l.

Dissolved trace element concentrations were generally near or below laboratory detection limits for most of the springs sampled. Trace elements that were frequently detected included the following:

- Aluminum (<0.1 to 20.7 mg/l)
- Arsenic (<0.001 to 0.013 mg/l)
- Barium (<0.1 to 2.8 mg/l)
- Iron (<0.02 to 24.1 mg/l)
- Lithium (0.007 to 0.03 mg/l)
- Manganese (<0.001 to 0.58 mg/l)
- Strontium (0.10 to 0.38 mg/l)

Less frequently detected trace elements included antimony, lanthanum, mercury, selenium, silver, titanium, vanadium and zinc. Some of the trace elements detected at higher concentrations, including aluminum, barium, iron, and manganese, may reflect the effects of colloidal material in the spring water when the samples were collected (SMI and Baker, 1995a).

The lack of seasonal variability of spring water quality in the proposed mine area is demonstrated by quarterly sampling results. Eight of the springs were sampled on a quarterly basis from March and April 1994 to April 1995. Review of the quarterly data shows that with the exception of temperature, and to a lesser degree TDS, spring water quality remained relatively stable over the period. Most springs showed a distinct increase in temperature during the summer months and a slight increase in TDS over the same period. Little or no significant trends were seen in most other parameters analyzed including silica, fluoride, nutrients, and trace elements.

The occurrence of mineralized zones in the proposed mining area appears to have had little effect on the quality of the springs. A few springs (MSC-7, MSC-8, and MSC-10 in particular) did exhibit higher sulfate and TDS concentrations which may be related to reactions between ground water and local zones of sulfidic rock.

have a chemical signature distinctly different from other waters in the Project Area. This difference is illustrated by Figure 3-16. As shown in the diagram, sodium was the dominant cation and bicarbonate was the dominant anion in most of the geothermal water samples analyzed. In a few samples, sulfate rather than bicarbonate, was the dominant anion which may be the result of contamination from drilling fluids (SMI/BCI, 1995a).

Review of available water quality data shows that the geothermal waters are characterized by relatively high pH values, high temperatures, elevated concentrations of TDS, silica, fluoride, boron, and lithium, and relatively low nutrient levels. The following range of values have been measured for these parameters:

- pH (8.1 to 9.9)
- Temperature (22.5 to 212°C)
- TDS (670 to 1615 mg/l)
- Silica (195 to 720 mg/l)
- Fluoride (2.8 to 22 mg/l)
- Boron (0.9 to 7 mg/l)
- Lithium (0.9 to 3.2 mg/l)
- Nitrate (<0.1 to 0.7 mg/l)

Trace element data for the geothermal waters are limited. Available data indicate that several trace elements can be detected in these waters including:

- aluminum (up to 78 mg/l)
- antimony (0.013 mg/l)
- arsenic (up to 0.07 mg/l)
- barium (up to 0.6 mg/l)
- bromine (0.145 mg/l)
- cesium (up to 1.04 mg/l)
- iron (up to 10 mg/l)
- lead (up to 0.06 mg/l)
- manganese (up to 0.08 mg/l)
- mercury (up to 0.4 mg/l)
- rubidium (up to 0.32 mg/l)
- uranium (up to 2 mg/l)
- zinc (up to 2.32 mg/l)

3.7 SOILS

For soil resources, the Study Area includes the Project Area and other immediately adjacent areas. The CEA includes the Study Area, Whirlwind Valley, and adjacent areas along the crest and western slope of the Northern Shoshone Range. Both the Study Area and the CEA are shown on Figure 3-17.

Baseline information used to characterize soils was derived from the Tuscarora Mountain Soil Survey (Dollarhide, 1980); a draft USDA-SCS Soil Survey work for Lander County, and a report prepared by JBR Consultants Group (JBR Consultants Group, 1992). Intensive soil surveys were completed for the proposed mine disturbance area (Nyenhuis, 1992), the alternative access corridor routes, and Project Area extension (RCI, 1994).

3.7.1 Soil Types, Properties, and Mapping

Soils within the cumulative effects area exhibit a wide range of characteristics reflecting variations in parent material, topography, and microclimate common to the region (JBR, 1992; Dollarhide and Staidl, 1980). These variations in soil characteristics are illustrated by Table 3-15, which summarizes selected characteristics for soils occurring within the cumulative effects area.

Correlation of the site-specific soils surveys (Nyenhuis, 1992 and RCI, 1994) resulted in several related soil units being combined. As designated on Figure 3-17, the Tenabo soils were combined with units 1, 1B, 5, 6 (Tenabo variants); the Havingdon soils were combined with Unit 10/-(Bucan stony loam); and the Chiara soils were combined with unit 8/4 (Ramires gravelly loam). Correlation resulted in 23 soil mapping units representing a range of topographic positions for the Project Area, extension area, and access routes. Soil mapping unit designations, locations, and aerial extents are shown on Figure 3-17. Table 3-16 summarizes selected soil mapping unit characteristics for this survey area. Soils can be grouped into five categories based on topographic position and associated landforms:

RCI also identified five jurisdictional wetlands outside the Project Area but within the expanded Study Area as summarized by Table 3-22. One jurisdictional wetland area exists within the proposed water supply well field area and four wetlands were identified along the various alternative access routes. The four wetland sites along the access routes all exhibited sufficient hydrophytic vegetation, hydric soils, and wetland hydrology to classify as jurisdictional wetlands. The first three wetland sites (Wetlands 1, 2, and 3) located in the SE¼, Section 2, T31N, R48E, the NE¼, Section 10, T31N, R48E, and midway between Sections 4 and 9, T31N, R48E, respectively are along the preferred eastern access alternative route. The fourth site (Wetland 4) runs through the middle of Section 8, T31N, R48E along the secondary eastern access alternative corridor.

RCI conducted a wetlands function and values evaluation using the Wetland Evaluation Technique (Adamus, et al, 1987) for wetlands and other waters of the United States in the Project Area (RCI, 1995). Wetland functions are defined as the physical, chemical, and biological characteristics of a wetland. Wetland values are those characteristics which are beneficial to society. In the five assessment areas reviewed by RCI, most functions and values were rated as moderate or low, with a few rated as high.

3.8.4 Threatened, Endangered, and Sensitive Plant Species

A review of the Nevada Natural Heritage Program database indicates that no occurrences of any Federal or State listed threatened, endangered, or sensitive plants are known within the boundaries of the Project Area. Four species, formerly listed as Federal Category 2 Candidate Species, have however, been documented as occurring within Lander County: Elko rockcress (*Arabis falcifructa*), Eastwood milkweed (*Asclepias eastwoodiana*), San Pitch Valley milkvetch (*Astragalus lentiginosus* var. *chartaceus*), and windloving buckwheat (*Eriogonum anemophilum*). A fifth species, lobed catchfly (*Silene scaposa* var. *lobata*), known to occur approximately seven miles away, was downgraded to Federal Category 3C and has been deleted from consideration for protection by the Northern Nevada Native Plant Society. Field vegetation survey efforts by WRD and RCI included inspections for these species, however, no specimens or populations were discovered within the Project Area. The USFWS recently revised the list of Candidate species (Federal Notice of Review, 2/28/96), reducing the number of Candidate species for Nevada from 270 to 6 and eliminating the C1 and C2 classifications. With the exception of the spotted frog (Rana pretiosa), all previously listed Candidate species which might occur within the Project Area have been removed from the Federal Candidate species list. In order to provide for "...interim consideration and conservation..." (BLM Instruction Memorandum NV-96-019, 3/20/96), however, the BLM has incorporated the formerly listed candidate species in the Nevada BLM Sensitive Species List. All cacti and yucca species are protected by the Nevada Cactus-Yucca Law (Nevada Revised Statutes 527.270). This law requires that the NDEP issue a permit for

TABLE 3-22
CHARACTERISTICS OF WETLANDS OUTSIDE THE PROJECT AREA, BUT WITHIN THE EXPANDED STUDY AREA

Wetland Number	Elevation	Areal Extent (Acres)
2	6050	0.58
4, 5, 6	6050	266.38
11	6400	0.20
Total Acres		267.16

Source: (RCI, 1995)

commercial taking in the event that large numbers of cactus plants would be affected. During site-specific surveys it was noted that the Project Area does not serve as prime habitat nor exhibit high density populations of cacti or yucca. Because of very sparse occurrence, it is not anticipated that a permit would be required for disturbance or removal of the limited numbers of individual yucca and cacti which may be affected.

3.9 GRAZING AND RANGE MANAGEMENT

For the evaluation of grazing use, the Study Area includes the Project Area and is essentially the same as the CEA, encompassing the Argenta and potentially effected portions of the Geyser grazing allotments as designated by the BLM and shown on Figure 3-19.

The characterizations of grazing and range management practices presented in this section are based on information obtained from the BLM (JBR, 1991 and 1992) and site-specific field studies (WRD, 1994 and RCI, 1994 and 1995). Information resulting from field surveys by WRD was used to delineate floral communities, and characterize potentially affected areas. The RCI studies included observations of current utilization and field verification and updating the information previously obtained and summarized by JBR.

3.9.1 Grazing Conditions and Use

The Project Area, excluding the proposed water supply well field and alternative access corridors, overlaps a substantial portion of the northeast corner of the Argenta grazing allotment as indicated by Figure 3-19. This allotment occupies a total of 300,160 acres of which approximately 41 percent (122,370 acres) are public lands managed by the BLM Battle Mountain District. The proposed well field and alternative access corridors are located in Whirlwind Valley within the Geyser Allotment which consists of 106,663 acres. Of this acreage approximately 44 percent (46,635 acres) is public lands managed by the BLM Elko District. There is presently no fence or physical boundary between these two adjacent grazing allotments.

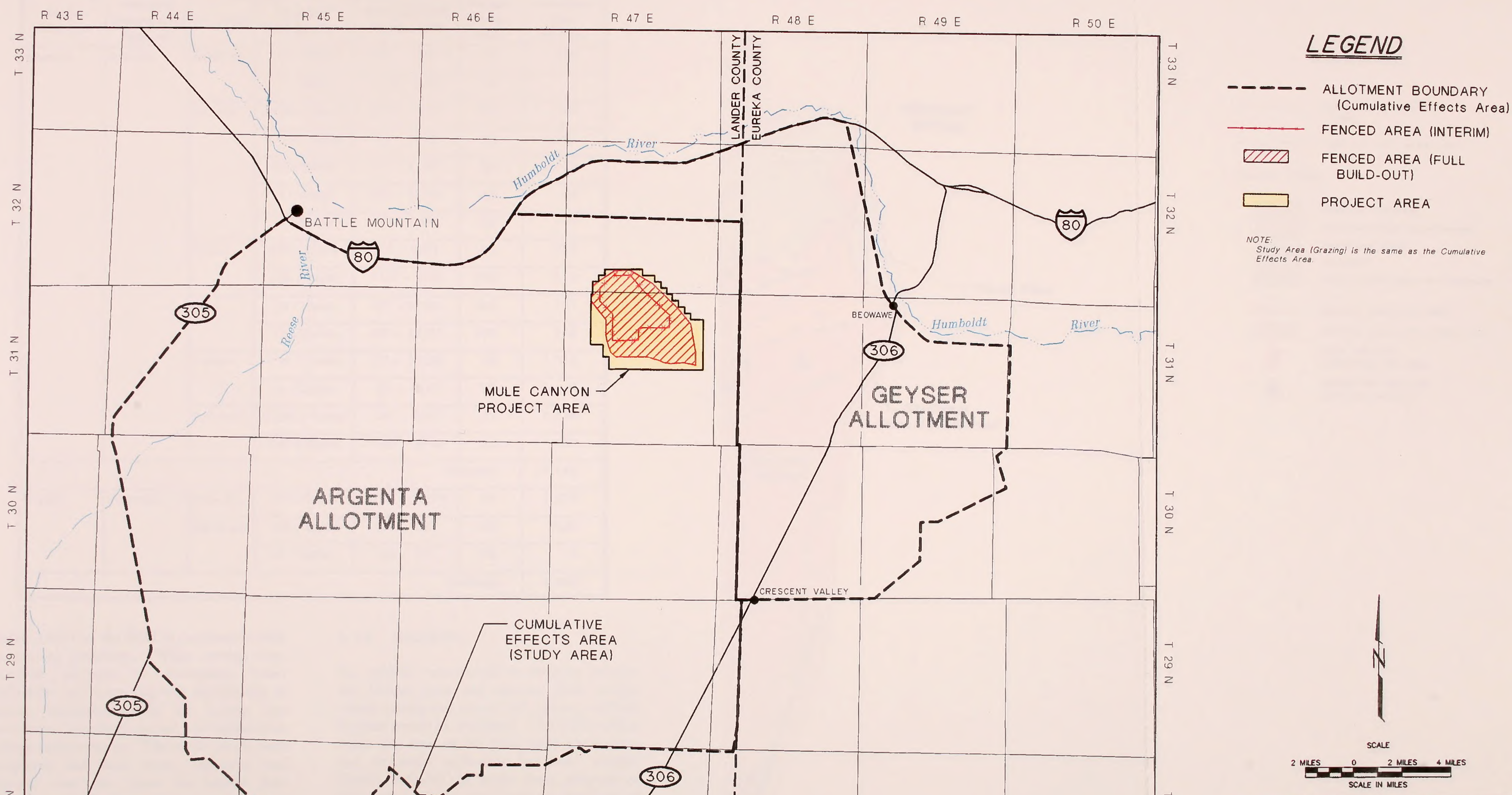
As indicated in Table 3-23, (based on BLM range surveys obtained from the BLM District Offices in Battle Mountain and Elko, Nevada), a total of six permittees are licensed to utilize the Argenta Allotment for grazing while only two licensed permittees utilize the Geyser Allotment. Tomera Ranches is the primary user of public lands within the Argenta Allotment with the Alves, Sansinena, Filippini, Horn, and Agri-Beef Ranches also utilizing portions of this area. The two permittees for the Geyser Allotment are Zeda, Inc. and Sansinena Ranch. Livestock grazing is generally limited to beef cattle for most portions of both allotments, however, Agri-Beef also grazes sheep on a portion of the Argenta Allotment. Because there is generally little or no fencing in the area, use tends to be territorial and there is limited seasonal management of grazing use.

The public lands of the Geyser Allotment, designated as Custodial (C) under the BLM's selective management approach, have been permitted for 2,062 Animal Unit Months (AUMs) based on the 1964 BLM range surveys as indicated by Table 3-23. This level of public land use equates to a carrying capacity of about 23 acres/AUM. The Argenta Allotment, where most project related disturbance would occur, is designated an Improve (I) category. This allotment has been permitted for 17,140 AUMs. Based on the 1964 BLM range surveys, the capacity of the overall allotment averages about nine acres/AUM although portions of the Argenta Allotment may not be suitable for grazing use due to steep terrain, rock exposures and limited vegetation, or lack of adequate livestock watering sources.

Subsequent to the 1964 BLM range survey, range fires and shifts in grazing utilization to areas not impacted by the fires have occurred. These factors have resulted in some changes in vegetation types, productivity, and carrying capacity for the affected areas.

3.9.2 Management

Management of the Argenta and Geyser allotments is consistent with the low intensity management designations for these areas. The only known range improvements are spring/trough developments constructed during



MULE CANYON MINE

FIGURE 3-19

LIVESTOCK GRAZING CUMULATIVE EFFECTS AREA

Source: JBR CONSULANTS GROUP, 4/30/92

File: MC-GRAZE.DWG

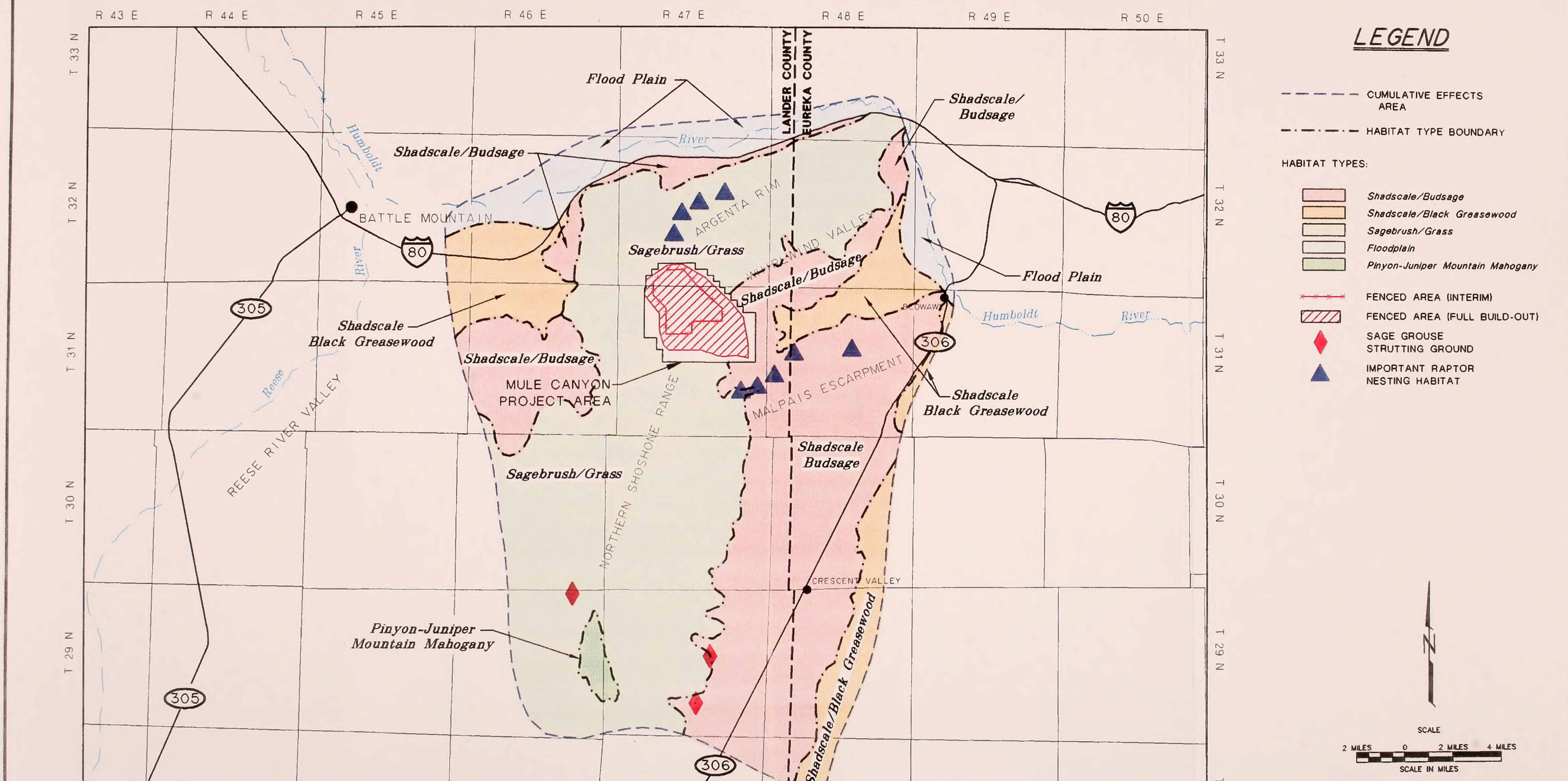
TABLE 3-23
GRAZING USE PARAMETERS FOR THE ARGENTA AND GEYSER ALLOTMENTS

Grazing Allotment	Selective Management Approach	Permittee	Livestock (Number/Kind)	Grazing Period (Begin -- End)	Percent Public Use	Permitted Use (AUMs)
Argenta	Improve	Sansinena	160 / Cattle	3/16 -- 12/311	30	459
			1 / Cattle	3/16 -- 4/16	30	4
		Tomera	2,106 / Sheep	2/16 -- 2/28	100	180
			1,019/ Cattle	3/1 -- 12/31	30	9,782
			308/Cattle	3/1 -- 12/31	80	2,479
			7 / Horse	3/1 -- 12/31	80	56
			4 / Horse	3/1 -- 3/31	80	4
		Alves	308 / Cattle	3/1 -- 3/31	100	314
			206 / Cattle	11/1 -- 2/28	100	813
		Horn	14 / Horse	3/1 --12/31	100	141
			16 / Horse	3/5 -- 12-31	100	159
		Filippini	118 / Cattle	3/1 -- 11/30	95	1,014
			4 / Cattle	6/1 -- 6/30	80	4
		Agri-Beef	9,252 / Sheep	4/1 -- 6/30	23	1,274
			2,014/Sheep	10/1 -- 2/28	23	460
					Subtotal	17,140
Geyser	Custodial	Zeda Inc.	371/ Cattle	4/15 -- 10/14	55	1,228
		Sansinena	108 / Cattle	4/1 -- 12/2	95	830
			4 / Cattle	4/1 -- 5/1	80	4
					Subtotal	**2,062**

the late 1950's by the BLM in cooperation with the grazing permittee. While serving their intended purpose of increasing water availability and increasing the distribution of grazing utilization, only the spring met government specifications and was registered as a range improvement. The stock ponds were completed but were never registered and siltation over the years has limited their effectiveness. Information on these range improvements including their location and nature is presented in Table 3-24.

3.10 WILDLIFE

For wildlife resources the Study Area includes the Project Area and adjacent lands within which anticipated direct and indirect wildlife impacts would be contained. The CEA, which takes into account big game herd movements and territorial utilization by many wildlife species, includes the Study Area, portions of Whirlwind Valley, the northern portions of Crescent Valley, the Northern Shoshone Range, and an area on the western side of the Northern Shoshone Range. Both the Study Area and CEA are shown on Figure 3-20.



MULE CANYON MINE

FIGURE 3-20

VEGETATION COMMUNITIES AND WILDLIFE HABITAT

Source: JBR CONSULANTS GROUP, 4/30/92

File: MCVEGCOM.DWG

Pronghorn are not common in the vicinity of the Project Area or in the Shoshone-Eureka Resource Area. Small numbers of pronghorn do occur in the general area. A group of 13 pronghorn was observed in the fall of 1991 in the Whirlwind Valley - Malpais Escarpment area, and another group of five animals were noted in Whirlwind Valley during the spring 1992 wildlife surveys (JBR, 1991 and 1992a). Pronghorn may be attracted to Whirlwind Valley because of the water source provided by the outflow stream from Beowawe Geysers hot springs and the Oxbow Resources, Inc. geothermal power plant. No pronghorn winter range or crucial range has been designated within the CEA by the NDOW.

According to NDOW and BLM habitat maps, the Project Area provides both year-long and winter mule deer range as shown by Figure 3-21. The northeastern portion of the Shoshone Range, including the lower elevations of Mule Canyon and Deer Canyon in the Project Area, are classified as crucial deer winter range. Crucial winter range also exists along the Argenta Rim and between Slaven and Bateman canyons approximately 6.5 miles southwest of the Project Area. Small numbers of wintering deer have also been recorded along the Malpais Escarpment on the south edge of Whirlwind Valley. According to Larry Teske, NDOW (personal communication, as cited in JBR, 1992b) many of the deer in the CEA summer along the Humboldt River and winter in the northeastern Shoshone Range, especially in the Argenta Point and Dunphy Pass areas. The river valley habitats in the CEA are classified as crucial year-long range as indicated by Figure 3-21.

Some of the deer that winter in this area also utilize the higher elevations in the Mount Lewis area to the west of the CEA as summer range.

The CEA lies within NDOW Management Area 15, Management Unit 151. The NDOW's management goal for this area is to maintain a ratio of 20 bucks or more per 100 does. In 1988, buck ratios declined dramatically to 10.9 bucks per 100 does. The ratio remained below 13.5 bucks per 100 does in 1989 and 1990. The management unit encompassing the northern Shoshone Range was split and the deer tag quota lowered for the area in 1991. Trend counts made in the 1991-1992 fall and winter period indicated that this management action was successful with the buck ratio rising to 20.8 bucks per 100 does.

Site-specific surveys indicate that mule deer use of the Project Area in the spring and fall is relatively low. Only four mule deer were observed near the Project Area during the fall 1991 surveys, and none were seen during the spring 1992 surveys. The relative frequency of tracks and pellets encountered during the two survey periods indicated that mule deer use of the area is somewhat higher in the spring than in the fall.

3.10.3 Other Mammals

Predators potentially occurring in the Project and CEAs include coyote, badger, kit fox, long-tailed weasel, short-tailed weasel, striped skunk, spotted skunk, and bobcat. Field surveys documented the presence of coyote, fox (tracks, probably kit fox), badger, and bobcat.

The Project Area supports a wide variety of other small and medium-sized mammals associated with Great Basin desert habitats. Field surveys and small mammal trapping documented the presence of 14 different species of small and medium-sized mammals (JBR, 1991 and 1992a; RCI, 1994). These included three rabbit and eight rodent species. One rabbit identified by field surveys was the pygmy rabbit. This species is listed by the USFWS as a C2 Candidate Species as discussed in greater detail in Section 3.10.9.

3.10.4 Waterbirds

The Project Area is located within the Pacific Flyway for waterfowl. Although waterbird habitat is limited within the Project Area, the Humboldt River on the north end of the CEA serves as an important migratory stop-over for waterfowl and shorebirds.

Within the Project Area and the remainder of the CEA, waterbird habitat is limited primarily to small creeks, stockponds, and springs. Small playas in Whirlwind Valley that are seasonally flooded after spring rains also provide rooting and foraging habitat for some species of migrating waterbirds. In addition, waterbird use has been recorded in the outflow stream of the Oxbow Resources, Inc. geothermal plant. Waterbirds observed in the Project Area include mallard, killdeer, common snipe, American avocet, and long-billed curlew.

3.10.5 Upland Game Birds

Mourning dove, chukar, gray partridge, sage grouse, and California quail are known to occur within the CEA. Mourning doves are summer residents and occur in the Project Area from spring through fall. Small numbers of gray partridge occur at scattered locations in the general vicinity of the Project Area. California quail were introduced at a number of sites in the Shoshone Range by the NDOW in the spring of 1992, however, suitable habitat for California quail is limited in the Project Area, and only one observation of California quail was recorded by field surveys.

Chukar were the most abundant game bird found in the Project Area and, from a recreational standpoint, are the most important game bird in the area. Because of the popularity of hunting for chukar within the CEA, potential impacts to this species has been identified as a project issue. Springs in the area provide an important water source for this species, and most observations of chukar were made in proximity to these water sources (RCI, 1994). Wet meadow and riparian habitats supported by springs are utilized as brood rearing habitat by chukar. Even fewer observations were recorded during the 1994 surveys.

The NDOW has conducted helicopter surveys to collect population trend information on chukar along the west side of the Project Area (Argenta aerial survey plot) since 1986. Chukar densities recorded from the survey plot have ranged from a high of 95 birds per square mile in 1989 to a low of 20 birds per square mile in 1993 and 1994 (RCI, 1994). There has been a steady downward trend of chukar populations in the Mule Canyon area since 1989 as a result of continued drought and associated poor forage conditions.

Sage grouse occur in the CEA but are not common in or near the Project Area. The Northern Shoshone Range are not heavily utilized as brood rearing habitat, and the closest known lek, or breeding sites, are located several miles south of the Project Area in the Crescent Valley and in an area known as The Park as shown on Figure 3-21. Sage grouse were noted in the Project Area on only two occasions during the summer of 1994. Both observations were of adult and young birds near Spring MCS-2. The presence of young birds indicates possible breeding activity near the Project Area, however, no sage grouse leks are known in the vicinity of the Project Area, and no evidence of breeding activity was recorded by field surveys.

3.10.6 Raptors

Several species of raptors are known to nest in the Study Area and are expected to breed in the CEA. Golden eagles, prairie falcon, and red-tailed hawk nest within the CEA at cliff sites to the north and south of the Project Area. Red-tailed hawk, Swainson's hawk, ferruginous hawk, northern harrier, short-eared owl, and long-eared owl nest near the Humboldt River and at suitable sites in associated agricultural lands. The ferruginous hawk is a Federal Candidate (C2) species as discussed in greater detail in Section 3.10.9. The north end of the Shoshone Range has been identified as important long-eared owl nesting habitat (Herron et al, 1985). Golden eagles, red-tailed hawks, sharp-shinned hawks, Cooper's hawks, and prairie falcons nest in the central Shoshone Range. In the southwestern portion of the CEA, stands of pinyon-juniper and large serviceberry shrubs provide potential nest sites for red-tailed hawk, ferruginous hawk, Cooper's hawk, and sharp-shinned hawk. Large cottonwoods growing in association with the springs and drainages in the CEA, and to a lesser extent the Project Area, represent potential nest sites for tree nesting raptors such as golden eagle, red-tailed hawk, and Swainson's hawk.

Raptors observed in or near the Project Area during field surveys included turkey vulture, golden eagle, prairie falcon, American kestrel, red-tailed hawk, Cooper's hawk, sharp-shinned hawk, northern harrier, great horned owl, and short-eared owl. Although suitable cliff nesting habitat for species such as golden eagle, red-tailed hawk, and prairie falcon is present along the Argenta Rim north and northwest of the Project Area and along the Malpais Escarpment southwest of the Project Area as shown on Figure 3-20, no evidence of raptor nesting activity was documented in these areas by field surveys. Mature poplars along the alternative east access route near Beowawe also represent potential raptor nest sites. One active red-tailed hawk nest was located in 1994 within the alternative east access corridor along the main road from to the project site from Beowawe. The nest was located in a poplar west of the Sansenina Ranch. One young was successfully fledged from the nest (RCI, 1994).

3.10.7 Other Birds

In general, the variety and occurrence of breeding songbirds within the Project Area is limited by a low diversity of vegetation species and structure. Most songbirds migrate to and from the area and occur only as summer residents. The greatest diversity of songbirds was recorded during the spring migration period. Many were migrants that were not present during the summer months. Species recorded by the fall surveys were primarily year-long residents, such as horned lark, common raven, black-billed magpie, ruby-crowned kinglet, and white-crowned sparrow. Common summer breeders recorded in the Project Area included horned lark, western meadowlark, Brewer's sparrow, Brewer's blackbird, rufous-sided towhee, lark sparrow, American robin, and loggerhead shrike.

3.10.8 Aquatic Macroinvertebrates

Water quality and aquatic macroinvertebrate populations were sampled at six perennial springs in the project area in 1994. Aquatic macroinvertebrates are small aquatic animals without internal bone structure such as insects, worms, mollusks, and snails. Aquatic macroinvertebrates are a possible issue related to project development because of the potential presence of a rare spring-snail species which is being considered for listing under the Endangered Species Act.

In general, spring waters in the Project Area were found to be warm, highly mineralized and alkaline (BioTekna, 1994). Water and aquatic habitat quality ranged from poor to excellent depending on the extent of habitat degradation, primarily from direct disturbance and organic loading. Macroinvertebrate species diversity varied with spring conditions, and species encountered were representative of the types of aquatic habitats present (BioTekna, 1994). Snails were found at two springs (MCS-3 and MCS-8), but they were determined to be rather common genera rather than the spring-snail (Family: *Hydrobiidae*) being considered for listing (BioTekna, 1994).

3.10.9 Threatened, Endangered, and Candidate Species

According to the USFWS (letter dated 4/6/94), no threatened or endangered species are likely to occur within the Project Area. Bald eagles (threatened), however, have been documented foraging and roosting during the winter along the Humboldt River near the Project Area (Lamp, personal communication, 1995). The letter listed four species formerly listed as Federal Category 2 Candidate Species (spotted bat, pygmy rabbit, loggerhead, shrike, and ferruginous hawk) and one formerly listed C1 Candidate (spotted frog) as possibly occurring in the area.

Since the date of that letter, western populations of the loggerhead shrike were removed from candidate listing and several species of *Myotis* bat and both subspecies of Townsend's big-eared bat were added as C2 Candidates (50 CFR Part 17, November 15, 1994). Based on review of habitat requirements for the listed candidate bat species and limited potential for occurrence, no surveys were completed. The USFWS recently revised the list of Candidate species (Federal Notice of Review, 2/28/96), reducing the number of candidate species for Nevada from 270 to 6 and eliminating the C1 and C2 classifications. With the exception of the spotted frog (Rana pretiosa), all previously listed Candidate species which might occur within the Project Area have been removed from the Federal Candidate species list. In order to provide for "...interim consideration and conservation..." (BLM Instruction Memorandum NV-96-019, 3/20/96), however, the BLM has incorporated the formerly listed candidate species in the Nevada BLM Sensitive Species List. Species identified as Federal Candidate or BLM Sensitive species possibly occurring near the Project Area are listed in Table 3-25. The possibility of these species occurring within the Project Area is discussed below by species.

<u>Western Small-footed Myotis</u>. This species inhabits rocky and canyonland areas and is widespread throughout the western United States (Barbour and Davis, 1969). The range of this species overlaps the Project Area and potential day roost sites may be provided by areas of rock outcrop. No natural caves or exposed abandoned mine adits are present within the Project Area.

<u>Fringed Myotis</u>. This species inhabits oak, pinyon-juniper, and desert scrub habitats in the Southwest. It is typically found at elevations from 4,000 to 7,000 feet (Barbour and Davis, 1969). Suitable foraging habitat is generally lacking within the Project Area but is present along the Humboldt River and at the higher elevations within the CEA. Preferred roost sites such as natural caves or exposed abandoned mine adits are not present within the Project Area. Because of the lack of suitable roost sites and foraging habitat, the presence of this species is unlikely.

<u>Long-eared Myotis</u>. Long-eared myotis occur throughout most of the western United States and prefer higher elevation coniferous forests (Barbour and Davis 1965). Suitable habitat is lacking within the project area but is present at the higher elevations within the CEA. Preferred roost sites such as buildings, trees, natural caves, or exposed abandoned mine adits are not present within the project area, the presence of this species is unlikely.

<u>Long-legged Myotis</u>. Long-legged myotis also prefer higher elevation coniferous forests but have been recorded in pinyon-juniper and montane shrub situations (Zeveloff, 1988). Preferred habitats are lacking within the Project Area but are present at the higher elevations within the CEA. Cliffs and areas of rock outcrop within the CEA may provide roost sites, however, the presence of this species is unlikely in the Project Area.

TABLE 3-25
CANDIDATE OR SENSITIVE SPECIES POTENTIALLY OCCURRING WITHIN THE PROJECT AREA

Common Name Status[1]	Scientific Name	Designation
Spotted bat	*Euderma maculatum*	BLM Sensitive
Western small-footed myotis	*Myotis ciliolabrum*	BLM Sensitive
Long-eared myotis	*Myotis evotis*	BLM Sensitive
Fringed myotis	*Myotis thysanodes*	BLM Sensitive
Long-lagged myotis	*Myotis volans*	BLM Sensitive
Yuma myotis	*Myotis yumanensis*	BLM Sensitive
Townsend's big-eared bat	*Plecotus townsendii*	BLM Sensitive
Pygmy rabbit	*Brachylagus idahoenisis*	BLM Sensitive
Ferruginous hawk	*Buteo regalis*	BLM Sensitive
Spotted frog	*Rana pretiosa*	Federal Candidate

by car. Elko is considered the regional trade center for the area with a growing economy and retail/service sector providing shopping, services, and entertainment. Battle Mountain and Carlin provide some services to their residents, but on a much smaller scale. Beowawe and Crescent Valley are very small towns and have few services other than basic utility provisions.

Studies of the socioeconomic effects of mineral and energy development in the rural west commonly use about a one-hour drive commuting time as an indicator in identifying where workers will live and, hence, the potential impact area for a project. However, in Nevada, urban settings are more widely distributed, therefore commutes are often longer than one hour. While driving time is important, other considerations including availability of suitable housing, quality and availability of public services, and access to shopping are often the determining factors relative to worker distribution and residence. If driving times are similar, a larger, more diverse community will outdraw a smaller one by a wide margin.

On this basis, the majority of the workers for the Mule Canyon project would probably live in Elko and Spring Creek, with some locating in Battle Mountain and Carlin, and a few in Beowawe and Crescent Valley. Carlin is closer to the mine site than Elko, but lacks amenities because of its small size. Battle Mountain would be the closest town of significant size given current County upgrading and construction on the Beacon Light Road, but this community presently lacks many of the housing opportunities, services, and amenities available in a larger town. Crescent Valley and Beowawe are very small, but close enough to the mine to potentially be affected.

Mining and agricultural activity have historically been the primary basis of the economy in Lander, Elko, and Eureka counties, with the service and trade industries becoming increasingly important, especially as they relate to mining activity and the gaming industry. During the decade from 1980 to 1990, increased gold exploration and mining along the Carlin Trend caused a huge in-migration to the area. The population of Elko County grew 96 percent during this period, Lander County 56 percent, and Eureka County 29 percent (Nevada Department of Taxation, and Nevada Employment Security Department).

Growth continues in the area, though not as rapidly as during the mining boom of the middle and late 1980's. Mining activity remains strong and new mine development and expansions can be expected in the region through at least the next five years. Barrick Goldstrike's new Meikle underground mine in the North Carlin Trend is nearing completion. Cortez Gold Mines has initiated construction on the Pipeline Project, a new open pit mine near the existing Cortez facilities in Crescent Valley. Battle Mountain Gold's Phoenix Project expansion is currently in the EIS phase and are scheduled to begin construction in 1997. SFPGC also has two EIS's in progress for expansions at their Twin Creeks and Lone Tree Mines, and has initiated the EIS process for their Trenton Canyon Project west of Battle Mountain with the mine scheduled to be operational by the end of 1997.

Other projects in the general area which are presently in the planning stage include Hecla Mining Company's new Rosebud Mine west of Winnemucca, and a possible expansion at First Miss Gold's Getchell Mine in the near future. Additionally, Newmont Gold Company plans to add 120 workers this fall to their Carlin area operations. Exploration continues throughout the area and new activity is expected through the next several years. The only mine in the area scheduled to downsize in the near future is AMAX Gold's Sleeper Mine north of Winnemucca which is expected to release 60 to 70 workers in early 1996 as their operations wind down.

Historical and current growth in the three counties impacted by mining development and ongoing operations has put considerable strain on housing availability and services in local communities. Housing remains extremely tight throughout the area, and will perhaps be the most critical issue associated with the Mule

Major northerly routes are approximately 60 miles away at Elko (State Route 225) and Winnemucca (U.S. 95). County and BLM roads serve as collector roads for the major State and Federal routes. The Proposed Project Area is currently accessible via BLM Road 6040 connecting to Lander County Road 106C (Beacon Light Road) on the west and Eureka County Road M-116 on the east.

Both the proposed west access (Beacon Light Road) and the east access alternatives would result in increased traffic near existing residences. The existing roads, which would be incorporated as part of the selected access, are utilized primarily for local traffic including use as school bus routes for the surrounding rural areas.

Interstate 80 is built to full interstate standards. The state highways are paved, all weather, two-way rural highways with 12 to 14-foot wide travel lanes in generally good condition. County roads are more varied in quality and condition. They range from very rough jeep tracks to well maintained, graded roads with full two-lane cross-sections. Designated County roads G-234, M-116, and 106C (Beacon Light Road) are gravel surfaced in good condition. The back country roads follow the natural terrain rather than survey lines and virtually all have a dirt and rock surface with no imported surfacing materials applied. The existing western site access route is quite rough and generally limited to four-wheel drive vehicles and dry weather conditions.

Traffic count data for the past ten years are inconsistent, showing traffic increasing in some years and decreasing in others. Interstate 80 traffic levels in the vicinity were highly variable but generally increased at an average of approximately 2.0 percent per year from 1990 to 1994, ranging from 5,075 to 5,490 vehicles per day (vpd) (NDOT 1995). State Route 306 traffic just south of Interstate 80 was also erratic from 1990 through 1994, ranging from 265 vpd to 365 vpd, increasing 8.3 percent in 1994 to 365 vpd (NDOT 1995). In general, traffic levels around the area appear to rise and fall with mineral development activity. Such effects may be highly localized for a road like State Route 306, but for Interstate 80 and streets in larger communities like Battle Mountain, Carlin, and Elko follow general regional trends.

Current traffic volumes are well below capacity on all major highways in the Study Area as indicated by Table 3-38. All major highways are operating at "A" levels of service, indicating traffic flows freely with no consistent delays, impediments, or congestion.

Streets in the communities of Battle Mountain, Carlin, and Elko generally have sufficient capacity to accommodate current traffic with only a few minor trouble spots. Elko, having experienced dramatic growth in recent years, has built connector loop streets and a third Humboldt River bridge, widened and improved streets, and installed new traffic signals to better handle associated traffic increases. While overall traffic levels have continued to increase, the system now affords drivers more options and traffic flows more efficiently. Increasing traffic levels, however, persist with continued growth in the area. Additional arterial and loop roads may be added to the street system to further alleviate congestion if future development warrants, but most potential development areas are located north of town where traffic flow constraints are minimal (Moss, 1995).

Carlin has no substantive traffic problems at present. Some growth has occurred in Carlin, but not on the scale Elko has experienced. Traffic levels have increased notably in the past 4 to 10 years. Even where traffic counts have doubled, however, they remain well below capacity. Old U.S. 40, for example, carries fewer than 1,000 vehicles per day (NDOT, 1992).

Battle Mountain streets are in fair to excellent condition and no traffic problem areas have been identified. A by-pass loop was recently completed to route hazardous materials traffic around the community and a new Interstate 80 interchange provides direct access from the highway to the central part of town.

TABLE 3-38 MAJOR HIGHWAY TRAFFIC VOLUMES - 1994			
ROADWAY	DESIGN CAPACITY (vehicles per day) (1)(2)	1994 AVERAGE DAILY TRAFFIC (ADT) (3)(4)	1994 PEAK HOUR TRAFFIC (6)
I-80			
• Carlin - 306 Interchange	35,000	Station 56 5,810	407
• 305 Interchange - Battle Mountain	35,000	Station 9 5,490	384
ROUTE 306			
• I-80 Beowawe	7,900	Station 11 365	40
ROUTE 305			
• South of Battle Mountain	7,900	Station 17 (5) 2,440	171

Notes:
(1) Kaiser 1992
(2) To maintain existing level of service "C"
(3) Manning 1995
(4) Counts represent aggregate of both directions
(5) Each county has duplicate station numbers. Station 17 on Route 305 is in Lander County.
(6) Lawson, Manning 1995

Source: Nevada Department of Transportation:

3.13.2 Commercial Transportation

Local public transportation is generally limited in the Study Area. Interstate bus service is provided by Greyhound Bus Lines with three eastbound and three westbound trips each day stopping in Battle Mountain, Carlin, and Elko. There is passenger rail service available via Amtrak with scheduled stops in Elko. Elko also has the nearest airport with scheduled commercial air service.

Skywest Airlines and Casino Express provide 9 flights daily to regional airports at Salt Lake City and Reno and to other Nevada locations. Battle Mountain has a general aviation airport with two runways, one 7,200 feet long and lighted for night use. A new terminal and additional services are planned in anticipation of future growth. Both the Elko and Battle Mountain airports have full service fixed-base operators and charter service is available.

Both the Union Pacific and Southern Pacific railroads provide freight rail service within the Study Area. Union Pacific trains stop every other day at Battle Mountain, Elko, and Winnemucca. About 14 Southern Pacific trains pass through the Study Area daily, stopping at Carlin for crew changes and freight transfer as needed.

3.14 AIR QUALITY

3.14.1 Regional Environment

The Project Area is located in the Shoshone Range, which separate the Whirlwind Valley Air Basin on the east from the Lower Reese River Valley Air Basin on the west. The Project Area lies mostly on the eastern slopes of the mountains, and therefore falls within the Whirlwind Valley Air Basin. Most potential air pollution sources associated with the mine would be located within this basin. The

The National Ambient Air Quality Standards (NAAQS), are based upon health-related exposure levels. The NAAQS are legal limits on the allowable ambient levels of air pollution that specify maximum allowable concentrations of criteria pollutants in the atmosphere. NAAQS are established for the following pollutants:

- Nitrogen dioxide (NO_2)
- Sulfur dioxide (SO_2)
- Carbon monoxide (CO)
- Particulate matter less than 10 microns in diameter (PM_{10})
- Ozone (O_3)
- Lead (Pb)

Under the Clean Air Act, State and local authorities are given primary responsibility for assuring that their respective regions are in attainment of, or have a verifiable plan to attain, the NAAQS. This provision also gives state and local agencies authority to promulgate the more stringent ambient air quality standards if necessary. The State of Nevada has authority to enforce the Federal ambient standards.

The primary standards reflect levels of air quality deemed necessary to protect the public health and include an adequate margin of safety. Areas found to be in violation of the primary standards are termed "nonattainment areas".

Nevada also regulates emissions from various types of sources, such as fuel-burning equipment, toxic sources, and sources of fugitive dust. Applicable Federal and State air quality standards are summarized by Table 3-39.

Under the provisions of the approved NDEP Air Quality Permit to Construct/Operate for the Mule Canyon Mine, SFPGC will comply with all applicable air emission standards and requirements.

An attainment designation means that the standard for that pollutant has not been violated in the specific area. A nonattainment designation means that the pollutant concentration in a particular area exceeded the standard established for that pollutant at least once in the last three years. A district with a nonattainment designation is required to develop plans for attaining and maintaining the standards for each nonattainment pollutant or its precursors.

The Mule Canyon Project impact region, as defined by particulate matter de minimis levels, is primarily in the Whirlwind Basin but extends over the ridge into the Lower Reese River air basin by up to two kilometers. The Whirlwind Valley portion of this impact area is designated as attainment or unclassifiable for all regulated criteria pollutants. However, the Lower Reese River Valley is still designated by the EPA as nonattainment for total suspended particulates (TSP), a particulate size range no longer regulated either on the state or Federal level. EPA provided Nevada a procedure for redesignating to attainment in 1992 and Nevada responded with the appropriate documents in that same year. The nonattainment designation is an artifact of an old standard, and it is treated by both EPA and Nevada as an area in attainment of the present PM_{10} standard.

In addition to ambient concentration standards, the Federal and State regulations limit emissions from specific types of sources through emissions standards called New Source Performance Standards (NSPS). Emissions from the Mule Canyon project would be limited by two subparts of the NSPS regulations: subpart LL, Metallic Mineral Processing, which will limit PM_{10} emissions from the conveyor transfer points to 10 percent opacity and Subpart 000, Nonmetallic Mineral Processing, which will limit PM_{10} emissions from crushing operations to 15 percent opacity and from conveying and screening to 10 percent opacity.

TABLE 3-39
NATIONAL AND NEVADA AMBIENT AIR QUALITY STANDARDS (μG/M^3)

Pollutant	Averaging Time	Nevada	National
Ozone	1 hour	235	235
Carbon Monoxide	8 hours	10,000	10,000
(below 5000 feet)	8 hours	6,670	10,000
(above 5000 feet)	1 hour	40,000	40,000
Nitrogen Dioxide	Annual	100	100
Sulfur Dioxide	Annual	80	80
	24 hours	365	365
	3 hours	1,300	1,300
Particulate Matter (PM^{10})	Annual	50	50
	24 hours	150	150
Lead	Quarterly	1.5	1.5
Hydrogen Sulfide	1 hour	112	None

Note: Ambient air qualify standards are not to be exceeded. The standards for Sulfur Dioxide are secondary standards.

3.14.4 Existing Emission Sources and Air Quality

Existing air quality in the Study Area meets applicable air quality standards due to its rural location, well away from residential and industrial sources of air emissions. The principal pollutant in this region is dust, which is of natural origin. Hydrogen sulfide (H_2S), which would not be emitted by the mine in significant quantities, is emitted from the nearby geothermal plant. This plant injects its spent water back into the ground and therefore does not release the associated hydrogen sulfide as a process exhaust, but does have fugitive emissions which may occasionally drift into the mine's region of influence. The nearest industrial facility with substantial combustion emissions is the Valmy Power Plant, approximately 30 miles to the northwest, and the nearest town with substantial traffic emissions (i.e., with a population greater than 50,000) is Reno, approximately 220 miles to the west-southwest. Other mining activities are outside of the CEA and so have negligible effect on baseline air quality in the Project Area.

The principal source of particulates is natural wind-blown dust, typical of any dry climate. The particulates are composed of crustal material and some biological material such as pollen from the sparse vegetation. The background particulate matter concentrations were measured on-site by Gold Fields between March 1992 and February 1993 (ASI, 1993). Particulate data concentrations for this period represented in Table 3-40. The maximum 24-hour PM_{10} concentration for this period was 83 $\mu g/m^3$ on August 22, 1992. The arithmetic average for the period was 12.4 $\mu g/m^3$, with a range of concentrations from 2 to 83 $\mu g/m^3$. All measured concentrations are far below the applicable ambient air quality standards of 50 $\mu g/m^3$ (annual) and 150 $\mu g/m^3$ (24-hour). Lead concentrations for particulates would be at natural background levels.

Because there is no industry nearby with substantial combustion emissions and only insignificant vehicle traffic in the area, criteria gas pollutants (carbon monoxide, sulfur dioxide and nitrogen oxides) will exist in negligible concentrations, essentially at natural background levels. Ozone concentrations will also be at natural background levels, although these will not be negligible.

3.15.1 Regional Environment

The site is located in the Shoshone Range between Whirlwind Valley and the Lower Reese River Valley. The project lies mostly on the eastern slopes of the mountains and would therefore be more visible from the east, although portions of the project which lie on the crest of the range would also be marginally visible from the west. Line, color and texture of the region demonstrate subtle variations quite unique to the Basin and Range province landscapes of Nevada. Distal views are patchy in nature because shrub vegetation is interspersed with grass dominated areas, all in association with the occasional dark lines of basalt outcrops and incised canyons.

3.15.2 Local Visual Conditions

Views of the Project Area from the west (Reese River Valley) and the east (Whirlwind and Crescent Valleys) are dominated by the northern Shoshone Range. Existing manmade features include powerlines, buildings, farm fields and structures on the valley floors, several dirt roads that traverse the mountain flanks, a geothermal plant and appurtenances, and radio towers on the mountain ridges.

Existing relatively significant mining operations visible in the area include the Argenta barite operation at the north end of the Shoshone Range, mining occurring on the northern and eastern flanks of Battle Mountain, and inactive quarrying operations located at the southern end of the Sheep Creek Range. From the east, the salt flats and the trees on the floor of Whirlwind Valley provide variation in color and texture.

The closest residential communities to the Project Area are Battle Mountain, Crescent Valley, and Beowawe. The site is not readily visible from Battle Mountain (approximately 15 miles away) and Crescent Valley (approximately 20 miles away) due to both distance and intervening topographic features. The Town of Beowawe is approximately 10 miles away and the site is visible from Beowawe although many of the proposed development features would be partially or fully hidden from view from Beowawe by intervening topographic features.

The major portion of the Project Area and most of the proposed development features would be directly visible from Viewpoint 3 (located on State Route 306 approximately 0.5 mile north of Beowawe and approximately 10 miles from the Project Area) and from Viewpoint 2 (located on Interstate 80 approximately 9 miles southeast of the Dunphy Junction and approximately 15.5 miles from the Project Area). The western portion of the Project Area and associated development features would be visible from Viewpoint 1 (located on Interstate 80 approximately 5 miles east of Battle Mountain and approximately 10 miles from the Project Area). The relationship between the Project Area and the selected Viewpoints is illustrated by Figure 3-24.

3.15.3 Visual Standards and Regulations

The BLM addresses visual impacts through a visual management system based on ratings of the existing quality of the visual environment and the level of allowable alteration for specific rating categories. The visual resource management (VRM) ratings measure and compare the degree of form, line, color, and texture contrast for both the existing conditions and the proposed disturbance. Based on these parameters the existing conditions and management objectives are rated and defined as a Class I, II, III, or IV visual resource. The following summarizes the BLM rating classifications (BLM, 1986) and objectives:

Class I - High visual quality, preservation of the existing character of the landscape, allowable modifications include limited land management and any changes should be minor and not attract attention

Class II - Moderate to high visual quality, retain existing character of the landscape, allowable modifications include minor visible changes which repeat the natural form, line, color, and texture of the landscape but do not attract the attention of the casual observer

Class III - Moderate visual quality, partially retain existing character of the landscape, allowable modifications include moderate changes which may attract attention but do not dominate the view, changes should repeat the basic line, form, color, and texture of the landscape

Class IV - Moderate to low visual quality, provides for management of activities involving major modification of the landscape, changes may dominate the view but efforts should be made to minimize visual impacts and repeat the basic visual elements to the extent possible

The northern Shoshone Range and adjacent lowlands have been designated by BLM as a Class IV visual management area. The Project Area is not located in the vicinity of any designated Wilderness or Wilderness Study Areas (refer to Section 3.1) so the specific visual management considerations which relate to these areas are not applicable.

3.15.4 Visual Assessment

Baseline visual conditions for the Study Area have been established through photographic documentation and a visual contrast analysis which considered both existing conditions and the disturbance configuration for both maximum operational disturbance and the reclaimed configuration (ESI, 1992). The 1992 visual analysis evaluated the same types of disturbance as would occur under the Proposed Action and alternatives. The proposed disturbance area, however, is smaller than the area considered in the 1992 analysis. The original contrast analysis remains applicable because the resulting contrast ratings were well within allowable ranges for the existing Class IV designation for this area and the present design would be less visually obtrusive that the 1992 design.

Photographic documentation of both existing visual conditions and the post-reclamation appearance of mine disturbance areas is presented in Section 4.13, Aesthetics.

3.16 LAND USE AND RECREATION

For evaluation of land use and recreation resources, the Study Area includes the Project Area and other lands which are related by common land use applications. The CEA encompasses the Study Area and includes the Shoshone-Eureka and Elko Resource Areas, and the eastern portion of the Winnemucca District, as designated and managed by the BLM. Both the Study Area and CEA are shown on Figure 3-25.

The characterizations of land use and recreation presented in this section are based on information obtained from published studies of this area; BLM Resource Management Plans (RMP), County Master Plans, and contacts with BLM, County, and USFS personnel.

3.16.1 Regional Land Use Patterns

The regional land use setting for the Project and Study Areas is dominated by the BLM Shoshone-Eureka and Elko Resource Areas, and the eastern portion of the Winnemucca District which comprise portions of Lander, Elko, Eureka, Pershing, and Humboldt counties. The Project Area, where most of the direct project related impacts would occur is located within the Shoshone-Eureka Resource Area, administered by the Battle Mountain District BLM. Some direct project impacts associated with the water supply wellfield and alternative access routes as well as indirect and cumulative land use impacts related to potential increases in population would occur in the Elko-Carlin vicinity, which is within the Elko Resource Area, administered by the Elko District BLM and in areas to the west which are administered by the Winnemucca District BLM. The Shoshone-Eureka Resource Area is in the central and southern portions of Lander and Eureka counties and northern Nye County.

The Resource Area covers a total of approximately 5.7 million acres, of which approximately 4.3 million acres (75 percent) are administered by the BLM, approximately 1 million acres of Toiyabe National Forest are managed by the USFS, and about 0.4 million

Elko Resource Area

- Provide for mineral exploration and development
- Guide future land tenure adjustments based on land manageability and quality of resource values

Winnemucca District

- Provide for mineral exploration and development
- Manage ongoing grazing to maintain productivity and minimize erosion
- Maintain and improve wildlife habitat

Minerals exploration and development are stated objectives of all three planning documents, and the proposed mining activities are consistent with this land use.

County Plans and Policies

Both Lander and Eureka Counties maintain land use plans that promote appropriate resource development while taking into consideration social and economic concerns and maintaining a balance between development and preservation of the existing environment.

In Lander County, private lands in the vicinity of the proposed project are managed in accordance with the Lander County Master Plan (1987). The Master Plan states "Only growth that will result in significant social and economic benefits should be considered, while discouraging growth which degrades the environment and results in undesirable changes to the identity and character of the County."

In Eureka County, private lands are managed in accordance with the Eureka County General Plan. The goals of the Eureka County General Plan include protecting farming, ranching, and mining; protecting water areas, rangelands, mountains, open views etc. from development that would reduce the County's desirability to local residents; and encouraging modest growth in Eureka, Beowawe, and Crescent Valley. The plan also directs that lands presently controlled by grazing agencies be defined, zoned, and maintained to permit optimum private uses in accordance with the General Plan and recommends that: 1) Continued grazing privileges for the livestock industry are essential and land should not be withdrawn from grazing uses unless compensatory AUMs are provided; and, 2) BLM land be made available for private purchase when the need for such lands to support agricultural and mining growth are proven necessary.

3.16.3 Site Land Use and Potential

The Project Area is within an area managed by the BLM and has a checkerboard pattern of private and public ownership. County zoning designates the Project Area and surrounding lands as A3 - Farm, Forestry, and Open Reserve (Lyngar, 1992). The Lander County Land Use Plan allows mining within the A3 zones and does not require a permit or other specific land use approvals for mining within this zone. Registration for development of a mine is required, however, and SFPGC has fulfilled this requirement.

The Project Area is generally relatively remote open space, with some use for utility installations and easements including a natural gas pipeline; a three powerlines and tie-in; the nearby geothermal power plant; and several radio and other communication towers.

Existing Federal Rights-of-Way for utility and communications installations on Public Lands within the Project Area include the following:

- Right-of-Way N-60171 - Lander County Beacon Light Road extension and modifications
- Right-of-Way N-2434 - Sierra Pacific Power Company power transmission line
- Right-of-Way N-56088 - Sierra Pacific Power Company power transmission line
- Right-of-Way N-59670 - Sierra Pacific Power Company power transmission line

- Right-of-Way NEV-064893 - Sierra Pacific Power Company power transmission line
- Right-of-Way NEV-065084 - Southwest Gas Corporation gas transmission line
- Right-of-Way N-46748 - Nevada Bell communication site
- Right-of-Way NEV-0057800 - BRAD Communication Services, Inc. Communications site

Those rights-of-way which fall within the mapped area are shown on Figure 1-2.

The closest residences are located near the town of Beowawe, approximately 10 miles from the eastern edge of the Project Area. The entire area is currently open to grazing and dispersed recreational use, in addition to the ongoing mineral exploration activities. The mine site represents about 4 percent of the Argenta Grazing Allotment. With no developed recreation areas in proximity to the Project Area, recreational use in the area is generally limited to chukar and mule deer hunting. There are no developed recreational areas in close proximity to the Project Area.

3.16.4 Developed Recreation Resources

Recreation opportunities in the Shoshone-Eureka Resource Area range from dispersed, individual use of vast public open spaces to organized, team sports use of developed municipal parks and facilities. This section addresses mainly outdoor, developed recreational resources with municipal recreation resources being addressed in Section 3.12.

The primary developed recreation areas in the Shoshone-Eureka Resource Area include Hickison Petroglyphs Recreation Site and Mill Creek Recreation Area, with Mill Creek which is located about 25 miles to the west, being the nearest site to the Project Area. Mill Creek is a 40-acre campground maintained by the BLM, with eight campsites and a stream with fishing. In 1990, the Mill Creek Recreation Area averaged 14 cars per day during the summer months of June, July, and August. The area is known as a popular campground for residents of Battle Mountain. The Hickison Petroglyphs Site is located about 80 miles to the south of the Project Area and includes an area of approximately 40 acres with 21 campsites. Average use of this area during the summer of 1990 was 28 cars per day.

The primary developed recreation opportunities in the Elko Resource area are reservoirs which are utilized for fishing, boating, and camping. The resource area contains three developed BLM recreation areas: North Wildhorse Recreation Area, Wilson Reservoir, and Zunino/Jiggs Reservoir. Table 3-44 describes these recreation areas. The only other regional recreation site within the Elko Resource Area is South Fork Reservoir, about 12 miles south of Elko. Other recreation opportunities range from skiing to white-water rafting. Recreation use within the resource area is almost evenly divided between use by Elko County residents and out-of-county residents.

There are no developed recreation areas in the eastern portion of the Winnemucca District. The closest developed recreation sites to this area are the Mill Creek Recreation Area, the USFS campground at Hinkey Summit in the Humboldt National Forest approximately 100 miles to the north, and Rye Patch Reservoir approximately 70 miles to the west. Most public lands in this area are managed for dispersed recreation including upland game hunting, off-road vehicle (ORV) use, and rockhounding.

3.16.5 Dispersed Recreation Uses

While population related demand could have regional implications, the recreation opportunities most likely to be directly influenced by the project would be those that are either located in, or that have important access through, the immediate project vicinity. Consequently, the main area of influence for recreation analyses is the area within three to five miles of the proposed Project Area.

TABLE 3-46
RECREATIONAL USE - HUMBOLDT NATIONAL FOREST

Ranger District	1987	1988	1989	1990	1991	% Increase
Mountain City[1]	86,200	106,900	93,200	90,000	100,400	16.5
Ruby Mountains[1]	269,600	299,100	317,500	439,600	383,100	42.1
Jarbidge[1]	63,600	71,300	198,700[2]	53,700	44,300	(30.4)
	419,400	477,300	673,000	583,300	527,800	25.8

Notes:

[1] Mountain City Ranger District is approximately 80 miles north of Elko; Kirby Mountain Ranger District is approximately 20 miles south of Elko; and Jarbidge Ranger District is approximately 100 miles northeast of Elko.

[2] Rainbow family gathering.

Source: Schassran, USFS, 1992.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

As the final component of the environmental evaluation process, determination of the environmental consequences of the project alternatives provides the basis for comparison of the project alternatives and subsequent agency decision-making. The characterization of environmental consequences presented in this chapter reflects consideration of the project alternatives as described in Chapter 2 within the context of existing environmental and socioeconomic resources and values.

The evaluation of environmental consequences addresses all potentially affected resource values but focuses specifically on those resource values and potential effects which relate to the project issues identified through the scoping process and subsequent review and consultation as described in Chapter 1. The discussion of environmental consequences addresses the full range of potential project-related impacts including direct, indirect, and cumulative impacts; unavoidable adverse impacts; irreversible and irretrievable commitment of resources; and relationships between short-term use and long-term productivity as defined in the Summary of Abbreviations, Acronyms, and Glossary.

The discussion of project alternatives presented in Chapter 2 includes descriptions of specific control, reclamation, and monitoring measures included as integral components of each alternative to limit the occurrence, severity, and/or duration of potential environmental impacts. In all cases the environmental consequences described for each resource reflect consideration of applicable control, reclamation, and monitoring measures and their effectiveness in limiting potential environmental impacts. Any unavoidable adverse impacts, irretrievable commitments of resources, or long-term effects remaining after application of appropriate operational measures would be addressed by specific mitigation measures, as identified in this Chapter.

4.2 GEOLOGIC CONSIDERATIONS

4.2.1 Geology - Introduction

The proposed mining and related activities would involve excavation and removal of ore, overburden, and interburden materials. Exposure of these materials would result in oxidation and weathering with the associated potential for release of ARD and leaching of metals and other chemical constituents. The proposed mining activities would also result in depletion of valuable mineral resource reserves.

In conjunction with, and in order to proceed with, the proposed mining and related operations, a number of temporary structures and facilities would be constructed including overburden and interburden disposal areas, milling facilities, a heap leach pile, and a tailings disposal facility. Mine excavations would also require establishment of a series of pit benches and highwalls. Facilities, structures, and pit highwalls could be affected by ground movements and resultant stresses generated by natural seismic events. Impacts resulting from seismic events could vary dependent on the location and proximity of the event and would also vary depending on the nature and construction of each facility. Structural or highwall failure resulting from seismically induced movement would pose a direct safety hazard to humans and any animals in the vicinity of these structures, and failure of any facilities designed to contain process solutions or hazardous materials could result in accidental release of these materials.

With the exception of resource depletion, potential geologic impacts would be controlled and monitored under applicable provisions of the NDEP Water Pollution Control Permit, the NDOW Industrial Artificial Pond Permit, provisions of the NDEP Reclamation Plan approvals and other applicable dam safety and structural design requirements. Compliance with the applicable regulatory standards and requirements would effectively prevent or minimize any significant short- or long-term impacts due to seismically induced deformation or failure or exposure and leaching of mine materials. The following subsections evaluate potential geologic impacts for each of the project alternatives.

4.2.2 Geology - Effects of Alternative A (No-Action Alternative)

Under the No-Action Alternative, the Project Area would remain in its current condition and configuration subject, however, to existing approved activities and uses including ongoing mineral exploration and livestock grazing. While exploration activities result in limited exposure and removal of geologic materials in exploration road cuts and as drill cuttings, the total volume of materials disturbed is relatively small. In addition, specific provisions of the existing exploration permit approvals provide for control, containment, and disposal of drill cuttings and other materials to minimize potential impacts. Surface disturbance associated with exploration roads and drill pads may affect surface stability. Any disturbance impacts, however, would be minor and localized due to the limited nature and scope of disturbance.

4.2.3 Geology - Effects Common to All Other Alternatives

4.2.3.1 Resource Depletion

Essentially all of the action alternatives would involve excavation and removal of similar quantities of ore and overburden and interburden materials. The potential for resource depletion would, therefore, be the same for Alternatives B through D.

Approximately 11 million tons of ore-grade material would be removed over the life of the mine and approximately 100 million tons of overburden and interburden materials would be removed to recover the ore. Under all of the action alternatives, the option exists to completely backfill the Main Pit or to leave this pit open. There is also the option of partially or completely backfilling any of the other pits consistent with the considerations and constraints discussed in Sections 2.2.4.3 and 2.4.8. Backfilling of any of the pits may render future recovery of any remaining lower-grade reserves economically infeasible.

4.2.3.2 Exposure to Leaching

Given that all alternatives would involve placement of ore materials in either a temporary stockpile near the mill facility or the heap leach pile, and overburden and interburden materials in permanent overburden and interburden disposal areas, the potential for exposure, oxidation, generation of ARD, and leaching would be similar. As discussed in Section 2.2.4.3, placement of overburden and interburden as backfill in pit areas could incrementally increase the potential for leaching by exposing these materials to ground water. Generally, the potential impacts associated with exposure of geologic materials would be addressed through the material testing and characterization which has already occurred as described in Section 3.4, and the selective material handling and placement practices and drainage control measures as described in Section 2.4.8. Any materials representing a potential source of ARD or elevated contaminant concentrations would be selectively placed so as to minimize exposure to surface drainage and infiltration and to restrict discharge of any drainage representing a potential source of surface or ground water contamination. Potential effects relating to placement and handling of geologic materials are discussed in detail in Sections 4.3 and 4.4.

4.2.3.3 Seismic Stability

The potential for seismically induced ground movements and stresses has been taken into consideration in the design of all major project structures, facilities, and mine excavations. As described in Section 2.4.8, the designs and proposed construction practices for all temporary stockpiles and permanent disposal areas including the temporary ore stockpile, the overburden and interburden disposal areas, the heap leach piles, and all structural fill embankments including the tailings facility embankment reflect consideration of potential seismically induced ground movements. Anticipated seismic accelerations of 0.22g based on the MPE have been utilized as the design basis for all critical structures. Based on the seismic history of the Project Area, there is a 90 percent probability that the MPE would not be exceeded over a period of 100 years. With an anticipated project life of fourteen years, use of the MPE and resultant calculated pseudostatic safety factors which exceed 1.0 for all facilities provide reasonable assurance that the proposed facilities would withstand the effects of the worst-case anticipated seismic event without significant structural damage or deformation.

Following final site reclamation and closure, the tailings facility, heap leach pile, and overburden and interburden disposal areas would remain with the potential for long-term impacts due to seismic movement. Potential long-term seismic impacts would be reduced by drainage and consolidation of tailings materials prior to final closure, neutralization of the heap leach, and grading of the tailings facility, heap leach pile, and overburden and interburden disposal areas. Long-term displacement or failure of any of these facilities could result in exposure of tailings or sulfide overburden and interburden materials. The potential for failure and/or exposure of any significant quantity of material, however, is unlikely, given both the seismic history of the area and facility design considerations.

4.2.4 Geology - Effects of Alternative B (Proposed Action)

Under Alternative B the project-related geologic impacts would be as described under Effects Common to All Other Alternatives. If the decision is made to not backfill the Main Pit, it would remain open following mining and reclamation and additional material would be placed in Overburden and Interburden Disposal Area 5. Both of these modifications from the proposed mining and reclamation plans under the Proposed Action would result in minor increases in steep-slope areas potentially subject to long-term seismic impacts.

4.2.5 Geology - Effects of Alternative C (East Access Alternatives)

Given that both of the east access alternatives are located in relatively stable flat-lying areas, the potential for seismic effects due to road disturbance is minimal. All other potential geologic impacts under Alternative C would be essentially the same as for the Proposed Action.

4.2.6 Geology - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Alternative D would modify the outslope configuration of the overburden and interburden disposal areas by eliminating the intermediate outslope benches which are incorporated in disposal area construction plans under the Proposed Action and/or reduce outslope gradients. Elimination of the outslope benches without changing the location of the toe or crest would have the effect of eliminating intermediate slope segments while retaining the same overall slope. This configuration would result in a slight reduction in the potential for interbench failures. It would, however, have the adverse effects of reducing erosional stability by increasing the volume and velocity of runoff on outslope areas and limiting access to outslope areas for final reclamation. Erosional stability concerns could be partially addressed by construction of contour furrows or similar drainage features on outslope areas. Such features are typically not, however, effective as long-term control measures, often requiring ongoing maintenance. Removal of outslope benches while maintaining the interbench slope gradient would steepen the overall slope resulting in reduced stability and a minor increase in the potential for slope failure. It should be noted that the failure analysis for the overburden and interburden piles is based on the maximum slope and this configuration would, therefore, still meet the stability design criteria. Reduction of outslope gradients, either with or without elimination of outslope benches, would tend to increase overall stability but would have the adverse effect of increasing the surface disturbance area.

4.2.7 Geology - Cumulative Effects

The Proposed Action or other action alternatives would not result in substantial long-term impacts on geologic resources within the corresponding CEA.

Relative to utilization and depletion of valuable mineral resources, the Proposed Action represents a typical mineral development action which is consistent with the long history of mineral development in this area. While valuable mineral resources would be recovered, resulting in some incremental reduction in the known quantity of available mineral resources for this area, associated mineral exploration offers good potential for identification of additional mineral reserves. Under applicable provisions of the Mining Law of 1872 and the FLPMA, development and utilization of mineral resources are consistent with management objectives for public lands and sound economic and public policy.

Excavation and exposure of geologic materials as a result of the proposed mining activities could pose potential incremental risks relative to generation of ARD and leaching of metals and other undesirable constituents. Potential cumulative impacts relating to exposure and leaching of geologic materials are discussed in Sections 4.3 and 4.4.

Project development would include the construction of mine-related structures and facilities. These structures and facilities would be subject to seismic impacts resulting from the occurrence of any large magnitude seismic events in proximity to the Project Area. The existence of these structures would increase the overall potential for damage within the affected area due to a seismic event, however as described in Section 4.2.3, all major mine facilities have been designed and would be constructed to withstand the anticipated worst-case seismically induced ground accelerations without failure or significant deformation.

4.2.8 Geologic Mitigation

The combination of baseline material testing and characterization, and operational control measures including ongoing material characterization, selective handling, isolation of potential materials of concern, and ongoing monitoring represent BACT for prevention of ARD and release of metals and other constituents. All seismic designs are based on accepted engineering methods and practices. Given these considerations, no supplemental mitigation measures would be necessary or justified except for evaluation and remediation measures as specified under applicable regulatory provisions to address the unlikely occurrence of ARD, release of metals or other constituents, or large-scale, seismically induced, surface material movements.

4.2.9 Other Geology Impact Considerations

Relative to geologic resources, other impact considerations including; 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships; are summarized by Table 4-1.

4.3 SURFACE WATER HYDROLOGY

4.3.1 Surface Water - Introduction

The proposed mining and related activities would result in direct surface disturbance within the Project Area with consequent alteration of local surface drainage patterns and modification of surface conditions within the disturbed areas. Modification of surface conditions could result in short- and long-term changes in local runoff, infiltration, and sediment loading. During and following completion of active mining operations, surface runoff would be diverted around pit areas.

TABLE 4-1
OTHER IMPACT CONSIDERATIONS
Page 1 of 2

Resource Category/ Alternative	Unavoidable Adverse Impacts	Irreversible and Irretrievable Resource Commitments	Short-Term Use/ Long-Term Productivity Relationships
Geologic Resources			
- Alternative A - Alternative B - Alternative C - Alternative D	None None None None	None Geologic disturbance Reserve depletion Same as Alt. B Same as Alt. B	None None None None
Surface Water Resources			
-Alternative A -Alternative B -Alternative C -Alternative D	None Minor reductions in runoff Pit lake and pond water quality Same as Alt. B Same as Alt. B	None None None None	None Minor reductions in runoff Same as Alt. B Same as Alt. B
Ground Water Resources			
-Alternative A	None	None	None
-Alternative B -Alternative C -Alternative D	Reduction of spring discharge Local depression of water table Minor localized changes in aquifers Same as Alt. B Same as Alt. B	Loss or reduction of spring discharge Localized reduction of aquifer storage capacity (well field) Same as Alt B. Same as Alt. B	Effects of reductions in spring flow on vegetation, grazing, and wildlife Same as Alt. B Same as Alt. B
Soil Resources			
-Alternative A -Alternative B -Alternative C -Alternative D	None Disturbance of soil profile and modification of soil physical/chemical characteristics Same as Alt. B Same as Alt. B	None Loss of minor quantities of soils which are infeasible to salvage Same as Alt. B Same as Alt. B	None None None None
Vegetation Resources			
-Alternative A	None	None	None
-Alternative B	Loss of vegetation and associated production during mining	Loss of vegetation and associated production for areas not reclaimed	None
-Alternative C	Slight increase in wetland disturbance over Alt. B	Loss or modification of small non-jurisdictional wetland areas	
-Alternative D	Same as Alt. B	Same as Alt. B	Same as Alt. B
Grazing Resources			
-Alternative A	None	None	None
-Alternative B	Loss of access and forage during mining. Loss of watering sources. Permanent loss of use for unreclaimed areas.	None Loss of watering sources. Permanent loss of use and forage for unreclaimed areas.	None Effect of loss of watering sources on grazing utility. Permanent loss of use and forage for unreclaimed areas.
-Alternative C	Same as Alt. B	Same as Alt. B	Same as Alt. B
-Alternative D	Same as Alt. B	Same as Alt. B	Same as Alt. B

TABLE 4-1
OTHER IMPACT CONSIDERATIONS
Page 2 of 2

Resource Category/ Alternative	Unavoidable Adverse Impacts	Irreversible and Irretrievable Resource Commitments	Short-Term Use/ Long-Term Productivity Relationships
Wildlife Resources			
-Alternative A	None	None	None
-Alternative B	Habitat loss and resultant displacement or loss wildlife during mining. Loss of watering sources. Permanent loss of habitat for unreclaimed areas.	None Loss of watering sources. Permanent loss of habitat for unreclaimed areas.	None Effect of loss of watering sources on utility and use of habitat. Permanent loss of habitat for unreclaimed areas
-Alternative C	Same as Alt. B	Same as Alt. B	Same as Alt. B
-Alternative D	Same as Alt. B	Same as Alt. B	Same as Alt. B
Cultural Resources			
-Alternative A	Disturbance related to existing permitted activities	None	Not applicable
-Alternative B	Loss of cultural resource context and values as a result of mitigation	Loss of cultural resource context and values as a result of mitigation	Not applicable
-Alternative C	Slight increase re: Alt. B	Slight increase re: Alt. B	Not applicable
-Alternative D	Same as Alt. B	Same as Alt. B	Not applicable
Socioeconomics			
-Alternative A	None	None	None
-Alternative B	Additional strain on existing resources (housing, schools, services)	Commitment of lands and resources to support population growth	Most commitments will involve long-term development and use
-Alternative C	Same as Alt. B	Same as Alt. B	Same as Alt. B
-Alternative D	Same as Alt. B	Same as Alt. B	Same as Alt. B
Air Quality			
-Alternative A	None	None	None
-Alternative B	Localized, temporary degradation	None	None
-Alternative C	Same as Alt. B	None	None
-Alternative D	Same as Alt. B	None	None
Visual Resources			
-Alternative A	Limited (existing disturbance)	Limited (existing disturbance)	Not applicable
-Alternative B	Alteration of surface configuration and features	Alteration of surface configuration and features	Not applicable
-Alternative C	Same as Alt. B	Same as Alt. B	Not applicable
-Alternative D	Same as Alt. B	Same as Alt. B	Not applicable
Land Use/Recreation			
-Alternative A	None	None	None
-Alternative B	Temporary exclusion of other uses	Loss of use for remaining roads and open pits Establishment of powerline and gasline rights-of-ways	Loss of use for remaining roads and open pits
-Alternative C	Same as Alt. B	Same as Alt. B	Same as Alt. B
-Alternative D	Same as Alt. B	Same as Alt. B	Same as Alt. B

Direct precipitation and groundwater seepage to mine pits during mining operations would be collected and pumped to designed holding ponds where it would evaporate; be utilized for dust control if testing confirms suitability for this purpose; or be recycled as process make-up water. Ground water drainage could impact surface seeps and springs through local reductions in ground water levels. The water quality of runoff which would come in contact with excavated mine materials including ore, low-grade ore, overburden and interburden materials, and process tailings, could be affected by generation of ARD and leaching and transport of heavy metals and other potential contaminants. Following completion of mining, pit dewatering would cease and water would accumulate in some of the open pits. The effects of leaching and evaporation relative to water quality in final pit areas are potential concerns. The potential for accidental discharge of process fluids, petroleum products, or other potential hazardous materials and consequent local effects on water quality are also potential concerns.

All potential surface and ground water impacts would be controlled, and monitored under applicable provisions of the NDEP Water Pollution Control Permit, NDEP Storm Water Pollution Prevention Plan, SPCC Plans, NDEP Storm Water Discharge Permit, and the NDOW Industrial Artificial Pond Permit to assure compliance with applicable drainage control provisions and water quality standards. Compliance with the applicable regulatory standards and requirements would effectively prevent or minimize any significant or long-term impacts on surface water quantity and quality. The following subsections provide detailed analyses of potential surface water environmental consequences for each of the project alternatives. These analyses incorporate relevant considerations relative to baseline geochemistry as described in Section 3.4.

4.3.2 Surface Water - Effects of Alternative A (No Action Alternative)

4.3.2.1 Surface Disturbance

Exploration activity has occurred and is ongoing within the Project Area and adjacent areas. A total of 39 acres located in the drainage basins to the east of Argenta Rim have been affected by exploration activities. Future proposed exploration activities are expected to affect an additional 200 acres. Surface disturbances related to future mineral exploration activities in and near the Project Area could result in temporary increases in total and suspended solids in ephemeral drainages. Potential short-term surface water quality impacts could also result from oil and fuel spills related to these activities.

4.3.2.2 Exploration Adit

As discussed in Section 3.6, water discharged from the exploration adit has a distinct quality compared to water sampled from springs and bedrock wells in the mine area. Historic data suggest that the quality of adit discharge can be extremely variable and, depending on the time of year and/or sampling location, may exhibit some of the characteristics of ARD. The adit has been sealed with a bulkhead seal under an approved NDEP closure plan and any minor surface discharges resulting from seepage around the seal are currently monitored and regulated under a site NPDES permit. As a result, associated surface water quality impacts for this alternative are not expected to be substantial.

4.3.3 Surface Water - Effects Common to All Other Alternatives

4.3.3.1 Surface Disturbance

The proposed Project Area encompasses a total area of approximately 9,236 acres. Total projected mining-related disturbance for all alternatives ranges from 2,670 to 2,690 acres. Of the total disturbance, approximately 450 to 580 acres would be disturbed outside the Project Area due to construction of access roads and utilization of off-site borrow sources. Specific acreages for the various land disturbance categories are discussed in Section 2.2. Following reclamation, total remaining unreclaimed surface disturbance areas would range from 320 to 350 acres including remaining open pits and access roads outside the Project Area. Disturbance would begin with construction activities during the early phases of the project. The potential for erosion and sediment loading downgradient from disturbance areas would be greatest during the construction phase, particularly if construction occurs during the runoff season or during periods of storm runoff. Sediment loading in downstream drainages, when flowing, would return to premining or near premining levels during the operational phase of mining. Construction practices have been designed and would be conducted to minimize the potential for erosion and sedimentation. Control measures would include construction of diversion structures to route flows around surface disturbance areas and the use of local sediment control measures including but not limited to berms, catch basins, silt fences, and mulch applications.

Within a short period (3- to 5-years) after reclamation of the Project Area disturbance, sedimentation effects would be expected to return to premining or near premining levels. Reduction of erosion and sedimentation potential is a major objective of the reclamation plan. Sediment control structures would remain in place until the reclamation objectives are achieved. Proposed construction and mining-related activities have been permitted and would be controlled and monitored under the NDEP Storm Water Pollution Plan, and Storm Water Discharge Permit.

4.3.3.2 Open Pit Mining

Pit Dewatering During Mining

During mining, runoff due to direct precipitation, and ground water seepage would flow into pit areas. The quality of water which would collect in the open pits during mining was evaluated (SMI/BCI, 1995a) using data from the geochemical testing program (Section 3.4) and baseline water quality data (Sections 3.5.6 and 3.6.4). Pit water quality projections were developed from two sets of simulations:

- Extracts from humidity cell tests were mixed with ground water samples obtained from site monitoring wells

- First and last pore volume rinses from overburden and interburden column tests were mixed

To account for potentially variable conditions in the pits, humidity cell extracts were mixed with ground water at various proportions, and a range of extract and ground water compositions were used. Also, for each pit area, two sets of column test rinsates were selected to represent observed rock alteration assemblages and mixed at 1:1 ratios. All mixtures were assumed to be in equilibrium with oxygen and carbon dioxide.

Simulations of pit water quality during mining were performed using the computer program PHREEQE (pH redox equilibrium equation), a chemical equilibrium code developed by the USGS which is widely used to model geochemical reactions (Parkhurst and others, 1980). Model results based on humidity cell data suggest that water which collects in the pits during mining could exceed drinking water quality standards for cadmium, copper, fluoride, iron, manganese, nickel, pH, selenium, sulfate, and TDS. Most exceedences occurred when low pH humidity cell extracts were used in the simulations and/or when the mixtures contained less than 50 percent ground water. These conditions are considered 'worst case', and associated water quality estimates are believed to overstate potential adverse water quality impacts. All extract mixtures modelled were determined to have the potential to oxidize and dissolve sulfides, which could generate ARD, as well as precipitate iron oxyhydroxides, which could adsorb metals. Mixtures modelled using low and/or intermediate pH extract data were also predicted to have the potential to dissolve carbonates (limited by the lack of significant quantities of carbonate materials) and precipitate minerals associated with ARD, which could increase the buffering capacity of the pit water and reduce metal concentrations and acidity, respectively.

Model results based on column test data were generally similar to those using humidity cell data, although pH values for the column test samples were typically higher. All rinsate mixtures exceeded drinking water quality standards for cadmium, manganese, selenium, sulfate, and TDS, and for a few mixtures, exceeded standards for chloride, iron, pH, and zinc. Many rinsate mixtures also had the potential to oxidize and dissolve sulfides and precipitate iron oxyhydroxides, carbonates (if the pH was greater than approximately 7.5), and ARD minerals. Comparison of the model simulations indicates that estimates of pit water quality during mining using column test data generally indicated higher concentrations of chloride, selenium, and sulfate, and lower concentrations of copper and zinc than estimates based on humidity cell data.

To minimize potential surface water quality impacts from water that collects in the open pits during mining, SFPGC as the project proponent, would construct and operate pit dewatering sumps to minimize water accumulations in the pits. Water collected from the sumps would be transferred to holding ponds by pump and pipeline and, depending on the results of water quality testing, would be utilized as process makeup water and for dust control.

Pit Filling After Mining

Results of ground water flow modeling indicate that upon completion of mining (and the cessation of pit dewatering), a lake up to approximately 110 feet deep would form in the southern portion of the South Pit and cover an area of approximately 2.1 acres. In addition, two small ponds (less than 20 feet deep) are predicted to develop in the southern portion of the West Pit and the central portion of the South Pit with a surface area of approximately 0.3 acres for each pond. Water may also temporarily pond in the other pits for a short time immediately following spring runoff or major precipitation events. Temporary ponding could occur if the permeability of the pit floor is limited by high clay content or is reduced by compaction from heavy equipment traffic. If long-term ponding and/or poor water quality become a problem, the BLM is stipulating that SFPGC will mitigate the problem through ripping to alleviate compaction, partial backfilling to eliminating ponding or other appropriate measures.

In order to predict water quality conditions in the open pits after mining and to evaluate potential impacts to surface and ground water, geochemical models were developed that account for the various physical and chemical processes expected to naturally occur. A general description of the geochemical models is provided below, followed by a discussion of the modeling results. Further information regarding the development and use of the geochemical models is presented in the Postclosure Hydrology and Pit Lake Geochemistry Report (SMI/BCI, 1995b).

It should be noted that since input parameters for the geochemical models were generally based on environmentally conservative (i.e., worst case) assumptions, the predicted contaminant concentrations for the pit ponds and lakes following mining are greater than actual anticipated concentrations. Also, hydrologic modeling predicts that the pit lakes and ponds will act almost exclusively as ground water sinks–that is, ground water will flow to the ponds from surrounding areas rather than from them into the ground water system. Maximum predicted pit-lake elevations are well below pit rims for all three areas. Thus, the pit lakes and ponds have little potential to degrade ground water or site surface waters, regardless of predicted water quality conditions. The primary, and perhaps sole, water loss from these water bodies will be due to evaporation. At closure, access to and use of the pits by humans and livestock would be restricted, and there are no plans to use the ponds or lake as a fisheries resource. Use of the ponds and lakes would be limited to short-term opportunistic use by birds and terrestrial wildlife. A preliminary risk assessment (ENSR, 1995) and expanded risk assessment (SMI, 1996) for potential pit water quality impacts to birds and terrestrial wildlife were completed to evaluate the nature and magnitude of potential exposures. The details of the risk assessment and potential related impacts to birds and wildlife are presented in Section 4.8. The risk assessments indicate limited short- or long-term impacts to wildlife due to exposure to the final pit lake but some potential for wildlife impacts due to exposure to waters in the shallow ponds. In order to address potential impacts associated with the two shallow ponds, the BLM is stipulating that the pond areas be partially backfilled to preclude ponding contingent on postmining water quality monitoring results.

Small Ponds and Temporary Pools - Small ponds predicted to form in the West and South Pits after mining from ground water inflow and temporary pools that may form in other pits from snowmelt runoff or major precipitation events are expected to exhibit water quality characteristics similar to water which would collect in the pits during mining (SMI/BCI, 1995b). Geochemical modelling studies were performed to predict pit water quality during mining as described in the previous section. Results of those studies suggest that, after mining, the small ponds and temporary pools could exceed drinking water quality standards for several parameters including cadmium, chloride, copper, fluoride, manganese, nickel, pH, selenium, sulfate, TDS, and zinc. The concentration of these and other parameters could increase in the ponds over time as a result of the relatively high net evaporation rate for this area (37 inches per year).

Pit Lake - The following factors were considered when developing a conceptual geochemical model of the permanent lake predicted to form in the southern portion of the South Pit:

- Quantity and quality of ground water and meteoric water that would enter and mix in the pit
- Geochemical characteristics of rock units exposed in the pit walls and floor
- Oxidation of sulfide minerals in the exposed rock units and the subsequent flushing of the oxidized rind with ground water and meteoric water
- Evaporation of the lake water during and after pit filling
- Speciation and potential precipitation and sorption of dissolved constituents
- Stratification and potential turnover in the lake

A schematic of the pit lake that illustrates these factors is presented as Figure 4-1, Conceptual Geochemical Model of the Permanent Pit Lake.

Column tests as described in Section 3.4, were used to predict the quality of water that would be flushed from the oxidized rind of rock exposed in the pit walls and floor. To determine which column test(s) would be most representative for the modeling study, the geochemical characteristics of the column test samples were compared to pit wall-rock characteristics estimated using block model data. The most conservative column test results (i.e., the waste rock leachate with the lowest pH and highest metal concentrations) were ultimately selected for the model simulations.

The computer program PHREEQE was used to simulate mixtures of leachate from the oxidized wall rock with inflows of background ground water and meteoric water. The proportion of leachate in the mixtures was based on predictions of steady-state ground water inflow into the pit, measurement of the thickness and porosity of the oxidized rind from a similar site, and average precipitation and evaporation rates for the area. It was assumed that once the wall rock becomes submerged, oxidation rates would be significantly reduced and that eventually all oxidation products would be flushed into the lake. It was also assumed that all pit water quality mixtures would be in equilibrium with atmospheric gases (SMI/BCI), 1995b).

After simulating the mixture of pit waters with PHREEQE, the computer program MINTEQA2 (Allison and others, 1980) was used to simulate potential precipitation and sorption of dissolved constituents from the lake. Minerals were allowed to precipitate out of solution if determined to be oversaturated, and sorption of dissolved constituents was allowed depending on the amount of amorphous ferric hydroxide predicted to precipitate and the modeled solution pH. It was assumed that precipitated minerals and sorbed constituents would have no further effect on pit lake water quality since they would settle out and be buried as geochemically stable sediments in the bottom of the pit lake.

Two constituents that are commonly of concern in many mining areas but that were not considered in lake chemistry modeling for this project are antimony and mercury. These constituents were not considered because neither was detected in either the column test leachate or the site ground water that were used as input for the modeling, and thus are not expected to be present in measurable concentrations in the pit lake.

Finally, to predict potential stratification and overturning of the lake, two computer programs, CE-THERM-R1 and CE-QUAL-R1, were used to estimate thermal and dissolved oxygen profiles. These programs are one-dimensional lake modeling codes developed by the COE for use with reservoirs (Environmental Laboratory, 1986).

Modeling results confirmed that the quality of the permanent pit lake will be dependent on several factors including the sources of water, mixing proportions, precipitation and sorption of constituents, and evaporation. Predicted short-term (during pit filling) and long-term pit water quality conditions are described below and summarized in Table 4-2.

<u>Short-term Pit Lake Water Quality</u> - Modeling results suggest that pit lake water quality would be poorest during early lake filling due to the strong influence of leachates from the oxidized wall rock. Initial inflows into the pit could exceed Nevada drinking water and aquatic quality standards for cadmium, iron, manganese, pH, selenium, sulfate, zinc, and TDS. As the pit lake fills, concentrations of most of these constituents are predicted to decrease due to dilution from ground water and meteoric water or chemical precipitation and sorption.

During the period of lake filling, initial concentrations of some constituents (cadmium, calcium, iron, manganese, and sulfate, in particular) could be reduced by mineral precipitation. Model and laboratory data also indicate that precipitation of amorphous ferric hydroxide could remove minor amounts of several metals including arsenic, cadmium, copper, lead, manganese, nickel, selenium, sulfate, and zinc from the pit lake by adsorption and settling.

Limnological modeling suggests that, depending on the occurrence and type of algae that would grow in the lake, stratification could occur in the summer months during and after filling and result in anoxic bottom conditions. Settling of amorphous ferric hydroxide precipitates into the anoxic zone could result in the reduction of ferric iron and sulfate and cause the precipitation of metallic sulfides. The latter could further reduce concentrations of zinc, nickel, manganese, and cadmium in the lake. Turnover of the lake could occur in the fall resulting in temporary expansion of the anoxic zone in the lower levels of the lake. The lowest 10 feet of the lake could remain anoxic throughout the year. Turnover would, however, have little effect on overall pit lake water quality based on available modeling results. Laboratory testing to evaluate the potential for dissolution of precipitated minerals upon exposure to anoxic conditions (SMI/BCI, 1995b) indicated that no significant concentrations of metals would be released into the lake water under this scenario.

Table 4-2 includes a column titled "Water Quality When Lake Fills," which represents a prediction of lake chemistry at that time (90 to 140 years after cessation of mining). The chemistry of the pit lake at that time could vary within the bounds defined by the compositions shown in the two columns to the right. The potential variance reflects consideration of the fact that the two modeled mechanisms (evaporation of lake water with replacement by ground water, and increased mineral precipitation as the pH increases) that result in further evolution of water quality from the modeled reference condition of lake filling would also be occurring during initial filling. Preferential flow through zones of higher permeability during pit filling would also cause short-term lake water quality to be better than indicated. Because the actual magnitude of these beneficial effects on lake water quality is difficult to quantify, a conservative (worst-case) approach to water quality prediction was used.

Long-Term Pit Lake Water Quality - After filling of the lake and accounting for long-term effects of mixing, precipitation, sorption, and evaporation, several important pit lake water quality parameters are predicted to change. Referring to Table 4-2, the following changes in pit lake water quality would occur over the period of pit filling and during a reasonable period thereafter during which most anticipated chemical reactions would occur:

- Potentially beneficial changes - Increased pH and decreased alkalinity, cadmium, iron, and manganese
- Potential adverse changes - Increased TDS, magnesium, potassium, sodium, aluminum, arsenic, barium, copper, selenium, silver, and zinc

To put these changes in perspective, pH is one of the most important water quality parameters and it improves with time. Increases in those parameters noted as potentially adverse are generally small in magnitude and, with the exceptions of cadmium and manganese, are projected to never exceed applicable drinking water standards. Cadmium and manganese are projected to exceed drinking water standards during filling, however, they are also projected to decrease over time to levels well below applicable drinking water standards. The only parameters projected to exceed drinking water standards over the long-term are TDS and sulfate. It should be noted that an expanded risk assessment (SMI, 1996) as summarized in Appendix E, indicated little potential for adverse wildlife impacts due to exposure to the final pit lake.

Beyond the modeled time period, losses of pit water to evaporation could increase the concentration of most constituents. Because baseline ground water quality is relatively good, however, additional concentration of constituents in the pit lake by evaporation is expected to be offset by dilution due to ground water inflows and would occur at a relatively slow rate (SMI/BCI, 1995b).

4.3.3.3 Ore Stockpiles

All alternatives include an ore stockpile near the mill where ore would be stored temporarily prior to transport or processing. To prevent surface water runoff from entering the stockpile during operations, diversion structures would be constructed above the facility to intercept and divert drainage around and away from the stockpile. Direct surface water runoff from, and any infiltration through, the ore stockpile would be channelled into a sedimentation basin designed to contain the 100-year, 24-hour storm event. Collected water would be allowed to evaporate or could be used for process makeup water in the mill. To prevent seepage through the base of the stockpile, the facility is designed with a compacted soil liner and a protective drainage cover above the liner (SMI/BCI, 1995a).

Geochemical testing suggests that exposure of ore materials to precipitation and infiltration could create leachates that exceed drinking water quality standards for aluminum, iron, manganese, and thallium (see Section 3.4). The design of the ore stockpile facility with runoff diversion structures, a liner system, and sedimentation pond reduces the potential for short-term surface water quality impacts from this area. In addition, due to its limited size, the amount of leachate potentially generated from the ore stockpile would be limited.

Due to the short time that ore would be stored prior to processing, no long-term surface water quality impacts would be expected from the ore stockpile. Once the ore is depleted and milling operations cease, the stockpile area would be regraded and reclaimed.

4.3.3.4 Heap Leach Pile

Limited or no surface water quality impacts are expected to occur from the heap leach pile during operations. This facility would be operated as a zero discharge circuit and with the exception of water that ponds temporarily following major storm events. As described in Section 4.3.3, only oxide overburden and interburden materials determined to have a low potential to generate acid and leach contaminants would potentially be backfilled under the Proposed Action.

4.3.5 Surface - Water Effects of Alternative C (East Access Alternatives)

Potential surface water impacts from Alternative C are predicted to be similar to those from the Proposed Action. The surface disturbance area would increase by approximately 220 acres if an east access road were constructed in addition to the proposed west access road, and would decrease slightly if an eastern access were constructed in lieu of the west access. Application of best management practices, as defined by applicable NDEP regulations, during road construction would, however, minimize potential impacts to surface water from increased erosion, runoff, and siltation from road disturbance areas, regardless of which access alternative or combination of alternatives is selected. Although different drainages could potentially be affected in the event of any accidental spills and resultant chemical releases during material transport to the site, the SPCC Plan developed for the proposed operations would be applicable to any and all routing alternatives and would be implemented as required to minimize potential water quality impacts.

4.3.6 Surface Water - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Alternative D is similar to the Proposed Action except that the configuration of the overburden and interburden disposal areas would be modified and result in a change in the height, footprint, and surface configuration of the piles. The most substantial of these changes would be the elimination of the proposed benches on disposal area outslopes. This change would potentially increase runoff volumes, velocities, and resultant erosion on outslope areas relative to the Proposed Action. Increased erosion would, in turn, have the potential to expose potential acid generating materials in designated sulfide disposal areas.

4.3.7 Surface Water Cumulative Effects

The Proposed Action or other action alternatives will not have any substantive permanent impacts on local and regional surface water resources within the designated Cumulative Impact Area. The main potential impacts would be disturbance of surface watersheds and minor alteration of surface drainage patterns in the Project Area.

Sediment control measures would be in place during construction and mining. During construction of the facilities, including access roads and utility corridors, specific construction practices to control erosion, runoff, and sedimentation would be implemented as described in Section 2.4.4. During active mining, surface runoff would be diverted around active pit and overburden and interburden disposal areas. Diversion ditches would keep most surface runoff from contacting overburden or interburden disposal areas. Runoff from the ore stockpile would be directed to a sediment pond and evaporated or used as process water. The heap leach pile and tailings facility would operate as zero discharge circuits. The quality of surface water runoff from the Project Area would not be substantially altered by the project. Postmining drainages would be established and stabilized in a manner which minimizes sediment production.

4.3.8 Surface Water - Hydrology Mitigation

Generally, the operational control and monitoring practices included as components of the Proposed Action and other action alternatives would provide for effective mitigation of potential surface water impacts. These measures include:

- Design for process water recycling to limit the potential for discharges
- Provisions for regular surface water monitoring
- Diversion of runoff around major facilities
- Local erosion and sediment controls
- Characterization and isolation of potential acid-generating materials
- Use of holding ponds for pit dewatering discharge
- Operation of the heap leach and tailings facilities as zero-discharge circuits
- An SPCC plan to address any accidental discharge

Given that potential surface water hydrologic impacts would be effectively addressed by specific regulatory standards for operation, maintenance, monitoring, reporting, and reclamation, the primary supplemental mitigation required would be ongoing compliance with the following plans and permits:

- NDEP Water Pollution Control Permit
- NDEP Storm Water Pollution Prevention Plan
- NDEP Storm Water Discharge Permit
- SPCC Plan
- NDOW Industrial Artificial Pond Permit

In addition, in order to address potential water quality concerns relative to the two shallow ponds projected to form following completion of mining, the BLM is stipulating that the pond areas be partially backfilled to preclude ponding contingent on the results of postmining water quality monitoring. If long-term ponding and/or poor water quality become a problem, the BLM is stipulating that SFPGC mitigate the problem through ripping to alleviate compaction, partial backfilling to eliminate ponding, or other appropriate measures.

4.3.9 Surface Water - Other Impact Considerations

Relative to surface water hydrologic resources, other impact considerations including: 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships; are summarized by Table 4-1.

4.4 GROUND WATER HYDROLOGY

4.4.1 Ground Water - Introduction

Potential impacts to the local ground water system from the proposed mining and related activities could be caused by open pit excavation, pit dewatering, heap leach operations, overburden and interburden and tailings disposal, pumping of ground water for water supply, and accidental spills of hazardous material. The potential impacts on ground water quantity and quality associated with each of the proposed alternatives are discussed in the following sections. These discussions incorporate consideration of geochemical conditions (as described in Section 3.4) as they relate to potential ground water impacts.

4.4.2 Ground Water - Effects of Alternative A (No Action)

Previous exploration activities at the Mule Canyon project site have included drilling of exploration, monitoring, and test boreholes, excavation of trenches, and mining of an exploration adit. Springs located within the project site were not disturbed during these activities since a minimum 25-foot buffer zone was maintained between flowing springs and ground disturbing activities. Also, drilling activities caused only temporary impacts to the ground water system. Boreholes with zones of artesian pressure were allowed to flow only for a short time prior to plugging with weighted drilling mud. Exploration boreholes were plugged and abandoned according to the requirements of the State Engineer's Office. Permitted ongoing exploration activities would involve similar disturbance, control measures, and potential impacts.

4.4.2.1 Exploration Adit

The primary impact to the local ground water system under the No-Action Alternative would be continuing discharge from the existing exploration adit in the northwest quarter of Section 4, T31N, R47E. The adit and associated drift were excavated in 1991 with a portal elevation of approximately 6,520 feet.

The adit extends more than 450 feet in a southwest direction, and the drift extends about 350 feet in a northwest/southeast direction. According to available information (ESI, 1992a) discharge from the adit during construction averaged about 5 gpm. Adit discharge declined following initial development averaging approximately 3 gpm from 1992 through the present. Historic discharge from the adit has impacted water levels in monitoring wells within the zone of influence (SMI/BCI, 1995a). The adit has been sealed with a bulkhead seal under an NDEP closure plan. Discharge is now limited to any minor seepage around the seal.

Future adit discharges will continue to impact ground water recharge-discharge patterns within the zone of influence. With a relatively small zone of influence and limited discharge volume, it is believed that the impact of adit discharge on local ground water flows would not be significant. The hydrogeologic balance in the adit area will likely result in a small decrease in discharge for spring GNCS 4. Once mining in the associated west ore zone is completed, adit discharge would decline further or cease since the adit falls within the zone of influence for the West Pit.

Water discharged from the exploration adit has been affected by the oxidation of sulfide minerals exposed in the adit walls and floor. Previous sampling has shown that, depending on the time of year and/or sample location, adit discharges can be of poor quality and characteristic of ARD (SMI/BCI, 1995a). Wells and springs monitored downgradient from the adit have a different chemical signature than the adit water, suggesting that impacts from the adit on ground water quality have been (and continue to be) localized. Based on these data, future impacts from the adit on site ground water quality are predicted to be minor.

4.4.2.2 Exploration Activities

Ground water quality could be locally and temporarily impacted by introduction of drilling additives and lost circulation of those additives during future exploration drilling. Possible fuel or oil spills from drilling activities could also cause minor effects to local ground water quality. Where drilling intercepts aquifer units, temporary, local dewatering and drawdown may occur until drillholes are plugged and sealed.

4.4.3 Ground Water Effects Common to All Other Alternatives

Potential impacts from proposed mining activities and mining related facilities on ground water quantity could include changes in the recharge-discharge relationships, and a decrease in water levels due to mine dewatering and water supply pumping. Reductions in water levels may cause springs to dry-up or spring flows to decline. Ground water quality could also be impacted by seepage from the open pits, heap leach pad, tailings and overburden and interburden disposal areas and from accidental spills.

4.4.3.1 Open Pit Mining

Surface Disturbance - The proposed mining operations would result in surface disturbance and excavation of two springs (MCS-3A and MCS-3B). The loss of these springs is unavoidable given the location of identified mineral reserves and would result in loss of the springs as a source of stock water for wildlife and livestock. Flows for springs MCS-A, MCS-2, MCS-4, and MCS-10 could be significantly reduced and the springs could dry up entirely. Discharge from four other springs (MCS-6, MCS-7A, MCS-8, and MCS-11) could also be reduced. Reduction of the fenced area until such time as a mill is constructed would defer any mining related access constraints to springs MSC-6, MSC-7A, MSC-8, and MSC-10 although these springs could still be impacted by dewatering effects. Other springs located along the flanks of the northern Shoshone Range would not be affected, due to their location well downgradient from the mining operations.

Pit Dewatering During Mining - Excavation of open pits below the zone of saturation would cause changes in the direction of ground water flow. Local ground water flow would be toward the pits, where discharge by pumping or increased evaporation would take place.

Two of the five proposed open pits (West and South) would be excavated below the zone of saturation and would need to be dewatered during the mining operation (SMI/BCI, 1995a). The remaining pits (Main, North, and Section 9) would be excavated above the zone of saturation. Since they would intercept shallow ground water flows and surface runoff, however, the remaining pits (except for the Section 9 Pit) would also require dewatering during mining.

Ground water flow modeling was performed to assess the rates of ground water inflow to the pits both during mining and following completion of mining. A detailed, three-dimensional ground water flow model was developed to evaluate hydrologic baseline conditions, design the pit dewatering system, and evaluate post-closure hydrogeologic conditions in the vicinity of the mine pits. Ground water inflow was modeled using the USGS Modular Three-Dimensional Ground Water Flow Program (MODFLOW) (McDonald and Harbaugh, 1988) as described in detail in SMI/BCI (1995b). In addition, the particle-tracking module PATH3D (Zheng, 1989) was used to evaluate the direction and approximate rate of ground water flow in the vicinity of the open pits following mine closure.

Open pits would be dewatered during mining through gravity drainage or pumping to collection sumps. Pumping rates were determined by calculating the two potential components of the pit inflow: surface runoff and ground water inflow. Surface runoff would be limited by the construction of diversion ditches which would prevent major inflows of surface water into the pits (BCI, 1994).

Results from ground water flow modeling indicate that during mining, individual pit inflows would range from 0 to 50 gpm. Total inflow to the open pits would peak at 110 gpm in year 2000 and then decline. The distribution of predicted dewatering rates during mining is presented in Table 2-9.

The main impacts from pit dewatering would include lowering of the ground water table, and consequent reductions in flow from local fresh-water springs (SMI/BCI, 1995b). Dewatering of the West and South pits is predicted to lower the water table immediately adjacent to the pits by several hundred feet. The resulting impact on the local ground water system, however, is expected to be minor since bedrock permeability and the relatively short duration of planned dewatering operations (1996 to 2005) would limit the areal extent of potential drawdown zones. The proposed pits are located near the local drainage divide which would also decrease the potential impact on surface and ground water resources. The maximum extent of drawdown during mining is estimated to be less than one mile from each pit.

During mining, water that collects in the open pits from ground water inflow and surface runoff would be removed by pumping. The potential for seepage to occur would, therefore, be low and adverse impacts to ground water quality from water accumulations in the open pits would not be anticipated.

Pit Filling After Mining - At the end of mining some of the mine pits would begin to fill due to surface water runoff, precipitation, and ground water inflow. According to SMI/BCI (1995b), permanent water accumulations would develop in only two pits after mining. A deep lake (approximately 110-feet deep and with a surface area of approximately 2.1 acres) would form in the South Pit and two shallow ponds (approximately 20 feet) would form in the central portion of the South Pit and the southern portion of the West Pit. The shallow ponds are predicted to reach an equilibrium level in approximately 10 to 20 years and the deep lake (South Pit) would fill and stabilize in approximately 90 to 140 years (SMI/BCI, 1995).

During the period of pit filling, site hydrogeologic conditions would gradually return to near pre-mining conditions. In areas where mining would result in local depression of the water table, ground water levels would return to dynamically stable levels approximating premining conditions. Pre-mining water levels would not, however, be achieved in the vicinity of the South and West

Pits since evaporation from the pit lakes or ponds would result in minor local drawdown. The existence of permanent water accumulations in the two pits would have only minimal long-term quantitative impact on the local ground water system.

Potential ground water impacts due to pit filling have been evaluated in the post-closure report (SMI/BCI, 1995b). Following completion of mining, impacts to ground water quality from the open pits would be minimal. Although the potential exists for some infiltration from the ponds and pit lake to underlying rock units, the infiltration potential is low due to relatively low permeabilities and the amount of seepage is not expected to be significant. High evaporation rates are projected to cause the pits to act as aquifer discharge areas with the result that there would be little, if any, aquifer recharge. Most of the water that would temporarily accumulate in the other pits following precipitation events would evaporate and result in little seepage. If more infiltration were to occur from the pits than projected, ground water quality could be locally impacted.

Geochemical modelling as described in Section 4.3, suggests that water that collects in the small permanent or temporary pit ponds could exceed drinking water quality standards for cadmium, chloride, copper, fluoride, iron, manganese, nickel, pH, selenium, sulfate, TDS, and zinc. The quality of the pit lake water is predicted to be poorest during early lake filling and could exceed water quality standards for cadmium, iron, manganese, pH, selenium, sulfate, TDS, and zinc. After filling, pit lake water quality could also exceed drinking water and aquatic standards for sulfate and TDS.

A preliminary risk assessment (ENSR, 1995) and an expanded risk assessment (SMI, 1996, as summarized in Appendix E) indicate that there would be little potential risk to wildlife due to exposure to the final pit lake but that there is some potential for adverse wildlife impacts associated with use of or exposure to the two shallow pit ponds. The BLM is stipulating partial backfilling of the shallow pond areas to prevent ponding contingent on the results of postmining water quality monitoring and the suitability of rockfill materials. With partial backfilling, the potential would exist for ground water migration away from the shallow pond areas. Elimination, however, of the evaporative effects which would cause the open ponds to act as ground water sinks, will also eliminate the concentrating effects of evaporation, resulting in improved water quality. Evaluation of particle tracking predictions (SMI/BCI, 1995b), indicates that any ground water from the backfilled shallow pond areas would move toward the final pit lake in the southern portion of the South Pit.

As indicated in the preceding section, the amount of infiltration from the open pits after mining would be minimal and would not be expected to result in any substantial ground water quality impacts. To confirm that ground water quality degradation is not occurring, SFPGC would monitor springs and wells downgradient from the pits during and for a period of at least 3 years following completion of mining and reclamation, consistent with applicable provisions of the NDEP Water Pollution Control Permit. The monitoring period for springs and wells proximate to the final pit lake may be extended by the NDEP consistent with extended monitoring requirements for impacts associated with permanent impoundments. Under the NDEP Water Pollution Control Permit, monitoring of the final pit lake will be required for up to 30 years following stabilization.

4.4.3.2 Ore Stockpile

The surface disturbance for the proposed ore stockpile would be relatively small (approximately 12 acres) and, therefore, is not expected to substantially impact the local ground water recharge-discharge system.

The ore stockpile would also not be expected to adversely impact ground water quality. As described in Section 4.3, the ore stockpile has been designed to minimize the formation and release of leachate during operations. Little or no leachate is expected to be generated from the ore stockpile or released into underlying soil materials. Infiltration and leaching potential would be minimized by proposed design features including a compacted soil liner, the limited size of the facility, and low precipitation and high evaporation rates at the site.

The ore stockpile would be underlain by approximately 700 feet of unsaturated alluvium and volcanic bedrock (SMI/BCI, 1995a). Even if minor leachate formation and infiltration were to occur, the natural attenuation capacity of these geologic materials could be expected to reduce contaminant concentrations to background levels before any seepage could reach the underlying aquifer.

4.4.3.3 Heap Leach Pad

The heap leach pad would not be expected to cause either short-term or long-term impacts to ground water resources. As described in Section 4.3, the facility has been designed and would be operated as a zero discharge circuit. After mine closure, it would be decommissioned and reclaimed to minimize the potential for long-term generation of leachate or release of cyanide or metals. During operations, a leak detection system would be monitored on a regular basis to detect any seepage (SMI/BCI, 1995). As a result of these measures and the low precipitation and high evaporation rates at the site, little or no leachate is expected to be released from the facility to underlying geologic materials.

water would be obtained directly from pit dewatering holding ponds and the remainder would be supplied from a well field.

In order to meet the projected demand, a well field has been sited in the western Whirlwind Valley. The well field would consist of three wells which would be completed to withdraw water from both the confined and unconfined aquifer zones. Because only a limited amount of water would be expected from pit dewatering operations, it is assumed that the Whirlwind Valley well field would supply the majority of the water needed for mining operations. Lander County has applied for a temporary water rights waiver which would allow establishment and use of an additional water supply well on the western side of the Shoshone Range in the alluvium of the Reese River Valley. This well is intended as a water source for construction and maintenance of the West Access Road, would be established only if needed, and if developed, would be maintained and utilized over the life of the mine.

There could be temporary impacts to ground water resources in the Whirlwind Valley due to withdrawals from the proposed well field. The predicted drawdown of the water table in the vicinity of the well field is estimated to average approximately twenty-two feet. The zone of measurable drawdown would extend approximately two miles radially from the well field and the water table is predicted to recover from the effects of pumping within a period of about twelve to eighteen years.

The potential impacts of these drawdowns on the ground water system would be temporary. The withdrawal of water from the confined aquifer would cause the existing upward hydraulic gradient to be temporarily decreased resulting in a reduction in ground water flow from the confined zone to the unconfined zone. This temporary change would not be considered to be detrimental to the environment and would be mitigated through recovery of the water table on cessation of pumping operations. The expected water table decline caused by pumping of the well field could also have a minor impact on the wetland located in the western portion of the Whirlwind Valley. Any impacts on the wetland would not, however, be significant since the wetland exists primarily because of surface discharge flows from the Oxbow Resource geothermal plant and ponding of surface runoff from the nearby mountain slopes (SMI/BCI, 1995a). An aquiclude which separates the near-surface unconfined aquifer and the deeper confined aquifer would also limit surface drawdown effects.

Temporary lowering of the water table would also not be expected to adversely impact ground water users in the Whirlwind Valley since drawdown would be limited, localized, and temporary. The increased depth to ground water would probably cause evapotranspiration losses from the aquifer to decline locally as the water table falls below the root zone of some plants. This effect is expected to be limited and would not cause appreciable changes in the natural vegetation since most species are not dependent on sub-irrigation for their survival. No significant impacts would be expected to occur to the ground water resources of the eastern Whirlwind Valley or the Humboldt River.

No substantial water quality impacts would be expected to occur due to water supply development for the mine. A minor decrease in salt content could occur in shallow ground water near the well fields as a result of lowering the water table and locally decreasing the rate of evapotranspiration. Also, by altering the natural hydraulic gradient near the well field, water quality could be affected locally by the mixing of waters from different aquifers. Such changes are expected to be temporary and water quality would return to baseline conditions after pumping operations cease.

4.4.3.7 Accidental Discharges

An accidental spill of hazardous material along an access route and/or at the project site could have local impacts on the ground water system. Impacts could include temporary local ground water contamination in the area of the spill, although the potential for surface water impacts would be greater than for impacts to ground water. A detailed discussion of accidental spills and potential impacts is presented in Section 4.3.3.7.

4.4.4 Ground Water - Effects of Alternative B (Proposed Action)

Potential ground water impacts under Alternative B would generally be the same as described in Section 4.4.3.

If the decision were made to not backfill the Main Pit, more material would be placed in Overburden and Interburden Disposal Area 5, increasing the volume and footprint of this disposal area. Given the option of partially or fully backfilling other pits as outlined in Section 2.4.8, the size and configuration of other overburden and interburden disposal areas could change, the depth and disturbed area associated with final pits could be reduced, and the number, size, and depth of final pit ponds or temporary pools could decrease. Under this alternative, both final pits and overburden and interburden disposal areas would be similarly designed and reclaimed to minimize the potential for formation of leachates or ARD. Whether the Main Pit is backfilled or not would have little or no affect on groundwater levels in the vicinity since the postmining water table is projected to be below the base of the Main Pit and evaporative effects would consequently be negligible. The impact to ground water quality from the Main Pit would also not be expected to differ substantially between the alternatives. Because ground water is not predicted to flow into the Main Pit following mining, the pit would largely remain dry, regardless of which option is selected. Under the no backfill option, some water could locally pond in the pit after mine closure due to storm events, but most of this water would be lost to evaporation and would not seep out of any backfilled pit.

Similarly, the decision to partially or fully backfill or to not backfill other mine pits would take into consideration the potential ground water level in the vicinity of each pit area, potential postmining surface and ground water inflows to the individual pit areas, and the availability of oxide backfill materials. In any pits where the postmining equilibrium water level would be above the base of the pit, ground water would pool in any backfill material placed in the pit(s). Since this pooled ground water would be in equilibrium with the ground water system, it would have little affect on ground water levels in the pit vicinity. Any changes in ground water quality which would occur due to contact with backfill materials, could influence ground water quality in the immediate vicinity. Potential ground water quality impacts would be minimized by the use of oxide backfill materials, and the natural effects of dilution and dispersion which would increase with increasing distance from the backfilled pit(s). Under the backfill option, any backfilled pits would be regraded and revegetated at mine closure to minimize surface infiltration and only oxide waste rock material determined to have a low potential to generate acid and leach contaminants would be backfilled into the pit(s).

4.4.5 Ground Water - Effects of Alternative C (East Access Alternatives)

Potential impacts to ground water resources from Alternative C are predicted to be similar to those from the Proposed Action. There would be some difference in surface disturbance areas by constructing an east access road rather than a west access road. However, road construction would not be expected to significantly alter the local ground water recharge-discharge system, regardless of which alternative is selected. In addition, although different ground water aquifers could potentially be impacted in the event of accidental spills and consequent material releases during transport to the site, implementation of the SPCC Plan would minimize any potential ground water quality impacts.

4.4.6 Ground Water - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Alternative D is similar to the Proposed Action except that the configuration of the overburden and interburden disposal areas would be modified resulting in potential changes in the height and footprint of the piles. This alternative would not be expected to result in impacts to ground water resources substantially different from those described for the Proposed Action. Some of the overburden and interburden disposal areas could be somewhat larger or smaller depending on the configuration option selected, but differences would not be great enough to substantially change the impacts to the ground water recharge-discharge system. Regardless of their configuration, overburden and interburden disposal areas have been designed to minimize potential percolation and conditions which could result in acid generation.

4.4.7 Ground Water - Cumulative Effects

No cumulative effects on ground water quantity or quality are anticipated from the Proposed Action or other action alternatives. There are no minerals mining, industrial, or other major development activities within the designated CEA which could result in cumulative impacts except the Oxbow Resources Geothermal Plant. Operation of the geothermal plant would not result in cumulative impacts since the geothermal system which supplies the plant does not have a direct hydrologic connection with hydrologic systems which could be impacted by the proposed mining activities as discussed in Sections 3.6.2 and 3.6.4.

4.4.8 Ground Water Hydrology Mitigation

Specific facility design, and operational control and monitoring considerations and practices incorporated as components of the Proposed Action and other action alternatives, would provide for effective mitigation of potential ground water impacts. These considerations and practices include:

- Controlled drainage and removal of surface and ground water inflows to mine pits during active operations
- Characterization and isolation of potential acid generating materials
- Limitation of any backfilling to non-sulfide materials
- Design of the ore stockpile, heap leach, and tailings facilities with low permeability liners, and leak detection systems (leach and tailings facilities only)
- Operation of the heap leach and tailings facilities as zero-discharge circuits
- An SPCC Plan to address accidental discharges of potentially hazardous materials
- Design of the mine water supply to minimize drawdown and design for process water recycling to limit the potential for discharges and minimize water supply requirements
- Provisions for regular ground water monitoring

Potential ground water impacts would be effectively addressed by ongoing compliance with specific regulatory standards for operation, maintenance, monitoring, reporting, and reclamation under the following plans and permits:

- NDEP Water Pollution Control Permit
- SPCC Plan
- NDOW Industrial Artificial Pond Permit

Any loss or reuction of flow rate or volume of appropriated or non-appropriated waters to wildlife or livestock within the project area shall be mitigated by the replacement of the amount of lost flows or volume such that total annual flow results in approximately the original annual flow volume. Mitigation, which may include spring developments; installation of wells, pipelines, pumping systems, and/or guzzlers; and/or other water development systems, shall be accomplished in a timely manner. An annual report, showing baseline flow data with flow volume for each year of the mining operation, shall be submitted by SFPGC to the BLM. Mitigation for the loss or reduction in water flow will be completed in consultation with and coordinated between BLM, NDOW, SFPGC, and any affected water-right holder or grazing permittee. A loss or reduction in water availability to wildlife or livestock shall be determined to have occurred with the physical loss of springs or the exclusion of livestock or wildlife from water, or based on comparison of a minimum of three years of flow data with baseline data. Loss of water or reduction in water availability shall be determined by the BLM and NDOW.

Installation, funding, and maintenance of these water develpments will be the responsibility of SFPGC or the current Mule Canyon Mine Operator until full closure of the mine. At closure, title to the fully maintained and operational developments will be transferred to the BLM and NDOW, and/or the affected grazing permittee or water-right holder.

This mitigation is in addition to any reulatory requirements of NDEP, NDWR, and NDOW and will not be construed as affecting the authority or regulaotry requirments of any agency of the State of Nevada.

- Design of mine structures to assure stability and minimize erosion potential
- Establishment and maintenance of drainage and sediment control structures
- Testing and characterization of soil suitability relative to use as a revegetation medium
- Salvage, stockpiling, and replacement of available soil and other suitable materials
- Revegetation of mine disturbance areas to stabilize replaced soils and minimize erosion

Potential soils impacts are effectively addressed by specific regulatory standards for mine operation and reclamation. Mitigation would be addressed through ongoing compliance with the NDEP Reclamation Plan and no supplemental mitigation would be required or justified.

4.5.9 Soils - Other Impact Considerations

Relative to soils resources, other impact considerations including: 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships; are summarized by Table 4-1.

4.6 VEGETATION

4.6.1 Vegetation - Introduction

The proposed mining and related activities would result in direct disturbance of existing vegetation communities. In disturbance areas, existing vegetation would be temporarily lost. Proposed project reclamation measures are, however, designed to reestablish an effective postmining vegetative culture. Revegetation objectives include:

- Reestablish predominantly native perennial species with inclusion of adapted introduced species as appropriate
- Provide a diverse self-sustaining vegetative culture
- Achieve vegetative cover and production levels consistent with effective erosion control and the designated postmining land uses of wildlife habitat and livestock grazing

The project proposal includes a revegetation testing program designed to evaluate a variety of revegetation seed mixtures and treatments to determine the most practical and effective method to be utilized for revegetation of various types of mining disturbance, as well as areas with varying topographic aspects. Vegetation could also be adversely impacted by mining-related changes in surface drainage including the loss of surface seeps and springs, certain types of air emissions, and accidental discharges of potentially hazardous materials. Given the absence of any known Threatened, Endangered, or Candidate plant species within the Project Area, no potential adverse impacts on protected plant species are anticipated.

The duration of potential vegetation impacts would be limited by implementation of the NDEP Reclamation Plan which includes specific plan provisions for revegetation of mining related surface disturbance areas. Any potential mining related impacts on wetlands or the associated vegetation would be regulated by the COE under applicable provisions of the Clean Water Act (Section 404). Mitigation would be required pursuant to COE required mandates for affected wetlands. Compliance with applicable regulatory standards and provisions would effectively prevent or minimize adverse vegetation impacts. The following subsections provide detailed analyses of potential vegetation resource consequences for each of the project alternatives.

4.6.2 Vegetation - Effects of No Action Alternative (Alternative A)

Under the No-Action Alternative, the Project Area would remain in its current condition and configuration subject, however, to existing approved activities and uses including ongoing mineral exploration, livestock grazing, and wildlife utilization. To date approximately 245 acres have been disturbed by mineral exploration with plans for future disturbance of an additional 204 acres under the existing approved Argenta Exploration Permit. Of this total acreage, approximately 61 acres have been disturbed within the Project Area, with 200 additional acres to be disturbed within the Project Area by further exploration activities. Approved exploration plans covering both existing and proposed exploration disturbance include provisions for revegetation of exploration disturbance areas. These practices should be effective in restoring an effective self-sustaining vegetative culture on mine disturbance areas. Ongoing grazing activities have the potential to impact vegetation either positively or negatively dependent on utilization levels and other factors. The effects of ongoing grazing activities are discussed in Section 4.7. Potential future grazing impacts would be expected to be similar to current impacts assuming that grazing management practices and utilization levels remain unchanged.

4.6.3 Vegetation - Effects Common to All Other Alternatives

Effects of the proposed mining and related activities could include vegetation removal and loss, reduction of plant productivity, and accumulation of potentially toxic elements in plants. Approximately 2,688 acres would be disturbed by the proposed mining and facility construction activities while an additional 210 acres would be enclosed within the interim project fenceline and an additional 4,400 acres within the ultimate project fenceline. The majority of the proposed disturbance (approximately 1,850 acres) would occur in the big sagebrush (*Artemesia tridentata wyomingensis*; 52 percent) and low sagebrush (*A. arbuscula*; 17 percent) vegetation types which dominate the region, as indicated by Table 4-5. Disturbance to the other vegetation communities: shadscale (8 percent); greasewood (14 percent); wetland (nominal); annual grasses (nominal); burn areas (8 percent); and areas with altered hydrologic regimes (nominal), account for the remaining 838 acres. Assuming vegetation is removed from the entire area proposed for construction, production losses could be up to approximately 1.6 million pounds (800 tons) of air-dry forage each year (assumes full production potential) for the 15-year life of the project. Based on recent site-specific vegetation surveys which reflect current site conditions but also reflect the effects of several previous years of drought conditions, annual production losses could be as low as 215,000 pounds (108 tons) of air-dry forage. Probable actual production losses under normal climatic conditions would be at least two times the minimum values measured by the recent surveys, or 430,000 pounds (220 tons) of air-dry forage annually.

Long-term disturbance of the ground surface would predispose the potential for invasion by weedy species (including noxious weeds), annuals, and certain invader species having limited forage value (such as has occurred in the area which was burned in the 1970's), as shown by Figure 3.18. Based on commitments to revegetate the area in a responsible manner and initiate weed control measures, SFPGC would be able to effectively limit conditions which could lead to significant weed infestatations.

Following completion of active mining operations, vegetative cover and productivity would be reestablished on much of the Project Area through revegetation efforts as detailed in Section 2.4.20. Based on the proposed reclamation efforts, effective re-establishment of high-quality usable forage could be attained with the potential for enhancement relative to predisturbance conditions. Evaluation of the reclamation plan indicates that initial revegetation efforts could replace approximately 38 percent cover which is comparable to existing cover values and a carrying capacity of approximately 16 acres/AUM, depending on aspect, soil conditions, and other factors. Under normal patterns would require consultation and concurrence by the BLM and the grazing permittees.

Potential grazing impacts would be controlled through implementation of the NDEP Reclamation Plan and BLM approval of the PO which include specific plan provisions for revegetation of mining related disturbance areas. Compliance with applicable regulatory standards and provisions would effectively prevent or minimize any substantive long-term adverse grazing impacts. The following subsections provide detailed analyses of potential grazing consequences for each of the project alternatives.

4.7.2 Grazing and Range Management - Effects of No Action Alternative (Alternative A)

Under the No-Action Alternative, the Project Area would remain in its current condition and configuration subject, however, to existing approved activities and uses including ongoing mineral exploration, livestock grazing, and wildlife utilization. Approved exploration plans covering both existing and proposed exploration disturbance include provisions for revegetation of exploration disturbance areas and restoration to grazing use. Ongoing grazing activities have the potential to impact vegetation either positively or negatively dependent on utilization levels and other factors. Possible impacts due to continuation of existing permitted grazing could include changes in vegetative cover and production and introduction or distribution of noxious weeds. Potential future grazing impacts would be expected to be similar to current impacts assuming that grazing management practices and utilization levels remain unchanged.

4.7.3 Grazing and Range Management - Effects Common to All Other Alternatives

Effects of the proposed mining and related activities on grazing resources would include a temporary elimination of grazing access, limitations on livestock movements and use due to the addition of fencing and other structures, vegetation removal and loss or reduction of plant productivity as discussed under Section 4.6, hazards to livestock, and the loss of surface seeps and springs as livestock watering sources.

As discussed in Section 4.6, a perimeter fence would initially enclose approximately 2,900 acres during the interim period until such time as a mill is constructed temporarily eliminating grazing access and use for approximately 290 AUMs of grazing capacity, based on historic BLM carrying capacities as indicated by Table 4-6. If and when a mill is constructed, the fenceline would be extended to encompass approximately 6,635 acres impacting 670 AUMs. This represents less than 4 percent of the 17,140 licensed AUMs in the Argenta allotment. The well field, access roads, and borrow sources outside the fenced perimeter would affect approximately 500 additional acres or 25 AUMs/year within the Argenta Geyser Allotment.

A maximum of approximately 340 acres of disturbance corresponding to the mine access roads and any mine pits which would not be backfilled would not be reclaimed and revegetated. These areas would represent a permanent loss of grazing capacity corresponding to approximately 34 AUMs.

Proposed surface disturbance of approximately 2,190 acres within the project area boundaries and 500 acres outside the project boundaries would result in the loss of a minimum of approximately 110 tons (based on recent site-specific data) and a maximum of approximately 800 tons (based on maximum production capacity) of air-dry forage each year for the 15-year life of the project. A more realistic estimate of production losses taking into account current site conditions (which reflect the effects of historic range fires and long-term grazing use, and normal climatic variations) would be approximately two times the measured site-specific productivity, or 220 tons of air-dry forage annually. This level of production loss is equivalent to the loss of approximately 410 AUMs based on a forage requirement of 1,080 pounds of air-dry forage per AUM. Production losses would not be additive relative to the AUM losses noted above, since disturbance within the Project Area would generally fall within the project fenceline. Disturbance and associated AUM losses outside the fenceline have already been addressed.

Proposed reclamation and revegetation, as described in Section 2.4.20, would result in reestablishment of premining grazing capacities for all mine disturbance areas except the mine access roads and any mine pits not backfilled and reclaimed following completion of mining. The maximum acreage for areas which would be disturbed and not reclaimed would be approximately 340 acres. Potential production losses associated with the unreclaimed areas could range from approximately 15 (site-specific production data) to 80 (full production capacity) tons of air-dry forage per year but would likely be approximately two times the minimum values, or 30 tons per year. This level of production loss is equivalent to approximately 55 AUMs. Based on the proposed revegetation plans and the experience of other mining operations in Nevada, there is a strong potential that revegetation would result in reestablishment of a mid- to late-successional mixed grassland-shrub community with higher vegetative productivity than the premining community it would replace. Given this consideration, productivity and AUMs losses associated with the unreclaimed areas could be partially or fully offset by the increased productivity of reclaimed lands. The proposed project reclamation plans also provide the option of retaining or removing the perimeter fencing which would enclose most of the project-related disturbance. Retention of the fencing would provide the means for more effectively managing grazing use, allowing rotational grazing between the fenced area and surrounding lands.

Principal hazards to livestock during the operational phase of mining would be the potential for vehicle-livestock collisions on access roads and other mine roads external to the perimeter fencing. In addition, should perimeter fencing be breached, the potential exists for exposure to non-fenced ditches, pits, or other structures. Wildlife fencing of most process facilities would minimize the likelihood of exposure to harmful or potentially toxic materials and any livestock found within the project fenceline would be returned to appropriate areas outside the Project Area. Following completion of mining activities, site reclamation, and elimination of livestock access constraints, potential hazards to livestock would include vehicle collision hazards on remaining roads and potential for steep-slope hazards associated with remaining open pit areas. The long-term potential for vehicle-livestock collisions would be minimized by limited use of Project Areas following mining and the relatively rugged terrain which would inherently limit vehicle speeds. Permanent berms around the final pit perimeters and elimination of pit access roads would discourage livestock access and limit remaining long-term hazards.

With regard to existing facilities which support livestock grazing uses, proposed mining operations would remove approximately 0.1 acres of non-jurisdictional wetlands and eliminate or result in the reduction of flows from up to 10 springs and seeps as discussed in Section 4.4.3.1. In addition, a developed spring which is an existing range improvement could be eliminated or modified by the proposed activities. Impacts would depend on actual on-the-ground construction locations. Elimination or reduction of flows from existing springs could impact grazing potential by limiting the utility and value of any areas which are not in reasonable proximity to potential watering sources. By reducing the fenced area until such time as a mill is constructed, access to and use of three of the potentially affected springs would be preserved.

4.7.4 Grazing and Range Management - Effects of Alternative B (Proposed Action)

In addition to the lands and AUM's that would be effectively removed from grazing use by the perimeter fencing, the proposed action would disturb an additional 500 acres of land (196 acres in the Argenta allotment and 304 acres in the Geyser allotment). This would remove 10 AUMs of capacity annually in the Argenta allotment for the life of the mine based on historic BLM carrying capacities and 15 AUMs/year from the Geyser allotment.

TABLE 4-6
POTENTIAL AUM IMPACTS FOR EACH ALTERNATIVE

	Affected AUMs in Fenced Area (Full Build-Out)	Affected AUMs outside Fenced Area		Total Affected AUMs
	Argenta	Argenta	Geyser	
Alternative A - No Action	0.0	0.0	0.0	0.0
Alternative B - Proposed Action	670.0	15.0	15.0	695.0
Alternative C - East Access	670.0	8.0	17.0	695.0
Alternative D - Overburden and Interburden Disposal Area Configuration	670.0	10.0	15.0	695.0

<u>Note:</u> AUMs based on permitted carrying capacities (BLM, 1964)

If the decision were made to not backfill the Main Pit, the corresponding surface area of approximately 20 acres would not be reclaimed. The resulting loss of AUMs would, however, be negligible.

4.7.5 Effects of Alternative C (East Access Alternatives)

In addition to the lands and AUMs that would be effectively removed from grazing use by the perimeter fencing, Alternative C (Secondary Preferred East Access) would disturb an additional 500 acres of land (151 acres in the Argenta allotment and 349 acres in the Geyser allotment). This would remove 8 AUMs of capacity annually in the Argenta allotment for the life of the mine based on historic BLM carrying capacities and 17 AUMs/year from the Geyser Allotment.

Alternative C (Preferred East Access) would affect 489 acres of land (155 acres in the Argenta allotment and 334 acres in the Geyser allotment). This would remove 8 AUMs of capacity annually in the Argenta allotment for the life of the mine based on historic BLM carrying capacities and 17 AUMs/year from the Geyser Allotment.

The effective AUMs lost for either of the eastern access alternatives would not be significantly different from the AUM losses associated with Alternative B.

4.7.6 Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

The potential project-related grazing impacts for areas within the project boundaries due to Alternative D would not vary significantly from the grazing impacts anticipated under the Proposed Action. Similarly, affected acres and AUMs outside the Project Area are identical to those for Alternative B. Under this alternative, significant changes in the overburden and interburden pile outslopes are not contemplated. Any minor changes which could occur would not have an appreciable impact on either livestock access or utilization, although increases in slope could decrease grazing value and decreases in slope could potentially increase grazing value beyond certain reasonable slope ranges.

4.7.7 Grazing and Range Management - Cumulative Effects

Cumulative grazing effects for the Argenta and Geyser Allotments would be limited to the project proposal and existing grazing uses since there are no other existing, proposed, or reasonably foreseeable activities in the CEA. There are, therefore, no impacts that are considered cumulative with the project proposal other than a slight increase in the potential for livestock-vehicle collisions.

4.7.8 Grazing Mitigation

As an interim mitigation measure, SFPGC would reduce the area enclosed by the project fenceline until such time as a mill is constructed. The reduction in the fenced area would allow continued grazing access and use for approximately 3,735 acres (or 374 AUMs) and continued access to three springs. Any loss or impairment of flow from springs for which existing valid water rights exist is subject to the jurisdiction of the NDWR with specific requirements for timely replacement or other mitigation. Any loss of flow for springs not covered by existing water rights would be mitigated in consultation with the BLM, NDOW, and affected grazing permittees. "Open Range" signs and posted speed limits for both mine roads and County access roads would reduce the potential for vehicle-livestock collisions. In the event that livestock damage does occur as a result of a vehicle-livestock collision, under applicable open range laws the individual or entity responsible for the loss would be liable for reasonable compensatory damages. SFPGC would assume responsibility for any damages involving company-owned vehicles.

Short-term grazing impacts can only be addressed through supplemental mitigation measures developed in consultation with and approved by the BLM and NDOW. Potential grazing mitigation options which would be subject to future consideration by and consultation with the BLM could include but would not be limited to water developments such as spring development or construction of catch basins or guzzlers; fertilization; supplemental seedings; weed and woody plant control and reduction (sagebrush and pinyon-juniper); and the use of existing project fencing or fence construction to facilitate seasonal grazing rotation.

As discussed in Section 4.6, the reclamation measures included as a component of the Proposed Action and other action alternatives would effectively mitigate the vegetative component relative to potential long-term grazing impacts.

4.7.9 Grazing and Range Management - Other Impact Considerations

Relative to grazing resources and use, other impact considerations including: 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships are summarized by Table 4-1.

4.8 WILDLIFE

4.8.1 Wildlife - Introduction

The proposed mining and related activities would result in temporary or permanent modification of wildlife habitat; loss or alteration of existing springs and seeps and associated riparian values; loss of non-mobile wildlife; and displacement or loss of mobile wildlife. Permanent alteration of habitat would occur in association with the development and retention of the open pits and access routes. Mule deer and chukar would be the principal species of concern affected by short and long-term habitat loss and changes to water sources. Populations of these species could be reduced for the duration of mining and until disturbed areas are successfully reclaimed. Project development would not reduce the viability of any listed Threatened, Endangered, or Candidate wildlife species. Operation of the tailings pond, holding ponds, and heap leach could expose wildlife to potentially toxic water sources. The risk of exposure, however, would be minimal as long as proper enclosure methods are implemented, as required under the NDOW's Industrial Artificial Pond Permit.

Potential wildlife impacts would be controlled through implementation of proposed operational control and reclamation measures under the NDEP Reclamation Plan and the NDOW Industrial Artificial Pond Permit. The NDEP Reclamation Plan includes specific provisions for revegetation and reestablishment of wildlife habitat on mine related disturbance areas following mine closure. The NDOW Industrial Artificial Pond Permit includes specifications for methods to detoxify created water sources and to exclude wildlife from potentially toxic water sources. In addition, SFPGC would use fencing to exclude wildlife from other potentially hazardous facilities. Compliance with applicable regulatory standards and provisions would effectively prevent or minimize any substantive long-term adverse wildlife impacts. The following subsections provide detailed analyses of potential wildlife consequences for each of the project alternatives.

4.8.2 Wildlife - Effects of Alternative A (No Action Alternative)

No additional disturbances to wildlife and habitat would occur under the No-Action Alternative. Habitat and wildlife disturbance would continue under existing exploration permits and grazing leases. Approved exploration plans covering both existing and proposed exploration disturbance include provisions for revegetation of exploration disturbance areas and restoration of wildlife and grazing values. Potential future grazing impacts

Another aspect of habitat modification would be the potential for loss of or reduction in flow from springs and seeps, and loss or alteration of associated riparian habitat either directly by disturbance or indirectly as a result of disruption or local drawdown of supporting surface and groundwater sources. An analysis of potential impacts to project area springs is presented in Section 4.8.3.3, Changes in Water Sources.

No loss of critical or important habitat for any Federally listed Threatened, Endangered, or Candidate or BLM Sensitive species would occur with project development. Habitat loss has, however, the potential to affect four Federal Candidate or BLM Sensitive species (spotted bat, western small-footed myotis, pygmy rabbit, and ferruginous hawk), raptors, and three game species (mule deer, chukar, and sage grouse). The USFWS recently revised the list of candidate species (Federal Notice of Review, 2/28/96), reducing the number of candidate species for Nevada from 270 to 6 (the species noted above were removed from the listing) and eliminating the C1 and C2 classifications. In order to provide for "...interim consideration and conservation..." (BLM Instruction Memorandum NV-96-019, 3/20/96), however, the BLM has incorporated the formerly listed candidate species in the Nevada BLM Sensitive Species List.

The following sections discuss potential impacts due to direct habitat loss for the principal species of concern.

Candidate or Sensitive Species - Spotted bats are believed to inhabit cliff and rock outcrop areas near water as discussed in Section 3.10.9. No portions of riparian habitat along the Humboldt River or rocky areas suitable for roosting by spotted bat would be affected by project development, and impacts to this species would not occur. Western small-footed myotis are known to occur in the area and may utilize existing rock crevices for day and maternity roosts. It is possible that surface disturbance in areas of rock outcrop could affect day roost or maternity sites of a small number of bats, but mine development would not likely result in a reduction in the viability of this species. With retention of final pit areas and development of pit lakes, additional suitable foraging and roosting habitat could be created for spotted bat and western small-footed myotis, however, water quality limitations could be a potential concern. Potential water quality concerns will be addressed by the expanded risk assessment currently in progress.

Ferruginous hawks are known to nest in the region and near the Humboldt River. No ferruginous hawks or nesting activity by this species were found in or near the Project Area, and the only impact possibly affecting this species would be a minor reduction in potential hunting habitat. A small loss of potential hunting habitat would not result in a reduction in the viability of this species.

Presence of pygmy rabbit was documented in big sagebrush habitat near the western edge of the Project Area. As indicated in Section 3.10.9, pygmy rabbits prefer relatively tall and dense stands of sagebrush. Although the majority of mine development disturbance would occur in big sagebrush habitat, most stands of big sagebrush within the disturbance areas do not support sagebrush with height and canopy cover characteristics (WRD, 1992) preferred by pygmy rabbit. In addition, there would be no surface disturbance within 1/2 mile of the general area in which the pygmy rabbit sighting was recorded. Therefore, it is unlikely that project development would result in a reduction in population viability within the Project Area or the CEA. If, however, project development were to result in the loss of small pockets of suitable pygmy rabbit, local reductions in pygmy rabbit populations could occur.

Mule Deer. The western third of the Project Area falls within yearlong range and includes a portion of crucial winter range for mule deer. Winter range is associated primarily with the Argenta Rim. Project development would result in a reduction of approximately 340 and 280 acres, respectively of yearlong and crucial winter range in the Project Area and the CEA.

This reduction represents a loss of approximately 2 percent of the crucial winter range and less than 1 percent of yearlong range within the CEA. Sagebrush habitats, especially where pockets of mixed shrubs occur, are the most heavily utilized by mule deer. Springs provide an important water source. Project development would temporarily affect

4.8.3.2 Human Presence and Noise

The most common wildlife responses to noise and human presence are avoidance or accommodation. Avoidance would result in displacement or loss of animals from an area larger than the actual disturbance area. Although all species may be affected by increased human presence and noise to some extent, big game species are often considered the most sensitive to human-related effects. Published studies suggest that big game displacement from noise may range from 1/8 to 1/2 mile, depending on duration and the disturbance activity (Ward, 1985, Perry and Overly, 1977, Rost and Bailey, 1979). During initial development phases, it is likely that mule deer would be displaced from a larger area than the actual disturbance sites due to avoidance response. Mule deer, however, have demonstrated the ability to acclimate to a variety of mining activities in the West as long as human harassment levels do not increase significantly. It is possible, therefore, that the extent of mule deer displacement would approximate the actual disturbance area after the first few year's of mine operation.

In addition to avoidance response, increased human presence intensifies the potential for wildlife/human interactions ranging from harassment of wildlife to poaching and legal harvest. Reductions in the buck/doe ratio in the Shoshone Range (1988-1990) has been attributed to an increase in exploration activities and improved access in this area (JBR, 1992b).

Increased human presence and related increases in traffic levels on project access roads would also increase the potential for vehicle/wildlife collisions. Traffic levels would be relatively similar between the construction and active operations periods. During construction it is anticipated that there would be 70 employee and 35 delivery (105 total) vehicle round trips per day, while during active operation there would be a maximum of 113 employee, 25 delivery, and 55 heavy haulage (193 total) vehicle round trips per day. Reduced traffic levels could be achieved though car-pooling or other cooperative traffic reduction measures, but no mine sponsored transportation is currently planned.

The potential for vehicle/wildlife collisions is typically highest in the early morning and evening hours and where roads traverse ranges or areas where big game concentrate. In the CEA the risk of vehicle/pronghorn collisions is expected to be low since few pronghorn occur in the area. Also, pronghorn visibility is relatively high since they remain in fairly open habitats. The potential for vehicle/mule deer collisions is expected to be highest in the upland shrub habitats associated with both sides of the Shoshone Range crest. However, with enforcement of appropriate speed limits along access roads, the risk of vehicle/deer collisions would be minimized. The NDOW requires mine operators to provide regular monitoring reports of incidences of wildlife mortality. If monitoring indicates a higher than expected incidence of vehicle/deer collisions along the access road, additional mitigation would be required to alleviate the problem. NDOW mortality records for other mines in the region indicate a low incidence of vehicle/deer collisions

4.8.3.3 Changes in Water Sources

Wildlife populations in the Project Area and CEA could be adversely affected by reductions in the availability of water sources and by the creation of ponds or impoundments containing water with potentially toxic or hazardous constituents. Several springs would be affected by mine development. Springs MCS-3A and MCS-3B would be eliminated by mine development, while other springs (MCS-A, MCS-2, MCS-4, MCS-6, MCS-7A, MCS-8, MCS-10, and MCS-11) could be indirectly affected by changes in ground and surface water flow regimes that would reduce or eliminate spring flows (SMI/BCI, 1995b) or by access constraints due to mine fencing. Loss of springs, reductions in spring flows, or access limitations would reduce available water for wildlife in the Project and CEA and would , as a consequence, limit the value and utility of surrounding areas as wildlife habitat. Temporary reduction of the fenced area until such time as the mill is constructed would preserve access to four springs.

While the quality of water in the permanent pit impoundments is a potential concern, these impoundments could also represent a potential benefit relative to wildlife habitat and use since sources of water in the area are limited and several existing watering sources would potentially be impacted as previously discussed in this section. There are several locations in Nevada where both natural and man-made impoundments or marshes have provided important benefits relative to wildlife habitat and use due to the presence of water where other sources of water are lacking, despite specific water quality limitations.

Wildlife exposure to contaminated surface water could occur at the mine dewatering holding ponds, ore stockpile sedimentation pond, tailings impoundment, and on the leach piles if cyanide solutions puddle on the surface. As described Sections 4.3.3.2 and 4.3.3.3, water accumulations in both the pit dewatering holding ponds and ore stockpile sedimentation pond could exceed drinking water standards for several constituents. Given, however, that these ponds would be located in areas where there would be considerable heavy equipment traffic and other human activity, wildlife utilization and exposure to these ponds would be limited to occasion opportunistic use with resultant low hazard exposure. Solutions present on the leach pad would contain potentially toxic levels of WAD cyanide. WAD cyanide levels in the tailings pond waters would be reduced to below 40 to 50 ppm by the cyanide neutralization process included as a component of the Proposed Action. Free cyanide below this level by itself would not pose a significant toxicity hazard to wildlife. However, pilot plant projections have indicated that tailings pond water could also contain potentially toxic levels of arsenic and selenium along with varying levels of copper, zinc, and iron. The effects of low levels of cyanide in combination with other metals are uncertain, and as a result no safe level of cyanide in conjunction with other metals has been established (Eisler 1990).

NDOW mortality records for other mine operations in the region indicate that there is a potential for cyanide poisoning and losses of a variety of species, especially birds. The tailings pond and heap leach facility would be fenced to exclude most terrestrial wildlife. Fencing would be constructed to specifications required by the NDOW's Industrial Artificial Pond Permit. Industrial Artificial Pond Permits issued by the NDOW require that all mine waters containing chemicals lethal to wildlife be fenced and covered to preclude access by all wildlife species. Given that no open solution ponds are proposed for the heap leach facility and the plans to neutralize cyanide prior to discharge in the tailings facility, no exclusion methods have been proposed for birds and bats. If wildlife mortalities (particularly birds or bats) are documented at the tailings or heap leach facilities, additional exclusion methods beyond fencing would be required by the NDOW.

After mine closure three additional water sources would be created. A pit lake (approximately 110 feet deep) is projected to form in the South Pit in 90 to 140 years, while two other small, shallow ponds (approximately 20 feet deep) would be created in the central portion of the South Pit and the southern-most depression of the West Pit in 10 to 20 years.

As discussed in Section 4.3.3.2, water quality in both the permanent pit lake and smaller pit ponds would exceed Nevada drinking water and aquatic standards for certain constituents. The expanded risk assessment (SMI, 1996) as summarized by Appendix E, indicates little potential for adverse wildlife impacts due to exposure to the permanent pit lake. As discussed in Section 4.6.3, however, the potential exists for establishment of wetlands-type vegetation in the shallow ponds due to normal fluctuations in water level. Establishment of vegetation in these areas could be accompanied by the uptake of any potentially toxic constituents creating a mechanism for potential bio-accumulation. Potential impacts of exposure or use of these waters or associated vegetation on wildlife would vary by species and are addressed relative to both short and long-term impacts by the expanded risk assessment (SMI, 1996). The BLM is addressing this concern by stipulating that the two shallow pond areas will be partially backfilled, contingent on the results of postmining water quality monitoring, to prevent potential adverse conditions and associated wildlife impacts.

limited impact on wildlife resources. Probably the major cumulative impact consideration, as noted relative to mule deer populations, is increased human utilization and presence in the area.

4.8.8 Wildlife Mitigation

Because wildlife habitat values are associated with similar resource components to those required to support livestock grazing, mitigation considerations and requirements are generally the same as discussed under Section 4.7.8 for grazing. Reclamation of mining related disturbance is the primary component of the Proposed Action and other action alternatives relative to effective wildlife mitigation. Proposed reclamation plans focus on reestablishment of a mid- to late-successional mixed grassland-shrub community with cover and production values comparable to or greater than existing premining vegetation communities. Partial backfilling of shallow pond areas as stipulated by the BLM would preclude accumulation of poor quality water. Solution control and detoxification, wildlife exclosures, and speed limits on mine roads would provide necessary supplemental protections.

The principal mining related wildlife impacts would be addressed through ongoing compliance with the following plans and permits:

- NDEP Water Pollution Control Permit
- NDEP Reclamation Plan
- NDOW Industrial Artificial Pond Permit

Potential supplemental wildlife mitigation measures would be the same as discussed in Section 4.7.8 for grazing and would include water development, range or habitat enhancement, and posted speed limits for mine roads and access roads.

4.8.9 Wildlife - Other Impact Considerations

Relative to wildlife resources and habitat, other impact considerations including: 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships, are summarized by Table 4-1.

4.9 CULTURAL RESOURCES

4.9.1 Cultural Resources - Introduction

The proposed mining and related activities would result in disturbance or loss of existing cultural resource values in the areas of proposed surface disturbance. Over 150 archaeological sites have been identified by Class III surveys as occurring within the Project Area and associated access corridors. Of the identified sites, 52 have been designated as eligible for listing on the National Register of Historic Places. Generally the identified sites include hunting blinds and remnants of rock walls constructed to redirect game, temporary campsites, and isolates. The proposed activities would not disturb, modify, or otherwise impact any known Native American traditional cultural properties, given that none have been identified as discussed in Section 3.11.5.4. Generally, surface disturbance and mine excavation activities would not be expected to impact any stratigraphic units commonly associated with significant paleontological resources. Therefore, no paleontological impacts are anticipated.

Potential cultural impacts have generally been controlled and addressed through implementation of a cultural resource management plan developed as a cooperative effort between the SHPO, BLM, and SFPGC and administered under the existing programmatic agreement between the SHPO and BLM. Generally, the mitigation plan involved excavation, characterization, and documentation of selected representative sites as described in Section 3.11.4. To date, 31 sites identified as eligible for NRHP inclusion have been mitigated. Under the programmatic agreement, excavation of these selected sites will serve to mitigate all NRHP sites except for one site in the Project Area and those sites within the alternative access right-of-ways as discussed in Section 3.11.4. Compliance with applicable regulatory standards and provisions would effectively prevent the loss or unnecessary disturbance of potentially valuable cultural resources. The following subsections provide detailed analyses of potential cultural and

TABLE 4-12
REASONABLY FORESEEABLE MINING PROJECTS WITHIN THE STUDY AREA

Project	Location	Estimated Construction Start Date	New Construction Workforce	New Operations Workforce
Barrick Goldstrike Meikle Mine	Elko County	Under Construction	--	200-220
Santa Fe Mule Canyon Mine	Northern Lander County	Late - 1996	100	190
Cortez Pipeline Project	Lander County	Under Construction	185	265
Battle Mountain Gold Phoenix Expansion Project	Northern Lander County	Pre-EIS 1997	200-300	195
Kinross Gold Banks Project	Southeastern Humboldt	Pre-EIS 1998	200-300	250-350
Santa Fe Twin Creeks Expansion	Humboldt County	Late-1996	600	0
Santa Fe Lone Tree Mine Expansion	Southeastern Humboldt County	EIS in Process Late-1996	0	0
Santa Fe Trenton Canyon Mine	Southeastern Humboldt County	Pre-EIS 1997	Undetermined.	100
Newmont Bootstrap/Tara Project	Elko County	Draft EIS Issued Late - 1996	100	0

4.11.3 Transportation - Effects Common To All Other Alternatives

Traffic Levels

Traffic analyses for all alternatives employed several assumptions based on projected employment levels for construction and operations and material transport requirements noted in the Mule Canyon Project PO. Peak hour employee commuting traffic during construction is estimated at 70 based on peak employment of 100 workers, two shifts, and 1.5 construction workers per vehicle. Heavy truck traffic is estimated at 35 deliveries per day. Assuming up to 15 percent of the deliveries would occur during peak traffic hours results in 6 peak hour trips. Six heavy truck trips would be equivalent to 24 passenger car trips for capacity analysis using a factor of four for rolling terrain from the *1985 Highway Capacity Manual* (TRB, 1985). Under these assumptions, total peak hour traffic during construction would be 94 trips.

During operations delivery traffic is estimated at 25 deliveries per day. The analysis assumed deliveries would be limited to the day shift and that up to 15 percent or 4 trips would occur during the peak hour period. Four heavy truck trips would be equivalent to 16 passenger car trips for capacity analysis using the factor of four noted above. Peak hour employee commuting traffic during operations is estimated at 113 based on peak employment of 190 workers, three shifts, and 1.5 workers per vehicle. At such time as the mill may be constructed, it is assumed that 10 to 20 employees would work at the mill, and would have a different shift schedule than the bulk of the workforce. Other light vehicle traffic during operations is estimated at 5 to 10 vehicles. It is assumed that up to 25 percent, or 3 trips would occur during the peak traffic hour. In addition to the direct traffic associated with the Mule Canyon Mine there would be additional truck traffic due to ore hauled from Mule Canyon to the Twin Creeks Mill until such time as production economics justify construction of the proposed Mule Canyon

Mill facility. Ore haulage would involve 55 round-trips per day on a 24-hour per day schedule from the Mule Canyon Mine to the Twin Creeks Mill located approximately 35 miles northeast of Winnemucca. Ore haulage units would be double-tandem, belly-dump trucks. Ore haulage would result in 220 passenger vehicle equivalent trips per day. Transportation impacts due to ore haulage to the Twin Creeks Mill are analyzed in the Twin Creeks Mine Draft EIS (BLM, July 1996).

If SFPGC proceeds with mill construction in the future, ore haulage from the mine to the Twin Creeks Mill would potentially be replaced by haulage of concentrates to the new milling facility for processing. The Mule Canyon autoclave would be designed to treat concentrates which could come from the Mule Canyon operations, other SFPGC operations in the area, or other nearby mining operations. The west access route has been designed to accommodate transportation of an autoclave to the site. Concentrates from outside sources would be hauled by truck to the Mule Canyon process plant. It is anticipated that 11 double-tandem belly-dump trucks carrying concentrate would come from outside sources on a daily basis. An additional 15 trucks carrying lime from Wendover would be required to support the Mule Canyon milling operations.

It is assumed that 15 percent of the heavy truck haulage trips under the maximum traffic scenario of ore haulage or 9 trips would occur at peak hour. Nine heavy truck trips are equivalent to 36 passenger car trips. For roadway capacity analysis purposes, total peak hour traffic is thus assumed to be 168 vehicle trips.

Until such time as mill facilities would be constructed at the Mule Canyon Mine, ore haulage to the Twin Creeks Mill would result in additional truck haulage traffic on State Route 226 from Golconda and on the Humboldt County road between State Route 226 and the Twin Creeks Mine. As previously noted, ore haulage traffic would consist of approximately 55 heavy truck trips per day which would be equivalent to 220 passenger car trips for capacity analysis. Ore haulage is scheduled on a 24-hour per day basis and peak hour traffic loads are estimated at 15 percent or 33 passenger vehicle equivalent trips during peak traffic hours.

As this discussion indicates, the traffic analysis assumes workers would commute to the mine in personal vehicles. If SFPGC were to elect to provide or sponsor employee buses or van pools, as several other mining operations in the Elko area have done, the effects on traffic flows on area roadways would be substantially reduced.

Traffic effects on specific highway segments would depend on distribution of the residence choices of the construction and operations workforces. It is estimated that the construction and operations workforce distribution to Battle Mountain, Carlin, Elko and other locations in the region including Crescent Valley would vary depending on which access route is selected. These variations are discussed under each specific alternative. Some workers may choose smaller or more distant communities or rural residential locations, however, the numbers would be too small to warrant separate analyses.

It is not anticipated that the proposed project would have any substantial impact on the Interstate 80 corridor or State Route 306 given current estimated average daily traffic of well over 5,400 vehicles and a design capacity of 35,000 vehicles per day for Interstate 80 and average daily traffic of 365 vehicles and design capacity of 7,900 for State Route 306. Interstate 80 operates at an "A" Level of Service (LOS). State Route 226 and the Humboldt County road which serves the Twin Creeks Mine have been upgraded in conjunction with ongoing mining operation and provide more than sufficient capacity to accommodate anticipated traffic levels.

Safety

Development of the proposed Mule Canyon Project would increase traffic on public roads in the area to some degree and would, as a direct result, increase road maintenance costs and traffic accident risks. None of these effects, however, would represent a major impact given that existing road design capacities are generally more than adequate to handle existing and projected traffic levels. In order to address specific safety concerns relating to increased mine-related traffic on the Interstate 80 frontage road, Lander County is requesting that NDOT designate a speed limit of 45 mph for this road.

<u>Chemicals and Potential Hazardous Materials</u>

As identified and discussed in Section 2.4.16, a number of chemicals and petroleum products would be utilized in conjunction with the proposed mining operations. These materials would be transported to the site by truck utilizing existing Federal, State, and County roads and mine access roads. Transportation impacts could occur if an accident were to result in leakage or a spill of any potentially hazardous or flammable materials. Based on material properties, transport quantities, and delivery frequency, the primary materials of concern would be sodium cyanide, acids, petroleum products, and ethylene glycol (antifreeze).

Dependent on which access route is selected, chemicals and petroleum products would be transported to the site using either the west access road (Beacon Light Road, Proposed Action) or one of the alternative eastern access routes (Alternative C). If the west access road were to be utilized, routing would be from Interstate 80 to the Interstate 80 frontage road at the East Battle Mountain Interchange, along the frontage road to the Beacon Light Road, and would follow the Beacon Light road to the mine site. From the Interstate 80 Interchange, this route does not cross any major drainages but does pass in proximity to several residences on the Beacon Light Road. If either of the east access alternatives were to be utilized, routing would be from Interstate 80 to State Route 306 at the Beowawe Interchange, along State Route 306 to either County Road G-234 or M-116, and then along one of these roads to the mine site. From the Beowawe Interchange, either of the eastern access routes would parallel the Humboldt River north of Beowawe and would pass in proximity to several residences in Beowawe.

If an accident and consequent release were to occur, potential impacts would be dependent on the nature and quantity of material released, the location of the release, and site-specific conditions at the time of the release. Generally, impacts could range from the minor inconvenience of temporary traffic delays and required cleanup to potential contamination of soil and water and toxic effects on wildlife or humans.

Impacts resulting from a release of sodium cyanide would be primarily dependent on whether or not the release were to occur near water or under wet conditions. If a release were to occur under dry conditions and away from water sources, impacts would be minimal, since the cyanide would be contained within the spill area. Under wet conditions or if a spill were to occur near standing or flowing water, humans and terrestrial and aquatic wildlife species could be exposed to potential toxic effects. Any toxic effects would, however, be limited in time and extent due to rapid natural degradation of cyanide in the environment. Given that the Project Area and local transportation routes are in sparsely populated areas, the potential for human health impacts would be minimal. Similar considerations would apply to any accidental transportation release of ethylene glycol which is not as toxic as cyanide but also does not degrade as readily.

Any acid spills which could result from a transportation accident would result in potential toxic effects to vegetation and terrestrial and aquatic wildlife which comes in contact with the acid as well as potential contamination of water sources. Generally terrestrial effects of an acid spill would be mitigated by neutralization by the alkaline soils common to this area. Aquatic effects would be mitigated by dilution and dispersion with increasing distance from the spill site.

Impacts resulting from a release of petroleum products could include both toxicity and risk of fire or explosion. Normally, local petroleum spills (particularly of diesel fuel) can be readily contained and resulting contaminated materials removed and remediated. Generally, long-term toxicity from any petroleum spill would not be a major concern since hydrocarbons are readily number of natural mechanisms.

The potential for adverse impacts associated with a transportation-related release of chemicals or petroleum products would be controlled under applicable requirements of NDOT which specify that all such materials be transported by licensed commercial carriers who are inspected on a regular basis. Any hazardous or flammable materials would be placarded and the driver would have shipping papers identifying the materials and associated hazards and providing information on emergency response procedures to be implemented in the event of an accident, fire, or spill. In the event of an accidental release, the carrier would have primary responsibility for first response and cleanup under their approved SPCC Plan. This Plan would include provisions for immediate notification of local emergency response personnel and agencies such as fire and police departments who could assist in securing the spill site, containment, cleanup, and any other measures necessary to protect public health, safety, and the environment. SFPGC has also developed an Emergency Response Plan in conjunction with the proposed operations and would be available to provide personnel, equipment, and other support, as needed, to address any emergency situation. Scheduling of chemical and fuel deliveries during low-traffic periods would also minimize the potential for both accidents and associated risks.

Noise

As previously discussed in this section, the Proposed Action and alternatives would result in increased traffic on mine access roads. This increase in traffic would be accompanied by increases in traffic-related noise which could impact residences in proximity to the mine access routes. For both the proposed west access route and the east access alternatives, there are residences in proximity to the existing roads.

The A-weighted sound scale (dBA) reflects a sound frequency range comparable to the frequencies audible to the human ear and is the normal basis for measuring and evaluating environmental noise sources. Noise levels associated with heavy truck traffic are estimated at approximately 60 - 70dBA at the road edge. With respect to the impact of traffic-related increases in noise levels, anticipated noise levels at the closest receptor point (nearby residences) are the primary concern. Sound waves decrease in strength (sound intensity) with increasing distance from the sound source with a 50 percent reduction in sound intensity as the distance from the sound source is doubled. It is important to recognize, however, that a decrease of 10 dBA represents a reduction in sound intensity of 10 times. At 50 feet from the road edge, the sound level due to heavy truck traffic would be approximately 50 to 60 dBA which is less than the sound intensity associated with normal conversation (65 dBA). At 500 feet from the road edge, the sound intensity level due to heavy truck traffic would be approximately 45 to 50 dBA, which compares with the average sound level inside most residences. As a basis for comparison, the U.S. Department of Housing and Urban Development has established a level of 65 dBA as the acceptable noise level for residential areas.

Dust

Most of the main roads which would be utilized to access the Project Area are paved roads. Dust generation from these roads would not be a problem except where there is tracking of mud from adjoining unpaved segments during wet weather or if there were to be excessive spillage of earth materials from open haulage units. Many of the local access roads in the immediate mine vicinity and within the Project Area boundary would be gravel-surfaced dirt roads. Regular traffic on these roads would result in generation of particulate dust emissions, particularly during dry periods and under heavy traffic loads. As noted in Section 2.4.3, these roads would be maintained to minimize dust generation. In addition, dust generation would be limited by posting and enforcing reasonable speed limits. Specific requirements for maintenance and dust control for the Beacon Light Road are stipulated in a contract between SFPGC and Lander County. Maintenance would include regular grading, watering, replacement of surfacing materials, application of dust control agents, or paving. Based on applicable EPA Guidelines (AP42), these methods represent BACT control and would be 85 percent effective in controlling particulate dust emissions. Regulatory limitations on fugitive dust emissions are based on visual standards. Citizens can report any suspected violations of air quality standards to the NBAQ which could then require implementation of monitoring or supplemental control measures.

4.11.4 Transportation - Effects of Alternative B (Proposed Action)

Development of the Alternative B would result in traffic accessing the site via a high standard, gravel surface road from the site to Lander County Road 106C (Beacon Light Road) connecting to the South Frontage Road adjacent to Interstate 80 near Battle Mountain, and to Interstate 80 east or west to respective origin and destination points. Construction traffic, as previous noted, would impose an estimated maximum of 94 passenger car equivalent vehicle trips on the Interstate 80 south frontage road and Beacon Light Road to the site during peak hours. Existing peak hour traffic level information is not available on this segment of the highway. This level of traffic, however, would be an increase over existing traffic on the roadway segment. Lander County has proceeded with modification and construction of the Beacon Light Road with traffic continuing to flow with minimal impediments during the temporary 1-year construction period.

Peak hour traffic effects during operation of the Mule Canyon Mine would be somewhat greater than construction effects, adding 168 passenger car equivalent vehicle trips to the current level of use. It is expected that the level of service would be in the wAvrange with this amount of traffic and traffic conditions would not be significantly affected.

As noted in Section 4.10, it is estimated that the non-local construction workforce distribution to Battle Mountain, Carlin, Elko and other surrounding areas would be approximately 40 percent (20 to 25 vehicles), 33 percent (16 to 20 vehicles), 25 percent (13 to 16 vehicles), and 2 percent (1 to 2 vehicles), respectively. Estimated operations percentage distributions for the same four communities would be 30 percent (29 to 36 vehicles), 15 percent (14 to 18 vehicles), 52 percent (49 to 62 vehicles) ,and 3 percent (2 to 4 vehicles), respectively. A higher percentage of the local component of the workforce would likely live within closer proximity of the access route.

Indirect traffic effects on area communities would be minor. Elko would experience slight aggravation of existing traffic problems. Effects would not be significant however, as project-related traffic would constitute less than one percent of total Elko traffic, based on population. Traffic increases in Battle Mountain would be more noticeable because base traffic levels are much lower. Capacity on Battle Mountain streets would not be exceeded, and the effects would not be significant. Carlin, Crescent Valley, and Beowawe would experience only minor changes in traffic levels as a result of the Proposed Action. Overall traffic effects would not be significant, since the west access would further distribute traffic impacts throughout the study area.

4.11.5 Transportation - Effects of Alternative C (East Access Alternatives)

Development of the Alternative C would result in traffic accessing the site via a high standard, gravel surface road from the site to State Route 306 near Beowawe, following State Route 306 to Interstate 80, and Interstate 80 east or west to respective origin and destination points. Construction traffic, as noted above, would impose an estimated maximum 94 passenger car equivalent vehicle trips on State Route 306 during peak hours. Combined with existing peak hour traffic of 40 trips, total traffic would be 134 trips. This level of traffic would be a substantial increase over existing traffic on the roadway segment. Nevertheless, the level of service would stay within the wAv(existing) range with this amount of traffic. The traffic would continue to flow with minimal impediments during the temporary 1-year construction period.

Peak hour traffic effects during operation of the Proposed Mule Canyon Project would be slightly greater than construction effects, adding 168 passenger car equivalent vehicle trips to the 40 existing peak hour trips for a total of 208. The level of service would stay within the "A" range with this amount of traffic and traffic conditions would not be significantly affected.

As noted in Section 4.10, it is estimated that the non-local construction workforce distribution to Battle Mountain, Carlin, Elko, and other areas would be approximately 20 percent (10 to 12 vehicles), 35 percent (18 to 20 vehicles), 35 percent (17 to 20 vehicles), and 10 percent (5 to 7 vehicles), respectively. Estimated operations percentage distributions for the same four communities would be 10 percent (10 to 12 vehicles), 20 percent (19 to 24 vehicles), 55 percent (52 to 66 vehicles), and 15 percent (14 to 18 vehicles), respectively. The percentages for operations worker distributions would likely also apply to the local hires as well. While some workers may choose smaller or more distant communities or rural residential locations, the numbers would be too small to warrant separate analyses.

Indirect traffic effects on area communities would be minor. Elko would experience slight aggravation of existing traffic problems. Long range plans include additional loops to alleviate congestion, but these solutions would not be implemented in the near future. Effects would not be significant, however, as project-related traffic would constitute less than one percent of total Elko traffic, based on population. Traffic increases in Battle Mountain would be more noticeable because base traffic levels are much lower. Capacity on Battle Mountain streets would not be exceeded, though, and the effects would not be significant. Carlin would experience only minor changes in traffic levels as a result of the project-related change as would Crescent Valley and Beowawe.

4.11.6 Transportation - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Alternative D would have no incremental effect on intensity or distribution of transportation effects from the Proposed Mule Canyon Project with transportation impacts under this alternative being essentially the same as for the Proposed Action.

4.11.7 Transportation - Cumulative Effects

Development of the proposed project would result in increases in peak traffic levels on the area road network. The distribution of traffic impacts on the road network would depend primarily on the selection of project access alternatives. Generally, roads in the area currently operate at levels well below their design traffic capacities so the increase in traffic levels should not result in any major short or long-term traffic impacts. The only area roads which would experience cumulative impacts from other reasonably foreseeable development activities within the cumulative effects area would be Interstate 80, State Route 306 through Crescent Valley (Cortez Pipeline Project), and the local road network in the potentially impacted communities of Battle Mountain, Elko/Spring Creek, Carlin, Beowawe, and Crescent Valley. With the exception of the local community road systems, other roads which could be impacted by the cumulative effects of mine development have adequate capacity to handle the increased cumulative traffic loads. Local community road systems would require upgrades which could be financed through mining-related tax revenues.

4.11.8 Transportation - Mitigation

As discussed in the preceding portions of this section, existing major road networks in the Project Area have adequate excess traffic carrying capacity to handle anticipated traffic increases which would result from implementation of the Proposed Action and other action alternatives. Existing traffic carrying capacity in the immediate project vicinity is not currently adequate to handle anticipated traffic increases and would be expanded through construction of the proposed west and/or east access roads. Lander County has indicated that they will request a 45 mph speed limit for the Interstate 80 frontage road as a traffic and safety consideration. Existing road networks in the potentially effected communities are also probably not adequate to handle increased traffic levels but would be expanded on an as-needed basis using tax revenues generated by both mining operations and increases in local economic activity. Given that plans or mechanisms exist for effective from outside sources. These impacts would be minor, dispersed, and therefore, have not been considered in the air emission impact analysis.

The primary pollutant emissions would be particulate matter, which is regulated in terms of PM_{10} (small particles with a nominal diameter of 10 micrometers or less). PM_{10} emissions would consist of fugitive dust from activities such as drilling, blasting, ore removal and transport, material handling, and wind erosion, and stationary source emissions from crushing, screening, storage, combustion processes, etc. There would also be small quantities of several non-criteria regulated air pollutants emitted from motor vehicles, blasting, concentrate refining, fuel storage, and combustion sources. Criteria pollutant emissions as estimated for the Mule Canyon Air Permit Application (Air Sciences, Inc., 1995) are summarized by Table 4-13, and non-criteria emissions are summarized by Table 4-14.

Project emission sources would result in minor increases in pollutant concentrations in the atmosphere and some degradation in air quality, which would largely be confined to the immediate Project Area. These impacts are discussed in detail in the following sections.

4.12.4 Air Quality - Effects of Alternative B (Proposed Action)

Information on air pollutant emissions, emission controls, and air quality impacts has been presented in the Mule Canyon Air Permit Application (Air Sciences, 1995). Table 4-13 and Table 4-14 summarize the projected pollutant emissions. PM_{10} (particulate matter) constitutes the largest emissions source, with approximately 470 tons per year of emissions at maximum projected activity rates. Of the total emissions, approximately 11 TPY would result from process sources (regulated by NDEP emission limitations and/or New Source Performance Standards), 13 TPY would be emitted by mobile sources, and the balance (446 TPY) would be emitted from fugitive sources such as mining, haul roads, and wind erosion.

Emissions of oxides of nitrogen (NO_x) would be primarily from haul trucks and other mine vehicles. Much lesser quantities of carbon monoxide (CO), sulfur dioxide (SO_2), organic compounds, and other pollutants would be emitted from fuel combustion and storage, and the refining and pressure oxidation processes.

Table 4-15 reflects controlled air pollutant levels after application of pollution controls and mitigation practices. Emissions due to ore transfer to the ore hopper, to the SAG mill, and feed to the SAG mill are federally regulated (NSPS, Subpart LL) and must meet a 10 percent opacity criterion. Compliance with this standard would be achieved using high pressure water sprays at the hopper loading point conveyor transfer point, and the discharge to the SAG mill. Dust generation due to limestone loading to the wet grinding circuit would be controlled with high pressure water sprays to meet a 15 percent opacity NSPS, Subpart OOO emission limit. Emissions of particulates from process sources would be controlled using several different control techniques. Material transfer points will be controlled by high pressure water sprays, providing a high level of control of particulate emissions. Emissions resulting from lime loading process would be controlled by baghouses (greater that 99 percent efficiency) on the lime silos. The transfer point for lime from the mill circuit lime silo would be partially enclosed and dust emissions would be controlled by high-pressure water sprays (90 percent efficiency). Application of water or other dust suppression agents (e.g., magnesium chloride) would provide a high level of control of fugitive dust from unpaved haul roads and mine access roads. Dust generation from drilling operations would be controlled through pneumatic flushing and on-board filters. Mercury and other fume toxin emissions from the dore furnace would be controlled with a wet scrubber, which is considered Nevada BACT.

with other sources. De minimis concentrations are defined by EPA as the impact levels which are of no consequence in non-attainment areas. The non-de minimis footprint for Mule Canyon is shown by Figure 4-2.

It should be noted that short-term (24-hour) PM_{10} air quality impacts were calculated based upon average daily emissions. Thus, it is possible that actual short-term emissions for specific periods could exceed the emission rates used in air quality modeling, resulting in incrementally greater impacts. However, since the predicted 24-hour maximum PM_{10} impact is well below the ambient standard, it is unlikely that project emissions would result in violation of the 24-hour PM_{10} standard.

It should also be emphasized that compliance with PM_{10} standards is dependent upon the proposed dust controls for haul roads and access roads, and the applicability of standard equations for wind erosion of exposed surface areas. During periods of unusually high winds, local impacts could exceed those predicted by the model. Minimization of the total disturbance areas would be important in controlling wind erosion impacts. Effective control of all project emissions can be achieved through the use of applicable controls and operational procedures. The extent of mitigation would depend directly on the implementation of these measures, and the diligence with which they are maintained. However, given the arid climate of the Project Area and the necessity of handling and moving large quantities of material, complete mitigation of air quality impacts is not feasible.

4.12.5 Air Quality Effects of Alternative C (East Access Alternatives)

The East Access Alternatives would involve the same control procedures and emissions considerations as discussed for the Proposed Action. Because the area of surface disturbance would be increased, the potential for fugitive dust emissions from mine-related traffic would increase accordingly.

Increases in potential dust emissions from the east access route would be offset in part by redistribution of mine-related traffic and corresponding reductions in traffic levels and dust emissions for the west access road.

4.12.6 Air Quality - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Changes in the configuration of the overburden and interburden piles could result in minor increases or decreases in air emissions due to differences in material handling requirements and slope exposures relative to wind erosion. Any such differences would be so minor as to be negligible and air emissions under Alternative D would be essentially the same as those discussed for the Proposed Action.

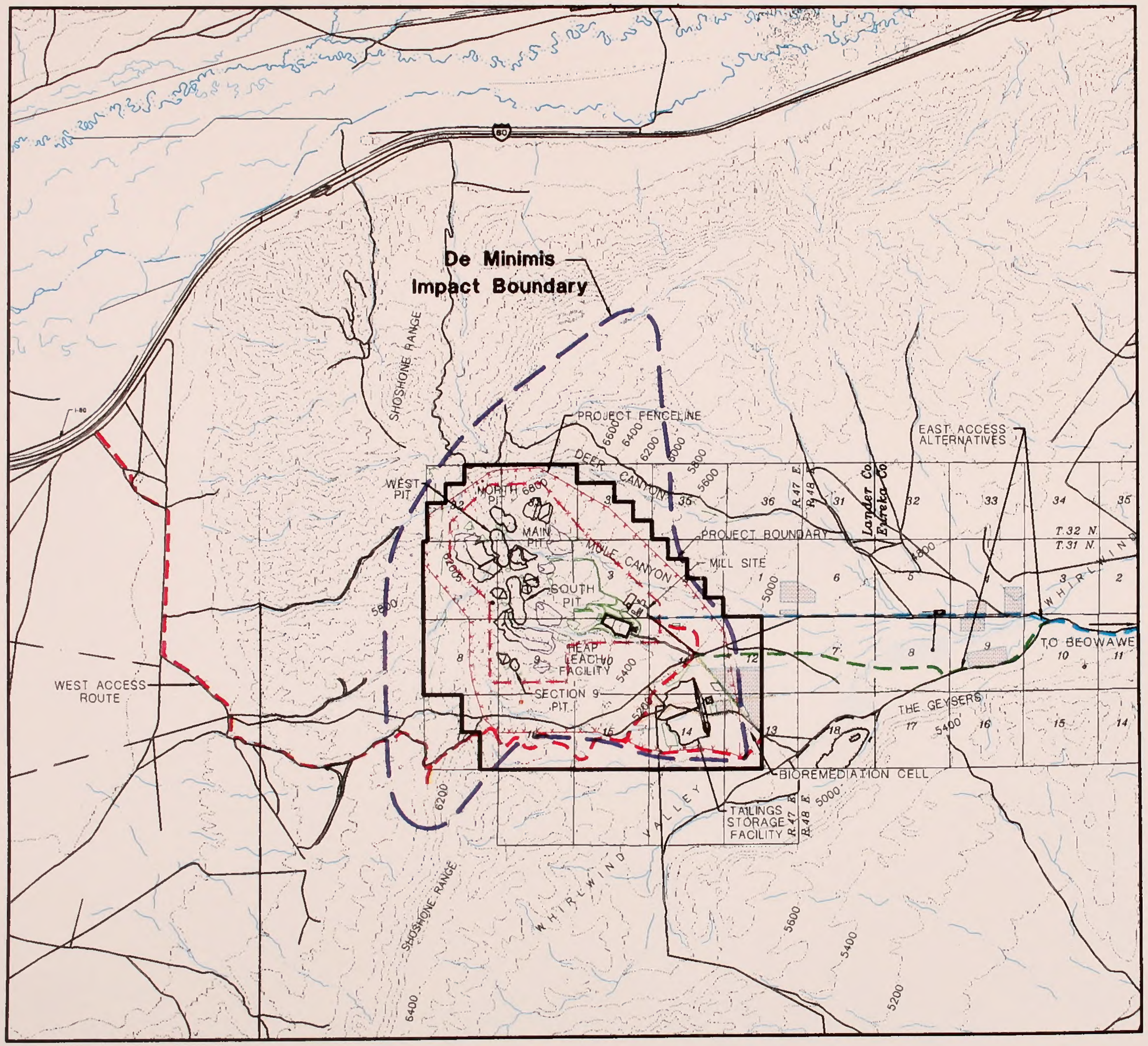
4.12.7 Air Quality - Cumulative Effects

As described in Section 4.12.4, direct project-related air quality impacts would be confined to the emissions impact boundary. Since there are no other air emission sources within this boundary, the potential for project-related cumulative air quality impacts is negligible. Indirect sources of air pollution including employee housing and traffic, and related development would contribute to regional impacts, but only to a minor extent. The low population density and large areas involved preclude meaningful evaluation of quantitative air quality cumulative impacts.

4.12.8 Air Quality Mitigation

Project-related air quality impacts which could occur as a result of implementation of the Proposed Action and other action alternatives would be effectively mitigated by operational control and reclamation measures including:

- Facility design to minimize or enclose potential emission sources
- Implementation of BACT control methods for specific process emission sources
- Application of appropriate control measures for non-process emission sources (includes dust control for the Beacon Light Road as stipulated in a contract between SFPGC and Lander County)



LEGEND

PROPOSED HAUL AND ACCESS ROADS
EXISTING ACCESS ROADS
DE MINIMIS IMPACT BOUNDARY
ACCESS ROAD - WEST ALIGNMENT
ACCESS ROAD - EAST ALIGNMENT-PREFERRED
ACCESS ROAD - EAST ALIGNMENT - SECONDARY PREFERRED
PROJECT FENCELINE (INTERIM)
PROJECT FENCELINE (FULL BUILD-OUT)
PROJECT BOUNDARY
WETLAND
PIT AREA
OXIDE OVERBURDEN/INTERBURDEN DISPOSAL AREAS
SULFIDE OVERBURDEN/INTERBURDEN DISPOSAL AREAS
GROWTH MEDIUM STOCKPILES
BORROW SOURCE
BIOREMEDIATION CELL

N

SCALE
5000' 0 5000' 10000'
CONTOUR INTERVAL 200 FT.

MULE CANYON MINE

FIGURE 4-2

AIR EMISSIONS DE MINIMIS IMPACT BOUNDARY (REVISED 8/96)

Source: ASI (1995)

File: AIREMISS.DWG

4.13.5 Visual Resources - Effects of Alternative C (East Access Alternatives)

Implementation of Alternative C would result in additional project-related disturbance in the Whirlwind Valley and on the lower mountain slopes. This disturbance, however, would not be readily visible from any of the three selected key viewpoints due to intervening topographic features. Aesthetic impacts resulting from Alternative C would, therefore, be essentially the same as would occur under the Proposed Action.

4.13.6 Visual Resources - Effects of Alternative D (Overburden and Interburden Disposal Area Configuration Alternative)

Alternative D would result in changes in the configuration of the overburden and interburden piles with minor effects on the appearance and visual impact of the piles as permanent mining-related features. The anticipated changes could be discernable dependent on viewpoint and perspective and the aesthetic impacts associated with this alternative could be less than the Proposed Action given the potential for reduction of linear features and associated contrasts.

4.13.7 Visual Resources - Cumulative Impacts

Based on BLM guidelines, the CEA for visual resources relative to the Mule Canon Mine includes all areas visible for 20 miles from Interstate 80 or other major area roads in the mine vicinity.

Given this definition, there are a number of mining and other development activities which could result in cumulative visual effects including the existing Argenta Mine, Battle Mountain Gold's operations near the Town of Battle Mountain, the Cortez Pipeline Project, and the Beowawe Geothermal Plant. Visual impacts for historic operations may not be mitigated to any significant extent, since reclamation of these areas may not occur. Any current active operations, however, are required to comply with applicable regulatory requirements including site reclamation which will provide for some mitigation of any related visual impacts. Given the nature, limited areal extent, significant distances separating most development activities, and reclamation considerations, cumulative aesthetic impacts resulting from existing and reasonably foreseeable development activities within the Project CEA would not be significant.

4.13.8 Visual Resources - Mitigation

Project-related visual impacts would include temporary and permanent impacts. Temporary impacts would result from surface disturbance, removal of natural vegetation, and exposure of underlying rock materials. Permanent impacts would include permanent alteration of the land surface associated with permanent mine structures including mine pits, overburden and interburden disposal areas, heap leach and tailings facilities and other ancillary structures. Project design considerations incorporated as components of the Proposed Action and other action alternatives would minimize both temporary and permanent visual impacts. Site reclamation would address, to the extent possible, visual contrasts of line, form, color, and texture. The proposed outslope design, while assuring stability and effective erosion control, would result in linear benchline features. In order to address visual impact concerns relating to benches and associated linear contrasts the BLM is stipulating that SFPGC develop modified outslope designs to be implemented where appropriate. Modifications would include, but not be limited to, rounding bench edges, varying bench widths, varying final bench topography, and flattening both overall and intermediate bench slope.

Possible options for modified bench designs are graphically illustrated by Figure 4-7. These designs would be utilized in overburden and interburden disposal area planning and construction, and would result in final reclaimed configurations that blend with the existing topography while meeting design requirements for long-term seismic and erosional stability, control of infiltration, and successful vegetative reestablishment. SFPGC would be limited to construction of only the first 50 foot lift of any given overburden and interburden disposal area until design modifications are finalized and approved by both the BLM and NDEP.

Full mitigation of visual impacts is not feasible. The proposed development activities and mitigation measures, however, would meet existing BLM visual management objectives for this area which take into consideration existing visual resource quality.

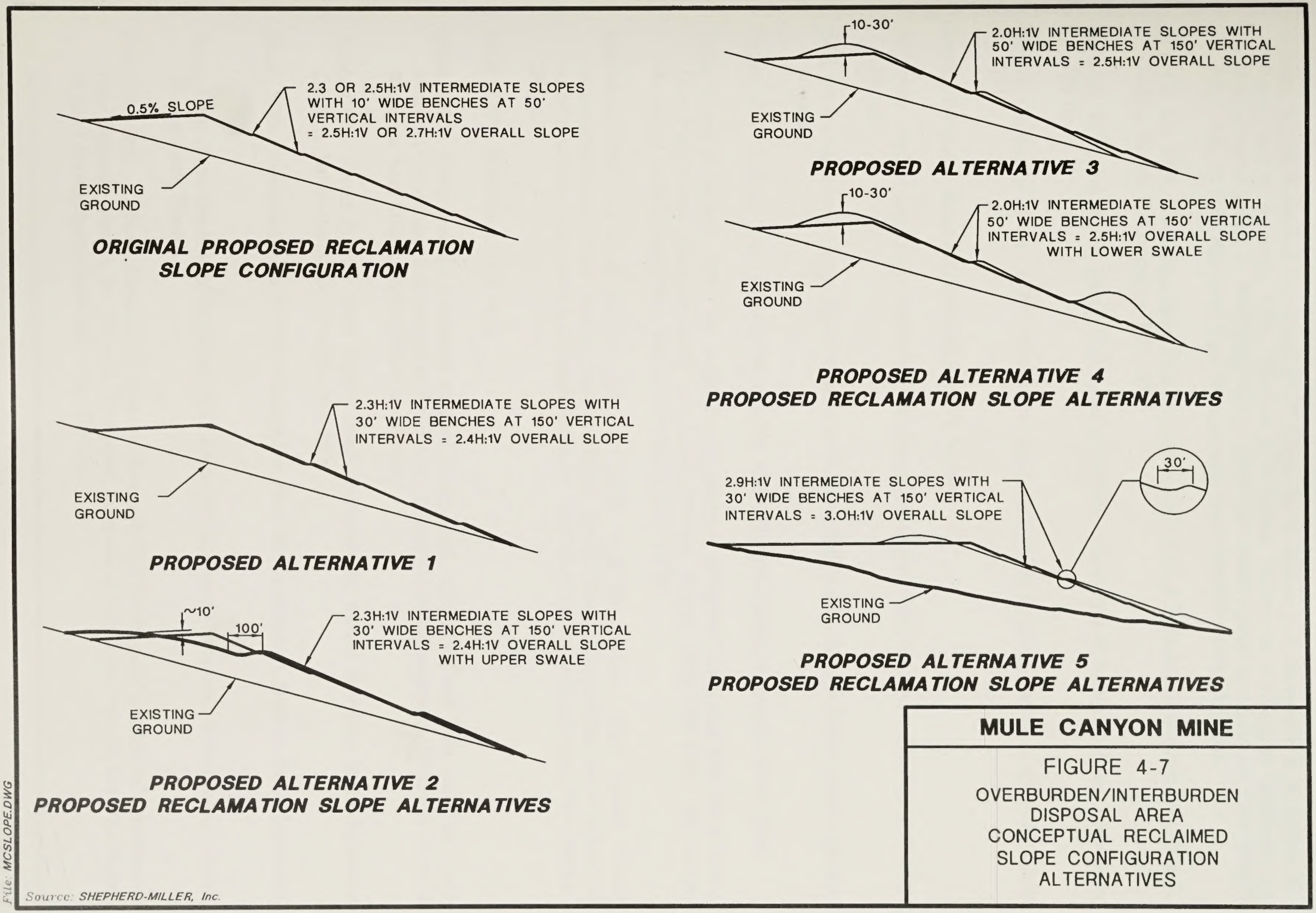
4.13.9 Visual Resources - Other Impact Considerations

Relative to visual resources, other impact considerations including; 1) Unavoidable adverse impacts; 2) Irreversible and irretrievable resource commitments; and 3) Short-term use and long-term productivity relationships; are summarized by Table 4-1.

4.14 LAND USE AND RECREATION

4.14.1 Land Use and Recreation - Introduction

The proposed mining and related activities would result in a temporary shiftz in land use for the Project Area, focusing on mineral exploration and development use and



MULE CANYON MINE

FIGURE 4-7

OVERBURDEN/INTERBURDEN DISPOSAL AREA CONCEPTUAL RECLAIMED SLOPE CONFIGURATION ALTERNATIVES

File: MCSLOPE.DWG

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Animal Unit Month (AUM): The amount of forage required by one cow and calf, or their equivalent, for one month. Approximately 800 pounds of air-dried feed (26 pounds/day).

APP: Acid producing potential.

Aquatic: Growing, living in, frequenting or taking place in water; in this EIS, used to indicate habitat, vegetation, and wildlife in freshwater.

Aquifer: A zone, stratum or group of strata acting as a hydraulic unit that stores or transmits water in sufficient quantities for beneficial use.

Aquitard: A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer; a leaky confining bed

Archaic period: An archaeologic period broken into various times; Pre-Archaic, Archaic, Early, Middle, and Late spanning from +10,000 B.C. to 1850 A.D.

Acid Rock Drainage (ARD): Low pH drainage resulting from leaching of acid from certain types of sulfidic rock by surface or ground water.

Areal: The spatial extent or location.

Artesian: Refers to ground water under hydrostatic pressure. Water in a well rises above the level of the water table under artesian pressure and usually flows at the surface.

Artifact: An object made or modified by humans.

Aspect: The direction toward which a slope faces.

Attainment area: A geographic region with which National Ambient Air Quality Standards (NAAQS) are met; three categories of attainment are defined Class I, Class II and Class III on the basis of the level of degradation of air quality which may be permitted.

Audible: Capable of being heard.

Autoclave: A closed reaction vessel utilized to rapidly oxidize mineral feedstocks under conditions of high temperature and pressure.

B

Background: (Visual distance zone.) The distant part of a landscape. The seen or viewed area located more than 3 to 5 miles from the viewer, and generally as far as the eye can detect objects.

Backfill: Waste material (i.e. rock) that is placed back in surface mine workings.

BACT: Best Available Control Technology - pollution controls as defined by EPA for a specific emission or pollutant discharge and required for meeting pollution control regulations.

Ball mill: Equipment used to reduce ore particles to a finer size; includes a large rotating cylinder partially filled with steel balls.

Barren rock: Non gold-bearing rock material

Barren solution: Non gold-bearing cyanide solution.

APPENDIX E

SUMMARY - ECOLOGICAL RISK ASSESSMENT

SUMMARY - ECOLOGICAL RISK ASSESSMENT

A screening level risk assessment (SLRA) for the predicted pit lake and ponds which will remain following completion of mining at the Mule Canyon Project was conducted to determine the potential for impacts of pit lake or pond water quality to receptors utilizing the water bodies (SMI 1996). Because of the general inaccessibility of the lake and ponds, humans are not likely to utilize the lake for any beneficial uses. Therefore, the focus of the risk assessment is on potential ecological receptors that could use the lake or ponds as a drinking water source, or, in the distant future as a food source. The methodology and assumptions included in the risk assessment are summarized below.

Identification of Constituents of Potential Concern

Predicted chemical concentrations at three different time stages of development for the pit lake and ponds are shown in Table 2-1 from the SLRA. The three time stages of development include from 2-25 years, 60 years and 100 years after mine closure. A single prediction for the pond water quality was made. The modeled concentrations were compared with (1) Nevada Aquatic Life Standards (NALS) for chronic exposure and (2) screening toxicological benchmarks derived for the mallard duck. Benchmark values for the mallard duck were selected for the initial screening because they are conservatively assumed to derive 100 percent of both drinking water and food from the pit lake and ponds, and, therefore, represent an organism with the highest potential for exposure.

Chemicals with predicted concentrations that did not exceed either NALS or mallard benchmark values were eliminated from further evaluation in the risk assessment. Chemicals that exceeded either of the screening values were retained for evaluation in the risk assessment. The final list of chemicals for evaluation in the SLRA is:

Pit Lake			South Pit Pond	West Pit Pond
2-25 years	60 years	100 years		
cadmium	cadmium	aluminum	cadmium	cadmium
manganese	manganese	methyl mercury[1]	manganese	manganese
selenium	selenium	thallium[1]	methyl mercury[1]	methyl mercury[1]
zinc	zinc	zinc	selenium	selenium
[1] This constituent has not been detected in any samples but has been included to evaluate potential concentrations below the detection limit.				

Description of Exposure Scenarios Included in the SLRA

The SLRA evaluated the range of potential biological communities that could develop in the pit lake, including: 1) A simple biological community, with no development of food sources; and 2) Development of a complex biological community, capable of supporting a complete food web. These scenarios were identified in the SLRA as Scenario A (full biological community) and Scenario B (no development of biological communities). Scenario A was assumed to occur at the pit lake 100 years after mining ceases. Scenario B was assumed to occur at 2 to 25 years and 60 years.

The small ponds are assumed, because of their small size and depth, to develop full biological communities. Therefore, only Scenario A was evaluated for the ponds.

Table E2-1 Predicted Water Quality for the Future Pit Lake and the Two Pit Ponds

Constituent	Pit Lake			South Pit Pond (mg/L)	West Pit Pond (mg/L)
	2-25 years[a] (mg/L)	60 years (mg/L)	100 years (mg/L)		
aluminum	0.056	0.037	0.088	0.025	0.025
antimony[b]	<0.001	<0.001	0.002	0.003	0.002
arsenic	0.003	0.0019	0.0031	0.002	0.003
barium	0.049	0.035	0.081	0.053	0.060
calcium	220	140	210	600	410
cadmium	6.9	1.3	0.0048	0.075	0.075
chloride	170	55	110	550	260
copper	0.086	0.016	0.034	0.005	0.075
fluoride	1.1	0.28	0.76	0.50	0.30
iron	0.37	0.043	0.00037	0.06	0.30
magnesium	2,030	420	780	310	220
manganese	270	20	0.000002	8.2	7.0
total mercury[b]	<0.0002	<0.0002	0.0003	<0.0002	<0.0002
methyl mercury[c]	NA	NA	0.000075	<0.00005	<0.00005
potassium	2.6	2.4	6.1	46	37
selenium	0.088	0.01	0.02	0.49	0.94
silver	0.008	0.0052	0.014	0.005	0.005
sodium	200	42	97	780	120
thallium[b]	<0.002	<0.002	0.003	<0.002	<0.002
zinc	5.2	1.5	2.8	0.038	0.0[illegible]5
pH	4.6-5.2	5.4	8.0	8.5	8.6
TDS	4,600-12,600	3,000	5,100	4,500	2,300
hardness (as $CaCO_3$)	3,300-8,900	2,100	3,800	2,800	1,900

a Concentration represents the maximum predicted concentration from 2, 7 and 25 years post-mining.
b This constituent was not detected in column leachate or ground water; its predicted concentration at 100 years is based on the use of one-half the detection limit as a starting concentration for modeling.
c Concentration was estimated assuming 25% of total as methyl mercury after development of biological communities (100 years and the ponds).

Identification of Target Receptors

As noted previously, human receptors were not evaluated in the SLRA, because the potential for exposure is remote, given the general inaccessibility of the lake and ponds. The formation of a water body in an otherwise arid landscape will have the potential for attracting wildlife species, both avian and mammal. Indicator species, representative of the organisms potentially occurring in the vicinity of the future pit lakes and ponds, were selected for evaluation in the risk assessment. Six ecological receptors and the species they represent were identified, including:

Receptor Category	Common Name	Scientific Name
Mammals		
Insectivorous Mammal	Little Brown Bat	*Myotis lucifugus*
Large Opportunistic/Omnivorous Mammal	Coyote	*Canis latrans*
Birds		
Insectivorous Bird	Cliff Swallow	*Petrochelidon pyrrhonota*
Shorebird	Spotted Sandpiper	*Actitis macularia*
Waterfowl	Mallard Duck	*Anas platyrhynchos*
Opportunistic/Carnivorous Bird, (Threatened and Endangered Specie)	Bald Eagle	*Haliaeetus leucocephalus*

The selected receptors represent a broad range of avian and mammalian fauna, encompass all relevant exposure pathways and address applicable Federal and State regulatory concerns. The risk assessment estimated potential risk to these species based on predicted chemical concentrations in the pit lake at each of the predicted time stages and on the predicted pond concentrations. The only exposure pathway evaluated for the pit lake in the early stages of development (2 to 25 years and 60 years) was ingestion of surface water by all receptors. It was assumed that 5 percent of the water needs of an organism would be supplied by the early stage pit lake. In the later stages of pit lake development the pathways included ingestion of water and food (insects, plants) for the mallard, and ingestion of water, fish, and birds for the eagle. All other receptors were assumed to ingest water and insects, or in the case of the coyote, water only.

Birds and small mammals such as the little brown bat were assumed to satisfy 100 percent of their water needs and food requirements from the pit lake or ponds for the 100 year scenario. Mallards are assumed to obtain all of their food, consisting of 25 percent plants and 75 percent invertebrates, from the pit lake. Eagles and coyotes are assumed to obtain only a fraction of their water from the pit lake (50 percent) for the 100 year scenario.

Results of the SLRA

Risks were characterized using the Hazard Quotient (HQ) method, which compares estimated doses to site receptors to toxicity reference values (TRVs), or the dose below which no adverse impacts would be expected. The resultant ratio is evaluated with respect to a target level of 1.0. HQs less than 1.0 are interpreted as exposure that is not expected to cause adverse ecological effects. HQ from 1 to 10 indicate minimal and possibly *de minimis* risk; however, further analysis may be indicated if simultaneous exposure to other chemicals with HQ greater than 1.0 is probable. HQ greater than 10 indicates potentially adverse effects may result; further analysis may be necessary to better define risk. HQ greater than 50 indicates exposures may result in effects on a large portion of animals and represents potentially significant risk; however, further analysis is required to better define risk.

Results of the risk characterization for the pit lake following closure of the mine are shown in Tables E5-1, E5-2, and E5-3 adapted from the SLRA. In the early stages of pit lake development (2 to 25 years) cadmium could be present at a concentration that would result in impacts to mammals ingesting pit lake water. Birds were not predicted to be impacted by the pit lake water concentrations. At 60 years no constituents are predicted to be present in the pit lake at concentrations that would impact birds or mammals utilizing the lake as a drinking water source. At 100 years, when the pit lake could become a source of both food and water for receptor organisms, there is a slight potential for some impacts. However, because all of the predicted HQs are less than 5, it is likely that impacts, if any, would be minimal.

Results of the risk characterization for the ponds is shown in Table E5-4 adapted from the SLRA. Predicted water quality for the ponds results in an HQ for birds of up to 20, with the highest HQ calculated for manganese. Selenium concentrations predicted for the ponds showed the greatest potential for causing adverse impacts to small mammals, such as the little brown bat, if all of their food and water is obtained from the pond. However, all of the HQs were less than 50, indicating that impacts may be restricted to certain organisms, and may not effect the receptor population.

<u>Assumptions and Uncertainties</u>

The SLRA was based on a number of assumptions and uncertainties relative to prediction of water quality, scenario assumptions regarding development of biological communities and associated wildlife use, bioconcentration factors, and chemical toxicity. These assumptions are summarized below.

Table E5-1 Summary of Hazard Quotients for Contaminants and Receptors of Concern in the Pit Lake at 100 Years

Constituent	Little Brown Bat	Mallard Duck	Cliff Swallow	Spotted Sandpiper	Bald Eagle	Coyote
aluminum	<1	<1	<1	<1	<1	<1
methyl mercury	<1	<1	<1	<1	4.6	<1
thallium	1.4	1.5	1.4	1.2	<1	<1
zinc	1.0	3.9	3.8	3.2	<1	<1

Table E5-2 Summary of Hazard Quotients for Contaminants and Receptors of Concern in the Pit Lake at 60 Years

Constituent	Little Brown Bat	Mallard Duck	Cliff Swallow	Spotted Sandpiper	Bald Eagle	Coyote
cadmium	<1	<1	<1	<1	<1	<1
manganese	<1	<1	<1	<1	<1	<1
selenium	<1	<1	<1	<1	<1	<1
zinc	<1	<1	<1	<1	<1	<1

Table E5-3 Summary of Hazard Quotients for Contaminants and Receptors of Concern in the Pit Lake at 2-25 Years

Constituent	Little Brown Bat	Mallard Duck	Cliff Swallow	Spotted Sandpiper	Bald Eagle	Coyote
cadmium	3.6	<1	<1	<1	<1	1.1
manganese	<1	<1	<1	<1	<1	<1
selenium	<1	<1	<1	<1	<1	<1
zinc	<1	<1	<1	<1	<1	<1

Table E5-4 Summary of Hazard Quotients for the South Pit Pond and the West Pit Pond

Constituent	Little Brown Bat		Mallard Duck		Cliff Swallow		Spotted Sandpiper		Bald Eagle		Coyote	
	South	West	South	West	South	West	South	West	South	West	South	West
cadmium	4.8	4.8	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
manganese	17	15	3.7	3.2	17	15	15	13	4.3	4.2	< 1	< 1
methyl	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3.0	3.0	< 1	< 1
selenium	24	46	< 1	1.6	1.5	2.8	1.2	2.4	< 1	1.5	1.9	3.7

Pit Lake and Pond Water Quality

Assumptions were necessarily made during modeling of pit lake and pit pond water quality and uncertainties are present in the final predictions. However, conservative assumptions were generally made which would tend to result in predictions of constituent concentrations that are higher than those that may actually exist. Methods and assumptions used in the modeling are described in detail in the post-closure report (SMI/BCI, 1995b) and a supplement to that report (SMI, 1996b) that was distributed with the SLRA document. Assumptions made included:

- Flow into the pits will occur uniformly through pit walls and floor
- Early inflow will occur primarily through the high-sulfur rocks of the pit floor
- After the lake and ponds have filled, water will be lost to evaporation and replaced by ground water

Habitat and Wildlife Use

It is assumed that by 100 years post-mining aquatic plant and invertebrate communities are sufficiently established to provide wildlife with food sources. Specific assumptions about the percentage of food and water wildlife would obtain from the pit lake and ponds were based on best professional judgement and discussion with local experts and regulating agencies. Actual wildlife use of the lake and ponds will be dependent on the degree of development of supporting communities and the overall quality of the aquatic ecosystem. It was conservatively assumed that small mammals and birds would obtain 100 percent of their diet and water intake from the Mule Canyon site. Several of the receptors are migratory and typically winter to the south of Nevada, reducing the total exposure time. This was not accounted for in the assessment.

The steep walls surrounding the water bodies will likely prevent the pit lake and ponds from becoming important habitat for nesting waterfowl or an important water source for large mammals. Several sources of drinking water (springs) exist in the area that are easy for mammals to reach.

Bioconcentration Factors

Table E4-2 adapted from the SLRA provides a list of the bioconcentraiton factors used in the SLRA. These bioconcentration factors were multiplied by concentrations of the chemicals in water to estimate the concentration of chemicals in plants, insects or fish. Bioconcentration factors can have a very wide range and are dependent on the organism, geographic location, chemical form and water chemistry. Where available, data from existing pit lakes in Nevada (PTI/RCI 1996) were used to derive the bioconcentration factors used in the SLRA.

Table E4-2 Bioconcentration Factors Used in the Calculation of Dose for the Selected COPCs

Constituent	Plant BCF (L/kg)	Reference	Invertebrate BCF (L/kg)	Reference	Fish BCF (L/kg)	Reference
aluminum	0.7	Mo et.al 1988	62.6	EPA 1988	62.6	EPA 1985
cadmium	293.5	PTI/RCI 1996	53.2	PTI/RCI 1996 EPA 1995	21.5	EPA 1985
manganese	46.2	Same	1800[a]	AQUIRE 1993	1800	AQUIRE 1995
methyl mercury	7.9	Same	380[b]	Saouter 1993	18973	EPA 1985
selenium	9.2	Same	15.6	PTI/RCI 1996 ACQUIRE 1995	30.5	EPA 1988
thallium	46.2	Same	34	EPA 1980	65.7	EPA 1980
zinc	777	Same	560.6	PTI/RCI 1996 EPA 1987	397.1	EPA 1987

[a] The fish BCF was used due to the lack of invertebrate data.

[b] PTI/RCI 1996 reported a value of 155,035, however, this value does not correspond with any literature values, and is currently being re-evaluated. The Saouter 1993 value was used in this SLRA.

Chemical Bioavailability

It was conservatively assumed in the SLRA that 100 percent of the chemical was bioavailable or absorbed by the organism ingesting the chemical. The absorption efficiency of chemicals from aquatic organisms used as food by receptors may actually be less than 100 percent.

Chemical Toxicity

Toxicity reference values were determined based on literature review and consideration of the test conditions. Often toxicity data is not available for the selected receptor species so it is necessary to extrapolate laboratory data from animal test species to the receptor species. While this is standard practice for risk assessment, selection of the appropriate toxicity reference value can effect the overall assessment of risk.

Cumulative or Additive Impacts

Chemicals were considered on an individual basis in this SLRA. No additive, synergistic, or antagonistic effects were evaluated. Insufficient data exists in the literature to apply this information to a SLRA.

APPENDIX F

SUMMARY OF PROJECT MITIGATION MEASURES

SUMMARY OF PROJECT MITIGATION MEASURES

The Proposed Action, as outlined by SFPGC's Plan of Operations, has been designed to prevent unnecessary and undue degradation consistent with applicable provisions of 43CFR 3809.0-1. Project designs and operating plans reflect specific consideration of prevention, control, and/or mitigation of potential adverse mining-related environmental impacts. Where appropriate, the Proposed Action incorporates specific control and mitigation measures. In certain cases, however, public comment and BLM review have resulted in identification of supplemental mitigation measures as necessary to prevent adverse environmental effects and unnecessary and undue degradation. Both those mitigation measures incorporated as components of the Proposed Action and supplemental mitigation as stipulated by the BLM are identified and discussed in Chapter 4 of the EIS and summarized, by resource category, in the following sections.

Geologic Mitigation

The combination of baseline material testing and characterization, and operational control measures including ongoing material characterization, selective handling, isolation of potential materials of concern, and ongoing monitoring represent BACT for prevention of ARD and release of metals and other constituents. All seismic designs are based on accepted engineering methods and practices. Given these considerations, no supplemental mitigation measures would be necessary or justified except for evaluation and remediation measures as specified under applicable regulatory provisions to address the unlikely occurrence of ARD, release of metals or other constituents, or large-scale, seismically induced, surface material movements.

Surface Water Hydrology Mitigation

Generally, the operational control and monitoring practices included as components of the Proposed Action and other action alternatives would provide for effective mitigation of potential surface water impacts. These measures include:

- Design for process water recycling to limit the potential for discharges
- Provisions for regular surface water monitoring
- Diversion of runoff around major facilities
- Localized erosion and sediment controls
- Characterization and isolation of potential acid-generating materials
- Use of holding ponds for pit dewatering discharge
- Operation of the heap leach and tailings facilities as zero-discharge circuits
- An SPCC plan to address any accidental discharge

Given that potential surface water hydrologic impacts would be effectively addressed by specific regulatory standards for operation, maintenance, monitoring, reporting, and reclamation, the primary supplemental mitigation required would be ongoing compliance with the following plans and permits:

- NDEP Water Pollution Control Permit
- NDEP Storm Water Pollution Prevention Plan
- NDEP Storm Water Discharge Permit
- SPCC Plan
- NDOW Industrial Artificial Pond Permit

In addition, in order to address potential water quality concerns relative to the two shallow ponds projected to form following completion of mining, the BLM is stipulating that the pond areas be partially backfilled to preclude ponding contingent on the results of postmining water quality monitoring. If long-term ponding and/or poor water quality become a problem, the BLM is stipulating that SFPGC mitigate the problem through ripping to alleviate compaction, partial backfilling to eliminate ponding, or other appropriate measures.

Ground Water Hydrology Mitigation

Specific facility design, and operational control and monitoring considerations and practices incorporated as components of the Proposed Action and other action alternatives, would provide for effective mitigation of potential ground water impacts. These considerations and practices include:

- Controlled drainage and removal of surface and ground water inflows to mine pits during active operations
- Characterization and isolation of potential acid generating materials
- Limitation of any backfilling to non-sulfide materials
- Design of the ore stockpile, heap leach, and tailings facilities with low permeability liners, and leak detection systems (leach and tailings facilities only)
- Operation of the heap leach and tailings facilities as zero-discharge circuits
- An SPCC Plan to address accidental discharges of potentially hazardous materials
- Design of the mine water supply to minimize drawdown and design for process water recycling to limit the potential for discharges and minimize water supply requirements
- Provisions for regular ground water monitoring

Potential ground water impacts would be effectively addressed by ongoing compliance with specific regulatory standards for operation, maintenance, monitoring, reporting, and reclamation under the following plans and permits:

- NDEP Water Pollution Control Permit
- SPCC Plan
- NDOW Industrial Artificial Pond Permit

Any loss or reduction of flow rate or volume of appropriated or non-appropriated waters to wildlife or livestock within the project area shall be mitigated by the replacement of the amount of lost flow or volume such that total annual flow results in approximately the original annual flow volume. Mitigation, which may include spring developments; installation of wells, pipelines, pumping systems, and/or guzzlers; and/or other water development systems, shall be accomplished in a timely manner. An annual report, showing base line flow data with flow volume for each year of the mining operation, shall be submitted by SFPGC to the BLM. Mitigation for the loss or reduction in water flow will be completed in consultation with and coordinated between BLM, NDOW, SFPGC, and any affected water-right holder or grazing permittee. A loss or reduction in water availability to wildlife or livestock shall be determined to have occurred with the physical loss of springs or the exclusion of livestock or wildlife from water, or based on comparison of a minimum of three years of flow data with base line data. Loss of water or reduction in water availability shall be determined by the BLM and NDOW.

Installation, funding, and maintenance of these water developments will be the responsibility of SFPGC or the current Mule Canyon Mine Operator until full closure of the mine. At closure, title to the fully maintained and operational developments will be transferred to the BLM and NDOW, and/or the affected grazing permittee or water-right holder.

This mitigation is in addition to any regulatory requirements of NDEP, NDWR, and NDOW and will not be construed as affecting the authority or regulatory requirements of any agency of the State of Nevada.

Soils Mitigation

The specific design considerations and operation and reclamation practices included as components of the Proposed Action and other action alternatives would effectively mitigate soil impacts. These considerations and practices include:

- Design of mine structures to assure stability and minimize erosion potential
- Establishment and maintenance of drainage and sediment control structures
- Testing and characterization of soil suitability relative to use as a revegetation medium
- Salvage, stockpiling, and replacement of available soil and other suitable materials
- Revegetation of mine disturbance areas to stabilize replaced soils and minimize erosion

Potential soils impacts are effectively addressed by specific regulatory standards for mine operation and reclamation. Mitigation would be addressed through ongoing compliance with the NDEP Reclamation Plan and no supplemental mitigation would be required or justified.

Vegetation Mitigation

Generally, the reclamation measures included as a component of the Proposed Action and other action alternatives would effectively mitigate any long-term potential vegetation impacts. Effective mitigation would be assured through ongoing compliance with the NDEP Reclamation Plan and no further long-term mitigation would be required. While some question exists relative to the need for any mitigation of short-term vegetation impacts, possible options would include off-site enhancement of similar vegetation communities through fertilization and weed and brush control.

Grazing Mitigation

As an interim mitigation measure, SFPGC would reduce the area enclosed by the project fenceline until such time as a mill is constructed. The reduction in the fenced area would allow continued grazing access and use for approximately 3,735 acres (or 374 AUMs and continued access to three springs. Any loss or impairment of flow from springs for which existing valid water rights exist is subject to the jurisdiction of the NDWR with specific requirements for timely replacement or other mitigation. "Open Range" signs and posted speed limits for both mine roads and County access roads would reduce the potential for vehicle-livestock collisions. In the event that livestock damage does occur as a result of a vehicle-livestock collision, under applicable open range laws the individual or entity responsible for the loss would be liable for reasonable compensatory damages. SFPGC would assume responsibility for any damages involving company-owned vehicles.

Short-term grazing impacts can only be addressed through supplemental mitigation measures developed in consultation with and approved by the BLM and NDOW. Potential grazing mitigation options which would be subject to future consideration by and consultation with the BLM could include but would not be limited to water developments such as spring development or construction of catch basins or guzzlers; fertilization; supplemental seedings; weed and woody plant control and reduction (sagebrush and pinyon-juniper); and the use of existing project fencing or fence construction to facilitate seasonal grazing rotation.

As discussed in Section 4.6, the reclamation measures included as a component of the Proposed Action and other action alternatives would effectively mitigate the vegetative component relative to potential long-term grazing impacts.

Wildlife Mitigation

Because wildlife habitat values are associated with similar resource components to those required to support livestock grazing, mitigation considerations and requirements are generally the same as discussed under Section 4.7.8 for grazing. Reclamation of mining related disturbance is the primary component of the Proposed Action and other action alternatives relative to effective wildlife mitigation. Proposed reclamation plans focus on reestablishment of a mid- to late-successional mixed grassland-shrub community with cover and production values comparable to or greater than existing premining vegetation communities. Partial backfilling of shallow pond areas as stipulated by the BLM would preclude accumulation of poor quality water. Solution control and detoxification, wildlife exclosures, and speed limits on mine roads would provide necessary supplemental protections.

The principal mining related wildlife impacts would be addressed through ongoing compliance with the following plans and permits:

- NDEP Water Pollution Control Permit
- NDEP Reclamation Plan
- NDOW Industrial Artificial Pond Permit

Potential supplemental wildlife mitigation measures would be the same as discussed in Section 4.7.8 for grazing and would include water development, range or habitat enhancement, and posted speed limits for mine roads and access roads.

Cultural Resource and Native American Concerns Mitigation

As noted and described in Sections 3.11.4, 4.9.1, and 4.9.3, potential project-related cultural resource impacts which would result from the Proposed Action and other action alternatives have been or will be effectively mitigated through implementation of a cultural resource management plan developed and administered under a programmatic agreement between SFPGC, the SHPO, and the BLM. Native American concerns have been identified through initial research and contacts with Native American groups as described in Section 3.11.5. Further consultation will continue if necessary under the AIRFA as an integral part of the NEPA process under the authority and jurisdiction of the BLM.

The only supplemental cultural or Native American mitigation required or justified would be supplemental mitigation for those sites identified in Sections 4.9.4 and 4.9.5; any consultation and any subsequent required site-specific mitigation for Native American resources or values identified through the NEPA process; and any required mitigation for new resource occurrences identified in the course of site disturbance, construction, and mining activities. It should be noted that mitigation provisions for any newly discovered sites are addressed in the existing programmatic agreement.

Socioeconomic Mitigation

As described in Section 4.10.3.5, socioeconomic impacts resulting from the Proposed Action and other action alternatives would generally be addressed through normal market forces and by government agencies utilizing supplemental revenues from project-related net proceeds, property, and sales tax revenues. Unequal distribution of project-related revenues between potentially impacted communities and counties is a recognized concern relative to mine development in Nevada.

SFPGC anticipates indirectly addressing the financial impacts of socioeconomic mitigation by offering a very competitive compensation and benefit package and purchasing required materials and supplies if available from competitive local suppliers.

Transportation - Mitigation

As discussed in the preceding portions of this section, existing major road networks in the Project Area have adequate excess traffic carrying capacity to handle anticipated traffic increases which would result from implementation of the Proposed Action and other action alternatives. Existing traffic carrying capacity in the immediate project vicinity is not currently adequate to handle anticipated traffic increases and would be expanded through construction of the proposed west and/or east access roads. As a safety consideration, Lander County has requested that NDOT designate a speed limit of 45 mph for the Interstate 80 frontage road. Existing road networks in the potentially effected communities are also probably not adequate to handle increased traffic levels but would be expanded on an as-needed basis using tax revenues generated by both mining operations and increases in local economic activity. Given that plans or mechanisms exist for effective mitigation of project-related traffic impacts, no supplemental mitigation is required.

Air Quality Mitigation

Project-related air quality impacts which could occur as a result of implementation of the Proposed Action and other action alternatives would be effectively mitigated by operational control and reclamation measures including:

- Facility design to minimize or enclose potential emission sources
- Implementation of BACT control methods for specific process emission sources
- Application of appropriate control measures for non-process emission sources (includes dust control for the Beacon Light Road as stipulated in a contract between SFPGC and Lander County and reasonable speed limits, maintenance, and dust control for mine haulage and access roads)
- Reclamation and surface stabilization of mine disturbance areas

Potential project-related air emissions would also be effectively controlled and mitigated through ongoing compliance with the NDEP Air Emissions Permit, consequently, no supplemental mitigation would be required.

Visual Resources - Mitigation

Project-related visual impacts would include temporary and permanent impacts. Temporary impacts would result from surface disturbance, removal of natural vegetation, and exposure of underlying rock materials. Permanent impacts would include permanent alteration of the land surface associated with permanent mine structures including mine pits, overburden and interburden disposal areas, heap leach and tailings facilities and other ancillary structures. Project design considerations incorporated as components of the Proposed Action and other action alternatives would minimize both temporary and permanent visual impacts. Site reclamation would address, to the extent possible, visual contrasts of line, form, color, and texture. The proposed outslope design, while assuring stability and effective erosion control, would result in linear benchline features. In order to address visual impact concerns relating to benches and associated linear contrasts the BLM is stipulating that SFPGC develop modified outslope designs to be implemented where appropriate. Modifications would include, but not be limited to, rounding bench edges, varying bench widths, varying final bench topography, and flattening both overall and intermediate bench slope.

Possible options for modified bench designs are graphically illustrated by Figure 4-7. These designs would be utilized in overburden and interburden disposal area planning and construction, and would result in final reclaimed configurations that blend with the existing topography while meeting design requirements for long-term seismic and erosional stability, control of infiltration, and successful vegetative reestablishment. SFPGC would be limited to construction of only the first 50 foot lift of any given overburden and interburden disposal area until design modifications are finalized and approved by both the BLM and NDEP.

Full mitigation of visual impacts is not feasible. The proposed development activities and mitigation measures, however, would meet existing BLM visual management objectives for this area which take into consideration existing visual resource quality.

<u>Land Use and Recreation Mitigation</u>

Premining land uses, including dispersed recreation, would be restored by the reclamation plans incorporated as a component of the Proposed Action and other action alternatives. Dispersed land use and recreation impacts due to mine-related population increases are possible and would generally be addressed under present or potential future management plans by the responsible lands management agencies or other public entities. Given the dispersed nature of the potential impacts, direct supplemental mitigation would not be feasible or justified.

CHAPTER 4

COMMENTS AND RESPONSES

MULE CANYON MINE ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 4 - COMMENTS AND RESPONSES

The BLM held one public meeting in Battle Mountain, Nevada on June 5, 1996 to receive comments and also received written comments on the Mule Canyon Draft Environmental Impact Statement (DEIS) through the end of the statutory public comment period on July 10, 1996. The BLM has reviewed all comments received and developed a response for each substantive comment. A total of 22 comment items were received including the recorder's transcript from the public meeting and 21 letters. A total of 122 substantive comments were identified from the comments received, with responses prepared for each of these comments. This Chapter includes all public comment items with substantive comments identified by brackets and a comment designation. Corresponding responses are identified by a number designation corresponding to the relevant comment (ie: Item 1, Comment 23 is identified as C 1.23 and the corresponding response is identified as R 1.23). The following identifies each of the public comment items received along with the number of substantive comments identified for each item:

Item 1 - Public Meeting Transcript (22 comments)

Item 2 - Letter, US Environmental Protection Agency (12 comments)

Item 3 - Letter, US Geological Survey (3 comments)

Item 4 - Letter, US Fish and Wildlife Service (3 comments)

Item 5 - Letter, Nevada Division of Wildlife (10 comments)

Item 6 - Letter, Nevada Division of Water Resources (3 comments)

Item 7 - Letter, Nevada Division of Environmental Protection - State Clearinghouse (1 comment)

Item 8 - Letter, Nevada Division of Minerals (1 comment)

Item 9 - Letter, Nevada Natural Heritage Program (3 comments)

Item 10 - Letter, Nevada Department of Transportation (1 comment)

Item 11 - Letter, Lander County (1 comment)

Item 12 - Letter, Western Shoshone Defense Project - Ms. Carrie Dann (3 comments)

Item 13 - Letter, Western Shoshone Resources (27 comments)

Item 14 - Letter, Sierra Pacific Power Company (8 comments)

Item 15 - Letter, Building and Construction Trades Council of Northern Nevada (10 comments)

Item 16 - Letter, Sansinena Ranch - Mr. Mike Sansinena (5 comments)

Item 17 - Letter, Julian Tomera Ranches -Mr. Pete Tomera (4 comments)

Item 18 - Letter, Ms. Roberta McGonagle, PhD (1 comment)

Item 19 - Letter, Ms. Liz Heimbegner (1 comment)

Letter 20 - Letter, Mr. Corbin Harney (1 comment)

Letter 21 - Letter, Mr. Corbin Harney (1 comment)

Item 22 - Letter, Ms. Nina Raffaele (1 comment)

As appropriate, text, tables, and figures from the DEIS were revised consistent with responses to the public comments and to address the noted concerns. The following Index of Revisions identifies those revisions which correspond to specific public comments.

INDEX OF REVISIONS	
Public Comment Designation	**Revisions to FEIS***
1.1	Pgs. 2-27, 3-130, 4-74, 4-74a, and 4-81
1.3	Pgs. 2-7, 2-7a, 3-130, 4-72, 4-72a, 4-73, 4-74, 4-74a, 4-75, 4-75a, and 4-81
1.8	Pgs. ES-9, 2-7, 2-7a, 2-36, 2-34, 2-34a, 2-65, 2-65a, 4-90, 4-90a, 4-90b, and F-6
1.15	Pgs. 2-37, 4-21, 4-21a, 4-47, and 4-47a
1.20	Pgs. 3-133 and 4-78
1.21	Pgs. 2-9, 4-71, 4-72, and 4-72a
2.1	Pgs. 2-9, 4-71, 4-72, and 4-72a
2.8	Pgs. 2-36, 4-9, 4-9a, 4-14, 4-24, 4-24a, 4-47, and Appendix E
2.4	Pgs. ES-9, 2-7, 2-7a, 2-36, 2-34, 2-34a, 2-65, 2-65a, 4-90, 4-90a, 4-90b, and F-6
2.8	Pgs. 2-34, 2-34a, 2-36, 2-65, 2-65a, 3-20, 3-24, and 6-3
2.8	Pgs. 4-22, 4-22a, 4-28, 4-28a, 4-42, 4-42a, and F-3
2.8	Pgs. 2-34, 2-34a, 2-36, 2-65, 2-65a, 3-20, and 3-24
2.12	Pgs. 2-36, 2-37, 4-9, 4-9a, 4-14, 4-21, 4-21a, 4-24, 4-24a, 4-47, 4-47a, 4-49, 4-49a, and Appendix E
3.1	Pg. 3-33
3.2	Pg. 3-53
3.3	Pg. 3-49
4.2	Pgs. ES-6, ES-6a, 4-22, 4-22a, 4-35, 4-39, 4-39a, 4-40, 4-42, and 4-42a
5.1	Pgs. 2-7, 2-7a, 2-27, 3-108, 3-130, 3-146, and 3-147
5.3	Pgs. 2-62, 2-64a, 2-64b, 2-64c, and 2-64d
5.4	Pgs. 3-84, 3-84a, 3-93, 3-94, 3-94a, 4-44, and 4-44a
5.6	Pg. 3-108
5.6	Pgs. 2-37, 2-65, 2-65a, 4-9, and 4-9a
5.7	Pgs. ES-6, ES-6a, 4-22, 4-22a, 4-35, 4-39, 4-39a, 4-40, 4-42, and 4-42a
5.10	Pg. 5-1
6.1	Pg. 1-8
6.2	Pg. 3-41
6.3	Pgs. 4-9 and 4-9a
8.1	Pgs. 3-133 and 3-134
8.1	Pgs. 2-7, 2-7a, 3-108, 3-146, 3-147, 4-75 and 4-75a

INDEX OF REVISIONS	
Public Comment Designation	**Revisions to FEIS***
9-2	Pgs. 5-2 and 5-2a
13.7	Pg. 1-6
13.3	Pgs. 2-34, 2-34a, 2-37, 2-65, 2-65a, 3-20, 3-24, 4-9, 4-9a, 4-14, 4-21, 4-21a, 4-24, 4-24a, 4-47, and 4-47a
13.7	Pgs. 2-7, 2-7a, 2-27, 3-108, 3-130, 4-72, and 4-72a
13.8	Pgs. 2-34, 2-34a, 2-65, 2-65a, 4-90, 4-90a, and 4-90b
13.9	Pgs. 3-133 and 4-81
14.1-8	Pgs. 2-52, 2-52a, 3-146, and 3-147
15.9	Pgs. 2-36, 4-9, 4-9a, 4-14, 4-24, 4-24a, and Appendix E
16.3	Pgs. 4-74, 4-74a, 4-75, and 4-75a
16.4	Pgs. ES-6, ES-6a, 4-35, 4-39, 4-39a, 4-40, 4-41, 4-42, and 4-42a
16.5	Pgs. ES-6, ES-6a, 4-35, 4-39, 4-39a, 4-40, 4-41, 4-42, and 4-42a
18.1	Pgs. 2-9, 3-108, 4-72, and 4-72a
***NOTE - Included in Chapter 3, Errata, and Addenda**	

BATTLE MOUNTAIN, NEVADA, WEDNESDAY, JUNE 5, 1996, 7:00 P.M.

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(Whereupon a presentation was made by Mr. Stubbs and Mr. Pavlich but were not reported.)

MR. STUBBS: We'll go to verbal comments now. I'd like to ask Denise to begin recording.

We have one ground rule, that would be five minutes per person, please, so that everyone has a chance, if everyone would like a chance. So at this time we're willing to take, would encourage you to give us questions or comments. Do we have any from the audience, please?

If you could state your name.

C 1.1

MR. SAYERS: Charles Sayers. I live on Skyline Road. I'd like to know on the issue on the road what they're going to do about the dust and stuff out there as you go along.

MR. PAVLICH: The dust is going to be, it's a permit condition that the dust must be controlled. It's our intention that on the lower end of the road we will use dust suppressants and as -- we won't use that kind of material on the incline sections because that can get too slippery during a rainy season or something. So we'll use water trucks on that portion of the road.

C 1.1 Cont.

MR. SAYERS: Is that a guarantee that there will be a water truck down there through the year?

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R 1.1 - SFPGC has a contract with Lander County for construction and maintenance of the Beacon Light Road over the period of active mining operations. As a part of this contract, potential fugitive dust emissions from the road will be controlled by periodic watering and/or application of binders or surfactants as needed for effective control. The Nevada Bureau of Air Quality (NBAQ) has regulatory responsibility and authority for any necessary monitoring and control of potential dust emissions, as a component of air quality. Limitations on fugitive dust emissions would be based on visual observations. At any time, citizens have the right to report suspected violations of air quality standards to the NBAQ which could then require implementation of supplemental monitoring and/or control measures. The NBAQ can be contacted at (702) 687-4670. Following the period of active mining, traffic on Beacon Light Road would be expected to return to a level comparable to the present pre-mining condition with a commensurate reduction in potential dust emissions.

C 1.1 Cont.

MR. PAVLICH: It's a permit condition to control the dust down there, yes, it is. If it's dusty, then you need to call us and we'll get it under control.

MR. SAYERS: I think that place should be asphalted through the housing district there because what are you guys going to do after eight years after the mine thing is -- that's an open road. We're fighting dust now.

MR. PAVLICH: We were working with the county. You may be aware, we're working with the county on that and had gotten one -- we had an agreement with the county as to how we were going to proceed on that on a cost-sharing, and it didn't work out from the county's side. That issue may come up again. I can't spend county money for you. But we had committed to doing a portion of that along with the county and the county was not able to reach a number they were comfortable with. So we haven't given up on that.

MR. SAYERS: Okay. Because that's the worst factor -- I've seen other problems made by the mines in the past is never followed up. That's what I'm concerned about.

MR. PAVLICH: I'm not making you a promise that that road is going to be paved. It is a county road. We're going to maintain it. We are going to control the dust on it.

C 1.2

MR. SAYERS: What's this deal going to do with our water levels on our pumps and stuff?

R 1.2 - Potential mining-related effects on the water table are addressed in the DEIS in Sections 4.4.3.1 (effects due to mine excavation and dewatering) and 4.4.3.6 (effects due to water supply withdrawals). Hydrologic modeling of ground water drawdown indicates that water table impacts could extend up to 1 mile from the mine pits and up to 2 miles from the water supply wellfield in Whirlwind Valley. Water table impacts for drawdowns associated with the mine pits would reach their maximum extent in 90 to 140 years, and would represent a long-term impact since the mine pits would remain as ground water sinks. Water table impacts associated with the water supply wellfield, would extend up to 12 to 18 years after cessation of pumping.

C 1.3

MR. PAVLICH: It will have no impact.

MR. STUBBS: In terms of the road, we've been discussing and looking at a number of mitigation measures for impacts on that road. Paving is one that we've discussed. We're continuing to look at it. And based on a lot of factors, including public comment, we may come out with some other recommendations in the Final EIS. And again that will be mailed out and you'll have a chance to review that document. But at this point we are giving it further consideration.

MR. SAYERS: Okay. That's basically what I wanted to know.

MR. STUBBS: Thanks.

MR. PETERSON: Jim Peterson. I live on 3300 East. My concern is with the trucking coming down through that road on that frontage road. Number one, it's a school bus route. I've got kids that live up and down there. I drive back and forth it. My wife drives it back and forth to work. That road is not built to handle that much traffic, for one, that kind of truck traffic, I don't feel.

Why can't it go over and go through the commercial zoned road on the other side, where you guys come out, you can drive down underneath the freeway, go down the other side which is commercial instead of residential?

Also, two, from what I understand in the

R 1.3 - Representatives from the BLM Battle Mountain District Office, Lander County, Lander County School District, NDOT, and SFPGC met on June 28th to discuss transportation issues. Issues identified to date, including appropriate routing of haulage traffic, school bus routes, the adequacy of road designs for anticipated traffic loads, and dust and noise were presented and discussed.

County representatives indicated their support for the currently proposed haulage route, selected by SFPGC in consultation with the Lander County Commissioners, which includes the Beacon Light Road and South I-80 Frontage Road. Selection of the proposed haulage route involved consideration of several alternative routing options. Given this consideration, alternate routes have been included and discussed in Section 2.2.4 of the EIS as, "Alternatives Considered but Eliminated from Detailed Analysis".

Public concerns relative to the school bus route were addressed by Lander County and the Lander County School District. The School District indicated that several bus pull-outs and turn-arounds on side roads already exist to allow children to board and disembark school buses out of normal traffic patterns. Lander County has indicated that it will request that NDOT designate a speed limit of 45 mph for the highway frontage road as a safety consideration (refer to Comment Letter 11). SFPGC's commitment to include road safety as a topic for both employee and contractor training and regularly scheduled safety meetings was noted by the School District representative as a positive step in preventing potential safety hazards.

Concerns relative to design, durability, and width of the frontage road were addressed by NDOT. The existing frontage road is designed to meet applicable design, durability, and width standards for State highways which include consideration of anticipated traffic levels and loads. In addition, the proposed Beacon Light Road construction plans meet all applicable design requirements for anticipated mine-related traffic levels and load requirements. The overlay of the highway frontage road being completed this summer and the ongoing construction activities on the Beacon Light Road will result in hard or gravel surface roads which will withstand anticipated traffic loads with normal road maintenance.

C 1.3 Cont.

Environmental Impact Statement, it says those trucks will not come within 500 feet of any housing. That's baloney because there's houses closer than that to the road. So that's where I'm at. That's my concern with that, because there's a lot of factors of what's it going to do to our property values with that kind of traffic flow through there, you know.

There's a lot of things that's affecting that. I drive it, like I say, my vehicles and stuff, and that road gets beat out with potholes all the time anyway. It's hard enough keeping it up.

MR. PAVLICH: You're talking about the Airport Road?

MR. PETERSON: The frontage road. Why can't you go on down to the right and go around, go underneath the freeway, catch that frontage road there? That's commercial zoned, that property up there. The other side is residential.

C 1.3 Cont.

And also, when you get to the stop sign, how many of your ore trucks are going to be able to stop on that incline and take off without dropping rear ends and stuff or how many are going to run that stop sign, run right through it?

MR. PAVLICH: If they run a stop sign, you're going to be, I'm confident that Lander County is not going

(R 1.3 Cont.) As pointed out, some residences may be within 500 feet of the roadway depending on the point of measurement. Given the difficulties of defining an appropriate point of measurement (ie: lot boundary, any structure, occupied residence) specific references to distances have been replaced in the EIS by more general terms defining general proximity. Specific concerns relative to road routing and proximity to residences can be addressed by contacting Lander County or NDOT.

to let them run stop aigna.

MR. PETERSON: What about the speed factor, end of his shift, he needa to get his truck back up that hill?

MR. PAVLICH: We're going to require our contractors to abide by all the laws out there. And people who don't will work for someone else.

MR. PETERSON: Like I say, with a school bus route factor, too, that's a big one. The amount of your shift change, the amount of people, traffic on the road from people that live out there, I've been working mining over 15 years and mining traffic and public accesa doesn't mix very well without having some kind of an accident?

MR. STUBBS: Could I summarize your concerns, make sure we've got them for the record?

You're concerned about safety issues along the road; property values?

MR. PETERSON: Yes.

MR. STUBBS: It's a school bus route; houses being no closer than 500 feet from the road is incorrect.

That seems like it summarizes it.

MR. PETERSON: Then the weight factor with the paving out there. From what I understand, that road is not set up to take that kind of weight day in and day out.

MR. STUBBS: Again, I would just emphasis your comments become part of the official record. We'll look at

R 1.3
Cont.

those and respond in the final and possibly alter the document providing mitigation. It depends on a lot of factors. But Jim, did you have anything else?

MR. PETERSON: No, that's my main concern.

MR. STUBBS: Thank you. I saw a hand right here. Yes, sir.

MR. WOLTERS: My name is Richard Wolters. I welcome Santa Fe. I think they're going to be good neighbors. And I like the way they've done business in the community in the past. And I think that we're going to be able to live in harmony with them with the Mule Canyon. I live on Skyline also.

C 1.4

However, they're putting in an interchange, they're changing the interchange between the county road that will be going to the mine and where it interfaces with Skyline. And if it's going to continue like they put it in, started putting it in today, they're going to cut out one of my ten-acre parcels for having a road access. I'd like to take a closer look at that.

The other concern I have is, along with Jim, about the road base on that access road. I don't think there's any way those trucks can make that turn onto that 14-foot underpass, though, under the freeway. So I think we'll have to live with them on our side of the road.

The houses at 3400 East, though, are within,

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R 1.4 - Please refer to the previous response R 1.3 relative to the issues of road safety and speed limits. As part of the planning process for modification of the West Access Road, Lander County contacted adjacent land owners and obtained releases for the road right-of-way. Where appropriate, reasonable compensation was also provided for right-of-way acquisition. Under the existing right-of-way agreements, Lander County has the right and obligation to locate and design the road to best meet the multiple objectives of safety, durability, and ease of construction and maintenance. Any concerns relative to road location, alignment, or design should be addressed to Lander County as the responsible jurisdictional entity.

C 1.4
Cont.

considerably within the 500 foot distance of that access road.

And the speed limit there is 55. But I am a little concerned about that, too. See, we have to go two and a half miles to the mailboxes and they're at 3300 East. And that, I think, we're going to have to have some lower speed limits for the trucks at that intersection. That's a real bad one where I haven't had any problem with Santa Fe's vehicles or anything like that, but, boy, since we've had construction and stuff up there, had some people going extremely fast there, so fast, you look, you see nothing, you pull out, then there's a vehicle there.

So we're going to have to work with the county and with your contract haulers to watch that.

But do you have the actual plan with respect to the addresses on Skyline that the construction company, where the road they're putting in there, the interchange they're putting in?

MR. PAVLICH: The plans for the road? We have that, but I don't have it here with me.

MR. WOLTERS: I'd like to see that, because if it's going to cut -- I arranged that one ten-acre piece of property so the road is at the southeast corner or the access gate is at the southeast corner. But the road is turning off of Skyline to interface with your road and it's

C 1.5

making the turn before it gets to my last ten-acre parcel there. And I don't know, depending on how they set it up, looks like it's going to cut them out from a decent access to the road.

MR. STUBBS: Thank you, Richard. More excellent points about the Skyline area and the Beacon Light Road issue.

Do we have other questions or comments?

MR. SEWALL: My name is Chris Sewall. I'm from Crescent Valley. I work with the Western Shoshone Defense Project. And I have a lot of questions, but I'll start with this one.

I want to know why no Native American consultation was done, and I want to know why the Draft EIS misrepresents that fact.

MR. STUBBS: It's my understanding, from our resource specialists, that the Native American consultation has been done. I can talk to you after the meeting and we can come to a meeting of the minds on that. Also, we can outline in the Final EIS exactly what steps we took in terms of Native American consultation.

MR. SEWALL: Actually, I disagree with you. I want to make a point. First of all, the Draft EIS says a tribal organization and two other tribal organizations, nontribal council organizations, were contacted for this.

R 1.5 - An ethnographic study (report on file at the Battle Mountain District Office of the BLM) for the Mule Canyon Project was undertaken in 1992 by Mary Rusco, an experienced professional ethnographer under contract to Archaeological Research Services, Inc., the firm hired by TerraMatrix (the EIS contractor) to write the archaeology sections of the EIS. Rusco had also been the principal ethnographer for the Tosawihi Project the previous summer. She relied heavily on information gathered during the latter project to guide her work for Mule Canyon, as the Tosawihi Quarry and Mule Canyon areas are within a few air miles of each other and within the general sphere of influence of the Tosawihi Western Shoshone. Rusco supplemented information derived from the Tosawihi Quarry ethnographic work with information gathered from informants whose knowledge was directly relevant to the Mule Canyon area of potential effect..

C 1.5 Cont.

Well, I've seen the report you're referring to. Those people were contacted in '91 or '92 about Tosawi quarries north of Battle Mountain, not about Mule Canyon.

But in the Draft EIS, you say that -- it looks as if you're saying that these people were consulted about Mule Canyon, and they weren't. And you've had three and a half years to go back and talk to these people.

Also in that report it said that the people that were talked to, Paul Smokes, Former Tribal Chair of Battle Mountain, specifically about Mule Canyon. Of all the Shoshone people that they talked to, all of them agreed that they wanted to participate in any kind of archeological excavations or be involved with that that happened at that location.

Now, there are 188 archeological sites in that project area, 31 of which I understand have been excavated. Were there any Western Shoshone people involved in this process?

MR. STUBBS: Chris, I'm not sure what the answer to that question is, but we'll certainly come up with the answer for you.

MR. SEWALL: I think it's your job to know that.

MR. STUBBS: I can't know everything as a project manager. It's my job to find the answer for you,

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(R 1.5 Cont.) Rusco contacted Western Shoshone tribal governments, groups and individuals who seemed, in her professional judgment, to be those with the most likelihood of having information about the Mule Canyon area, and would be willing to actively participate in her study; also contacted were those people identified by others as potential informants. To this end, letters were sent and phone calls were made to Western Shoshone government entities and individuals. The tribal entities and individuals contacted by these methods are referenced in the ethnographic study, with the exception of those who did not wish to be identified.

Further contacts were made by the BLM, including as Rusco suggested, discussion with the Battle Mountain tribal chair, in the summer of 1993. The latter said he would contact people who he thought might have information, and if they wished to participate in the consultation process they would either let him know or would contact the BLM directly. No one, however, expressed any concerns that were relayed to the BLM as a result of this contact. Personnel from the BLM on more than one occasion during the years 1993, 1994 and 1995, discussed Mule Canyon with members of the Western Shoshone Historic Preservation Society (this group was designated as the official representative, for cultural matters, of several bands of Western Shoshone by a signed Memorandum of Understanding) and Citizens Alert. The Mule Canyon Project was also discussed among BLM personnel and Western Shoshone people during a tour of another mining property across the valley from Mule Canyon. In this case, the BLM Archaeologist for the project outlined the status of the project, what had been done archaeologically, and described findings and future possible work. This took place in August of 1995.

Upon review of the information gathered from Western Shoshone informants, the BLM determined that a good faith effort had been made to gain pertinent information, and that no concrete issues were raised by Western Shoshone people about the Mule Canyon Project area that could be feasibly addressed or would necessitate further consultation beyond those opportunities to comment on NEPA documents as afforded by the NEPA process. No Traditional Cultural Properties(as defined by National Register Bulletin 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties*) were identified in the project area, nor is there reason to believe that such properties are present.

C 1.5 Cont.

and I will.

MR. SEWALL: That's just the first question I have. Maybe if somebody else has something.

MR. STUBBS: You have more time if you have more questions.

MR. SEWALL: Yes. It's also my understanding that that report was done as a background study and that report itself says that it was a background study in preparation for a Bureau of Land Management consultation with Native American people which has yet to happen, it seems.

And another concern I have is that this meeting is happening right now at the same time that the monthly tribal council meeting that the Battle Mountain reservations have. And I also have some other specific questions about the springs that are being impacted in this project.

C 1.6

Apparently six springs, two springs will definitely be destroyed and four more will probably be dried out. And it wasn't clear whether those were perennial springs or springs that were more ephemeral in nature. Can anybody clarify that?

MR. PAVLICH: I don't have that with me right now. I think we can get that.

MR. YOUNG: It depends on which spring. Most of the springs are perennial, but some of them are ephemeral

(R 1.5 Cont.) Six public scoping/comment meetings have been held concerning the Mule Canyon Project during the period 1991 through 1996. This has been a highly publicized project with ample opportunity for comment by any and all concerned groups and individuals. Tribal leaders did not attend these meetings, nor did they submit written comments, with one exception. The Battle Mountain BLM office received by mail a resolution and position paper from the Battle Mountain Band Council proclaimed on August 26, 1993. The *Position Paper on Environmental Changes* stated that this was to serve as the Council response to all future inquiries and solicitations of information from the BLM (plus other government agencies). The position paper was drafted because the Council stated it did not have the funds or staff to respond to the correspondence from the various government agencies.

R 1.6 - Section 3.5.5 of the DEIS identifies springs MCS-4, 5, 6, and 10 as intermittent and all other springs as perennial springs. Two perennial springs (refer to Section 4.8.3.3 of the DEIS), Springs MCS-3A and 3B, will be eliminated by mining-related surface disturbance. As also noted in Section 4.8.3.3 of the DEIS, the potential exists that flows from three intermittent springs (MCS-4, 6, and 10) and five perennial springs (MCS-A, 2, 7A, 8, and 11) will be reduced or eliminated by mining-related changes in the ground water-table in the vicinity of mine pit excavations.

in nature.

MR. SEWALL: I'm aware of that. I was wondering, the six springs that you're reasonably sure will be destroyed or dried out, I was wondering about the nature of those particular springs.

MR. YOUNG: We're assuming them -- it depends a lot on the season, but the springs all have the ability to be perennial in wetter years.

MR. STUBBS: Chris, we are looking at possibilities for alternate water sources. And some of that will be discussed in the Final EIS.

Again, we may not be able to give you all the answers tonight, but I can assure you that all the concerns will be addressed in the Final EIS.

Were there more questions?

MR. SEWALL: Yes, I have a question regarding reclamation.

C 1.7

In the beginning of the Draft EIS, you state that there will be no permanent loss of AUMs and that in fact there may be an increase in AUMs following reclamation.

Do you have any examples of mines that have been completely reclaimed in which that has occurred in which there is an increase in actual AUMs after grazing use?

MR. STUBBS: I don't have any examples. I believe that statement was based on test plots and things of

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R 1.7 - The comment that the DEIS indicates no permanent loss of AUM's is not accurate. In Section 4.7.3, permanent AUM losses due to mining-related disturbance are acknowledged and quantified. As noted in Section 3.8, vegetation communities within the Project Area are typical of the disclimactic communities of the Great Basin, existing at a level below the potential climax vegetation community and reflecting the results of prior disturbance (range-fires, grazing, etc.). The discussion of potential mining-related grazing impacts presented in Section 4.7.3 notes that:

> "...there is a strong potential that revegetation would result in reestablishment of a mid- to late- successional mixed grassland-shrub community with higher vegetative productivity than the premining community it would replace."

Given the opportunity to enhance existing marginal conditions through effective revegetation, SFPGC may increase vegetative productivity and grazing potential, offsetting some of the permanent AUM losses identified.

In addition, SFPGC has contributed to off-site mitigation in the form of revegetation for areas in Whirlwind Valley affected by historic range fires. The 1994 seeding program, which was partially funded by SFPGC, represents supplemental mitigation for anticipated future impacts associated with the Mule Canyon Mine.

that nature, when we go back in and see what we see after that is done. I don't have any examples, but I can certainly look, though.

C 1.8

MR. SEWALL: I also have a question about Alternative B, changing slope of waste dumps and stuff. It says in the Draft EIS that the alternative response to specific BLM concerns, including the issues of long-term stability, reclamation, feasibility, grazing impacts.

If that is so, why is the agency's preferred alternative Alternative B?

MR. STUBBS: We take into account a number of considerations. And what I can say at this time is that no final decision has been made about the selected alternative.

Chris, you've got one more minute if you have more questions.

C 1.9

MR. SEWALL: I think the only other thing I'd like to say is you're probably aware that many traditional Western Shoshone consider the Treaty of Ruby Valley to be a still valid agreement between two sovereign nations. And as such, I believe it should be in this document as well. And I'd also like to know, in that treaty, as far as I understand, there was provisions for a railroad and not all the railroad land that was given to that, stolen actually, and given to the railroad by the U.S. Government, in which now is the private lands which are described in the diagram

R 1.8 - Relative to the issue of overburden and interburden disposal area configuration, Alternative B has been identified as the preferred alternative because, of the alternatives evaluated, it best meets the multiple objectives of long-term stability, reclamation feasibility, grazing impacts and use, and visibility as well as other relevant considerations. Elimination of all outslope benches would reduce visual impacts but could affect stability and reclamation feasibility. The primary purpose of the outslope benches is to control surface runoff, erosion, and soil loss on disposal area out slopes. Since the availability of adequate quantities of growth media is the critical factor relative to reclamation success, any increase in erosion and soil loss could limit reclamation success. Any significant reduction in slopes would increase long-term stability and reclamation feasibility but would result in undesirable increases in the total disturbance acreage. Grazing utility would be increased for the flatter slopes but this benefit would be offset by the increased disturbance area.

Alternative B provides for adequate long-term geotechnical stability, out slope areas can be effectively reclaimed with limited potential for erosional instability, disturbance areas associated with outslopes would be minimized (relative to grazing utility), and visibility would not be significantly different from other potential alternatives when viewed from the selected key observation points. Given concerns expressed by the EPA and the BLM, the BLM is stipulating that SFPGC develop modified overburden and interburden disposal area designs to reduce linear contrasts associated with bench-line features (see Section 4.13.8 and Appendix F of the FEIS). Specific impact considerations and comparisons of Alternative D with other alternatives are discussed in Sections 4.2.6, 4.3.6, 4.4.6, 4.6.6, 4.7.6, 4.8.6, and 4.13.6.

R 1.9 - Consideration of the issue of the Treaty of Ruby Valley has, for the purposes of this NEPA process, been foreclosed by judicial determination in *U.S. vs. Dann* 873 F. 2d 1189 1200 (1989), *cert. denied* 493 U.S. 890 (1990).

C 1.9
Cont.

there that are part of this project.

That's all I'll say right at the moment.

MR. STUBBS: Thanks for your comments.

Do we have anybody else? I saw a hand in the back of the room, a couple hands.

C 1.10

MR. HARNEY: My name is Corbin Harney. My concern has always been that you people, the mining people throughout the country, throughout the world as far as that goes, look at all the water that you're going to be pumping and then you put cyanide into this water. The livestock owner, and us included, are we going to be drinking this cyanide water?

The tailings you're going to be putting out there, the waste, them people that's living out there, is it going to be living in swamp land in the dust? I hope they can breathe that. I hope they can, the mining outfit will buy them a breather of some kind so they won't be breathing the cyanide dust.

But it seemed to me that you guys have never done your work. You present this to the people, like you done before. Whatever you guys done, never done your own work at all. And today you're saying, well, we're going to look into it. When are you going to look into it? Tonight or tomorrow?

This is how you guys have been treating us as a

R 1.10 - Comment 1.10 reflects several misconceptions including the following:

- That mining-related operations will result in discharge of cyanide to surface and/or ground water
- That dust emissions (including emissions of hazardous air pollutants) will not be controlled and would represent a potential health hazard

It also indicates a desire for SFPGC to work with the Native American people as project planning and development proceed.

Specific design, operational control, and reclamation practices have been incorporated in the Proposed Action to prevent discharge of cyanide or other process solutions to surface or ground water. These measures are summarized in Sections 4.3.3.4, 4.3.3.5, 4.3.3.7, 4.4.3.3, 4.4.3.4, and 4.4.3.7 and specific design, construction, operational, and reclamation details are described in Sections 2.4.9, 2.4.11, 2.4.12, 2.4.16, and 2.4.20.2 of the DEIS. In addition, all proposed operations have been permitted and will operate under applicable provisions of the approved NDEP Water Pollution Control Permit which is designed to prevent significant adverse water quality impacts.

Potential air emissions, emission levels, and proposed control measures are described in Sections 4.12.1 through 4.12.9 of the DEIS. Table 4-15 of the DEIS compares predicted maximum air pollutant concentrations with applicable National and Nevada Ambient Air Quality Standards which are based on health-related exposure levels as explained in Section 3.14.3 of the DEIS. As indicated by this table, applicable air quality standards will not be exceeded and therefore, no potential health hazard will exist.

As part of the overall NEPA process and under existing applicable laws, Native Americans have the right and opportunity to express any project-related concerns. SFPGC in cooperation with the BLM and other appropriate jurisdictional agencies will address identified concerns through response and mitigation measures as appropriate consistent with the nature and significance of any identified project impacts.

people. I'm sick and tired of it. I hope you guys do breathe this stuff, drink this water and be satisfied. I hope you guys can eat that gold so you'll be really rich people and so forth.

C 1.10 Cont.

This is something that you have to work with. You are the people that's going to be dealing with this. Throughout the country, throughout the world, there's so much cyanide out there today getting into our water table. You're going to be monkeying around with nothing but a gravel bottom. Whatever you guys do, I hope you do realize that you made a mistake, big mistake for the people.

The young people you're going to be raising out there, I don't know how healthy they're going to be. This is something that you people have to think about. I know that the mining outfit is thinking about that gold, a million ounces of gold. But that ain't going to give us our health at all. All it's going to do is give us a problem.

And I hope you guys do your work and work with the nature, work with the native people. They own the land here, you remember. You guys came into this part of the country, lied about what treaty you're going to make with the Shoshone people. And today your law is sitting back and saying, hey, you guys, we're pushing you to do something.

C 1.10 Cont.

We've been told and lied to many times. I hope this don't come to a vote, the people that's going to be coming in from throughout the country from the other states and put them to a vote like you did before on mining and so forth. You guys done that on Rock Creek on us, had the people coming in, miners coming in from Wyoming, Montana, Idaho, working here for your people for six months. You told them how wonderful that's going to be. And they voted for it. Now some of you people realize it's a waste of money for you. Think about it. We already began to drink cyanide water, chemical waters. Our water is running out. Maybe the stores will bring in more water for you from the faucet that they're going to be filling them jugs up for you. Thank you.

MR. STUBBS: Thanks for your comments, Mr. Harney.

Another question in the back.

MR. GREENBAUM: I'm Rob Greenbaum. I'm also with the Western Shoshone Defense Project. And I have a few things to say. Partially some more on what Chris and Corbin said.

C 1.11

As far as the sovereignty issue is concerned, in the past, the typical BLM response has been the basic one of saying that it's outside of the scope, it's beyond the authority of the BLM.

That's not something I want to see in this Final EIS. It's not something that a lot of the Western

R 1.11 - Please refer to previous responses R 1.5 and R 1.9 which address the issues of sovereignty and Native American consultation.

C 1.11 Cont.

Shoshone people are happy about. They read that and what they see is an evasive answer: It's outside of the BLM scope.

Maybe the BLM needs to go to whoever does have the authority. NEPA requires that whoever the lead agency is invite whatever agencies are appropriate. The Western Shoshone Nation is a sovereign nation. Maybe you need to get the state department. But the answer, however it's included in the Final EIS, should be something a little more constructive in detail showing actual land transfer and not something referring to putting it off on somebody else that also has never had an answer to that question, land transfer.

C 1.12

Along with that, as far as the Native American consultation, the big problem that we had with that is, besides the fact, as Chris said, you haven't done any. As far as I understand as well that there wasn't a background study and suggested, made recommendations, basically said that the study was incomplete.

The BLM, as far as I can understand, from the documents I've read, is that they haven't followed NEPA. They haven't followed the National Register Bulletin No. 38, I think it is, referring to Native American consultation. Actually, that's the one referring to guidelines for evaluating and documenting traditional and cultural

R 1.12 - No traditional cultural properties were identified by Western Shoshone informants within the Mule Canyon Project area. In the absence of specific identification of traditional cultural properties, National Register criteria for archaeological properties are used for evaluating archaeological sites and objects which may be associated with traditional cultural properties. Information as to whether or not an activity constitutes a significant impact for the Shoshone people needs to come from tribal leaders and/or recognized traditional leaders. If at any time this information had been forthcoming, where appropriate, evaluations would have been made using this additional information and guidance to supplement the National Register criteria. No Western Shoshone has, however, identified any traditional cultural properties in the Mule Canyon area of potential effect.

C 1.12
Cont.

properties. Haven't even followed the BLM manual.

Part of that has to do with not correctly and fully applying the National Register guidelines for evaluating traditional properties.

The Draft EIS draws on inconclusive and incomplete evidence and basically doesn't go forward and ask the questions that they need to ask regarding those sites. They simply make their conclusions based on this preliminary report. Besides that, the National Register of Historic Places isn't the only criteria for determining what's a significant cultural resource or what's important to Native Americans.

And that's where the Draft EIS seems to lump everything into, is saying, well, does it satisfy the National Register of Historic Places? But NEPA makes a specific distinction between cultural resources in general and those that happen to qualify for the National Register.

The BLM manual also mentions that even the Register bulletin itself says that's not the final word.

So that shouldn't be the only criteria used for evaluating what's a significant impact for the Shoshone people.

Along with that, it's really frustrating to find, I mean this is a comment period on the Draft EIS, but as far as Native American consultation is concerned, it's

(R 1.12 Cont.) The scoping process for this project was initiated in 1991 and has been ongoing since that time. Six public scoping/comment meetings have been conducted. All were advertised in newspapers throughout the State. The Mule Canyon Project has been the subject of numerous articles in local newspapers. Environmental documents have been circulated to the required agencies, groups, organizations, tribes, and all others who have requested them.

C 1.12
Cont.

not really a substantive document to make comments on, because no Native American consultation was done, and it's only a preliminary report from, whatever, three, four years ago. Basically nobody has been able to -- I mean this document, when NEPA says you should apply the scoping process as early as possible to get as informed people as possible to have a substantive document to have people comment on.

But this is the first commenting on it, and so now all the people are commenting on is a totally inconclusive study. So I mean that, I think, is disgusting, frankly. It's really insulting to the Shoshone people not having come in, because this is now their only real opportunity to comment on the Draft EIS, which doesn't really have much of a substance. That kind of thing should be done before so that they can have another chance so that then they can see a real document and then go from there.

So I'd like to ask what kind of Native American consultation the BLM did go and do and whether or not there's going to be some allowance for an extra period or something and review before the Final EIS goes in since -- I mean, the DEIS, it's a draft, but it's not supposed to be an incomplete document. It's supposed to be a complete document that comments can be made on. But the complete Native American consultation hasn't been done. So it sort

C 1.12 Cont.

of seems just like it's incomplete and there should be an extra period.

But I would like to hear what kind of consultation you're going to do as far as people in Battle Mountain and not just -- I mean not just the councils, I mean the councils, other organizations, individuals and in Battle Mountain and Beowawe and in all Shoshone territory, because Shoshones don't have the same kind of relationships as white people do. There's been a lot of movement, different people in different areas have relatives, what not; they all have the interrelationship.

So Carson Valley, Battle Mountain, all over Shoshone territory, site visits, especially as far as any potential mitigation is concerned.

Another thing I'd like to point out on that is that even the BLM manual on this says that Native American concerns are not just cultural resources, concerns that can be mitigated. So when they talk about all they're going to do is mitigate with excavations and data recovery, that doesn't really comply with the laws and regulations, from what I understand.

MR. STUBBS: Thanks, Rob. A lot of good comments.

And one question you asked is what type of consultation will be done. As I said before, it's my

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(R 1.12 Cont.)

Mitigation processes as they pertain to archaeological considerations for the Mule Canyon Project were carried out through standard, accepted archaeological practices and were agreed to by the Nevada State Historic Preservation Office. Mitigation methods utilized are dependent upon the nature of potential effects and upon what it is that is to be affected. Mitigation carried out at Mule Canyon was for scientific, archaeological purposes, and archaeological evaluations were made under the National Register of Historic Places Criterion d, which pertains to the gathering of significant scientific data. No other type of mitigation was undertaken as potential effects to nonarchaeological elements were not identified by Western Shoshone informants.

understanding from my resource specialists that Native American consultation has been done.

MR. GREENBAUM: Can you explain how?

MR. STUBBS: I can't explain how. I'm not completely briefed on the details. I'll get you the answer, though. And since the issue has been raised, I'll chase it down starting tomorrow.

But I can't explain it right now.

MR. SEWALL: The archeologist is right here. Perhaps Gary, who's listed as the archeologist in the EIS, the specialist on this, can explain how it's done.

MR. FOULKES: I wasn't planning on speaking tonight, but I guess I can, with Chris' --

MR. STUBBS: Would you prefer that we have this discussion outside of this room, perhaps tomorrow or something?

MR. GREENBAUM: I thought this was a public meeting.

MR. FOULKES: I can make a few comments.

Your remark about what was done as far as Native American consultation is incorrect. We had an ethnographer, a private person, a private consultant, who made contacts and had meetings with Western Shoshone.

MR. SEWALL: Who are they?

MR. FOULKES: It's listed in the document. I can't name all the names. She contacted the people through a network who she was told would have information about that area and were willing to talk. And we did that. She submitted a report, and nothing in what she found out, as near as we could tell, was identified aa a problem or a real concern or anything that we can deal with.

MR. GREENBAUM: What does that mean?

MR. FOULKES: It means in order for us to be able to deal with Native American concerns as far as mining goes or land actions, we have to be told specific areas, very specific areaa and placea where there are concerns. We didn't get that. It's not enough for us to be able to, for somebody to say we're concerned with the Northern Shoshone Mountains. There'a nothing that we, from our legal standpoint, can do with those kinds of comments.

MR. GREENBAUM: What if they're a bit more specific than that? Becauae I think they were.

MR. FOULKES: They have to be very apecific.

MR. GREENBAUM: How apecific?

MR. FOULKES: Well, very specific. If you want something, if you want to protect an interest on a piece of the land, you're going to have to tell us where your concerna are. If a mine is going to affect 2,000 acres or whatever it is, you're going to have to tell us, for us to take your interests into account, you're going to have to tell us where in those 2,000 acres you have a concern. And we did not, as far as we know, to this date, we did not get that kind of information.

If that kind of information is available and there are people who can tell us that, from here on out, we will take that into account, as part of the process.

MR. SEWALL: I still think the report that I saw, the ten organizations listed in the Draft EIS were not the ten organizations that were contacted regarding Mule Canyon.

MR. FOULKES: Chris, I don't know how you know that. Maybe you have some information that I don't. That's entirely possible. All I know about that is that the ethnographer, who is a professional ethnographer, said these are the people I contacted and this is the information I found.

Now, if that's incorrect, I don't know.

MR. GREENBAUM: What is that from, the information? When was that information gathered?

MR. FOULKES: '92 and '93.

MR. GREENBAUM: '92 and '93.

MR. FOULKES: We accepted her report. It was signed off on January of '94.

MR. GREENBAUM: When did you receive it?

MR. FOULKES: I can't tell you that. I don't

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know. I don't have that with me. Like I said, if there are people out there who have information about the Mule Canyon area and want to express it, we're certainly glad to hear about that, and we'll take those concerns into account. But we didn't get anything through that enthnographic research and documentation and contacts that we could make any kind of further comments on, take any further action on.

C 1.13

MR. SEWALL: According to the Draft EIS, there were five potential traditional cultural properties identified, and the BLM has unilaterally decided that those don't fit the criteria of traditional cultural properties. And I want to know why the Indian people weren't asked if they felt like these were traditional cultural properties.

See, there's been no talking going on as far as I can tell since September of '92, and a lot has changed. That was Goldfields back then that was building this mine. As I understand it, there's been a new plan of operations, amended plan of operation submitted by Santa Fe Pacific Gold. So that was a long time ago.

MR. FOULKES: But remember that the areas that are being affected were not changed by the change in ownership of the companies.

MR. SEWALL: And also, as I said before, the people asked to be involved in any kind of archeological work that was done. As far as I know they were not involved

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R 1.13 - No properties in the Mule Canyon Project area were identified as traditional cultural properties by Western Shoshone informants. In addition, BLM consultation did not reveal the existence of any traditional cultural properties in the area of potential effect. Determining whether or not Indian people believe a thing or place is a traditional cultural property is one of the specific tasks of the professional ethnographer. This is one of the main reasons for using the professional. In this case the ethnographer did not report that any Western Shoshone informants had identified any things or places as traditional cultural properties.

Informants did identify certain specific sites or features which will not be impacted by the Mule Canyon Project. The townsite of Beowawe, the hot springs, Stoney Point, Iron Point, and a prominent rock outcrop identified by Shoshone informants are outside the area of potential project effects. The area of potential effects is that area which will be directly impacted by project activities. There will be no effect on traditional cultural properties

C 1.13
Cont.

in the excavation that happened.

MR. FOULKES: Those concerns were expressed after the ground work was done.

MR. SEWALL: After the excavations were done?

MR. FOULKES: Yes.

MR. SEWALL: As far as the information I have, that is not true. There was one excavation done before these so-called consultations were done in '92. And then the rest of these excavations had been done since then.

MR. FOULKES: I don't think that's true, but I'll --

MR. STUBBS: Chris, we can get you a better response to that.

MR. FOULKES: If you want to, call me; we'll discuss it. I'm not trying to hide anything, believe me.

C 1.14

MR. WOLTERS: I'm really confused about the archeological sites. I have mules and I've ridden all over Mule Canyon and I haven't seen a site up there that looked like anybody coherently put two rocks on top of another. I'd be -- I don't work for the mine or anything else. I'm a property owner that may be affected by it.

And I forgot, I would like you, maybe you can do like you're doing out there with the hay ranchers, I would be happy for them to test my well and then test it at various periods. I'm sure the other property owners on the

(R 1.13 Cont.) in the area of potential effect and therefore, no cumulative effects. Identification or references to general areas on the Argenta Rim do not indicate these areas, such as hunting and gathering areas and roads and trails, or the activities undertaken on or within them, as important to the maintenance of the cultural identity of the Western Shoshone. Additionally, access to locales on Argenta Rim will not be closed and will not prevent activities such as hunting and gathering, nor any undisclosed religious activities. A petroglyph complex discovered by archaeologists during inventory to the south of the project area was not identified by informants. As yet no consultation has been initiated concerning the site since it is well out of the area of potential effect, and there are no plans to affect it. The decision that no Traditional Cultural Properties are involved in this project was made based on information derived from Western Shoshone informants and was not simply a unilateral decision made by the BLM.

Throughout the project scoping process, no Native Americans have requested of the BLM that they be in any way involved in the data recovery undertaken at Mule Canyon.

R 1.14 - A Water Pollution Control Permit (Permit NV 94110) has been issued for the Mule Canyon Mine as discussed in Section 4.3.1, which addresses monitoring and mitigation of any potential ground water impacts. The terms of this permit require extensive monitoring of the heap leach and tailings disposal facilities to verify compliance with applicable water quality

C 1.14
Cont.

road would be happy to do that, too.

But like Calvin fears about the groundwater contamination and so on, that was a concern I forgot to mention a while ago, and I suppose that would be possible to work up something like you're doing out there with tha hay ranchers for Lonetree.

MR. PAVLICH: Yes.

MR. STUBBS: That was Richard Wolters again.

MR. WOLTERS: But as to the archeological sites, I'm not trying to be a smart aleck. Like I say, I ride my mules up in there and I have never seen any sites. If there are sites, point them out.

MR. FOULKES: Well, there were and there still are, and --

MR. WOLTERS: Are they being disrupted?

MR. FOULKES: Pardon?

MR. WOLTERS: Like destroyed or whatever?

MR. FOULKES: They would have been by the mine. But we had all the sites excavated, professionally excavated, that would have been impacted by the mine, yes, we did.

MR. GREENBAUM: Is that the 33 listed or is it more than that in the DEIS?

MR. FOULKES: Whatever it said in there is what I remember is correct. I don't remember exactly.

(R 1.14 Cont.) standards. Copies of this permit are available for review in the BLM Battle Mountain District Office. Individuals may also contact the Nevada Division of Environmental Protection (NDEP) with any requests for additional monitoring. The NDEP phone number is (702) 687-4670 or (800) 992-0900 ext. 4670.

C 1.15

MR. GREENBAUM: But that's rough?

MR. STUBBS: Other questions or comments?

MR. GREENBAUM: I do have one more, if I could.

MR. STUBBS: Rob Greenbaum again.

MR. GREENBAUM: About the backfilling alternatives and the discussion of that. It talks about, well, essentially two different things, one environmental and one economic reason that might be done for rejecting.

The environmental one is a question of whether the nonsulfide ore can do it, I forgot which ones were the geologists, but just on the environmental basis, how much nonsulfide ore is there, how environmentally possible is it to go ahead and backfill?

MR. PAVLICH: The ore won't be there.

MR. GREENBAUM: I meant the overburden, all the material excavated.

MR. BRUMIT: Typically this is a sulfide operation, okay. We are sending the sulfides to Twin Creeks to be processed. With that, the waste typically is sulfidic as well. And we have enough waste to either encapsulate or isolate the sulfide material coming out of the pits as they are now. And so from that standpoint, the oxide material, or the nonsulfide material, will be utilized to do that. But I can't give you an accurate percentage. I just don't have that.

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R 1.15 - As noted in Section 2.2.4.3 of the DEIS:

> "Since backfilling mine pits with potentially acid-generating sulfide materials could result in adverse ground water quality impacts, partial or total backfilling would be constrained by the availability of suitable non-sulfide materials."

The Mule Canyon Project Overburden/Interburden Design Report (SMI, 1995) indicates that of the total of 100M tons of overburden and interburden material which will be excavated by the proposed mining operations, approximately 37M tons is projected to exceed the 0.9 total sulfur content and 1.2 ANP/AGP threshold established for classification as potential acid producing material. The remaining 63M tons of non-acid producing (oxide) material would be allocated as follows:

- 8M tons to complete backfilling of the Main Pit
- 0.1M tons for partial backfilling to eliminate the shallow ponds which would otherwise form in the southern portion of the West Pit and the central portion of the South Pit
- 50M tons which would be placed along with sulfide materials in designated sulfide disposal areas and utilized to meet drain and cover material requirements for these areas
- 4.9M tons in oxide stockpiles

Plans for placement of oxide material in sulfide disposal areas reflect the practical operational and economic considerations of pit sequencing and haulage and the desire to minimize total surface disturbance area. Some of the oxide material designated for placement in sulfide disposal areas could be placed in separate dumps, where it would be available for backfilling.

C 1.15 Cont.

MR. GREENBAUM: So is it not likely, then, that the fill, even forgetting, just epeaking purely environmentalwise, is it not likely that any backfilling of the pits will be possible?

MR. PAVLICH: The question is will "any" is the term. There will not be a complete backfilling. It's really not a feasible way of doing that without causing other problems.

MR. GREENBAUM: Such as?

MR. PAVLICH: From the environmental standpoint on the encapsulating, we are going to have enough eulfidic waste where we can deal with that with the oxide material for capping and making sure that in the wettest years we're not getting that stuff wet. Okay. How much backfilling ie doable is really a function of further exploration, which is going to continue, and it'e going to be more economic than environmental. We'll be able to do a little bit. From an environmental standpoint, you can't do it all. How much ie doable will probably be an economic decision.

C 1.15 Cont.

MR. GREENBAUM: What I'm asking is how much is doable as far as environmental. I'll deal with the economics in a second. I'm just interested to know because the DEIS is pretty vague on it. What ie the feaeibility of however much backfilling of pite, eimply talking about environmental? I mean, there are environmental obstacles to

(R 1.15 Cont.) Segregation of dumps, however, would result in additional surface disturbance and the feasibility of backfilling would still be subject to the considerations detailed in Section 2.2.4.3 of the DEIS. Given the following pit excavation tonnages, the limited tonnage of oxide material currently designated for placement in oxide stockpiles would not be adequate to completely backfill any pit except the Section 9 Pit. Backfilling is not feasible for the Section 9 Pit since it will be the final pit to be developed in the proposed mining sequence:

North Pit - 22.9M tons
Main Pit - (designated to be backfilled as noted above)
West Pit - 35.5M tons
South Pit - 38.6M tons
Section 9 Pit - 2.3M tons

In the event that oxide overburden and interburden quantities are greater than projected or if additional oxide reserves are located and developed in the future, the possibility exists that additional backfilling of other pits could occur. Any additional backfilling would be limited, however, by the constraints referenced above.

C 1.15
Cont.

backfilling. And I'm wondering how much are there.

MR. YOUNG: There's very little opportunity to backfill any of the pits with anything other than oxide material. The impacts, water quality impacts to the purged aquifers could be significant if we were to backfill the pits with sulfide material. We're not proposing to backfill any of the pits with sulfide material.

MR. GREENBAUM: Right. I'm asking about nonsulfide. Because that's what's in the DEIS.

MR. YOUNG: That's correct. So the oxide material that will be excavated has to then be utilized, what is left over from the proposal to backfill the main pit would then have to be utilized to encapsulate the sulfide waste on the surface to provide an adequate basal cover as well as an adequate surface cover to prevent water quality impacts for the amount of precipitation.

MR. GREENBAUM: I'm not arguing with that. I'm just trying to ask a simple question.

MR. YOUNG: I'm giving you the answer, that there's very little opportunity to backfill any pits other than the pit that is proposed to be backfilled.

MR. GREENBAUM: The main pit?

MR. YOUNG: That's correct.

MR. GREENBAUM: So the chances remain pretty high?

C 1.15 Cont.

MR. YOUNG: Actually the proposal --

MR. GREENBAUM: It says it's an option.

MR. YOUNG: It's an option. The option is that unless there are additional discovery of mineralization and some other considerations, that may occur.

MR. GREENBAUM: But environmental.

MR. YOUNG: It's actually cheaper to backfill the main pit than it is to construct and reclaim the waste tailings.

MR. GREENBAUM: As far as the other pits, then, the chances of having enough nonsulfide material to backfill the other pits is pretty slim?

MR. YOUNG: Yes.

MR. GREENBAUM: Because I'm confused, because in the DEIS it seems to say that, well, we have no idea, that it's certainly a possibility. The DEIS doesn't make any clarification about what the potentials are to do that, as far as the economic reasons for any or all of them.

C 1.16

The one thing I didn't understand at all is why the DEIS is allowed to, has gone ahead and taken into account on the economic side the very vague notion of potential future economically extractable gold ore. I mean, the plan of operations is based on, or the DEIS is based upon the plan of operations which talks about the project as it is from what Santa Fe thinks they can do.

R 1.16 - Given the known mineralization which occurs in this area, future mining of low grade ore reserves which are not economically recoverable under current conditions is reasonably foreseeable action. Potential future mining of any low grade ore reserves is not contemplated as part of the Proposed Action or analyzed in the DEIS and would require a supplemental environmental evaluation under applicable NEPA requirements if proposed by SFPGC. It is, however, appropriate to consider the impact of backfilling as a component of the Proposed Action on any reasonably foreseeable future action such as future reserve development and recovery. In fact, the Bureau of Mines requested that future mineral development potential be considered and addressed during project scoping as noted in Section 1.5.8 of the DEIS and the documentation of the public scoping process.

So I don't see why the environmental part and any possible environmental reclamation, in case we forget this is an environmental document and it is the National Environmental Policy Act that's supposed to be the thrust of it, why should the environmental reclamation have anything to do with -- I won't go into questions about current economic feasibility, but it doesn't offer any -- there's no data, there's no way to assess what the factors are for some hypothetical situation in the future where, well, there might be a time where gold could be extracted economically because of market conditions or technology and so therefore let's leave it open in case something happens.

And that's all it is is something. It doesn't say like that really would comply with NEPA for taking into account something which is purely hypothetical. I mean there's not even some kind of bizarre computer graph. It's just a hypothetical situation with no backing to it. Environmental is one thing, but that, I don't think, should be a consideration.

MR. STUBBS: We are charged with looking at economics.

MR. GREENBAUM: Yes. I said I wasn't going to get into that. But economics is what Santa Fe wants to spend and what they think is an appropriate profit margin and all that. But as far as the future, I mean there's just

C 1.16
Cont.

no -- thara's nothing, thara's no basis of that futura at all.

MR. STUBBS: So you're looking for some more details on the economics when wa're discussing the backfilling issue?

MR. GREENBAUM: If they're possibla to be given. I don't know how they are. I mean in tha DEIS, all it talks about is the -- I mean, it says that there might ba, it says partial or complete backfilling in mina pits could eliminate accass to any remaining lowar grade ors remaining in the pits and could preclude future recovery. And anothar part says, well, aa far aa the main pit is concarnad, whether or not it will be backfillad, part of the discussion of that is will it limit access to ramaining minaral resources which could not be economically racovered at the time but might be raasonably racoverable in the future.

But there's no basis. I maan, there's just no availabla data for it. It just seams to be leaving it, let's leave it wide open for any future possibility. I mean, if there's no way to asaesa what all those trends are as far as economics and all that, then it ahouldn't be a considaration for laaving the pits opan. And if you do have information on that, it should be in the -- it should have been in tha DEIS. It should have been in tha final.

Actually, it should have been in the plan of operations, if what you're planning on doing, I mean if your thought for this mining project is beyond the scope of what you submitted already and what the DEIS has covered, because you do know how much gold is down there and you do know how much lower grade material there is and you have an idea of when it might become economically feasible, I just think that information should be put in there, otherwise it's just leaving the door wide open for not knowing if anyone is going to commit.

MR. STUBBS: Okay. Thanks for the comment, Rob.

Other comments, please?

C 1.17

MR. GRISSOM: Dave Grissom. I have a concern with, it was an issue brought up a while back in the local newspaper where the state was going to go ahead and repave the frontage road and then when they found out the access road traffic was going to be on it from the mining stuff, they decided they were going to back out of it, wait for a while to kind of hash it out between the two parties involved there.

Is there going to be an ongoing deal where they're eventually going to maintain the road, or upgrade it at least? Because that road isn't --

MR. PAVLICH: You're talking about Airport

R 1.17 - Please refer to previous Response 1.3 which addresses road design, durability, and maintenance.

C 1.17
Cont.

Road? It's going to be paved. It's going to be paved this summer.

MR. GRISSOM: It is going to be repaved this summer? Is it going to be wider than it is now?

MR. PAVLICH: I don't know.

MR. GRISSOM: It's narrow now, that it doesn't even have room to put white lines on the side for a fog line, where, when your traffic is coming at you at night, all you have is the headlights coming in your eyes. Interstate traffic is coming at you also at that same direction. It's hard to see at night.

And the other concern I have there is with the children, like on the 3400. In the morning, when they go to get on the bus, they have to cross the frontage road and wait on the other side. And the width is one of the main concerns there. Even with the casual truck, just even a, I don't know, a delivery truck coming out there, you're really crowded over, any kind of oversized truck, you're really crowded to the shoulders on the truck.

And when the ground is wet out there, that shoulder is so soft. As soon as you even get close to it, it will suck you right off into it and bury you right now.

Our concern is the width of the road to be brought out at least enough to have some kind of a, maybe a couple feet on each side, so that we can at least have a fog

C 1.17 Cont.

line there and enough width so it would be a little more comfortable for people driving down that road.

MR. STUBBS: And you're talking about the Airport Road?

MR. GRISSOM: Yes, the frontage road, 401.

MR. STUBBS: Could you spell your last name.

MR. GRISSOM: G-r-i-s-s-o-m.

MR. STUBBS: Thanks. Anything else?

C 1.18

MR. GRISSOM: Also on the access road through there, are you guys going to, what's the word I'm looking for, magchloride that, or is it just going to be a graded road with gravel on it?

Magchloride. And this is going to be done more than once a year?

MR. PAVLICH: Right now it's an annual plan.

MR. GRISSOM: So just once a year?

MR. PAVLICH: Unless it needs it more often.

MR. BRUMIT: As far as the maintenance agreement, that's what it is.

MR. STUBBS: Thanks, Dave.

Further comments? Back corner.

MR. SANSINENA: Mike Sansinena.

C 1.19

The proposed project area is right in the heart of our summer range. The springs are irreplaceable as live water which would require no maintenance. Wells can be

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R 1.18 - Please refer to previous Response 1.1 relative to dust control considerations for the West Access Road. In addition, dust control for mine access and haul roads is addressed in Sections 2.4.3 and 4.12.4 of the DEIS.

R 1.19 - Please refer to Responses 16.1 through 16.5, as Comment Letter 16 from M. Sansinena duplicates his comments from the Public Comment Meeting transcript.

C 1.19
Cont.

drilled but they require maintenance which are done with considerable expense.

The forage which will be in the fenced area in the heart of our summer range is critical. The best forage we have on the top of the Shoshone Mountain Range with the highest rainfall and because it was serviced by the live springs - dependable water.

Fencing the project area obstructs and complicates the planning and development of pastures for the grazing management system. This principally because of its central location and embracing the best dependable waters and high quality forage.

We understand that mining has its place on public land too, but in fairness, the consequences should be negotiated and the ranch should be provided just compensation for the disruption to our public land grazing.

My ranch has been in my family for 14 generations, including my daughter. We wish the mine wasn't here, but we appreciate that they have approached us and indicated they want to compensate us, which we appreciate, but they have not determined how much yet.

MR. STUBBS: Thanks. That was Mike?

MR. SANSINENA: Yes.

MR. STUBBS: Thanks, Mike.

I saw a hand right here.

C 1.20

MR. PAUL: Lance Paul, P-a-u-l.

I have a question about air quality monitoring in Whirlwind Valley and how many stations will there be for air quality monitoring, what's expected for dust contamination of the air from your proposed mine.

MR. YOUNG: In Whirlwind Valley, there is the one air monitoring station now that's been there since 1991 that we've been collecting baselines on since that time.

There will be monitoring stations probably pulled in a little tighter to the fence based on the final fence line. But at this point in time I don't know how many or at what locations those monitoring stations will be -- but we'll be required to meet Bureau of Air Quality standards both on the access road and from the mine site to control fugitive dust. There won't be any point sources on the mine until or unless we build a process facility. Right now it's simply run of mine, heap leach. There won't be any crushing or any other type of facility that constitutes point source. Of course if we build the processing mill, then there would be point sources. Now it's simply a fugitive dust issue.

C 1.20 Cont.

MR. PAUL: So there will be one monitoring station to monitor all fugitive dust for five pits?

MR. YOUNG: No. The pits themselves are contained within a project fence line.

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R 1.20 - An Air Quality Permit (Permit AP-10H-0593) has been issued for the Mule Canyon Project. The NBAQ considers the Mule Canyon Project (including all process emission sources) to be a minor source of emissions in that total annual emissions will be less than 100 tons for every regulated air pollutant. Therefore, the approved permit does not require any monitoring stations but does include specific controls standard for fugitive dust emissions. Any member of the public may report suspected violations of applicable fugitive dust emission control requirements or may request supplemental monitoring by contacting the NBAQ at (702) 687-4670.

C 1.20 Cont.

C 1.20 Cont.

C 1.21

MR. PAUL: But that doesn't contain fugitive dust?

MR. YOUNG: The fugitive dust standards, the ambient air standards will have to be met at the project fence line.

MR. PAUL: Okay.

MR. YOUNG: There will be dust generated in the mine site. That mine site will be precluded from public access for safety reasons, as well as environmental reasons.

MR. PAUL: But at the fence line they'll be monitoring?

MR. YOUNG: There will be monitoring stations at the fence line.

MR. PAUL: Will it have to meet the baseline on the Whirlwind Valley?

MR. YOUNG: It will have to meet the ambient air standards for that area.

MR. PAUL: Which is determined by that?

MR. YOUNG: That's correct.

MR. STUBBS: Back of the room.

MS. ALLEN: My name is Jennifer Allen. I live in Crescent Valley. I work for the Western Shoshone Defense Project.

Perhaps what I need is a bit of clarification. As the gentleman that just spoke stated, that the tailings

C 1.21
Cont.

facility and the milling facilities are, the impacts of those are based on something until or unless they're constructed. And I'm not sure, and I've only glanced at the documents, I don't know whether or not they are considered as an alternative; if the impacts of those have been studied or if this was part of the plan of operations.

And from what I think I've heard you say in the presentation, it was not an alternative. And I'm wondering when the consequences of these, the environmental effects, are going to be brought forward and in what way there's going to be some sort of public participation in that. If the tailings facility and the milling facilities are constructed, is there going to be an additional environmental assessment that's brought forward?

MR. STUBBS: Jennifer, the mine doesn't have any immediate plans to build the mill and the tailings facility. It is a possibility so we considered it as such in the EIS and analyzed the impacts so that if such a time comes as they decide to build it, it will already have been analyzed through this public process.

MR. PAVLICH: I'd like to address that. Up until November of '95 that was the only alternative being analyzed. So all of the effort that has gone into putting this document together, that was the primary, we were taking the maximum impact case in what was analyzed in the

R 1.21 - As described in Section 2.4.9.2 of the DEIS, some of the ore from the Mule Canyon Mine would be processed using conventional milling methods. Initially, mill grade ore would be transported to the existing SFPGC's existing Twin Creeks Mill for processing. At some later time, an on-site mill and tailings facility could be constructed at the Mule Canyon Mine if economically justified. Potential impacts associated with transportation of mill grade ore from the Mule Canyon Mine are addressed in Section 14.11.3 of the DEIS. Analysis of other potential impacts associated with milling and disposal of tailings from the Mule Canyon ore at Twin Creeks is addressed in the overall evaluation of milling operations presented in the Twin Creeks EIS. Given that on-site milling is a future possibility, mill and tailings facility construction, operation, and reclamation are included as a component of the Proposed Action and potential associated impacts are analyzed in the DEIS.

document.

MS. ALLEN: And that includes the tailings and the milling facilities?

MR. PAVLICH: Yes.

MS. ALLEN: The increased air emissions?

MR. PAVLICH: That's correct.

MR. YOUNG: Water quality issues. The mill is part of the proposed action. And the consequences and the impact of that action have been dealt with in the draft and are included.

MS. ALLEN: Nonetheless, it still sort of feels like a vague document. I don't really know what we're confronting or what I'm looking at because the document is so full of statements of uncertainty and ambiguity, that in many ways it feels very insulting that I have no idea, necessarily, what it is that you're going to be doing because it's a lot of unless, until, perhaps, probabilities, future actions. And I feel like it's just floating around in the air and that for true public participation and true public review it needs to be very narrowed down so that people know what we're looking at.

MR. STUBBS: So your point is that there's a lot of things that just aren't clear in your reading of it?

MS. ALLEN: Not necessarily just my reading, but in the writing of it, the presentation of it.

MR. STUBBS: Okay. Anything else, Jennifer?

MS. ALLEN: Not right now.

MR. STUBBS: Other comments?

MS. DANN: If there's nobody else, I'll address it a little bit. I'm Carrie Dann. I'm with the Western Shoshone Defense, D-a-n-n.

C 1.22

A while ago, when Gary was talking about site specific, as far as being a traditional Western Shoshone, one site to us is not as important as the other site. To you a burial is so important. To me, when you bury your dead, what that means is that body returns to the earth to fertilize future life. So many of these burials now, and there's thousands of them in there, they have gone to replenish and refertilize the earth. In our ways this earth is sacred. Every inch of that land is important, and not just specific sites. And water, too. Any time any mining, and which we see with all the mining companies today, they are tampering with something most sacred, not only to Western Shoshones but to life.

C 1.22
Cont.

Your children, the future children, where are they going to get that water? You know yourself, your body, if you deny yourself clean water, eventually you're going to expire. All men and women that's bringing up children of tomorrow, what do they have? Possibilities, Safeway, Raley's, Smith's, that's where you'll get your water. I

R 1.22 - Please refer to previous responses R 1.12 and R 1.13 relative to the issue of traditional cultural properties, and responses R 1.14, R 5.7, R 6.3, R 12.3, R 13.2, R 13.3 relative to water quality, spring and seep, wildlife, and human health issues. Also, please note that no burial sites have been identified as occurring within the Mule Canyon Project area.

think for the future race and future generations to have clean water is to put life first instead of putting gold first.

C 1.22 Cont.

We've got along without computers. I see an ad, computers, all this stuff, we have to have that. We have to have gold. We've got along without computers. Why do you have to disturb an important thing which we all survive on, which is water? Why do you have to kill a stream, a spring? Why? Then you say we mitigated. You don't mitigate life, do you? In my opinion you don't do that. You either kill that spring, that's it, period. No ifs, no buts, no maybes, no mitigation.

What do you do when you mitigate? You put a well there? Everything artificially manmade is there now pumping the water, but, what, for the next 10 years, 15, 20, 25 years? Or is it going to go on forever as a spring would have gone on forever?

I really -- it hurts me, and I think it would hurt all future generations to see that water, one of the most important things in life of not only humans but of all life, to be disturbed in that manner. I think it's wrong.

C 1.22 Cont.

I think genocide against, it's a genocide against my beliefs and it's a genocide against any future generations to come, whether it's man or wildlife, birds, whatever. It is a genocide.

Maybe some day your grandchildren, when you're barely walking with all that millions of gold you have hanging around your neck, will come and say I can't breathe, I need water, I need clear water. Is that what's going to be coming to our future? Is that what we want? I certainly don't want it.

And I have one question.

Through my dealings with different departments of the United States, they always seem to hold one thing, which is trust responsibility to the native people. I'd like to know, and for you to identify, what does that trust responsibility mean. Does that mean we're mentally incompetent or physically incompetent or incompetent in both of them?

I would like to also know who plays in that role besides the Department of Interior, which you're part of the Department of Interior, what is your role in that as Bureau of Land Management?

You are also entrusted with taking care of the land and to see the land destroyed and the water destroyed. You're doing a hell of a poor job in being a caretaker of that land. You're looking at today. You're not looking at tomorrow.

That's all I have to say. Thank you.

MR. STUBBS: Carrie, thank you for your

comments.

Other questions, comments or concerns? Last chance to speak up before we adjourn tonight? Anybody?

If there's nothing further, I'll encourage you to sign our ledger if you haven't done so. It's important to me that we're able to send you information on this project. We had real good participation tonight, and I also appreciate that. Thanks for coming down, and I hope that everybody drives safely.

(Proceedings concluded at 8:30 p.m.)

-o0o-

STATE OF NEVADA,)
) ss.
COUNTY OF WASHOE.)

I, DENISE PHIPPS, Cartified Shorthand Reporter in and for the County of Washoe, State of Nevada, do hereby certify;

That on Wednesday, June 5, 1996, at tha offices of the United Statas Forest Servica, Battle Mountain, Nevada, I was present and took verbatim stanotype notas of tha Hearing entitled herein, and thereafter transcribed the same into typawriting as herein appears;

That said hearing was taken in stenotype notes by me, a Certified Shorthand Reportar, and theraafter reducad to typawriting under my diraction as herein appears;

That the foregoing transcript is a full, true and correct transcription of my stenotype notes of said hearing.

Datad at Reno, Nevada, this 11th day of June, 1996.

Denise Phipps

DENISE PHIPPS, CCR #234, RMR, CRR

DENISE PHIPPS
Notary Public - State of Nevada
Appointment Recorded in Washoe Co.
MY APPOINTMENT EXPIRES MAY 30, 19

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

July 10, 1996

Gerald Smith, District Manager
Battle Mountain District
Bureau of Land Management
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 Mule Canyon Mine, Lander and Eureka Counties, Nevada. Our comments are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Clean Air Act Section 309.

The DEIS evaluates alternatives for a gold mining project, which involves excavation of five pits, construction and operation of heap leach facilities, 12 to 14 overburden and interburden disposal piles, a possible mill and tailings impoundment (to be determined at a later date), ore stockpiles, haul roads, and ancillary facilities. Alternatives to the preferred design (Alternative B) which are considered in detail vary the access route (Alternative C) and configuration of the permanent overburden and interburden disposal structures (Alternative D). Alternative locations, mining methods, and complete backfilling (Alternatives E-G) were judged infeasible and eliminated from detailed analysis.

We have rated this DEIS as EO-2 -- Environmental Objections-Insufficient Information (see the enclosed "Summary of Rating Definitions and Follow-Up Actions"). Our objections to the proposed project are based on its potential to adversely affect surface water and groundwater if facilities are not designed adequately. Our rating is also based on the need for additional information in the Final Environmental Impact Statement (FEIS) regarding the impacts of transporting ore to Twin Creeks mine for milling; the results of the ecological risk assessment; the selection of options for pit backfilling and waste rock pile design; design parameters for several mining and processing

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facilities; impacts to wildlife and springs; and mitigation measures. Our specific comments are enclosed.

We appreciate the opportunity to review this FEIS. Please send a copy of the FEIS to this office when it is officially filed with our Washington, D.C., office. If you have any questions, please call me at (415) 744-1015, or have your staff contact Jeanne Geselbracht at (415) 744-1576.

Sincerely,

Deanna M. Wieman

Deanna M. Wieman, Director
Office of External Affairs

001589/96-182

Enclosures

cc: Doug Zimmerman, NDEP
John Kiesner, US FWS-Reno

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."

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General Comments

C 2.1

The DEIS's discussion of milling facilities for Mule Canyon ore is somewhat confusing. The document states that until production economics justify construction of milling facilities at Mule Canyon, ore would be hauled by truck to the Twin Creeks Mine mill over 85 miles away (p. 2-43). Although Mule Canyon ore would be processed at Twin Creeks for at least part of the duration of the project, the DEIS does not address the potential impacts associated with hauling 2,200 tons of ore per day in 55 round-trips to Twin Creeks or with milling and disposing of tailings there. BLM uses Interstate 80 as the project impact boundary, beyond which project impacts are not considered, except in the case of air resources. The DEIS (p. 4-77), however, describes the air impacts associated with transportation of ore to Twin Creeks as indirect impacts.

Milling at Twin Creeks is an integral component of the proposed Mule Canyon Project. The impacts related to transporting, milling and disposing of ore at Twin Creeks would be direct impacts of the proposed project, as defined at 40 CFR 1508.8, and need to be addressed in the Mule Canyon FEIS. The FEIS should assess the impacts of transporting and milling Mule Canyon ore and disposing of tailings at Twin Creeks on all resources, including air and water quality and wildlife mortalities. EPA was unable to find these impacts discussed in the Twin Creeks DEIS, which has been released for public review just recently.

C 2.2

The DEIS (pp. 2-36, 37) states that an expanded risk assessment is being conducted, the results of which will be included in the FEIS. The risk assessment conclusions will also be used to make further determinations regarding whether the South and West pits should be backfilled. Elsewhere, however, the DEIS states that the determination to backfill pits other than the Main Pit would only be made using additional information obtained through mine development. The DEIS should have included the expanded risk assessment and BLM's conclusions regarding the need for backfilling to mitigate potential impacts to water quality in each pit pond/lake. Without this information, the full scope of impacts, possible mitigation measures, and the effectiveness of those mitigation measures cannot be assessed. The FEIS should provide this information, indicate which pit(s) would be prioritized for backfilling (e.g., the Main Pit or the South and West pits), and include the rationale upon which these priorities are based (e.g., the risk assessment results, availability of neutralizing waste rock for above-ground waste rock piles, etc.). The FEIS should also provide more detail on the anticipated availability of oxide waste rock for pit backfilling and

1

R 2.1 - Please refer to previous response R 1.21. Direct transportation impacts resulting from haulage of ore from Mule Canyon to the Twin Creeks Mill are addressed in Section 4.11.3 of the Mule Canyon DEIS. Consistent with applicable provisions of the Paperwork Reduction Act and referencing provisions under NEPA (40CFR 1500.4), analysis of the potential impacts of milling and tailings disposal for Mule Canyon ore which is processed at Twin Creeks could be provided in either the Mule Canyon or Twin Creeks EIS but does not need to be included in both. Sections 2.4.4.4, 2.6.2.1, and 3.10.2.2 of the Twin Creeks DEIS address potential impacts of milling and tailings disposal operations for the Twin Creeks Mine. The nature and magnitude of these potential impacts are governed by the design and operating methods to be utilized for the mill and tailings facilities rather than the characteristics of any specific feed stream, so it would be impractical and inappropriate to discuss impacts in the context of a specific feed stream. Given these considerations, coverage of milling and tailings related impacts in the Twin Creeks EIS is both adequate and consistent with applicable NEPA guidance.

R 2.2 - The results of the preliminary risk assessment are referenced and discussed and ongoing work on the expanded risk assessment is noted in Sections 2.4.8, 4.3.3.2, and 4.8.3.3 of the DEIS. The expanded *Ecological Risk Assessment* (SMI, 1996) included in the Project File, has been completed subsequent to development and issuance of the DEIS, providing valuable supplemental information relative to evaluation of pit water quality and any associated benefits or limitations. A summary of the expanded risk assessment has been added to the EIS document as Appendix E. The expanded risk assessment for those areas where shallow ponding is projected to occur identifies certain constituents that may be present at levels that pose a potential risk to wildlife and thus represent a potential water quality concern.

(R 2.2 Cont.) Given this concern, SFPGC has investigated backfilling of these areas as a possible option to eliminate the potential for wildlife exposure to ponded water or any associated riparian vegetation which might develop.

SFPGC has reviewed the results of the expanded risk assessment with the BLM and has agreed to backfill the areas associated with the shallow ponds based on the results of postmining water quality monitoring for these areas. If water monitoring results indicate elevated levels of constituents which would pose a significant short- or long-term risk to wildlife, consistent with the risk analysis approach outlined in the *Ecological Risk Assessment* (SMI, 1996), the BLM is stipulating that SFPGC would proceed with backfilling of the pond areas with oxide material. The availability of sufficient oxide material to complete backfilling of the shallow pond areas as well as other pit areas is addressed by Response 1.15. Please refer to this previous response.

If migration of ground water away from the backfilled pit areas were to occur, evaluation of the particle tracking predictions (as documented by Figures 2.6 and 2.7 of the post-closure report (SMI/BCI, 1995b), included in the Project File), indicates that the probable direction of ground water movements from the southern portion of the West Pit and the central portion of the South Pit would be toward the southern portion of the South Pit where the permanent pit lake is predicted to form. Backfilling of the areas of shallow ponding would, therefore, not be expected to result in adverse ground water quality impacts beyond the immediate vicinity of the pits. Specific considerations and criteria governing the feasibility of partially or completely backfilling other pits are discussed in some detail in Sections 2.2.4.3 and 2.4.8 of the DEIS. Also refer to Responses 1.15 and 2.5 for further discussion of related issues.

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C 2.2 Cont.

neutralizing waste rock for the sulfide overburden/interburden dumps if pit backfilling occurs.

Alternatives

C 2.3

According to the DEIS (p. 2-37), the net total surface disturbance for all overburden and interburden disposal areas under the Main Pit backfill option would increase by approximately three acres. It is unclear why pit backfilling would end up increasing surface disturbance rather than decreasing it. The FEIS should clarify this.

C 2.4

The DEIS (p. 4-37) states that alternative D would involve inconsequential increases or decreases in the number of disturbed acres over the proposed alternative (±10 acres). Presumably this would apply to options E-1, E-2, and E-3 ((different overburden/interburden disposal area configurations, p. 2-12). EPA supports option E-3 because it appears that it would result in long-term slope stability, the most successful reclamation, and the least visual impacts. Reclamation is more likely to be successful on shallow slopes than on steep and/or benched side slopes. In addition, visual impacts would be reduced, particularly if angles are rounded and slopes are graded to include hummocks and contours similar to the natural contours of the local landscape. The insignificant amount of additional surface disturbance would, therefore, be justified.

C 2.5

Alternative G, the Total Backfill Alternative, was eliminated from further analysis in the DEIS based on operational, environmental, and economic factors. Although complete backfilling may not be practical or necessary, we recommend that BLM encourage the greatest amount of backfilling practicable. The reasons for eliminating Alternative G are not completely substantiated in the DEIS and should be discussed further in the context of additional backfill options other than backfilling only the Main Pit. We recommend the following considerations:

> Operationally, the pits could be developed in such a way as to provide a steady stream of ore at the right blend to account for mill feed characteristics and backfill needs. Given five pits, several of which are long and narrow, there appears to be much flexibility to at least fill part of some of these pits (e.g., one end of a pit).
>
> Filling pits to prevent the formation of pit lakes with poor quality water could prove a net benefit. However, the DEIS does not provide sufficient hydrogeologic information to determine exactly how this measure might

2

R 2.3 - As depicted on Drawings 1B and 2B in the *Mule Canyon Plan of Operations and Reclamation Permit Application* (SMI, 1995), the backfill option includes additional disturbance of approximately 3 acres around the Main Pit to meet volume fill requirements, blend the backfilled area with the surrounding topography, and meet erosional stability requirements. There is no significant change in disturbance acreage for overburden and interburden disposal areas 5, 5B2, 5C, and 5D between the two options.

R 2.4 - Option E-3, while offering certain advantages, was not selected as the preferred option for inclusion as a component of the proposed action because it would not be erosionally stable. Although the overall slope would be flatter, elimination of benches as a means of routing flow off the slope would result in uncontrolled overland flow and significantly increased soil loss. Increased soil loss would hinder effective revegetation, and increase infiltration, both of which would be unacceptable for reclamation purposes. Erosional stability and soil loss calculations are evaluated and discussed in Appendix C of the PO. The existing natural terrain withing the Project Area would also limit application of Option E-3 since natural slopes in many of the proposed disposal areas exceed 3H:1V.

The overburden and interburden disposal plans and configurations developed and presented in the *Mule Canyon Plan of Operations and Reclamation Permit Application* (SMI, 1995), include an integrated drainage plan which provides for collection and conveyance of surface runoff off and away from the reclaimed surfaces, minimizing soil erosion and increasing the potential for successful revegetation.

(R 2.4 Cont.) One of the primary objectives in the design of the reclamation configuration was to limit surface disturbance in order to maintain, to the extent practical, existing vegetation and avoid existing natural springs, seeps, and drainageways. Any significant expansion of the overburden and interburden disposal areas would involve additional disturbance and related impacts to these important environmental features and values.

Potential visual impacts associated with the proposed overburden and interburden disposal areas relate to both the size and configuration of the disposal areas and the linear bench-line features. In order to mitigate linear contrasts associated with bench-line features, the BLM is stipulating that SFPGC develop modified disposal area designs. Modification would include, but not be limited to, rounding bench edges, varying bench widths, varying final bench topography, and flattening both overall and intermediate bench slope. Possible options for modified bench designs are graphically illustrated by Figure 4-7 of the FEIS.

R 2.5 - The EPA comment relates to the consideration given to backfilling of all pits as an alternative to the Proposed Action. The commentor requested that further consideration be given to backfilling including:

- Development and sequencing of mine pits to meet both operational blending requirements and the objective of maximizing backfill opportunities
- Backfilling to eliminate potential impacts of poor quality water in pit lakes and related surface and ground water implications
- Impacts of backfilling on future mineral access

The discussion of the Total Backfill Alternative (Alternative G) in Section 2.2.4.3 of the DEIS describes in general terms the operational, environmental, and economic factors considered in evaluating this option. The following addresses the further considerations identified by the commentor.

Extensive geologic characterization indicates that, in most cases, individual reserve areas (and the corresponding mine pits) have distinctive ore characteristics. Since it is not practical to design separate process facilities for each distinct ore type, process design is based on typical median characteristics for the entire known Mule Canyon ore reserve. Ore characteristics are summarized in Section 3 and Appendix F of the Baseline Hydrology and Geochemistry Report (SMI/BCI, 1995a), included in the Project File. In order to optimize resource utilization and recovery, it is necessary to blend ore from multiple pits to obtain a process feed which meets the median range of characteristics on which the process design is based. Given distinctive characteristics for each reserve area, blending from different areas within a single pit is generally not possible. The necessity of keeping several pits open at the same time to facilitate required blending limits the potential for concurrent backfilling. In most cases, backfilling would require rehandle of overburden and interburden material from existing disposal areas, adding significantly to overall mining and processing costs while providing limited incremental environmental benefits.

(R 2.5 Cont.) Analysis of the potential hydrologic and geochemical effects of pit backfilling was conducted in conjunction with preparation of the baseline report (referenced as SMI/BCI, 1995a in the DEIS) and the post-closure report (referenced as SMI/BCI 1995b in the DEIS). Both of these reports are included in the Project File. Figures 2.6 and 2.8 in the post-closure report illustrate the results of particle-tracking modeling indicating that backfilling of the pits would result in ground water migration away from the pits, while migration away from the pits would generally not occur if the pits were left open since they would act as ground water sinks due to evaporative effects. Evaporative losses would occur both from pits where a lake or pond forms and from pits where evaporative losses exceed inflows and no water accumulation occurs. With backfilling, a ground water flow pattern similar to that existing before mining may develop. Ground water would flow into the backfilled materials from the upgradient areas, and flow out of these materials in a downgradient direction.

With fluctuation of ground water levels within the backfilled materials, any dissolved constituents released by oxidation or leaching of the materials would more readily be transported downgradient within the ground water system by ground water moving through these materials. Monitoring to identify and quantify any mining-related changes in water quality constituents would be much more difficult under a backfill scenario than under the Proposed Action. By placing overburden and interburden materials in permanent disposal areas at the ground surface and above the ground water table, the potential for contact between these materials and ground water and subsequent potential for leaching and transport of dissolved constituents would be significantly reduced relative to the Total Backfill Option, and the potential for water quality impacts thereby minimized. Please refer to previous response R 2.2 relative to potential ground water quality effects related to partial backfill of shallow pond areas.

C 2.5 Cont.

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result in groundwater degradation or whether groundwater degradation from a backfilled pit would be worse than that from a pit lake.

Areas with greater concentrations of future ore reserves could be left unburied. However, future reserves would only be buried beneath a few hundred feet of waste rock which would be economical to remove if the economics of recovery change.

C 2.6

Geochemical Characterization and Water Quality

For purposes of this DEIS, potential acid producing material has been identified as any material having an acid neutralization potential/acid generation potential (ANP/AGP) of less than 1.2. However, we understand that BLM has recently developed a policy to use an ANP/AGP ratio of 3:1 as its threshold for potentially acid generating material. EPA supports BLM's use of 3:1 for the Mule Canyon project as well because we believe that an ANP/AGP of 3:1 should be used to account for uncertainty unless further kinetic testing has demonstrated that there is very little risk of acid generation for specific rock units.

The DEIS indicates that relatively few waste rock samples tested in humidity cells suggest acid-generating conditions. However, water discharged from the exploration adit has been of poor quality and characteristic of acid mine drainage (DEIS, p. 4-22). The FEIS should reconcile this information with the results of the bench-scale kinetic tests. Furthermore, the adit is only a few years old. It is unclear that the quality of water sampled to date has reached its worst potential or that a plume from the adit has had a chance to reach the downgradient monitoring points. The FEIS should indicate how far downgradient from the adit these monitoring points are located.

The FEIS should indicate how much of the overall waste rock would be acid-generating, how much of the sulfide waste rock would be acid generating, how much neutralizing material would be available for the sulfide dumps, and how many sulfide dumps are anticipated.

The DEIS (p. 2-36) refers to the acid neutralizing capacity of smectite clays. The FEIS should provide additional information regarding the actual testing results of the native clay that would be used at the Mule Canyon dumps for purposes of both acting as an impermeable layer under and over dumps as well as its acid neutralizing capacity. In addition, the FEIS should discuss how acidity would affect the clay structure and permeability over time.

3

(R 2.5 Cont.) SFPGC owns or has valid lease rights for known mineral resources withing the Mule Canyon Project Area. The right to develop and extract those resources on Federal lands is conveyed by the Mining Law of 1872, however, the right to mine is limited to those resources determined to be economically recoverable. Given this economic constraint, backfilling of mine pits becomes an economic decision relative to the economic viability of any remaining mineral reserves. The decision to backfill or not backfill mine pits is also constrained by the requirement to prevent unnecessary or undue degradation.

Backfilling of any pit where mineral reserves remain will adversely affect the economics of recovering the mineral resource since recovery would require removal of any backfilled material, increasing operating costs with no compensating increase in the value of the mineral commodity.

As noted in Section 2.2.4.3 of the DEIS, SFPGC also has or will consider all relevant factors including operational, environmental, and economic elements in determining whether or not to partially or fully backfill each of the proposed mine pit areas.

R 2.6 - The commentor notes that an ANP/AGP ratio of less than 1.2 has been used to identify potentially acid-generating materials, while the current BLM cutoff is an ANP/AGP ratio of less than 3. The use of 1.2 as an appropriate cutoff for this project is supported by extensive kinetic testing as discussed in Section 3.4.5.5 and documented in Appendix A of the DEIS and in the referenced baseline report (SMI/BCI, 1995a), included in the Project File. Kinetic tests were conducted on samples with a wide range of ANP/AGP ratios (see Figures 7.9d and 7.9e of the baseline report), with the results showing that use of an ANP/AGP ratio of 1.2 as a cutoff for potentially acid-generating materials was sufficiently conservative to segregate potentially problematic materials.

(R 2.6 Cont.) The geochemical conditions which have resulted in the poor water quality observed for discharge from the existing exploration adit are addressed in both the baseline report (SMI/BCI, 1995a) and the post-closure report (SMI/BCI, 1995b), as referenced in Section 4.4.2.1 of the DEIS and included in the Project File. Section 5.1.5 of the post-closure report discusses reasons why adit discharge chemistry is not believed to be representative of water quality conditions which could develop in the pit lake and ponds or of discharge water quality from the overburden and interburden disposal areas. The adit was constructed to intersect the high-grade sulfide ore body for metallurgical testing. Rocks of the type intersected by the adit represent a relatively small percentage of the overall volume of ore, overburden, and interburden which will be excavated or exposed by the proposed mining operations.

Generation and release of acid-rock drainage from the adit has diminished since the installation of a bulkhead in 1993, probably because the adit has become flooded, slowing or eliminating ongoing oxidation of the exposed wall rock. The intercepted sulfide ore body, which is the source of the observed acid-rock drainage, will be mined out and the resulting ore material will be processed using pressure oxidation to break-down the sulfides. The proposed mining plan will result in complete elimination of the adit and the associated discharge as part of the West Pit. There are no existing or proposed surface or ground water monitoring points downgradient of the adit with the exception of an NPDES monitoring point downgradient of the adit at the outfall of an existing sediment pond which captures any flow from the adit. Baseline water quality and quantity of the adit discharge were, however, monitored over a three-year period. Baseline monitoring information is summarized in the baseline report (SMI/BCI, 1995a) as referenced in Section 3.6.4 of the DEIS and included in the Project File. To date, any water which has accumulated in the downgradient sediment pond due to adit discharge has evaporated and the pond has never discharged.

Of the total 100M tons of overburden and interburden material to be excavated during mining, approximately 37M tons met the criteria of >0.9% sulfur and an ANP/AGP ratio of <1.2 ANP/AGP based on geochemical characterization of the target ore reserves. Material meeting these criteria was designated as sulfide material. The remaining 63M tons of overburden and interburden material was designated as oxide material. There was no neutralizing material found in the project area during several site investigations. As presented in the baseline reports, the overburden and interburden disposal areas are designed to isolate potential acid-generating material from surface and ground water, not to neutralize these materials. (Please refer to the *Mule Canyon Project Overburden/Interburden Design Report* (SMI, 1995) for further information.

(R 2.6 Cont.) The commentor requests additional information on the properties of the smecite clays that are discussed in the DEIS. The geochemical properties of these clays are discussed in a report prepared by SMI (Chermak and Runnells, 1994). This report is referenced on page 2-36 of the DEIS, but was not included in the list of references in Chapter 6 of the DEIS. The same report is also referenced incorrectly as Runnells and Chermak, 1994 on page 3-24 of the DEIS. As appropriate, references in the EIS have been revised or added for completeness. As reported in the referenced report, X-ray diffraction analyses of samples of waste rock were completed to determine the mineralogy of the samples. Significant amounts of smectite clays were identified in many of the samples analyzed. The ability of smectite clays to absorb acid and dissolved metals is well recognized and is further addressed in Section 7.3.1.3 of the baseline report (SMI/BCI, 1995a), included in the Project File. There are currently no plans to use clays as an impermeable layer for the overburden and interburden disposal areas.

The primary purpose of the oxide layer is to serve as a physical (not chemical) buffer between the sulfide overburden and interburden materials and the growth media to minimize infiltration and facilitate effective vegetative reestablishment. Infiltration through the upper cover layer, consisting of approximately 5 feet of oxide material and 1 foot of growth media, will be limited by the design configuration which will promote runoff to designed drainage structures, and revegetation which will promote effective evapo-transpiration. A separate layer of oxide material beneath the sulfide material will consist of coarse material designed to drain any meteoric water which may infiltrate through the disposal areas. Neither the upper or lower oxide layers are intended to provide neutralization, since mineralogical characterization and kinetic testing indicated little or no neutralizing material and, as a result, that very little neutralization would occur. Additional information on the design of overburden and interburden disposal areas is provided in response R 2.8. Please refer to this supplemental response.

An on-site laboratory will be established for analytical testing of overburden and interburden materials. Samples collected for testing will consist of cuttings from production blastholes. On-site testing will be conducted at a minimum frequency of one sample for every 50 blastholes. Based on projected drillhole depth and spacing, each sample will represent a maximum of approximately 23,000 tons of rock. Detailed information relative to the sampling plan and the type of testing to be performed is presented in the *Mule Canyon Project Overburden and Interburden Design Report* (SMI, 1995), included in the Project File. Given the lack of lithologic correlations, visual characterization of waste rock would not provide an accurate basis for designating overburden and interburden materials as either oxide or sulfide relative to selective placement in disposal areas and will not be used.

C 2.6 Cont.

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According to the DEIS (p. 2-36), two to five feet of oxide material would be placed under each sulfide disposal area to act as a buffer between the sulfide material and underlying soils and as an underdrain. It is unclear that two to five feet of oxide material would effectively neutralize any acid generated for the entire waste rock dump. Not only should the oxide material be neutralizing, but the sulfide material should be admixed throughout the dump with neutralizing material to ensure sufficient neutralization of each dump.

According to the DEIS, preliminary overburden and interburden designations will be verified through ongoing operational sampling and analysis to provide for control and routing of waste rock to appropriate disposal locations (p. 2-34). There was no apparent correlation between lithology or alteration and humidity cell and column extract concentrations (DEIS, p. 3-24). Does this mean that visual characterization would not used to characterize waste rock? The FEIS should describe the sampling and analysis frequencies and processes in detail.

C 2.7

Hydrology

Pit dewatering would result in lowering of the groundwater and reduction of flow from freshwater springs in the project area. The discussion in the DEIS (p. 4-28) regarding mitigation for springs is vague. The FEIS should discuss more specifically how the loss of springs in the project vicinity would be mitigated, including where the mitigation would take place to be most beneficial.

The FEIS should include a map depicting groundwater contours during and following mining operations.

Facilities Design

Waste Rock Piles

C 2.8

According to the DEIS (p. 3-23, 24), humidity cell and column test data indicate that several trace elements could be leached from the ore and waste rock. The Meteoric Water Mobility Procedure also suggested that leaching of mine materials could result in leachate concentrations for some constituents exceeding NDEP standards. We are concerned that the sulfide and oxide waste rock piles are not designed adequately to prevent infiltration of meteoric water, including snowmelt, into the piles and seepage out of them. In addition, it is unclear that the oxide and sulfide waste rock piles should be separate. We recommend that BLM consider the option of spreading the sulfide waste rock out among many piles in order to ensure adequate

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R 2.7 - The BLM is stipulating that SFPGC mitigate any resource impacts associated with affected springs or seeps through installation of well(s) and/or guzzlers in consultation with the BLM, NDOW, and any potentially affected grazing permittees as described in 4.48 and Appendix F of the FEIS. Spring flow is currently monitored on a quarterly basis as required by the Nevada State Engineer. As springs are impacted, SFPGC will initiate consultation with affected individuals and agencies and proceed with impact mitigation based on this consultation process within twelve months of any resource impacts. In addition to mitigation of resource impacts, SFPGC is required by state law to mitigate any mining-related loss or impairment of spring flow. Mitigation will occur in consultation with the State Engineer under the jurisdiction of the Nevada Division of Water Resources.

Maps depicting ground water contours during and following mining operations are included in the baseline report (SMI/BCI, 1995a). The reviewer is referred to two technical documents prepared in support of the DEIS and included in the Project File for information on changes in ground water contours associated with the Proposed Action. Ground water drawdown contours expected during and immediately following mining at the end of years 1999, 2003, and 2005 are provided in Figures 8.2, 8.3, and 8.4 of the baseline report (SMI/BCI, 1995a). Ground water elevation contours and drawdowns associated with the three mine closure options evaluated for the DEIS (backfilled mine pits, open mine pits, and combination of backfilled pits with remaining pits left open and placement of overburden piles) are provided in Figures, 2.2A, 2.2B, 2.3A, 2.3B, 2.5A, and 2.5B, respectively, of the post-closure report (SMI/BCI, 1995b). Figure 2.5B of the post-closure report represents the steady-state drawdown for closure option 3 (Proposed Action); while Figure 2.5A, shows steady-state ground water elevations for this same option.

R 2.8 - SFPGC recognizes that mitigation will be required if Acid Rock Drainage becomes apparent. Very little neutralizing material exists, either as a component of the overburden and interburden materials or in close proximity to the project area. These considerations were taken into account in the overburden and interburden disposal design and planning process, resulting in a design which isolates sulfide materials from surface and ground water. Specific design considerations are addressed in the following sections. Also, please refer to previous response R 2.6 for related information.

(R 2.8 Cont.) The *Mule Canyon Project Overburden and Interburden Design Report* (SMI, 1995), included in the Project File, was reviewed and approved by NDEP. The design includes a detailed drainage plan, placement of a layer of oxide material on top of and under the disposal areas, placement of growth medium and revegetation to meet postmining land use objectives. The overburden and interburden disposal area designs and placement plans are designed to prevent upgradient runoff from reaching the disposal areas, promote runoff from disposal area surfaces to designed drainage structures, limit infiltration, and provide for effective drainage of any minor amounts of meteoric water which may infiltrate through the disposal areas. In addition to the final design configuration, Best Management Practices including surface drainage control, compaction, and grading will be implemented during operations to minimize infiltration, control erosion, and facilitate concurrent reclamation where practical.

The statement in the DEIS that the oxide material over the sulfide waste dumps would "minimize infiltration, oxidation, and leaching" may be somewhat misleading. The purpose of the oxide top layer is to serve as a physical buffer between the sulfide material and overlying growth media in order to increase revegetation potential and plant growth. Increased vegetative establishment will increase evapotranspiration, which in turn will decrease infiltration. By isolating sulfide materials from direct surface exposure and minimizing infiltration potential, oxidation and leaching will be minimized. The considerations are described in Sections 2.4.8 and 2.4.20.2 of the FEIS. The HELP model was used to evaluate infiltration for the proposed overburden and interburden stockpile configuration. Results of this analysis, presented in the design report (SMI, 1995) indicate minimal potential for surface infiltration. This report was reviewed and approved by the NDEP. It should be noted that for all overburden and interburden disposal areas combined, the total average infiltration as calculated using the HELP model was determined to be approximately 12 gpm. This infiltration rate is for a combined total area of approximately 504 acres.

The approved overburden and interburden disposal facility design plan does not specify permeability or filter fabric. The designed drainage plan will significantly reduce the amount of upgradient runoff reaching the overburden and interburden disposal areas and will limit potential surface infiltration by routing runoff from the pile surface to designed drainages which will carry runoff flows off the disposal area surface. Infiltration analyses indicate that minimal infiltration will occur with the current design. Since runon will be controlled and infiltration will be minimal, underdrain capacity is not a critical design component. In addition, with minimal infiltration, clay or silt materials will not be mobilized and transported through the disposal piles and as a result the potential for clogging of the underlying oxide material will be limited.

(R 2.8 Cont.) The commentor is correct in noting the discrepancy in the figures presented for the peak horizontal acceleration due to the MCE. The peak horizontal acceleration used in the design of the reclamation configurations was 0.22 g, based on an accepted range of 50 to 70 percent of peak horizontal acceleration for the MCE (0.42g). This represents a conservative estimate for stable reclamation configuration design. As appropriate, Section 2.4.8 and 4.2.3.3 of the EIS have been reviewed and corrected to eliminate this discrepancy. Please refer to the *Mule Canyon Project Overburden and Interburden Design Report* (SMI, 1995), included in the Project File, for additional details.

Consistent with the concern relative to surface drainage from overburden and interburden disposal areas, the BLM stipulates that SFPGC will increase the minimum slope on the upper surface of disposal areas to one percent to minimize the potential for ponding as described in Sections 2.4.8 and 2.4.20.2 of the FEIS.

C 2.8 Cont.

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isolation surrounded by, and/or admixing with, neutralizing rock. The FEIS should discuss this option.

It is unclear how five feet of oxide material over sulfide waste rock dumps would "minimize infiltration, oxidation, and leaching" (DEIS, p. 2-65). No specifications for cap permeability or neutralizing potential are provided. Furthermore, no specifications for permeability of water or acid are provided for waste rock dump bases. The FEIS should provide these specifications.

The FEIS should specify the minimum permeability of the waste rock pile underdrains and discuss how they would be prevented from clogging with the clay-rich sulfide overburden. Are there provisions for a filter fabric?

On page 2-36 of the DEIS, the pseudostatic evaluation of the overburden and interburden disposal piles is based on a peak seismic acceleration corresponding to the maximum credible event of 0.42g, while on page 3-15, the peak horizontal acceleration for the Maximum Credible Event is listed as .33g. The FEIS should rectify this apparent discrepancy.

The DEIS (p. 2-34, 65) states that a minimum slope of 0.5 percent would be adequate to promote effective drainage off of waste rock piles. This number is rather low and should be increased to a minimum of one to two percent in order to prevent ponding from poor grading quality control or fill settlement. Slopes greater than two percent can cause erosion.

C 2.9

Tailings Facility

The FEIS should specify the permeability of the tailings facility "composite soil liner." According to the DEIS (p. 4-16, 17), tailings water would contain concentrations of arsenic, copper, iron, selenium, and silver exceeding drinking water and/or aquatic life standards. It is not clear that facility design and reclamation measures would preclude leaching after closure. We believe that clay 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 layer of clay to a permeability of 1 x 10^{-6} cm/sec is much more feasible. We recommend that the clay layer be specified as two feet thick. In addition, there is no specification for permeability for the reclaimed tailings cover. This should be included in the FEIS.

A factor of safety for the main tailings facility embankment is given in the DEIS (p. 2-49) as 1.0 for surface slumping and 1.2

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R 2.9 - The tailings impoundment has been designed with a compacted soil liner that will be installed to achieve a hydraulic conductivity of no more than 1 x 10^{-6} centimeters per second (cm/sec) as specified in the *Section 14 Tailing Impoundment Facility Design Report* (WESTEC, 1995), included in the Project File. Many tailings impoundments and lined containment facilities have been successfully constructed (meeting thickness, compaction, and permeability specifications) with a 12-inch soil liner (the minimum thickness required under NAC 445A.437) using large construction equipment. The soil liner will be placed and compacted to design density in two 6-inch lifts to a minimum thickness of 12 inches. Liner thickness and compaction will be monitored during construction to verify compliance with design specifications. The liner design in combination with a hydraulic relief layer which will be placed above the liner in critical areas within the tailings impoundment provides adequate protection against short- or long-term seepage and exceeds applicable design requirements under the Nevada Administrative Code (NAC) Section 445A.437 as regulated by the NDEP. The Mule Canyon tailings impoundment liner system has been reviewed and approved by the NDEP as a requirement for issuance of Water Pollution Control Permit NEV 94110.

There is no regulatory requirement for permeability of the tailings cover, however based on available design information, the anticipated permeability of the tailings material will be approximately 1 x 10^{-5}cm/sec, which is relatively low. The design of the tailings impoundment has been reviewed and approved by the NDEP as a component of the Water Pollution Control Permit for the Mule Canyon Mine. In addition to design considerations, the NDEP will not release the bond for the tailings impoundment until all applicable closure requirements are met.

Figure 3.8 of the design report (WESTEC, 1995), included in the Project File, indicates a pseudo-static factor of safety of 1.0 for the interior slope of the tailings dam during Stage 1 construction and initial filling. This is the calculated factor of safety against surficial raveling for the interior slope during the design earthquake. Surface raveling or shallow surficial failure would not extend through the liner nor would it result in a reduction in the crest height of the tailings dam.

(R 2.9 Cont.) This type of failure is typically cosmetic in nature and may require some minor repair, depending on the severity of raveling, to prevent further damage but would not adversely affect the integrity of the containment system. The interior slope of the embankment was designed to provide a factor of safety of 1.2 against deep circular failure which could damage the liner system within the impoundment. The tailings embankment is also designed to provide for a factor of safety of greater than 1.2 for circular failure which could result in a reduction in embankment height. All of the stated design safety factors are well within reasonable ranges based on accepted engineering practice, applicable regulatory requirements, and accepted industry standards. Tailings accumulations within the tailings impoundment will buttress the interior slope and the embankment has been designed with sufficient mass to resist both shear failure and tipping, therefore, factors of safety for both surficial raveling and deep circular failure will increase with tailings placement for both the static and pseudo-static conditions.

C 2.9 Cont.

for circular failure during initial construction before tailings placement in both pseudostatic and static conditions. In light of the importance of impounding potential cyanide-containing tailings, a factor of safety for the embankment of 1.0 seems rather low once tailings are impounded. The FEIS should discuss whether the factor of safety increases or decreases with the placement of tailings.

Heap Leach Pad

C 2.10

According to the DEIS (p. 4-15), heap leach material could produce leachate that exceeds drinking water standards for several constituents. Following leaching operations, spent ore would be rinsed until designated constituent concentrations in the rinsate decline to State specified threshold levels. The FEIS should specify what these threshold levels would be. If meteoric water would have the potential to leach metals and degrade groundwater quality following heap leach facility closure, closure/reclamation of the facility should include an impermeable cap beneath the growth medium layer.

Additional details regarding heap leach facility design should be included in the FEIS. It is unclear that 40-mil PVC is of sufficient thickness for a heap leach pad liner. What are PVC's advantages over HDPE for this application? What is the maximum particle size to be placed on the PVC liner? If PVC is used, it should not be exposed to the sun unless specifically designed for that purpose. With the availability of the smectite, a permeability of $1x10^{-6}$ cm/sec instead of $1x10^{-5}$ cm/sec is feasible and should be the target permeability of the secondary liner. The thickness of one foot for the smectite liner is not practical in the field with large construction equipment (sheepsfoot compactor). A layer of two feet is much more practical and appears to be obtainable based on the amount of fat clay available.

The heap leach pad overflow pond includes HDPE liners and an intermediate geonet over a four-inch "bedded layer" (DEIS, p. 2-42). The FEIS should describe how clogging of the geonet would be prevented. The FEIS should also specify the thickness of the HDPE liners.

Ore Stockpiles

C 2.11

The FEIS should specify the permeability of the native soil layer under the ore stockpile. This layer should be capable of precluding any leaching from the stockpile into the underlying substrate.

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R 2.10 -The schedule of compliance which is a component of the approved NDEP Water Pollution Control Permit for the Mule Canyon Mine includes specific closure requirements for the heap leach facility. SFPGC will post a bond that will not be released until these closure requirements have been met. Requirements for closure of the heap leach facility include meeting effluent standards of less than 0.2 mg/l WAD (Weak Acid Dissociable) cyanide, pH between 6.5 and 8.5, and constituents concentrations as defined by the Water Pollution Control Permit. The Water Pollution Control Permit and its applicable requirements are referenced in Section 4.4.8. After applicable closure requirements are met, the heap leach facility will be reclaimed through grading, placement of a 12-inch growth media layer, and revegetation. Similar to the reclamation considerations for the overburden and interburden disposal areas as discussed in previous response R 2.8, growth media placement and revegetation are designed to increase evapotranspiration and reduce infiltration into the facility. Given the arid climate and high evaporation rates for this area, the proposed measures should adequately minimize infiltration to the reclaimed leach facility, therefore, no impermeable cap is included in the reclamation plan.

Throughout the mining industry, numerous precious metal leach pads have been successfully constructed and operated using PVC liners ranging in thickness between 20 and 40 mils (thousandths of an inch). Many of these liner designs have incorporated placement of crushed ore directly on the liner with maximum particle sizes as large as 3 inches and heaps stacked as high as 200 to 300 feet. For the proposed Mule Canyon leach pad, the material to be placed on the 40 mil PVC liner will have a maximum particle size of 3/4 inch and maximum height of the leach pile will be approximately 100 feet.

Loading criteria for the proposed leach pad design are, therefore, far less rigorous than many existing leach pads. PVC was specified for this installation because many of the properties of PVC liners are superior to those of HDPE liners, including multi-axial elongation, resistance to stress cracking, flexibility, thermal expansion and contraction, resistance to hydrostatic puncture, and coefficient of friction (considering smooth sheet geomembranes), all of which are important in leach pad liner design. As indicated by the design drawings and specified in the technical specifications included in the *Heap Leach Facility Design Report* (WESTEC, 1995), included in the Project File, ultraviolet (UV) stable PVC geomembrane will be used in any areas where the liner material will be exposed to sunlight for extended periods.

(R 2.10 Cont.) With regard to utilizing clay soils that may occur in conjunction with overburden and interburden materials or exist in the general proximity of the project area, use of clay as a bedding material for the leach pad geomembrane liner would be subject to the following requirements:

- It must have a hydraulic conductivity of no greater than 1×10^{-5} cm/sec in accordance with the design approved by the NDEP through Water Pollution Control Permit NEV 94110 and Section 02205, Paragraph 2.01, Sub-Paragraph D of the technical specifications prepared by WESTEC

- It must have a maximum particle size of ½ inch, as required by Section 02205, Paragraph 2.01, Sub-Paragraph D of the technical specifications prepared by WESTEC

- It must have a tested interface friction of 18 degrees or above when tested against the proposed PVC liner in accordance with the requirements determined through the stability analyses

WESTEC has sampled surficial soils in the proposed pit areas. Assuming these soils are similar to those materials to be excavated as overburden and interburden and considering the material limitations noted above results in the following concerns relative to use of clay soils as liner bedding material:

- The soils are highly variable with respect to clay content
- The soils contain a significant amount of rock relative to the clay content and it may not be operationally or economically feasible to remove the rock to meet the material specifications necessary to prevent liner damage due to punctures
- High clay soils typically have lower interface strengths.

The subject clay soils will likely not have adequate strength to meet specification for geotechnical stability.

(R 2.10 Cont.) Given these concerns and their practical implications, segregation and use of clay materials from the overburden and interburden do not appear to be operationally feasible and there are no known sources in the immediate vicinity of the project area which could provide adequate quantities of suitable clay material for use as liner bedding material. Also refer to previous response R 2.6 relative to the occurrence and characteristics of smectite clays in the overburden and interburden materials.

With respect to the thickness of the liner bedding, many landfills, tailings impoundments, and lined containment facilities have been successfully constructed using a 12-inch thick compacted soil liner (the minimum thickness required through NAC 445A.434) using large construction equipment. Please refer to previous response R 2.9 relative to the adequacy of 12-inch thick compacted soil liners. Technical specifications included in the design report (WESTEC, 1995), included in the Project File, describe in detail how bedding thickness, compaction, and hydraulic conductivity will be monitored during construction to meet or exceed project design specifications.

As shown in the drawings included in the design report (WESTEC, 1995), the leak detection geonet will be constructed between the 80 mil primary and 60 mil secondary geomembrane liners. The secondary liner, constructed below the geonet, will be in contact with the underlying 4-inch soil bedding layer. Since the geonet will not be in contact with the bedding, there is no possible avenue for bedding or other material to plug the geonet. The only avenue for plugging of the geonet would be failure of either liner.

R 2.11 - The ore stockpile is a temporary facility which will be utilized during the life of the active mining operations. As noted and described in Section 2.4.9.2, the ore stockpile design includes upgradient diversions to route surface runoff around the pile, a compacted soil liner, and a lined downgradient sedimentation pond to intercept any runoff from or infiltration through the stockpile. As specified in the *Ore Stockpile Design Report* (SMI, 1995), included in the Project File, the stockpile will be underlain by a two-foot thick low permeability compacted soil liner with a permeability of approximately 1×10^{-5} cm/sec. In addition, the stockpile pad will be sloped to promote effective drainage, with any runoff or minor infiltration draining to a lined sedimentation pond as shown on the drawings included in the design report (SMI, 1995).

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Biological Resources

C 2.12

The DEIS (p. 4-47) states that the pit dewatering holding ponds and ore stockpile sedimentation pond could exceed drinking water standards for several constituents. The DEIS further states that, given that these ponds would be located in areas where there would be considerable heavy equipment traffic and other human activity, wildlife use and exposure to these ponds would be limited to occasional opportunistic use with resultant low hazard exposure. This statement is unfounded in the DEIS in light of the fact that wildlife mortalities frequently occur at mine sites where heavy equipment and noise have not deterred pond use, particularly for birds. The FEIS should discuss the potential risks to wildlife from contact with water in these ponds and identify the wildlife exclusion measures that would be implemented if needed at the various ponds and water holding facilities on site.

The DEIS mentions that wetland habitat could establish in the shallow post-mining pit lakes. Given that drinking water and aquatic life standards are expected to be exceeded for certain constituents in these ponds, the FEIS should discuss in detail the results of the expanded risk assessment, the specific potential risks to wildlife, and mitigation measures that would effectively prevent these risks.

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R 2.12 - The approved NDEP Water Pollution Control Permit requires SFPGC to monitor all open impoundments including the pit dewatering holding ponds and ore stockpile sedimentation pond initially, following construction and upon accumulation of any significant amount of water, then annually. In addition, as noted in Section 2.4.7, any water from the pit dewatering holding ponds which is utilized for purposes other than as process make-up water will be sampled and analyzed on a regular basis to evaluate suitability for the intended use. In the event that the water quality analyses indicate a potential hazard to wildlife from water contained in the holding or sedimentation ponds, SFPGC will review monitoring results with appropriate NDOW representatives and, if indicated, develop and implement appropriate wildlife mitigation measures. Possible mitigation options would include fencing and/or covering the ponds, pumping to limit water accumulations in the ponds, water treatment, or other appropriate protective measures.

Relative to potential wildlife risks associated with the shallow ponds, please refer to previous response R 2.2 which addresses this issue.

United States Department of the Interior

U.S. GEOLOGICAL SURVEY

In Reply Refer To:
Mail Stop 423

MEMORANDUM

To: District Manager, Bureau of Land Management

From: James F. Devine [signature] for 7/10/96
Senior Advisor for Science Applications

Subject: Review of Draft Environmental Impact Statement for the Mule Canyon Mine, Battle Mountain, Nevada

As requested by the Bureau of Land Management (BLM), Battle Mountain District Office, the U.S. Geological Survey (USGS) has reviewed the subject draft environmental impact statement (EIS) and offers the following comments:

Section 3.5.4, Page 3-33

C 3.1 The statement that project operations would not affect Drainage Basin H (headwaters of Water Canyon) is questionable. The southern extent of Drainage Basin H is bordered by the North Pit and excavation of this pit may have some impact on the Water Canyon watershed, particularly if a significant amount of recharge to that watershed is generated in that area.

Section 3.6.3, Page 3-53

C 3.2 The hydrograph for the Connelly Well (Conn #54) does not illustrate "a relatively flat water table"; it only suggests that there has been very little variation in water level over the period of record.

Section 3.6.2, Page 3-49

C 3.3 In the subsection "Volcanic Bedrock Aquifer," ground-water contours are shown in figure 3-11, not 3-13, and generalized flow directions are shown in figure 3-13, not 3-12.

Copy to: USGS State Representative, Water Resources Division, Nevada
Director, Office of Environmental Policy and Compliance

R 3.1 - Regarding drainage Sub-basin H, ground water modeling results reported in the *Post-Closure Hydrology and Pit Lake Geochemistry Report* (SMI/BCI, 1995b) indicate that retention of mine pits as open excavations will result in a decline in ground water elevation of 60 to 80 feet for much of Sub-basin H. There will, therefore be some impact on ground water resources, although no springs or seeps have been identified within the sub-basin. Section 3.5.4 of the EIS has been revised to clarify this potential ground water impact. As noted in Table 3-6 of the DEIS, Sub-basin H falls within the Deer Canyon surface drainage area and so would not affect surface hydrology in Water Canyon.

R 3.2 - In order to clarify ground water conditions in Whirlwind Valley, the referenced EIS text in Section 3.6.3 has been revised to indicate that a seasonably-stable water table extends eastward to the Humboldt River.

R 3.3 - The commentor is correct in noting the referencing discrepancy. The referenced sections of the EIS have been reviewed and revised to address the discrepancy.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

NEVADA STATE OFFICE
4600 KIETZKE LANE, BUILDING C-125
RENO, NEVADA 89502-5093

July 10, 1996
File No. EC32.7

Memorandum

To: Environmental Protection Specialist, Bureau of Land Management, Battle Mountain District Office, Battle Mountain, Nevada (Attn: Christopher Stubbs)

From: State Supervisor, Nevada State Office, Reno, Nevada

Subject: Mule Canyon Mine Environmental Impact Statement

The Fish and Wildlife Service (Service) has reviewed the Draft Environmental Impact Statement (EIS) for the proposed Mule Canyon Mine and is providing the following comments. The proposed project is to be located approximately 15 miles southeast of Winnemucca, Nevada, and is to consist of several open pit surface mines, several waste rock disposal piles, a heap leach extraction pile, and various associated facilities.

C 4.1

Section 1.6.1, page 1-14: This section describes "Recent, Ongoing and Reasonably Foreseeable Mining Activities" within the Cumulative Effects Area in an effort to evaluate the potential cumulative impacts related to the proposed project. This section includes the Barrick Goldstrike, Meikle Mine and the Newmont, Bootstrap/Tara Project both located in a geologic formation known as the Carlin Trend. The description of mining activities in this area does not include other Carlin Trend mines, such as the Barrick Goldstrike, Goldstrike Mine; Dee Gold Mine; Newmont, Post, Gold Quarry and Genesis Mines; or other mines within the described area, such as the Getchell, Pinson, and Marigold mines. The Service recommends that all active and historic mines in the Cumulative Effects Area be included in the evaluation of cumulative impacts.

C 4.2

Section 3.5.5, page 3-35: This section describes the presence and location of several seeps and springs in the proposed project area. The Service is concerned with the long-term protection of seeps and springs because of their importance to wildlife in Nevada and recommends that adverse impacts to springs and seeps in the project area be avoided. In the event that impacts cannot be avoided, the project proponent should contact the Reno Field Office of the Army Corps of Engineers, 300 Booth Street, Room 2103, Reno, Nevada 89509, (702) 784-5304 for the purpose of coordination under section 404 of the Clean Water Act. Additionally, the Service recommends locating all rock disposal areas away from water sources which may enhance the development of acid rock drainage.

R 4.1 - Section 1.6.1 of the DEIS states that:

> "It should be noted that cumulative effects for any given resource category may or may not relate to each of the listed projects."

The referenced section is intended to provide the reader with a general description of potential cumulative effects and associated areas for all resources. Specific cumulative effects areas differ for each resource and are described in Chapter 3 of the DEIS. For example, the cumulative effects area for wildlife is described in Section 3.10 and shown in Figure 3-20 of the DEIS. This specific cumulative effects area for analyses of potential wildlife impacts is a much smaller area than the general region outlined in Section 1.6.1.

R 4.2 - To the extent reasonably feasible, SFPGC took known spring and seep locations into consideration in siting and designing the proposed mine operations and facilities (including rock disposal areas), attempting to avoid these important features wherever possible. As noted in Section 4.4.3.1 of the DEIS, however, disturbance or disruption of certain springs and seeps would be unavoidable. Impacts to springs and seeps will be mitigated through cooperative consultation with the BLM, NDOW, and affected grazing permittees and development and implementation of appropriate mitigation measures.

(R 4.2 Cont.) Please refer to previous responses R 1.6 and R 2.7 relative to protection and mitigation of springs and seeps. Given the potential for minor impacts to Waters of the U.S., SFPGC has filed a 404 Permit Application with the U.S. Army Corps of Engineers. The Corp of Engineers has stated that they will issue the permit after completion of the NEPA process.

Given the proximity of overburden and interburden disposal areas to mine pits, flows from any springs or seeps affected by the disposal areas will be diminished by pit dewatering and resultant lowering of the ground water table. In addition, an oxide layer under any sulfide disposal areas would prevent contact between any minor spring/seep discharge and potential acid producing materials and provide for drainage as discussed in previous response R 2.6.

File No. EC.32.7

C 4.3

Section 4.8.3.3, page 4-47: The document states that an ecological risk assessment was performed to evaluate potential impacts related to the presence of potentially toxic compounds in the pit lakes which will form as a result of this project. We are aware that the most recent version of the risk assessment was completed after release of the Draft EIS and, therefore, the conclusions and recommendations of the risk assessment could not be included in the Draft EIS. This risk assessment predicts exposure to various compounds, notably methyl mercury, thallium, zinc, selenium, manganese, and cadmium, to concentrations in excess of toxicity reference values derived from scientific literature for all receptor species in at least one of the scenarios evaluated (Sheppard Miller, Inc. 1996). We recommend that these findings be included in the final EIS, along with measures designed to avoid, minimize, or mitigate the predicted risks. These measures could include partial filling of pits, minimizing the development of aquatic habitats by selective redesign of the pit walls, and/or preventing the introduction of fish in any of the pit lakes. Additionally, we suggest that a discussion of the residual risk remaining after mitigation measures have been implemented be included in the final EIS.

If you have any questions, please do not hesitate to contact John F. Miesner at (702) 784-5227.

Carlos H. Mendoza

cc:
Assistant Regional Director, Interior Basin Ecoregion, Fish and Wildlife Service, Portland, Oregon
Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Portland, Oregon
State Director, Bureau of Land Management, Reno, Nevada
Chief, Wetlands Section, Environmental Protection Agency, San Francisco, California
Project Manager, Reno Field Office, Regulatory Section, Army Corps of Engineers, Reno, Nevada
Administrator, Nevada Division of Environmental Protection, Carson City, Nevada
Chief, Bureau of Mining Regulation and Reclamation, Nevada Division of Environmental Protection, Carson City, Nevada
Administrator, Nevada Division of Wildlife, Reno, Nevada
Regional Manager, Nevada Division of Wildlife, Elko, Nevada

R 4.3 - Please refer to previous response R 2.2 which addresses consideration of the expanded risk assessment, partial pit backfilling, and mitigation of potential wildlife risks associated with the final pit lake and shallow ponds.

References

Sheppard Miller, Inc. 1996. Screening level risk assessment for predicted pit lake and ponds, Mule Canyon project. 70 pp.

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

June 27, 1996

Christopher Stubbs
EIS Project Manager
Battle Mountain District
Bureau of Land Management
P.O. Box 1420
Battle Mountain, NV 89820

RE: SAI # 96300169, Mule Canyon Draft Environmental Impact Statement, Sante Fe Pacific Gold Corporation - BLM

Dear Mr. Stubbs:

C 5.1 We appreciate the opportunity to review and provide comments on the subject document. Our first comment questions the way the document conducts the analysis for Alternate C, the East Access Route. This section starts on Page 2-9 in the document. The entire discussion following this alternative throughout the document seems superfluous knowing the west access route is already under construction.

C 5.2 In Section 2.4.9.1, Heap Leach Processing, on Page 2-42, the document indicates the heap leach pad will be lined with a PVC liner. In most cases we have seen in Nevada, PVC liners do not provide the length of service and durability as other types of liner material.

On the same page, the document indicates the process solutions will be contained in steel tanks. This is an excellent design feature. Steel tanks can be constructed to completely preclude access by wildlife.

C 5.3 In Section 2.4.20.1, General Reclamation Considerations, on Page 2-62, the document indicates there are four different seed mixtures proposed for the reclamation of the proposed action. A listing of those four seed mixes should be included in the document to allow the reader to know and evaluate what species will be used for the revegetation effort.

C 5.4 In Section 3.10.9, Threatened, Endangered, and Candidate Species, the document discusses changes in the USF&WS policy that may affect the status of the Category 2 species. It is our understanding the Bureau of Land Management also has a policy concerning these species. This information should also be included in the document.

R 5.1 - While it is true that the West Access is currently being constructed, the existence of the West Access does not preclude development and use of the East Access as either the primary or a supplemental access route as outlined in the DEIS (Alternative C). Given existing public and agency concerns relative to the West Access, if the associated mitigation requirements become too onerous or costly, SFPGC may develop the East Access as the primary mine access route. The only change in the EIS which is appropriate at this time is the clarification that Lander County is currently constructing the West Access.

R 5.2 - Please refer to previous response R 2.10 relative to reasons for specification of a PVC liner. Based on both published data and case history, many design engineers believe that PVC liners are more durable than polyethylene-based geomembrane liners. Polyvinyl chloride liners are currently being deployed on many gold heap leach facilities throughout the world and have been successfully used for heap leach pads for the last 10 to 15 years. Polyethylene-based liners, such as high density polyethylene (HDPE), very low density polyethylene (VLDPE), and linear low density polyethylene (LLDPE) are the other geomembrane liner types commonly used for heap leach pad construction. While it is true that service life for PVC geomembranes is less than that of HDPE liners, if protected against ultraviolet light or if UV-stabilized PVC is utilized, PVC liners have a similar or longer service life than VLDPE liners. The quality of the manufacture of a PVC liner and protection from ultraviolet (UV) light (if the material is not UV-stabilized) are the main factors which will affect service life. As outlined in the *Heap Leach Facility Design Report* (WESTEC, 1995), very stringent technical specifications for the manufacture and deployment of the proposed PVC liner are designed to assure that the liner system meets its intended purpose of preventing infiltration of leach solutions to underlying materials. In addition, UV- stabilized PVC will be used in those areas where liner material may be exposed to UV light for any extended periods.

(R 5.2 Cont.) In specifying a liner type, all factors including puncture strength, stretch and tear resistance, flexibility, thermal expansion and contraction, coefficient of friction, and service life must be considered and with selection focusing on the material(s) providing the best combination of properties consistent with the specific application. Given the benefits of PVC compared with other available liner types for this application, and an anticipated service life which is adequate for both the design operating period and a reasonable post-closure period during which reclamation will be completed and vegetation will have become sufficiently well established to effectively limit infiltration, PVC is a reasonable choice for this application. The proposed Mule Canyon heap leach pad liner system has been approved by the NDEP as a component of the approved Water Pollution Control Permit. The NDEP has approved and monitored the performance of PVC liners on numerous leach pads in the State of Nevada and has based its approval on this direct experience and observation.

R 5.3 - Section 2.4.20.1 of the EIS document has been revised to incorporate the proposed revegetation seed mixtures (Tables 2-14 through 2-17). The proposed seed mixtures consist primarily of native species with some non-native adaptive introduced species included to promote rapid vegetative establishment, assure effective vegetative diversity, and provide effective livestock and wildlife forage and browse consistent with proposed postmining land uses.

R 5.4 - The USFWS published a Federal Register Notice of Review (2/28/96) which included a revised list of candidate species. For Nevada, the list reduced the number of candidate species from 270 C1 and C2 species to 6 species and eliminated the former C1 and C2 category system. The USFWS Threatened, Endangered, and the former Candidate species listings have historically provided the basis for the BLM's Special Status Species designation as incorporated in BLM policy (6840 Manual) to assure protection and conservation of these species. In order to address this change in USFWS policy, the BLM issued an Instruction Memorandum (Memorandum No. NV-96-019, 3/20/96) providing the following guidance:

> "To provide interim consideration and conservation, all former Nevada C2 species, and former Nevada C1 species not included in the FWS NOR, are hereby incorporated into the Nevada BLM Sensitive Species List, thereby providing the same statewide level of protection and consideration as was previously in effect."

Section 3.10.9 of the EIS has been reviewed and revised to reflect this recent change in agency policy regarding candidate species.

Christopher Stubbs
June 27, 1996
Page 2

C 5.5 In Section 3.12.1, Socioeconomic Factors, Study Area Overview and Recent Trends, on Page 3-108, the document states, "the majority of the workers for the Mule Canyon Project would probably live in Elko and Spring Creek...". If this is the case, how come the West Access Route has been constructed prior to this analysis being conducted? This conflict should be explained in the document. The same paragraph indicates the West Access Route has not been constructed.

C 5.6 In Section 4.3.3.2 Surface Water Effects Common to All Alternatives, Open Pit Mining, under the heading Pit Filling After Mining, on Page 4-9, the document indicates temporary ponding could occur in the bottoms of the pit not expected to fill with groundwater if the permeability of the pit floor is limited by high clay content or reduced by compaction. This issue has created problems of ponds with very poor water quality at other mines in this region. Sante Fe should ensure the pits do not have ponds in them that create hazardous conditions, even short lived ponds.

C 5.7 In Section 4.4.3.1, Ground Water Effects Common to All Alternatives, under the heading of Pit Filling After Mining, on Page 4-24, the document indicates monitoring of the springs and seeps for groundwater degradation will continue for three years following completion of the mining and reclamation. Will this be an adequate amount of time to determine if degradation will develop in the groundwater aquifer from water contributions related to the pits?

C 5.8 In Section 4.7.8, Grazing Mitigation, the document indicates plant control and reductions in sagebrush communities would be used as mitigation. We are very concerned with this type of activity. Historical use of this type of vegetation management has been very detrimental to certain wildlife species.

In Section 4.8.3, Wildlife - Effects Common to All Alternatives, the section was written very well and documents the expected impacts to wildlife species in a clear fashion.

C 5.9 In Section 4.8.8, Wildlife Mitigation, the document indicates the wildlife habitat values are similar to those associated with livestock grazing and mitigation considerations would be the same as discussed in the grazing section. Mitigation designed to benefit both wildlife and domestic livestock would need to focus on the restoration and/or maintenance of vegetative plant communities similar to the potential for a particular site. If this is the goal of the mitigation considered in the grazing section, then both wildlife and livestock would benefit.

C 5.10 Finally, as a matter of bookkeeping, in Chapter 5, the document refers to our agency as the Department of Wildlife. We are now the Division of Wildlife, under the Department of Conservation and Natural Resources.

R 5.5 - Early in the project planning phase, representatives of Lander County and Battle Mountain approached Gold Fields Mining Company, the previous project owner, indicating their desire and support for a west access. Given declining ore reserves for Battle Mountain Gold's Fortitude operations which has been a major employer in this area, the City and County felt that a west access would be an important factor in supporting and encouraging continued employment and economic growth. Development of the west access has been a cooperative and mutually beneficial effort of SFPGC and Lander County. The west access will potentially increase the available labor pool for the mine while supporting the development and economy of the local area. While Battle Mountain is considerably closer to the project area than Elko and the west access will provide direct site access from Battle Mountain, recent trends indicate that many employees are willing to commute longer distances in order to have access to the greater diversity of housing and services which a larger community such as Elko/Spring Creek provides. The EIS text has been revised to reflect construction of the West Access Road.

R 5.6 - Any minor accumulations of water in final pit areas will exist for only very brief periods following snowmelt or major thunderstorms due to high evaporation rates for this area. Following completion of active mining in each pit area and during the four-year final reclamation period, SFPGC will have the opportunity to observe final pit conditions and, where appropriate monitor final pit water quality. If longer-term ponding or poor water quality are identified as concerns under applicable monitoring, inspection, reporting, and oversight provisions of the NDEP Water Pollution Control Permit, SFPGC will take appropriate action to mitigate any significant problems. Mitigation may involve ripping areas of concern to alleviate compaction and promote infiltration, partial backfilling of areas where ponding is occurring, or other appropriate measures. Effective mitigation of any significant water quality concerns is required under SFPGC's Water Pollution Control Permit and will be necessary in order to obtain final bond release.

R 5.7 - Monitoring requirements for potential impacts to Waters of the State are regulated by the Nevada Division of Water Resources (NDWR). Pursuant to applicable State law and regulations, SFPGC is required to monitor any mining-related impacts from Mule Canyon Mine on springs and wells in the affected area.

(R 5.7 Cont.) For wells, the monitoring requirement is a condition of any applicable water right approval(s). The frequency and duration of required monitoring are regulated by the NDWR which will accept public input relative to monitoring requirements at the following address:

Nevada Division of Water Resources
Capitol Complex
123 W. Nye Lane
Carson City, Nevada, 89810
Telephone (702) 687-4380

The State Engineer will require SFPGC to mitigate any loss of flow or impairment of any appropriated springs or wells affected by the Mule Canyon operations. In addition to direct monitoring of any affected springs and seeps, under NAC 445A.446 Part 3, SFPGC will be required to monitor any permanent pit lakes for a period of up to 30 years following lake stabilization. Extended monitoring of proximate wells and springs may be required by NDEP in the vicinity of any permanent pit lakes.

R 5.8 - The reference to weed and woody plant control as a potential grazing mitigation measure identifies this as one of several possible mitigation options. Weed control would focus on weedy invader species which have reestablished on burned and heavily grazed areas to the detriment of more desirable native grass, forb, and shrub species. Woody plant control would focus on any areas where fires or other land use impacts have resulted in a sagebrush or other woody plant monoculture. Woody plant control would involve selective control or removal of woody plants where abnormally high densities exist in order to increase overall vegetative diversity and edge effect. The text discussion in Section 4.7.8 of the DEIS notes that SFPGC will consult with the BLM relative to possible grazing mitigation measures. SFPGC will expand this consultation to include the NDOW where mitigation may also impact area wildlife to assure that any impact measures would benefit both livestock and wildlife.

R 5.9 - As stated in Section 4.8.8:

> "Proposed reclamation plans focus on reestablishment of a mid- to late-successional mixed grassland-shrub community with cover and production values comparable to or greater than existing premining vegetation communities."

For additional information on specific revegetation species please refer to Response 5.3.

In addition to the proposed revegetation measures, SFPGC has committed to temporarily reduce the area enclosed by the project fenceline from approximately 6,635 acres to approximately 2,000 acres until such time as construction of the proposed Mule Canyon Mill and associated tailings disposal facility becomes economically feasible. This temporary reduction in the fenced area will significantly increase the area available for continued livestock and wildlife use and shorten the duration of mining-related impacts due to exclosure of livestock and wildlife from mine disturbance areas. In addition, by reducing the fenced area, several springs which would have been within the fenceline will now be accessible to livestock and wildlife. SFPGC will also consult with the BLM, NDOW, and affected grazing permittees to develop and implement appropriate mitigation measures for mining-related impacts to springs and seeps as described in previous response R 2.7 and will review reclamation plans and land use objectives with these same entities to determine and implement any of the other supplemental mitigation measures identified in Section 4.7.8 which may be appropriate.

The objectives and plans for mitigation of mining-related impacts as presented in Sections 2.4.20, 4.6.1, 4.6.3, and 4.8.8 of the DEIS have been reviewed and revised as appropriate to reflect planned supplemental mitigation measures. The integrated mitigation plans, as revised are compatible with the dual postmining land uses of livestock grazing and wildlife habitat. It is important to note that a rotational grazing management program could also be effective in achieving mitigation for both livestock and wildlife, with development and implementation of such a program to be a cooperative effort between the BLM and affected grazing permittees.

R 5.10 - In order to show the accurate current designation for the Division of Wildlife, all references to NDOW have been reviewed and revised as appropriate.

Christopher Stubbs
June 27, 1996
Page 3

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
Nevada State Clearinghouse
Gerald Smith, District Manager, Battle Mountain District, BLM
Doug Zimmerman, Chief, Bureau of Mining Regulation and Reclamation, NDEP
Richard Allison, Santa Fe
Larry Teske
File

BOB MILLER
Governor

STATE OF NEVADA

PETER G. MORROS
Director

R. MICHAEL TURNIPSEED, P.E.
State Engineer

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
Capitol Complex
123 W. Nye Lane
Carson City, Nevada 89710
(702) 687-4380 • Fax (702) 687-6972

July 10, 1996

Nevada State Clearinghouse
Planning Division
Blasdel Bldg. Rm. 200

RE: DEIS - Mule Canyon Mine, Lander & Eureka Counties

The draft EIS has addressed most of the divisions concerns with the exceptions of the following items:

C 6.1 - Page 1-8, item 13 of table 1-1; While a "dam safety permit" may be required from NDEP by regulation, a dam safety permit is definitely required by Statute (NRS Chapter 535) from the State Engineer (NDWR). SFPGC has already acquired a dam safety Permit J-443 for Section 14 tailings dam.

C 6.2 -Section 3.5.5 through 3.5.7 fails to mention water rights holders for potentially affected springs. As an example Julian Tomera Ranches, Inc. holds claims of vested right on three springs for stockwatering in township 32 north, range 47 east alone.

C 6.3 - Sections 4.3 and 4.4, table 4-1: The discussion of long-term effects to the groundwater system are not adequately presented. Any permanent loss of groundwater is water that cannot be put to beneficial use and, therefore, the potential total loss of perennial yield is of great importance. The discussion of the interaction of meteoric water (potential recharge), pit interception of groundwater and evaporation (discharged) does not contain enough information to assure the reader that the topic has been thoroughly investigated. What are the areas of the "shallow" ponds? Also, since the disturbed area is within elevations that contribute to recharge, the potential loss of recharge from man altered ground surface (compacted, capped, etc..) should be addressed.

Sincerely,

Michael J. Anderson
Hydraulic Engineer III

MJA/tdf

R 6.1 - Table 1.1 has been revised to reflect the NDWR - State Engineer as the responsible agency for the required Dam Safety Permit and Section 4.3.8 has been revised to include a notation for the approved Dam Safety Permit.

R 6.2 - Springs and seeps in the Project Area and any corresponding water rights and water rights filings based on current records of the DWR are summarized in Table 3-8 and their locations are shown on Figure 3-9. The discussion of water rights in Section 3.5.7 identifies those individuals or entities who have water rights or water rights filings on record with DWR as summarized in Table 3-8a and shown on Figure 3-10.

Julian Tomera Ranches has filed Proofs of Appropriation numbers 07561, 07562, 07563, 07564, 07582 and 07583 with the DWR, Battle Mountain Division. To date, mapping showing the locations for these filings has not been submitted. Lacking documentation for filing locations, SFPGC has not attempted to tie the filings to specific springs on either Table 3-8 or Figure 3-9 in the EIS document, however, based on undocumented information and conversations, correlations between water rights filings and spring locations as shown on Figure 3-9 appear to be as follows:

Proof of Appropriation 07561 - Spring designation "j"
Proof of Appropriation 07562 - Unknown
Proof of Appropriation 07563 - Spring designations "f" and "k"
Proof of Appropriation 07564 - Spring designations "c" and/or "d" and "e"
Proof of Appropriation 07582 - Spring designation "u"
Proof of Appropriation 07583 - Spring designations "l" and "m" and/or "n"

Please note that the reference to water rights on Table 3-10 is in error, water rights are shown on Table 3-8. The water rights discussion in Section 3.5.7 has been reviewed and revised to reflect appropriate additions and corrections.

(R 6.2 Cont.) The remaining seep and spring locations as shown on Figure 3-9 do not appear to have associated water rights or water rights filings based on current DWR records. These include the springs/seeps designated as a, g, h, o, p, q, r, s, t, v and w in Table 3-8 and on Figure 3-9. Please note that in addition to the spring identified under Proof of Appropriation 07562, it appears that five springs listed under Proof of Appropriation 07563 are not shown on Figure 3-9. These springs may be ephemeral springs which were not flowing at the time of the spring and seep survey, and were thus not identified as active springs or seeps.

R 6.3 - The long-term effects of the Mule Canyon Project to the ground water system were considered and discussed in detail in the *Post-Closure Hydrology and Pit Lake Geochemistry Report* (SMI/BCI, 1995b). As part of the hydrologic analysis, the detailed, calibrated, ground water flow model developed for the project was used to predict hydrogeologic conditions near the mine pits under three mine closure scenarios: 1) Partial backfill of the pits; 2) Open pits with adjacent overburden and interburden disposal areas; and 3) A combination of backfill and open pits with corresponding modification of the size and configuration of overburden and interburden disposal areas. All parameters of the overall water balance were considered in the model simulations, including infiltration to aquifer zones, and evaporative losses from the surfaces of the pit lake and ponds. The reviewer is referred to Sections 2.1 and 2.2 of the post-closure report (SMI/BCI, 1995b) for a detailed discussion of the effects of the three closure options on the ground water system, including the effects of reduced recharge on the ground water table.

The surface areas of the South Pit lake and shallow ponds, although calculated, were not specifically noted in the background hydrology reports or the DEIS. The surface area at steady-state equilibrium of the South Pit lake is estimated to be 2.1 acres, and the two ponds that would develop in the central portion of the South Pit and southern end of the West Pit are expected to be have a surface area of approximately 0.3 acres each. Section 4.3.3.2 has been revised to include the projected surface areas of the pit lake and shallow ponds.

PETER C. MORROS, Director
L.H. DODGION, Administrator

(702) 687-4670
TDD 687-4678

Administration
Mining Regulation and Reclamation
Water Pollution Control
Facsimile 687-5856

Address Reply to
Capitol Complex
Carson City, NV 89710

STATE OF NEVADA
BOB MILLER
Governor

Waste Management
Corrective Actions
Federal Facilities
Facsimile 885-0868

Air Quality
Water Quality Planning
Facsimile 687-6396

Located at:
333 W. Nye Lane
Carson City, NV 89710

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

Capitol Complex
Carson City, Nevada 89710

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June 19, 1996

<u>CLEARINGHOUSE COMMENTS</u>

NDEP # 1996-122
SAI NV # 96300169

TITLE: BLM - Draft EIS for Santa Fe Pacific Co's Mule Canyon Mine

The Division of Environmental Protection has reviewed the aforementioned State Clearinghouse item and has the following comments:

C 7.1 It should be noted that the State of Nevada no longer has a BACT requirement for HAP's (hazardous air pollutants). See page 3-133, paragraph 4, NAC 445B.341 was repealed on March 26, 1996 by State Environmental Commission petition 96009 (LCB file R-021-96). Also on page 3-133 the last paragraph references opacity standards. Subpart OOO limits opacity from crushing to 15 percent, while conveying and screening is limited to 10 percent. On page 3-134, the note on table 3-39 should be amended to reflect that ambient air quality standards are to never be exceeded.

David R. Cowperthwaite
David R. Cowperthwaite
Clearinghouse Coordinator
Division of Environmental Protection

R 7.1 - The discussion of air quality standards in Section 3.14.3 and the related summary table (Table 3-39) have been revised to reflect recent changes in applicable State standards.

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

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DIRECTOR'S OFFICE

June 27, 1996

Julie Butler, Coordinator
Nevada State Clearinghouse
Department of Administration, Planning Division
Blasdel Bldg., Room 200
Carson City, NV 89710

Re: Nevada SAI #96300169 -- Draft Environmental Impact Statement (DEIS) -- Mule Canyon Mine -- Santa Fe Pacific Gold Corp. -- Due Date: July 8, 1996

Dear Julie:

The Nevada Division of Minerals is pleased to have the opportunity to review and provide comments on the DEIS for the Mule Canyon Mine.

We congratulate the BLM, its contractors, cooperating agencies and Santa Fe Pacific Gold Corporation for their work in the development of an excellent document for this project. We concur with the choice of Alternative B as the preferred alternative. It provides the best overall balance between environmental and economic concerns.

C 8.1 The Division would like to pose a question related to the housing shortages in the nearby communities as noted under "Socio-Economics". Has consideration been given to construction of access roads in <u>both</u> east and west directions? This scenario would be a convenience to a number of employees and might provide for a more equitable dispersal of employees and their families in communities where housing availability and services are strained. In addition, traffic flow would be reduced on the west road and vendors coming from the east would have a shorter haul with the addition of an east road.

The Mule Canyon project has the full support of the Division of Minerals. We would like the opportunity to review the final EIS for this project once it becomes available.

R 8.1 -Access to the Mule Canyon Mine from the east already exists via State Route 306 and existing county roads. Lander County is currently in the process of reconstructing Beacon Light Road past the Mule Canyon Project and this road will tie into the existing Eureka County Road near the Beowawe Geothermal Plant. The existing county road is maintained by Eureka County and could be used by employees and suppliers to access the Mule Canyon Mine from the east, although the West Access would remain as the primary mine access under the Proposed Action.

Please contact Division staff at any time for additional information or assistance.

Sincerely,

Bill Durbin

Bill Durbin - Chief
Bureau of Abandoned Mine Lands

bd\sai96169

Nevada Natural Heritage Program

Department of Conservation and Natural Resources
1550 East College Parkway • Carson City, Nevada 89710
(702) 687-4245

2 July 1996

Comments on Nevada SAI # 96300169, DEIS -- Mule Canyon Mine, Lander & Eureka counties.
Comment due date July 8, 1996.

C 9.1

1. The statements on pages 3-84, 3-93, etc. regarding elimination of the category-2 candidate designation for species by the U.S. Fish and Wildlife Service should be removed, as they are irrelevant to the requirements for analyzing effects on sensitive species. All former C-2 species remain on BLM's sensitive species list, and any proposed impacts that could contribute to the need to list any species as threatened or endangered are significant and require analysis, regardless of any current designations that might or might not have been applied to such species.

C 9.2

2. Without more information, we cannot determine from the DEIS whether on-site surveys were conducted properly and in a manner likely to detect the presence of any sensitive species (p. 3-84, 4-36). Was the survey conducted at a time of year appropriate to detection of the target species? Did the surveyors have sufficient knowledge and training to recognize the species and their habitats, and to distinguish the species from look-alikes? Arabis falcifructa in particular is difficult to detect and easily confused with similar-appearing species by those inexperienced in surveying for Arabis species. Unless these questions can be addressed satisfactorily, the conclusion that no impacts to sensitive plant species are likely to occur cannot be supported.

C 9.3

3. Without more information, we cannot assess the merits of the four proposed reclamation seed mixes referred to on page 2-62. Exactly which species are included in the mixes? If historical BLM practices are being followed, the mixes probably contain exotic species. We strongly object to the use of other than 100%-native seed mixes.

The vegetation of Nevada has been extensively, cumulatively and, in many large areas, severely impacted by both unintentional introduction of invasive exotic plant species, and by intentional introduction of such species for reseeding and range treatment purposes. There are now enough suppliers of native seed, enough data accumulated on the use of native seed for reseeding projects, and enough evidence accumulated on the harmful effects of introducing exotic species to the landscape, that there is no longer any need, reason, or excuse for using any less than 100% native species on public lands. Any proposal to do otherwise should address both the proposed and cumulative impacts thereby created.

R 9.1 - Please refer to previous response R 5.4 which addresses the issue of "Candidate" species.

R 9.2 - The List of Preparers (Chapter 5) has been revised to include the professional consultants who completed the technical research, field studies, and analyses on which the DEIS discussion of Threatened, Endangered, and Sensitive species is based. Baseline reports as referenced in the DEIS include detailed descriptions of the methodologies utilized in collecting and analyzing all technical data.

R 9.3 - Please refer to previous Response 5.3 which addresses the proposed reclamation seed mixtures. The seed mixes include a diversity of grass, shrub, and forb species most of which are native species indigenous to the project area, with a limited number of adaptive introduced species selected for their superior stabilization performance specifically considering site climatic and edaphic conditions. Proposed seed mixtures may be modified as appropriate based on the results of revegetation success evaluations and seed availability, and any changes in the seed mixtures will be reviewed with the BLM, NDEP, and NDOW prior to seeding.

Given the existence of numerous productive and beneficial non-native plant species in the existing premine vegetation communities and the practical difficulties of establishing a quick growing, diverse vegetative cover using exclusively native species, exclusion of selected, beneficial non-native species can not be reasonably justified.

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1263 S. Stewart Street
Carson City, Nevada 89712

BOB MILLER, Governor

TOM STEPHENS, P.E., Director

RECEIVED
JUN 25 1996

June 19, 1996

In Reply Refer to:

Julie Butler, Coordinator
Nevada State Clearinghouse
Department of Administration
Budget Division
Blasdel Building, Room 204
Carson City, NV 89710

PSD 7.01

Dear Ms. Butler:

The Nevada Department of Transportation has reviewed the project titled DEIS - Mule Canyon Mine, Lander and Eureka Counties SAI#96300169.

Based on the information submitted, we have the following comments on the proposed project.

C 10.1 Radii on the ramps at East Battle Mountain Interchange will require modifications to safely handle truck turning movements.

Thank you for the opportunity to review this project.

Sincerely,

Thomas J. Fronapfel

Thomas J. Fronapfel, P.E.
Assistant Director
Planning

TJF:PAF:dg

R 10.1 -The Assistant District Engineer for the Winnemucca District of NDOT was contacted relative to concerns about modifications to the East Battle Mountain Interchange to handle heavy truck traffic. He indicated that the interchange is scheduled for ramp reconstruction this summer and that reconstruction will include changes in ramp radii and/or width to safely handle anticipated truck traffic.

C 11.1

Lander County

315 South Humboldt • Battle Mountain, Nevada 89820 • 702-635-2885 • Fax 702-635-5332

July 9, 1996

Gerald M. Smith
District Manager
Bureau of Land Management
P. O. Box 1420
Battle Mountain, NV 89820

Dear Gerald:

Lander County has received the BLM's comments on the Mule Canyon Mine Draft Environmental Impact Statement. Your comments on transportation are of special interest to Lander County. Lander County and the Nevada Department of Transportation (NDOT) have evaluated all of the alternatives proposed in the comments, and found only alternative #4 to be viable. This evaluation process included several discussions by telephone, meetings between the County Manager and Santa Fe, and this topic was also place on the agenda for a commission meeting. Representatives of NDOT and Santa Fe were present at the Commission meeting to discuss the pros and cons of several alternatives. They selected overlaying the frontage road as the most viable alternative.

The County Commission continually works with the Lander County School District to provide safe bus routes. The Commissioners will work with the School District to take all measures necessary in providing the safest bus route possible on the frontage road.

Lander County will also submit a letter to the Nevada Department of Transportation requesting that the posted speed limit for the frontage road be 45 miles per hour. I hope this letter will give the BLM the assurances it seeks. Please contact our office if we can be of any further assistance.

Sincerely,

Heather Smith Estes

Heather Smith Estes, Chair
Lander County Commissioners

cc: Commissioners
Susan Thompson, Acting County Manager
Chron File

R 11.1 - This letter documents County commitments relative to the transportation impacts discussed in Comment 1.3 and addressed by the corresponding response.

WESTERN SHOSHONE DEFENSE PROJECT

P.O. Box 211106, CRESCENT VALLEY, NV 89821 - Tel(702)468-0230 Fax(702)468-0237

June 26th, 1996

Christopher Stubbs, NEPA Coordinator
Battle Mountain District BLM
50 Bastian Road, P.O. Box 1420
Battle Mountain, Nevada 89820

RE: Mule Canyon Project, Santa Fe Gold

Dear Mr. Stubbs,

C 12.1 First and foremost the Western Shoshone Nation has never given up title to the lands involved with the Mule Canyon Project. The Western Shoshone people were recognized as an independent nation by the 1863 Treaty of Ruby Valley with the U.S. government. This Treaty has never been abrogated and is still in full effect. According to the U.S. Constitution, Article VI, treaties are to be interpreted as the ***"supreme law of the land."*** Nothing in the Treaty relinquished the rights and responsibilities of the Western Shoshone Nation towards the waters which flow through and under their territory. Traditional Western Shoshone believe water is the source of all life. Thus we possess a cultural/spiritual and legal responsibility to protect these waters. The jurisdiction of the BLM and the Nevada State Division of Environmental Protection in permitting the destruction and contamination of water within Western Shoshone territory is invalid. True authority remains with the traditional government of the Western Shoshone Nation, the Western Shoshone National Council. The destruction of water by mining projects like Mule Canyon is a crime against humanity and a crime against all life.

C 12.2 Why was my family not consulted with about this project? We are the closest Western Shoshone community to the project yet we were not contacted. Do our feelings not matter? Apparently we are like the animals to you, voiceless.

C 12.3 I feel that if this project is permitted, Santa Fe Pacific Gold must assume permanent responsibility for water quality at this site. Much of the ground in question contain sulphide ore bodies; and a strong possibility exists for the creation of acid mine drainage and the leaching of heavy metals. Because permanent pit lakes will be created by this mine, what is to prevent the leaching of heavy metals into this water over the course of 25, 50, 75, 100 + years? If Santa Fe feels there will be no such problem then there should be no problem in their assumption of responsibility for these waters. If heavy metal contamination or other contamination of groundwater occurs within these pits how will this be treated and who will pay for it? I suggest a binding contract with Santa Fe for a time period of ***seven generations*** to assume responsibility for the waters flowing into, through, under and over their facilities associated with the Mule Canyon

R 12.1 - Please refer to previous responses R 1.9, R 1.10, R 1.14 and R 6.3 which address the issues of land rights, sovereignty, and impacts to and mitigation for surface and ground water resources.

R 12.2 - Please refer to previous response R 1.5 which addresses the issues of both ethnographic consultation and opportunities for public comment. By law, the BLM is obligated to consult with Native Americans on a government to government basis. As near as it can be ascertained, no member of the Dann Family is either a tribal government representative or a recognized traditional religious leader, nor was any member identified by the professional ethnographer, or any informant, as a person who would have pertinent knowledge of Mule Canyon and/or participate in the consultation process. In addition, historically, members of the Dann family have expressed unwillingness to participate in the consultation process.

R 12.3 - Potential mining-related surface and ground water impacts, including the potential for generation of acid drainage and leaching of heavy metals, are identified and discussed in detail in Sections 4.3.3 and 4.4.3 of the DEIS. As noted in Section 4.3.3.2 of the DEIS and in the referenced *Postclosure Hydrology and Pit Lake Geochemistry Report* (SMI/BCI, 1995b), water quality changes in the final pit lake were modeled for a period of 140 years to the point in time where both the lake level and pit lake geochemistry would stabilize.

A preliminary *Screening Level Risk Assessment* (ENSR, 1995) and expanded *Ecological Risk Assessment* (SMI, 1996) address potential biological hazards associated with the final pit lake and ponds and concluded that potential risks related to the final pit lake would be minimal. The level of risk associated with the two shallow ponds which would develop in the South and West pit areas would be greater since limited pond volumes would be effected to a greater degree by evaporation and the shallow nature of the ponds could lead to establishment of vegetation within the pond area and bioaccumulation effects over time.

C 12.3
Cont.

Project. Only in this way can the health of future generations of Western Shoshone and all of the relations with which we share the land be guarantied. I hope that you will take these concerns very seriously.

Sincerely,

Carrie Dann

Carrie Dann
Western Shoshone Nation

P.S. If the U.S. claims that they have "taken" Western Shoshone lands in some mysterious way, then you must describe the mysterious way that lands can be taken from Indian Nations other than agreements or treaties of cession. The U.S. created and operates IRA "Tribal Governments", which have no jurisdiction off what is known as Trust land.

The proposed Mule Canyon Mine is a further escalation of the genocidal acts perpetrated against the Western Shoshone people. First was the genocidal physical destruction of 98 percent of indigenous peoples. Now it is the total destruction of our beliefs, culture, and traditions. Our lands and liberties are being destroyed against our will and without our consent.

2

(R 12.3 Cont.) As noted in previous response R 2.2, SFPGC has agreed to backfill the areas associated with the shallow ponds contingent on the results of postmining water quality monitoring for these areas in order to effectively mitigate any potential water quality concerns. Discussion of the risk assessments and resulting conclusions is presented in Section 4.8.3.3 and Appendix E. While these discussions focus on potential wildlife impacts, the same considerations would be applicable although to a lesser degree, to potential water quality-related human health hazards.

Under applicable Nevada law, SFPGC is required to monitor pit lakes for a period of up to 30 years following lake stabilization. Given this requirement, SFPGC does have a long-term obligation to assess and mitigate any significant mining-related water quality problems.

Document Submitted by: Western Shoshone Resources Inc.

Researched and Prepared by: Western Shoshone Defense Project

P.O. Box 211106
Crescent Valley, Nevada 89821
phone (702) 468-0230, fax (702) 468-0237

Comments on the Draft Environmental Impact Statement

of Santa Fe Pacific Gold Corporation's

MULE CANYON MINE

BLM Battle Mountain District

The following pages represent our comments concerning the Mule Canyon Mine Draft Environmental Impact Statement. Our evaluation of this document has lead us to the conclusion that the said document is inadequate in the analysis of the potential impacts of this project. As such it does not provide the public with adequate information to judge the impacts of this project. Our recommendation is that this document be redone with additional information to address the issues and concerns expressed in these comments. Based upon the information in our possession, the Mule Canyon Mine would create unacceptable environmental and cultural impacts on the Western Shoshone Nation. We oppose the construction of this project as it is now proposed.

C 13.1

The Treaty of Ruby Valley and Western Shoshone Sovereignty Issues

The Treaty of Ruby Valley has not been discussed in this DEIS. The U.S. Constitution says that treaties are the supreme law of the land, not the 1872 Mining Law or the other federal regulations to which the DEIS makes reference. The 1863 Treaty of Ruby Valley between the U.S. and the sovereign Western Shoshone Nation has never been superseded by any legal means. Therefore, the lands which the Treaty affirms as belonging to the Western Shoshone Nation are still under their jurisdiction. Western Shoshone have often made this objection to BLM actions. The response of the BLM, including most recently in the Record of Decision for the Cortez Pipeline Gold Mine, has been that the Treaty is outside the scope of the BLM's judgment. That may very well be so. That does not entitle the BLM to proceed with actions the legitimacy of which is in doubt. If necessary, the BLM must go to the highest level necessary to validate its authority and its actions. The DEIS does not take the Treaty of Ruby Valley into account in its management considerations, nor does it show that the Treaty has been legally abrogated. If the authority to do so is outside the BLM's jurisdiction, then the BLM does not have the authority to take the action suggested by the DEIS. NEPA requires that the lead agency invite all relevant agencies to participate in the NEPA process. As the Western Shoshone Nation is a sovereign nation, perhaps the U.S. State Department needs to be involved.

R 13.1 - Please refer to previous response R 1.9 which addresses the issue of sovereignty and existing valid rights.

It should be noted that cash payment such as the Claims money, often made reference to by the U.S. government when discussing the land rights issues, does not nullify a Treaty. One does not buy or sell their inherent sovereign rights.–The Treaty was a recognition of these rights by the U.S. In a nation to nation agreement, one nation cannot unilaterally decide that the other side has lost its nationhood, especially by offering money.

The current Draft **United Nations Declaration On The Rights of Indigenous Peoples**, which the U.S. is a party to, supports the claims of the Western Shoshone Nation. Articles 36, 30 and 26 are particularly relevant:

Article 36

Indigenous peoples have the right to the recognition, observance and enforcement of treaties, agreements and other constructive arrangements concluded with States or their successors, according to their original spirit and intent, and to have States honor and respect such treaties, agreements and other constructive arrangements. Conflicts and disputes which cannot otherwise be settled should be submitted to competent international bodies agreed to by all parties concerned.

Article 30

Indigenous peoples have the right to determine and develop priorities and strategies for the development or use of their lands, territories and other resources, including the right to require the States obtain their free and informed consent prior to the approval of any project affecting their lands, territories and other resources, particularly in connection with the development, utilization or exploitation of mineral, water or other resources. Pursuant to agreement with the indigenous peoples concerned, just and fair compensation shall be provided for any such activities and measures taken to mitigate adverse environmental, economic, social, cultural or spiritual impact.

Article 26

Indigenous peoples have the right to own, develop, control, and use the lands and territories, including the total environment of the lands, air, waters, coastal areas, sea-ice, flora and fauna and other resources which they have traditionally owned or otherwise occupied or used. This includes the right to the full recognition of their laws, traditions and customs, land-tenure systems and institutions for the development and management of resources, and the right to effective measures by the States to prevent any interference with, alienation of or encroachment upon these rights.

These articles in the U.N. Declaration support our contention that the Western Shoshone Nation has a sovereign right in determining which projects may occur within their traditional land base. U.S. and specifically BLM policy to this point in time has been in violation of these articles. The Mule Canyon DEIS is particularly deficient because it fails to address the issue of Western Shoshone land rights and the impact of this mine on "resources" of extreme importance to the continuing existence of the Western Shoshone Nation, i.e. water, plants and animals. The Western Shoshone Nation has not given its "free and informed consent" to this mining project. Fair compensation and mitigation as required by Article 30 of the U.N. Declaration has not been provided for the destruction of water resources in the Mule Canyon area.

Some confusion exists around the provisions in the Treaty of Ruby Valley which permit mining in Western Shoshone territory. The U.S. Supreme Court has ruled that treaties are to be interpreted as they were understood at the time of signing. This ruling is further reinforced by Article 36 of the U.N. Declaration which states that such treaties are to be recognized and enforced according to their original spirit and intent. In 1863 mining was of an entirely different nature. The Western Shoshone in no way agreed to the scale, intensity, or form of modern open pit heap leach gold mining.

Included with these comments is a copy of a paper entitled "An Inquiry into the Rights of the Western Shoshone Nation" written by Steve Newcomb of the Indigenous Law Institute. We would like this included as part of our comments.

AN INQUIRY INTO THE RIGHTS OF THE WESTERN SHOSHONE NATION

by Steve Newcomb, Director, Indigenous Law Institute

Introduction

Mary, Carrie, and Clifford Dann continue to live under the constant threat of being forced off their lands by the federal government of the United States. The United States contends that the Danns and all other Western Shoshones have lost their land rights because of "gradual encroachment" by the dominant society. This novel and fraudulent fiction would have us believe that the Western Shoshones have no right of free consent. In other words, according to the federal government's view of reality, the Western Shoshones can be deprived of their lands against their will. It is clear that the United States is asserting a right of empire and dictatorial powers over the Western Shoshones under color of law. This means that while it may appear to be "law", it is simply a pretension on the part of the United States.

This behavior on the part of the United States is understandable given its origins. As George Washington wrote in 1786: "However unimportant America may be considered at present...there will assuredly come a day, when this country will have some weight in the scale of Empires...Altho' I pretend to no peculiar information respecting commercial affairs, nor any foresight into the scenes of futurity; yet as the member of an infant empire ...I cannot help turning my attention to this subject..." (emphasis added) (Cited in Richard Van Alstyne's, The Rising American Empire, p. 69, 1960)

The Western Shoshones are under siege because the American Empire will stop at nothing to seize all Indian lands, and against the true law of this continent, which is Traditional Native Law. As the Congregational minister Jedediah Morse of Boston predicted in his book American Geography in 1789, "it is well known that empire has been traveling from east to west. Probably her last and broadest seat will be America... We cannot but anticipate the period, as not far distant when the American Empire will comprehend millions of souls, west of the Mississippi." (Van Alstyne, Ibid.) It is this very empire that now threatens the Western Shoshones with genocidal dispossession In our view, any discussion of Indigenous human rights must take place within the context of empire and domination, dating back to the time of Cristobal Colon (Columbus) and to the Inter Cetera papal bull of 1493.

The following inquiry is meant to pose a different line of thought than the one maintained by the U.S. federal government. What follows is only a tentative first step toward redefining the rights of Native and Indigenous First Nations. Please ask yourself, if George Washington's "infant empire", which is now full-grown, can deprive the Western Shoshones and other Native peoples of their lands and their liberty how do you know that you won't be next in line?

Question: What was the status of the Western Shoshone Nation when it made the Ruby Valley Treaty with the U.S.?

Answer: Before the Ruby Valley Treaty, the Western Shoshones were "a people distinct from others," which is exactly how Chief Justice John Marshall defined the word 'nation' in the U.S. Supreme Court ruling Worcester v. Georgia. A Marshall stated in Worcester:

> The term 'nation', so generally applied, means 'a people distinct from others.' The constitution, by declaring treaties already made, as well as those to be made, to be the supreme law of the land, has adopted and sanctioned the previous treaties with the Indian nations, and, consequently, admits their rank among those powers who are capable of making treaties. The words 'treaty' and 'nation' are words of our own language, selected in our diplomatic and legislative proceedings by ourselves, having each a definite and well understood meaning. We have applied them to Indians as we have applied them to other nations of the earth. They are applied to all in the same sense. (emphasis added) (6 Peters, 559, 1832)

Thus, the words 'nation' and 'treaty' are to be applied to the Western Shoshone in the same way those terms are applied to the other nations of the earth. The Ruby Valley Treaty is an acknowledgment on the part of the U.S. that the Western Shoshone Nation is to be regarded as existing among "those powers who are capable of making treaties."

Question: Yes, but isn't there a major difference between a treaty which the U.S. makes with an Indian nation, and a treaty which it makes with nation-states?

Answer: As a matter of fact this question was answered by the above quote from Worcester. But another case has also dealt with this question. In the case Turner v. American Baptist Missionary Union, a Michigan federal district court stated :

> It is contended that a treaty with an Indian tribe has not the same dignity or effect as a treaty with a foreign and independent nation. This distinction is not authorized by the constitution. Since the commencement of the government, treaties have been made with the Indians, and the treaty-making power has been exercised in making them. They are treaties within the meaning of the constitution, and as such are the supreme laws of the land.

When federal officials make the argument that the Ruby Valley treaty does not carry the same weight as a treaty which the U.S. has entered into with, say, France or Great Britain, they are making an argument that is "not authorized by the constitution."

***Question:* But how are we to know what rights the Western Shoshones had to their lands and their liberty when the Ruby Valley Treaty was made?**

Answer: According to the international law standards of the Christian Commonwealth, "the authority of a nation within its own territory is absolute and exclusive." (Church v. Hubbart, 2 Cranch, 187, 234). Since the word "nation" is correctly applied to the Western Shoshones, as it is correctly applied to any other nations on earth, the authority of the Western Shoshone Nation within its own territory was absolute and exclusive at the time it entered into the treaty of Ruby Valley with the United States and continues to be absolute and exclusive to this day.

With regard to the liberty of the Western Shoshones, in the case Johnson v. McIntosh (8 Wheaton, 543, 1823), Chief Justice John Marshall observed that it was "impossible to 'govern' the Indians 'as a distinct people.' Why? Because they were as brave and as high spirited as they were fierce, and were ready to repel by arms every attempt on their independence." Of the Louisiana purchase, Marshall observed that it was the purchase of a country that was already in the possession of Indian peoples "who are in fact independent."

Supreme Court Justice Joseph Story also commented on the independent spirit of the Indians. The Indians loved the fact that they were free and independent and fought courageously to defend their lands and their liberty. As Story noted in his Commentaries on the Constitution of the U.S.:

> There is no doubt, that the Indian tribes, inhabiting this continent at the time of its discovery, maintained a claim to the exclusive possession and occupancy of the territory within their respective limits, as sovereigns and absolute proprietors of the soil. They acknowledged no obedience, or allegiance or subordination to any foreign sovereign whatsoever; and as far as they have possessed the means, they have ever since asserted this plenary right of dominion, and yielded it up only when lost by the superior force of conquest, or transferred by a voluntary cession.

By looking at history in this manner can we understand what rights the Western Shoshone Nation had to their lands and their liberty at the time of the Ruby Valley Treaty. Clearly the Western Shoshones were "a people distinct from others," making them a "nation", but they were also a free and independent nation when they entered into that treaty of peace and friendship with the U. S. of America in 1863. When the Western Shoshones entered into that treaty, presumably it was to protect their lands and their liberty. To this day, the Western Shoshones have never freely agreed to give up their lands or their liberty.

***Question:* But I thought the courts of the U.S. held that the Western Shoshone lost their land rights due to "gradual encroachment"?**

Answer: As I have already explained, Indian people can not lose any of their rights to their liberty or their property without their free consent, and the Western Shoshones have never freely consented to relinquish their rights to their Western Shoshone Territory.

But let me approach your question in a different way. In 1787, the Continental Congress enacted what is known as the Northwest Ordinance, which states in part:

> The utmost good faith shall always be observed towards the Indians, their lands and liberty shall never be taken from them without consent; and in their property, rights, and liberty, they never shall be invaded or disturbed, unless in just and lawful wars authorized by Congress; but laws founded in justice and humanity shall from time to time be made, for preventing wrongs being done to them, and for preserving peace and friendship with them...(Journals of the Continental Congress, 32:340-41)

Now, let me ask you this, if the Western Shoshones were stripped of their lands by "gradual encroachment" weren't they also "invaded" and "disturbed" in "their property, rights and liberty" which the U.S. federal government forces the Western Shoshones to give up their lands against their will, aren't their "lands and liberty" being "taken from them without their consent."?

***Question:* Well, those are good questions from a rhetorical standpoint, but wasn't the provision you quoted from the Northwest Ordinance simply a kind of ceremonial statement rather than a declaration of policy? Besides, the Northwest Ordinance was written and enacted while the present Constitution for the U.S. of America was still being drafted. How do we even know the Northwest Ordinance is still binding on the U.S. by law?**

Answer: Since the early 1940's the Northwest Ordinance has been cited in court ruling 142 times. It is definitely still "valid law," having been reenacted into by the first Congress that was convened under the present Constitution. Indeed, the Northwest Ordinance has been referred to by the courts as part of "the basic organic law of the U.S." As such, principles set forth in the ordinance are foundational principles of the U.S., and therefore still very much operative and binding the federal government. They are principles by which the federal government bound itself.

But there is an additional piece of information that you are probably not aware of. In 1848, after the Treaty of Guadalupe Hidalgo between the U.S. and the United Mexican States, the U.S. Senate passed a resolution "to establish suitable Territorial governments for California, for Deseret, and for New Mexico." Additional language was then added to the resolution, securing "to the inhabitants of those territories all the privileges and liberties secured to the inhabitants of the Northwest Territory by the Ordinance of July 13, 1787." The territories referred to as "California" and "Deseret" included the Western Shoshone Territory.

When Congress passed "An Act to organize the Territory of Nevada" in 1861, the legislation was worded consistent with the Northwest Ordinance of 1787. The act establishing the Territory of Nevada reads in part:

> nothing in this act shall be construed to impair the rights of person or property pertaining to the Indians in said territory, so long as such rights shall remain unextinguished by treaty between the U.S. and such Indians, or to include any territory which, by treaty, with any Indian tribe is not without the consent of said tribe, to be included within the territorial limits, or jurisdiction of any state or territory; but all such territory (pertaining to the Indians) shall be excepted out of the boundaries, and constitute no part of the territory of Nevada, until said tribe shall signify their assent to the President of the U.S., to be included in said territory..."

The above passage becomes all the more important in light of Section 16 of the Act establishing the Territory of Nevada: and be it further enacted, that the constitution and all laws of the U.S. which are not locally inapplicable, shall have the same force and effect within the said territory of Nevada as elsewhere within the U.S.

When Congress established the Territory of Nevada the Western Shoshone Territory was left out of the boundaries of the Nevada Territory. Congress acknowledged that the Western Shoshone lands would constitute "no part of the Territory of Nevada", until such time as the Indians should freely consent, in a treaty with the U.S., to have their lands "included in the said territory". Furthermore, Section 16 quoted above says nothing about the constitution and laws of the U.S. having any force or effect within the boundaries of any Indian Territory, or over any Indian nation or people without the Indians' free consent.

What this means, then, is that the Western Shoshones' free and independent status as a nation can not be justly narrowed or extinguished against the will of the Western Shoshones, without free consent. To this day, the Western Shoshones continue to possess inherent fundamental rights to their lands and to their liberty by virtue of their existence as a distinct people, and a NATION. And none of their rights can be taken from them by any non-Western Shoshone government which would presume to govern them against their will.

This disqualifies the argument that the U.S. may unilaterally "extinguish" the territorial rights of the Western Shoshone Nation, or that the Western Shoshone lost their rights to their liberty and their territory based on "gradual encroachment." Such an extinguishment is not permissible pursuant to the Ruby Valley Treaty, which according to Article Six, section two, of the Constitution for the U.S. is the "supreme Law of the Land" of the U.S. of America and therefore binding on the whole nation.

Question: **How do you know that the Treaty of Ruby Valley is binding on the United States?**

Answer: On April 13, 1787, the secretary for foreign affairs issued a letter to Congress for its consideration. If adopted, the letter was to be sent to the respective states regarding the subject of treaties. The letter was considered and unanimously agreed to by the Continental Congress.

The letter mentioned that Great Britain had complained of violations of the 1783 treaty of peace between Britain and the United States, and went on to advise the states as to the nature of treaties. As the letter stated:

> When therefore a treaty is constitutionally made, ratified and published by us (the Congress), it immediately becomes binding on the whole nation, and superadded to the laws of the land, without the intervention of the state legislatures. Treaties derive their obligation from being compacts between the sovereign of this and the sovereign of another nation... Hence it is clear, that treaties must be implicitly received and observed by every member of the nation....(Secret Journals of the Acts and Proceedings of Congress, From The First Meeting Thereof To The Constitution, By The Adoption Of The Constitution Of The United States, Vol. IV, p. 331, 1821)

Alexander Hamilton, in The Federalist Papers (no. 75), said that treaties are "CONTRACTS with foreign nations which have the force of law, but derive it from the obligations of good faith. They are not rules prescribed by the sovereign to the subject, but agreements between sovereign and sovereign."

In John Jay's opinion, treaties "are just as binding and just as far beyond the reach of legislative acts now as they will be at any future period, or under any form of government." Clearly, treaties formed pursuant to the new Constitution for the United States of America were also binding on the whole nation, and could not be unilaterally altered or amended by the United States without the consent of the other party to the treaty.

Question: Some people in the U.S. federal government contend that the Western Shoshone Nation is only a "domestic dependent nation: as articulated in the Supreme Court ruling Cherokee Nation v. Georgia 30 U.S. (5 Pet.) 1L. Ed. 25 (1831). Are they correct?

Answer: No. Such U.S. government officials are mistaken. They probably do not understand the significance of the Ruby Valley Treaty. Such U.S. government officials have not considered that Chief Justice Marshall stated in Cherokee Nation, that Indians "may, more correctly, perhaps, be denominated domestic dependent nations." Besides an Indian treaty is to be interpreted as the Indians understood the treaty when it was made (Worcester v. Georgia). The only way for the "domestic dependent nation" argument to apply with regard to the Treaty of Ruby Valley is if it could be shown, which it cannot, that the Western Shoshones understood and agreed in the Treaty of Ruby Valley to allow themselves to be defined as a "domestic dependent nation."

Question: What about the argument that the Western Shoshone Nation only has a right of "aboriginal title" to its lands and territories? Is this a valid argument?

Answer: It is not for the United States to define the land rights of Western Shoshones. The Western Shoshone Nation has the right to define its own land rights within its own territorial boundaries. The notions of "aboriginal title," "native title," "original Indian title," and so forth, were definitions created by the United States, and then unilaterally imposed on Native nations and peoples. Beginning with the premise that the term "nation" is properly applied to the Western Shoshones, it must therefore follow that the Western Shoshones also possess rights of territorial sovereignty, territorial integrity, as well as what Vattel termed the rights of "empire" and "domain". As Vattel pointed out:

> the general domain of the nation is full and absolute, since there exists no authority upon earth by which it can be limited: it therefore excludes all right on the part of foreigners. And as the right of a nation ought to be respected by all others, none can form any pretensions to the country which belongs to that nation, nor ought to dispose of it without her consent, any more than the things in the country. (Emmerich de Vattel, The Law of Nations, (1758), p. 164)

Because the Western Shoshone have the inherent right of the "general domain" over their territory, and because such a right of "domain" is "full and absolute," this "excludes all right on the part of" the United States. Therefore, the United States may not, based on any moral power, legitimately "form any pretensions to the country which belongs to" the Western Shoshone Nation.

Conclusion

According to the principles outlined above, we begin to get a more accurate picture of the Western Shoshone Nation's rights. The Western Shoshone were originally free and independent. They had the sole power of decision-making over their territory. They had the absolute right to keep others away from their lands, or else to allow visitors to come onto their lands only after having obtained permission. The Western Shoshones were "a people distinct from others," which was how Chief Justice Marshall defined a "nation" in Worcester. But not only were the Western Shoshones a NATION, they were "in fact independent" at the time of Christian European contact.

This means that the Western Shoshone are rightfully entitled to remain a free and independent nation or people, their right to that status cannot be taken from them against their will. They cannot be legitimately deprived of their rights by any non-Western Shoshone nation or people. They cannot be deprived of their lands, or their rights if they are tricked into doing so by any artifice, fraud, or duress on the part of the non-Western Shoshone people.

Contrary to what it will assert, the United States has no legitimate or rightful authority over the Western Shoshone Nation. Furthermore, the United States Congress cannot legitimately "take" any portion of the Western Shoshone Nation's territory. Because the individual States never delegated to the federal government of the United States any power to "take" the lands of other nations or peoples (the States not having any such power to delegate), it must follow that there is nothing in the U.S. Constitution that could be construed as giving the federal government the power or authority to "take" even one square inch of an Indian nation's lands.

Therefore, at the present time, the Western Shoshone nations still has inherent rights to the lands within its Territory. Its territorial rights are full and absolute, and thus exclude any pretensions on the part of the United States. This also means that the Western Shoshone Nation's lands are as foreign to the jurisdiction of the federal government of the United States as the United States is foreign to, say, Canada or Mexico. At the time the U.S. Constitution was drafted, the respective States had no authority over the Western Shoshone Nation, and hence had no such authority to delegate to the federal government.

C 13.2

Significant Impacts to Water

The Mule Canyon Mine's destruction and contamination of water represents the most severe impact of this project. Destruction of this water constitutes an ecological and cultural genocide for the Western Shoshone. Water is the source of all life. All water is connected. Water is sacred as are the springs it flows from. The BLM, the State of Nevada and Santa Fe Pacific Gold are knowingly destroying water (drying up springs and leaving contaminated pit lakes) if this project is permitted. This is a crime against nature and a crime against humanity.

The DEIS lists 23 cold water (non-thermal) springs within the project area:

- 15 at or near the mine
- 4 southwest of the mine
- 2 north of the mine
- 2 northeast of the mine

On page 4-22, the DEIS lists the following impacts to springs, demonstrating that almost half of the springs identified could be significantly affected.:

- loss of 2 springs from direct surface disturbance and excavation
- significant reductioo in 4 springs, with potential to dry up completely
- discharge from 4 springs could be reduced

- "Other springs located along the flanks of the northern Shoshone Mountain Range would not be affected, due to their location well down gradient from the mining operations.

What all this means is the loss of a unique ecological zone. On page 3-89, the DEIS states that "The Project Area contains a high density of springs compared to other areas within the Great Basio." If so, then wouldn't a mine in the Project Area be severely impacting a rather unique ecological area? In addition, the Project Area is located within the Pacific Flyway for waterfowl.[1]

The impacts to springs will have a significant impact to the wildlife in the area, due to reduced water quantity and also to contaminated water sources.[2] Unfortunately the BLM has failed to accurately assess the loss of these wetlands to wildlife. There is no documentation or evaluation of wildlife use of specific water sources, or any evaluation of the wildlife/plant life value of the springs, seeps and other wetlands in the project area. A single paragraph states that wetland functions and values were evaluated for five undefined assessment areas (values or functions) and that "most functions and values were rated as moderate or low, with a few rated as high." Now how is an informed member of the public to interpret that piece of useless information? The extreme importance of springs and seeps to wildlife in this arid area would suggest that this should be a topic of extensive evaluation on a project which threatens to destroy these water sources.

Destruction of these water sources will prevent effective wildlife or grazing use of uodisturbed areas around the mine. The impact on mule deer critical range is especially bad because of the downward trend in herd numbers. Many Western Shoshone consider hunting to be an integral form of cultural/spiritual expression thus such destruction of mule deer habitat

[1] DEIS p.3-90.

[2] DEIS p. 4-46.

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R 13.2 - Please refer to previous responses R 1.6, R 1.10, R 2.2, R 2.7, R 5.6, R 6.3, and R 12.3 which address the issues of mining-related impacts on springs and seeps and other hydrologic impact, protection, and mitigation considerations. As noted in responses R1.6 and R2.7, potential mining-related impacts on seeps and springs are clearly identified in the DEIS and loss or impairment of flow from existing springs and seeps will be mitigated by SFPGC through installation of wells or guzzlers in consultation with the BLM, NDOW, and affected grazing permittees.

The characterization of springs as a "unique ecological zone" is partially correct and is specifically addressed in Section 3.8.3 of the DEIS. Detailed evaluation of the wetland vegetation type which may be associated with area springs was completed using methods prescribed by the U.S. Army Corp of Engineers as outlined in the *Proposed Wetland Deliniation and Other Waters of the U.S. Inventory* (RCI, 1995) and *Mule Canyon Project - Weland Evaluation for Functions and Values* (RCI, 1995). These evaluations included characterization of any unique characteristics or values of the subject wetland areas with respect to ecological relationships. Based on these evaluations, certain areas were designated as wetlands and SFPGC has applied to the Corp of Engineers for a 404 Permit for disturbance of portions of the designated wetlands areas. As noted in Section 4.6.3 of the DEIS, only 0.1 acre of wetlands would be disturbed by the proposed mine development activities and related impacts are discussed in the referenced section. Other project-related impacts to wildlife and other resources are identified and discussed in the appropriate sections of Chapter 4 of the DEIS.

(R 13.2 Cont.) Guzzlers, which are essentially manmade runoff catch basins, will function without maintenance for extended time periods if properly installed. With respect to wells, the commentor is correct in stating that long-term maintenance is required to assure a consistent water supply. Since wells would be utilized primarily for stock watering, however, agreements relative to long-term maintenance or provisions for transfer of the wells to the surface landowner or leasee will effectively address any direct associated livestock impacts. Strictly as a water source, there would be little difference between a natural spring or a guzzler or well. As noted above, certain unique habitat values associated with springs would be affected by the proposed mining operation, however, the total area affected would be very small and the related impacts have been considered in developing project mitigation plans.

C 13.2
Cont.

represents not only an ecological loss but a cultural/spiritual loss as well. The DEIS claims that only 2% of crucial winter range and 1% of yearlong range would be lost, but this percentage is in terms of total acreage. All land is not used equally and the loss of springs and wetland areas creates a disproportionate loss of habitat which is not accounted for in the DEIS. Loss of habitat is also described as temporary which is inaccurate. Water sources will be lost permanently and reclamation has failed to restore any mine sites to its pre-mine condition. We have serious reservations about the potential for reclamation which will be discussed later.

C 13.3

Not only is the pit lake water a source of toxic metals and minerals, the waste rock dumps, heap leach pads and tailings facilities provide sources for the long term release of toxic substances. Post closure surface run off during periods of high moisture (rain and snow) would exceed State water quality standards. The period of time that this contaminated runoff can be expected to occur has not been predicted. Wildlife use of this surface runoff has not been evaluated. Plant and animal bioaccumulation of runoff constituents such as selenium has not been addressed. While it seems most of the mine facilities will produce contaminated runoff, no consideration has been given to the cumulative effects of this, especially when this will occur for decades, if not centuries after the closure of the mine. The DEIS claims that waste dumps high in sulfide will be isolated with oxide ore. The long term effectiveness of this isolation is highly questionable because of the steep slopes of the dumps and the high erosion potential.

The tailings impoundment will lead to water contamination and provide a long term source of contaminants. If liquid tailings need to be isolated in a pond lined with an impermeable layer, it seems common sense that the entire tailings facility should be lined with an impermeable layer as well. The proposed clay layer will "limit" migration of tailings fluid into groundwater according to the DEIS. The linings of the tailings pond should completely stop any leakage of tailings fluid into the groundwater. In the event that a leak is detected in the tailings or heap leach facilities, how is this leak going to be stopped? The concentrated nature of metals in the leftover tailings creates an effective time bomb. Gradually wind and water will wear away any layer on the surface exposing the toxic innards. How is this going to be prevented?

The creation of permanent pit lakes is unacceptable. These will create a permanent loss of groundwater through evaporation which would otherwise not occur. The water quality of these pit lakes would be very bad. Modeling in the DEIS indicates this as does the fact that this is a sulfide ore body. The exposure of wildlife to these contaminated waters is unavoidable. The mine site is located on the Pacific Flyway for migratory waterfowl, and adjacent to the Humboldt River, a popular stop over point. Exposure of wildlife to toxic constituents of the pit water can lead to bioaccumulation. When the other pit lakes which are presently being created (Pipeline, Newmont/Barrack, etc.) are taken into account, the potential to slowly poison wildlife especially waterfowl and birds of prey, is great. The cumulative impact of all these pit lakes must be evaluated. They do not exist in isolation of one another.

The DEIS states that a comprehensive Risk Assessment is being completed to evaluate the potential impacts of pit lake water quality on wildlife. **Why has this DEIS been released without the completion of this assessment!? This is perhaps the most environmentally destructive impact of the project and its evaluation has been left out of the DEIS. The public is being asked to comment on a grossly incomplete document.** Risk Assessments are a relatively new art to the public and land management agencies. As such it is necessary to provide in the DEIS a detailed description of the process used to develop the risk analysis, including the parameters, assumptions, and models used. Many subjective decisions and

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R 13.3 - Responsibility for the prevention of degradation of the Waters of the State is addressed by applicable laws of the State of Nevada as administered by the NDEP. The NDEP has approved and issued Water Pollution Control Permit NEV94110 for the Mule Canyon Project reflecting consideration of all potential sources of surface and ground water contamination and stipulating specific control, mitigation, and monitoring measures which will be implemented to prevent water quality degradation. A copy of this permit is included in the Project File. Postclosure monitoring, as required by the NDEP Water Pollution Control Permit, will determine actual water quality trends. Based on monitoring results, the need for any mitigation will be assessed and appropriate mitigation measures will be developed or modified and implemented based on applicable provisions of the Nevada Administrative Code, SFPGC's approved Water Pollution Control Permit, and best management practices. This approach takes into consideration both current standards and existing data while providing the flexibility necessary to reflect regulatory changes and advances in mining, reclamation, and environmental technology and methods.

The *Baseline Hydrology and Geochemistry Report* (SMI/BCI, 1995a) characterizes both ore and overburden/interburden materials as well as surficial materials for the site. Surficial materials to be utilized as growth media have not been identified as containing any potentially toxic or hazardous constituents. The proposed reclamation plan includes regrading to a geotechnically and erosionally stable configuration and replacement of growth media over disturbed areas. The regraded configuration is designed to minimize runoff velocities and flow volumes, effectively limiting erosion potential. Replacement of growth media and a protective oxide layer on sulfide disposal areas will prevent direct contact between surface runoff and disturbed or excavated materials once reclamation is completed. Revegetation is an important component of the proposed reclamation plan since effective reestablishment of vegetative cover will stabilize surface materials and prevent or minimize surface erosion.

C 13.3
Cont.

assumptions are inherent in the risk assessment process and it is necessary that the public be aware of these assumption in order to make informed comments.

No credible mitigation is offered for the destruction or contamination of water. One sentence in the entire document reads: "The only supplemental mitigation which would be justified to address long-term water supply impacts would be water supply developments such as guzzlers, catch basins, or wells to mitigate loss of or reduction in flow from springs and seeps." No further elaboration on the effectiveness of this mitigation, the cost, who would pay for it, and how it would be implemented are included. The public is left with the feeling that this possible mitigation is not being taken seriously by the BLM or Santa Fe Pacific Gold.

The drilling of wells, creation of water catchments and the installation of guzzlers, if it was to occur, does not mitigate the loss of natural water sources. Springs and seeps flow naturally, without the intervention of man. Their water is free to all wildlife, and will flow as long as the Creator desires. The proposed mitigation requires the time, material and money of man to create and maintain them. They will last only as long as there is time, money, materials and man to maintain them. Often they are not as useful to plant and animal life as a natural spring or seep would be. These man made creations also do not possess the spiritual integrity that a natural spring or seep would.

It is our understanding that the creation of a pit lake which would degrade the waters of the State is illegal under NDEP regulations, yet this exactly what is going to happen. This presents long term impacts long after the closure of the mine. **We feel that Santa Fe Pacific Gold must retain full responsibility for any future impacts associated with this project.** The offer to monitor pit lake water quality for three years after closure is ludierous, insulting and unacceptable! The BLM should be aware that under NEPA regulations "monitoring" does not constitute mitigation. Nowhere in the DEIS has there been any description of how degraded water quality in the pits would be remediated or cleaned up. There is a suggestion that material could be backfilled into the pits above the water level, but no real analysis has been done. Elsewhere in the document the potential for backfilling is described as very limited. At the June 5th public hearing in Battle Mountain the BLM responded that "there is very little opportunity to backfill any pit." If there is any doubt to the accuracy of this quote we have it on video tape. Even if the backfilling to water level were possible that still wouldn't prevent the creation of contaminated water, it would simply make the surface inaccessible to wildlife.

Monitoring of pit lake water quality and migration must occur for hundreds of years in the future. It also must be accompanied by a realistic and effective plan to deal with the water contamination. We do not see any commitment by the BLM, the State or Santa FE Pacific Gold to deal with these issues. It is also apparent that no plans for long term monitoring or cleanup exist. If mining is to occur on the so called "public lands" then the public is entitled to a firm commitment of accountability by the companies mining and the agencies overseeing this activity. As Western Shoshone people, we intend to remain on our lands for as long as the Creator wishes, far longer than Santa Fe Pacific Gold or the BLM will be around. Because of this we must look out for the long term effects of these projects. It is both our right and our responsibility to determine what activities take place on our ancestral homelands.

Two springs will be completely destroyed with a high likelihood that four to eight more may be dried up or have their flow reduced yet the BLM has the audacity to claim that there will be no cumulative impacts to groundwater quantity or quality.

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(R 13.3 Cont.) Given these material, design, and reclamation considerations, the potential for contamination of surface runoff from reclaimed mine disturbance areas is negligible. Runoff water quality will be monitored following mine reclamation and closure as required by the NDEP. If runoff water quality does not meet applicable State standards, SFPGC will be responsible for mitigating any adverse water quality impacts which may involve collection and treatment of runoff pursuant to applicable provisions of the Water Pollution Control Permit.

Design of the overburden and interburden disposal areas included erosional analysis of the proposed and alternative disposal area configurations as described in Section 2.4.8 of the DEIS. Erosional stability calculations are included in Appendixes C and D of the Mule Canyon Project Plan of Operations (SMI, 1994).

Please refer to previous response R 2.9 which addresses concerns relative to the adequacy of the composite soil liner and characteristics of the growth media cover for the proposed tailings facility. The tailings facility liner design incorporates a hydraulic relief layer designed to limit hydraulic pressure on the liner to no more than two feet of head (0.9 psi). By minimizing fluid pressure on the liner, the potential for seepage through the liner is minimized. Use of the hydraulic relief system above the soil liner will also increase the rate of drainage and densification for overlying tailings. Laboratory consolidation tests performed on tailings samples from pilot-scale process testing resulted in an estimated hydraulic conductivity of about 1×10^{-6} to 1×10^{-7} cm/sec. Based on the preliminary testing, the consolidated tailings will have a permeability similar to the design liner specifications with little potential for any significant long-term infiltration into or through the consolidated tailings. Also refer to Section 4.3.3.5 of the DEIS for discussion of tailings water quality and the potential for long-term leachate generation.

(R 13.3 Cont.) Under NAC 445A.446, SFPGC is required to monitor the permanent pit lake for a period of up to 30 years following stabilization. Additionally, NAC 445A.429 requires the State to assure that the pit lake will not result in adverse effects on human health or terrestrial and avian wildlife. A risk assessment based on projected pit lake water quality indicates little long-term health or wildlife risk as summarized by previous responses R 2.2 and R 12.3 and Appendix E of the FEIS. SFPGC will post a performance bond to assure that pit lake monitoring and mitigation, if necessary, are completed per applicable provisions of the NDEP Water Pollution Control Permit. In addition, the requested impact study of pit lakes in Northern Nevada represents a regional or comprehensive impact analysis rather than a cumulative impact analysis and is beyond the scope of the Mule Canyon EIS.

Please refer to previous responses R 2.2, R 4.3, and R 12.3 which address questions regarding both the preliminary and expanded risk assessments. It should be noted that the DEIS discussed the results of the initial risk assessment in general terms and deferred to the expanded risk assessment for quantitative measurement of potential risks associated with the final pit lake and shallow ponds. From an impact standpoint, the potential impacts noted in the DEIS were more severe than actually indicated by the expanded risk assessment so the DEIS provided a full, albeit overly conservative, analysis of potential mining related impacts.

As stated in Section 4.3.3.2 of the DEIS, modeling indicates that neither the permanent pit lake nor shallow ponds projected to develop following completion of mining would discharge to the surface or ground water systems since these features would act as ground water sinks. Therefore, development of the pit lake and shallow ponds is not expected to result in any degradation of surrounding surface or ground water resources. Ultimately, the pit lake would become waters of the State of Nevada. Applicable water quality standards at that time would depend on any potential beneficial use of the lake. Since use of the lake as a drinking water supply for humans or livestock, use for irrigation purposes, and/or use as a fishery or for aquatic habitat are not contemplated, standards established to protect these uses are not applicable.

Please refer to previous responses R 1.15, R 1.16, and R 2.5 relative to the issue of the potential for pit backfilling. The statement that, "there is very little opportunity to backfill any pit", is not quite accurate. The actual quote as documented by the Public Meeting transcript (page 28, line 2) was that, "there is very little opportunity to backfill any of the pits with anything other than oxide material,...". This statement was made by a SFPGC representative in reference to the fact that the pits could not be backfilled with sulfide material (as opposed to oxide material) for environmental reasons.

C 13.4

Geologic Instability

The mine site is located in a geologically unstable area. The use of the MPE (Maximum Probable Earthquake) for design criteria on the waste dump and tailings facilities is inappropriate. Because of the permanent nature of these structures and the need to permanently isolate their contents, design should be based on the MCE (Maximum Credible Earthquake) Because Santa Fe Pacific Gold will probably not be in existence in several hundred years it seems prudent to design these facilities very conservatively to protect the future inhabitants of this area.

C 13.5

Consideration of Potential Future Access to Minerals in Deciding Whether or Not to backfill pits

In discussing the relevant factors in deciding whether or not the open pits will be backfilled, the DEIS includes the consideration of whether or not backfilling might be an obstacle to potential future access to gold.

The Plan of Operations for which the Mule Canyon Mine DEIS was designed only deals with the exploitation of gold deposits which Santa Fe Pacific Gold Corporation considers economically recoverable under current market and technological conditions.

The DEIS, then, should also consider environmentally preferable alternatives with respect to the current project as outlined in the Mule Canyon Mine PO. An EIS should not be making determinations on environmental reclamation techniques based upon purely hypothetical, potential future scenarios which have no basis in currently available data.

In rejecting the alternative of total backfilling of all pits, the DEIS states on page 2-6:

> Partial or complete backfilling of mine pits would eliminate access to any remaining lower grade ore remaining in the pits and could preclude future recovery and utilization since the value of the remaining ore would have to be sufficiently high to support re-excavation of any backfilled materials.

As to whether or not the Main Pit will be backfilled, the DEIS, on page 2-36, questions:

> Will backfilling prevent or limit access to remaining mineral resources which could not be economically recovered at the time but might reasonably be recoverable in the future?

This should not be a criteria for whether or not to backfill a pit. The EIS is for the project described in the Plan of Operations. If the PO is drawn up with certain parameters in mind, including designing the project around what is currently "economically feasible," then under NEPA, the decision of whether or not to backfill any of the pits should not rest on vague, unknown future scenarios of what "might be." What constitutes "reasonably. . . recoverable in the future?" The unknown future seems too arbitrary to be a viable consideration. When the project, as outlined in the PO and the DEIS, is completed, backfilling should be completed if it is environmentally preferable.

If the BLM wants to talk about the need for Santa Fe to exercise "cost efficiency," then why don't they use the definition provided in the DEIS itself? "Cost efficiency is usually measured using present net value. . ." Present value, i.e., not hypothetical possible future scenarios, like future gold extraction.

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R 13.4 - Mine-related facilities have been designed in accordance with all applicable requirements as established in State law. As the responsible jurisdictional authority, the NDEP has reviewed the proposed facility designs and has issued both a Reclamation Plan Approval and Water Pollution Control Permit for the Mule Canyon Mine. Any concerns relative to the adequacy of the design requirements should be addressed to the NDEP at the following address:

Nevada Division of Environmental Protection
201 South Fall Street
Carson City, Nevada 89710
(702) 687-4670

R 13.5 - Please refer to previous responses R 1.16 and R 2.5 which address the issue of pit backfilling. It is also important to note that in the discussion of pit backfilling presented in Sections 2.2.4.3 and 2.4.8, access to remaining mineral reserves is only one of several considerations governing the decision to backfill or not backfill specific mine pit areas. SFPGC has the right to develop and extract the mineral deposits located within the Mule Canyon Project Area including those deposits located on public lands through direct ownership or valid lease rights. It is the BLM's responsibility to assure through this EIS process that the company is preventing unnecessary and undue degradation to the public lands through the use of appropriate mining and reclamation techniques.

The BLM can require by law protection of cultural resources, stable facility and dump designs, water pollution controls, pit stabilization, revegetation, and protection of public safety in order to meet the requirements of FLPMA for the prevention of unnecessary and undue degradation. Surface mining inherently requires some change in the landscape which is not classified as unnecessary and undue degradation. The Plan of Operations submitted to the BLM by SFPGC is based on projected gold market prices over the mine life. If SFPGC, as the project proponent, decides to mine additional reserves beyond the limits shown in the Plan of Operations because of better economics, SFPGC will have to file a new or amended plan with the BLM which may be subject to supplemental environmental review dependent on the nature and significance of plan changes and associated impacts.

C 13.5 Cont.

The DEIS is misleading in its representation of the possibility of backfilling pits in an environmentally safe manner. The DEIS makes it appear that it is a possibility depending on the amount of non-sulfide materials available to backfill the pit. [DEIS pp. 2-36 - 2-37] Yet, at the public meeting for comments on the DEIS, it was revealed that it was clearly known that there would not be enough non-sulfide material to backfill any of the pits except the Main Pit. [Public meeting, BLM Battle Mountain District Office, June 5, 1996] The FEIS should make clear how much backfilling is environmentally possible or likely.

Failure to Present and Address Alternatives

C 13.6

At first glance the DEIS seems to satisfy NEPA requirements that alternatives be considered, but a closer examination reveals most of the evaluated alternatives are irrelevant or meaningless. The geologic/geographic nature of the ore deposits preclude the consideration of Alternatives E and F because they required a change of location or alternative mining methods to open pit heap leaching. Thus alternatives E and F were needless and meaningless, but attempted to create the illusion that the BLM was exploring numerous alternatives. Alternative C, the east access alternative was already precluded by the decision of Santa Fe Pacific Gold and Lander County to upgrade the Beacon Light Road for western access. The BLM facilitated this arrangement with a separate EA for this project. Thus much time, energy, and paper was wasted assessing the impacts of an eastern route, when the decision to use the western rout had already been made. Alternative D Overburden and Interburden Materials Disposal Area Configuration Alternative which suggests slight modifications in the construction of the waste piles which would result at most in a 2% difference in surface area disturbed. This would seem to make this alternative more of an "option" within the preferred alternative rather than an alternative of its own. The possibility of a backfilling "option" referred to in the preferred alternative seems to be far more significant for mitigation/environmental impact purposes than "Alternative D" That leaves us with three real alternatives left, the No Action Alternative, the Preferred Alternative, and the Total Backfill Alternative. Unfortunately two of these are also irrelevant because the No Action alternative is considered impossible by the BLM because of the supremacy of the 1872 Mining Law. The "Total Backfill" Alternative is discarded because of environmental impacts and cost, which is interesting because this same activity is suggested as mitigation for the impacts of pit lake water quality. In the end it seems that the only alternative presented is the preferred alternative. So much for assessing alternatives.

None of the so called alternatives seem to meet the first criteria for consideration: "1) Does the option or alternative effectively meet the objective of providing reasonable protection for or mitigation of project effects on potentially affected environmental resources." One alternative which we would like seriously considered is the possibility of mining the gold deposits above the water table. This would prevent any of the impacts from dewatering and pit lakes forming. Another possibility would be leaving out or reconfiguring those pits expected to destroy springs. While such alternatives may not allow for the complete extraction of the identified gold deposit, they could effectively prevent impacts associated to water quantity and quality.

An issue which concerns us is the discounting of certain options, alternatives, and measures because of the cost. If the BLM is going to permit this then the public is entitled to an accurate cost benefit analysis. It is not enough for Santa Fe Pacific Gold to claim that it will cost too much. If these are "public resources" we are dealing with then the "public" is entitled to know ho much is going to be spent on this project and how much Santa Fe Pacific Gold is going to make off of it. Only then can one make an informed decision on whether or not a certain

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(R 13.5 Cont.) The mining-related disturbance as shown and discussed in the DEIS is the maximum allowable disturbance under the current Plan of Operations on file with the BLM. Please refer to previous response R 1.15 which addresses the nature and quantity of material available for backfilling.

R 13.6 - The BLM considered a full range of reasonable alternatives for the Mule Canyon Mine DEIS, including those that were eliminated from further analysis. The regulations for implementing NEPA (40 CFR 1500-1508) state in Part 1502.14(a), "...for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." Alternatives E (Project Location), F (Mining Methods), and G (Total Backfill) were considered but eliminated from detailed analysis. The rationale for elimination of these alternatives from further study, per 40 CFR 1502.14, is outlined in Section 2.2.4 of the DEIS. Alternatives E and F were considered in the analysis primarily because alternative project location and mining methods are two concerns which are frequently, if not almost always, raised during public review of mining projects.

Relative to Alternative C (East Access Alternative), please refer to previous response R 5.1 which addresses the issue of the West Access precluding the East Access Alternative.

The question of whether Alternative D (Overburden and Interburden Disposal Area Configuration Alternative) and the pit backfilling option should be analyzed as alternatives or options is subject to the BLM's discretion as the responsible agency. Based on the BLM's interpretation of applicable regulations and guidelines (re: NEPA, CEQA, and the BLM NEPA Handbook) the presentation of these project components in the DEIS is both appropriate and consistent with regulatory intent.

(R 13.6 Cont.) NEPA stipulates consideration of the No-Action Alternative which, as noted in Section 2.2.5.1 of the DEIS, "is the baseline for evaluation of potential effects of all other project alternatives.". The implication that the No-Action Alternative was not given serious consideration is inaccurate as evidenced by discussion of the environmental consequences of Alternative A for each individual resource category addressed in Chapter 4. The rationale for elimination of Alternative G (Total Backfill Alternative) is explained in detail in Section 2.2.4.3. The apparent discrepancy that the commentor notes between elimination of Alternative G from detailed analysis and consideration of partial backfilling of shallow pond areas to address water quality concerns represents a misunderstanding of the concept and intent of "total" versus "partial" backfilling.

Limiting mining to those portions of the identified mineral reserves above the water table would be inconsistent with reasonable principles of effective resource management and would render the proposed mining operations economically infeasible. The reason given by the commentor for consideration of this alternative is prevention of potential adverse surface and ground water impacts. As discussed in Sections 4.3 and 4.4 of the DEIS, however, potential surface and ground water impacts have been fully disclosed and evaluated with the result that the potential mining-related hydrologic impacts do not provide any compelling reason to preclude mining and related operations as proposed. As noted in Sections 2.4.2 and 2.4.8 of the DEIS, avoidance of springs and seeps to the extent reasonably feasible was an important consideration in siting and designing mine facilities. In fact, during the design process, several facilities were shifted or reconfigured specifically to avoid disturbance of existing springs. In those few cases where impacts to existing springs or seeps can not be reasonably avoided, the BLM has stipulated that SFPGC mitigate any mining-related impacts. Please refer to previous responses R 1.6, R 2.7, and R 4.2 which address the issues of avoidance of springs and seeps and mitigation for mining-related impacts.

The only option or alternative where cost was presented as a factor for consideration was partial or complete backfilling. Given the incremental cost and questionable incremental environmental benefits of completely backfilling mine pits, it has been determined that total backfill is not a reasonably feasible or environmentally justifiable alternative. It should also be noted that cost was only one of several considerations presented which would govern the decision to backfill or not backfill specific mine pit areas (refer to the discussions presented in Sections 2.2.4.3 and 2.4.8). According to regulatory guidance, "reasonable alternatives include those that are practical or feasible from the technical and <u>economic</u> (emphasis added) standpoint..." (From the Council on Environmental Quality's *Forty Most Asked Questions*). Completely backfilling the pits is not feasible from an economic standpoint and was therefore eliminated from detailed analysis.

C 13.6 Cont.

option costs too much. It will always be in the interest for Santa Fe Pacific Gold or any other mining company to externalize as many costs as possible. They will only do that which makes them money, facilitates making money or which is required by law. What criteria does the BLM use in determining if a certain action would cost too much?

C 13.7

Inappropriate Segmentation

It is our opinion that this is a clear case of segmentation, and that the decision to upgrade the Beacon Light road should have been considered as part of this DEIS. It clearly would not and could not have happened without the intent and monetary support of Santa Fe Pacific Gold for the explicit purpose of the Mule Canyon Mine. Why weren't copies of this EA sent to the "interested parties" which were sent the DEIS? Why

C 13.8

Inadequate Reclamation and Evaluation of Grazing Impacts

Throughout the DEIS it is assumed that there will be full and completely successful reclamation of all disturbed areas outside of the open pits. At one point the DEIS even suggests there could be a net increase in AUMs as a result of this mining project. We know of no examples of a fully reclaimed mine which meets or exceeds the previous AUM levels. The DEIS provides no examples or evidence to support this assertion. In fact we feel there will be a dramatic and lasting loss of AUMs for the following reasons: first the destruction of springs and seeps prevent effective use of forage, even if it was.to be established. second the steep slopes of the waste dumps as described in the preferred alternative would make establishment of stable growth medium and vegetation very difficult. third steep, unstable slopes would make any forage inaccessible to cattle, and finally "borrow" areas in lowlands would most likely be infested with invasive weeds following disturbance. Disturbed areas around the geyser geothermal development already indicate a serious invasion of undesirable weeds. The use of the term "borrow source" is misleading and inaccurate. There is nothing to indicate that any of the soil removed will ever be put back. It is essentially being mined to provide raw material for reclamation. These "borrow" areas will become seeding areas for weeds.

C 13.9

Air Quality

Despite BLM assurances there will be a decrease in air quality downwind of the site, especially during construction. This has been demonstrated by recent construction at the Pipeline Project which has increased the amount of dust in Crescent Valley during wind storms. If air quality is going to be monitored, what criteria is there for the placement of the monitoring equipment? We are afraid that any monitoring equipment would be intentionally placed in a geographic location to limit the amount of pollution monitored. This seems to be the case with the Pipeline Project which has the air quality monitoring station at the bottom of a gully.

C 13.10

Short-term use versus Long-term productivity

The DEIS fails to discuss issues of short-term use versus long-term productivity. The 2 page table does not constitute consideration of these issues. It is obvious that this mining project is a short term use of the area. It will produce a certain amount of monetary wealth which can be quantified. Much of this wealth will consumed in operating costs and the social expenses of employees and the surrounding communities. Little if any of this monetary wealth would go to the Western Shoshone people. The impacts of the project on other values, other wealth will be long lasting. The area proposed for development is currently rich in clean air, rich in water, rich in wildlife. The destruction and contamination of water sources (not a potential, but a definite impact even according to this inadequate document) is a long lasting effect, limiting the ability of the land to support animal and plant life. This life and this water would continue to produce indefinitely, if it were not destroyed by the mine. It is the Western Shoshone people, and perhaps

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R 13.7 - Please refer to previous response R 5.5 which addresses development of the West Access. From the outset it is important to note that modification of the Beacon Light Road was initially suggested by Lander County and that the associated right-of-way application (N-60171) was filed by and granted to the County. While it is true that the road will be utilized during the mine life primarily for mine-related traffic, the road will remain long after mining has been completed and the site reclaimed. The cooperative approach which Lander County and SFPGC developed regarding upgrades to the Beacon Light Road has been openly pursued as mutually beneficial. The County was enabled to upgrade and extend an existing road providing access from the Battle Mountain area to both the proposed mine and Crescent Valley and SFPGC has a reliable access road which is designed to safely handle mining-related traffic loads over the life of the mine. Potential impacts due to construction and modification of the Beacon Light Road have been identified and analyzed in EA NV-64-EA96-05 as referenced in Section 2.4.3 of the DEIS. Mine related use of this public road and potential associated impacts are discussed and addressed in Sections 2.4.17 and 4.11 of the DEIS.

Please refer to previous response R 1.4 which addresses notification relative to modification of the Beacon Light Road. All individuals which could be directly impacted by upgrading and use of the Beacon Light Road were consulted during preparation of the Beacon Light Road Right-of Way EA and the related road design process. The road right-of-way EA (EA NV-64-EA96-05) is available for review at the BLM Battle Mountain District Office.

R 13.8 - Please refer to previous responses R 1.7, R 1.8, R 2.7, R 5.8, and R 9.3 which address the issues of mitigation for loss or impairment of spring flows, erosional stability, and revegetation considerations. The observation that steeper slopes may discourage grazing use of overburden and interburden disposal area outslopes is partially correct. The proposed benched configuration will, however, provide some access and the total area corresponding to the benched slopes will be relatively small so any corresponding grazing losses will be of limited magnitude. Given that much of the area which will be affected by the proposed mining-related activities exists at a level well below it's climax vegetation potential, the opportunity exists to improve the condition of the vegetation community through effective reclamation and revegetation as discussed in response R 1.7.

(R 13.8 Cont.) The commentor is also correct in pointing out the apparent discrepancy in meaning of the term "borrow area". Use of this term in the DEIS is consistent with common construction and engineering usage where a borrow area is identified as a selected material source without regard for whether or not the borrow material will ultimately be returned to it's original location. The assumption that borrow areas will be subject to weedy plant invasion and will then become a source for further distribution of undesirable weedy species is unfounded. As noted in Section 2.4.20 and indicated specifically by Table 2-13, all mining-related disturbance areas (including borrow areas) will be reclaimed following completion of active operations in those areas. Revegetation seed mixtures and methods have specifically been selected to promote rapid establishment of a stable vegetation community composed primarily of indigenous native perennial species which would effectively preclude weedy species invasion.

R 13.9 - During the Public Comment Meeting on the DEIS, erroneous statements were made regarding future air quality monitoring. Gold Fields Mining Company (SFPGC's predecessor) established an air quality monitoring and meteorological station in Whirlwind Valley which was operated by GFMC and later SFPGC from August 1991 through December 1994 as described in Section 3.14.6 of the DEIS. The primary purpose of this station was to collect site-specific data as a basis for air quality dispersion modeling to evaluate potential project-related air quality impacts. Identification of potential air emission sources, determination of emission levels from each source, and dispersion modeling as described in Sections 3.14.5, 3.14.6, 4.12.3 and 4.12.4 and the *Mule Canyon Air Permit Application* (Air Sciences, Inc., 1995), resulted in the determination that project-related air emissions would be below the regulatory threshold level where monitoring is required. SFPGC, therefore, has no obligation to monitor air quality. Also, please refer to Response R1.20.

R 13.10 - Table 4-1 indicates many of the long-term productivity impacts noted in the comment including the following:

- Minor reductions in surface runoff
- Effects of reductions in spring flow on vegetation, grazing, and wildlife
- Effects of loss of watering sources on grazing utility
- Permanent loss of use and forage for unreclaimed areas
- Effects of loss of watering sources on utility and use of habitat
- Permanent loss of habitat for unreclaimed areas
- Long-term commitment and use of resources related to socioeconomic development
- Loss of future use for remaining roads and pit areas

Given this disclosure and related impact and mitigation discussions in Chapter 4 of the DEIS, the issues of short-term use versus long-term productivity have been adequately disclosed and addressed.

As for the issue of distribution of economic benefits related to project development and operation, any individual has equal access to project employment along with related economic benefits based solely on qualifications and performance. SFPGC is also a publicly-held company with ownership through stock purchase available to any individual or group. Dependent on company performance, any project-related economic benefits would accrue to the stockholder-owners.

C 13.10 Cont.

those ranchers and other residents who choose to respect the land, that will be living with the consequences of this project. It is our opinion that we have far more to lose with the creation of this mine than we have to gain. Perhaps we would momentarily, monetarily gain, but our children, and our children's children would lose.

Significant Impacts to Western Shoshone

That this area is a unique ecological zone within the Great Basin is corroborated by the extensive historic and present use of the area for hunting and gathering purposes, and for associated religious practices, by Shoshone people. Because of these conditions, the area naturally is also the site of traditional Western Shoshone settlements. The site continues to be used By Western Shoshone people for various purposes. The Western Shoshone Nation has a vested interest in the maintenance and future health of these lands.

C 13.11

It is our belief based upon the evidence we have gathered that the BLM has failed to live up to its responsibilities in consulting Western Shoshone people about the cultural significance of areas located near this project. It is also apparent in the recently released Draft Environmental Impact Statement (DEIS) for Mule Canyon that the BLM has mislead the public about the nature and content of any consultations which may have taken place. This project will have a significant impact on the historical remains of the Newe. It will also impact the plants, wildlife and water who have given sustenance to the Newe since our beginnings.

Who was "consulted" about this mining project?

BLM documents indicate the only tribal organizations mailed letters about Mule Canyon were three of the Te-Moak Bands (Battle Mountain, Elko, and Wells) and the Western Shoshone National Council. This is completely contrary to the claims in the DEIS that "eight tribal governments and two other organizations" were consulted. The only one actually spoken with (or possibly consulted with) was the Battle Mountain Band chairperson and a tribal council member. Several elders from Battle Mountain, one individual from Beowawe and one individual from Wells were also spoken with, but this was done as part of the background study, not a consultation. **The organizations listed in the DEIS were contacted at an earlier date about mining around the Tosawihi quarries, not Mule Canyon!** The BLM claims to have contacted the Duckwater Shoshone Tribe, but failed to contact the Ely and Yomba Shoshone tribes. The local Dann family in Crescent Valley and the Tosawihi people residing in Winnemucca were not contacted. If this area is traditionally Tosawithi land then why were not the other communities known to contain Tosawithi descendants contacted?

At the June 5, 1996 public hearing in Battle Mountain, BLM was unwilling to clarify the people and dates they consulted about this project. Only on June 20, 1996 did we receive a reply indicating BLM met with Paul Snooks and Florine Maine in the summer of 1993, and also had several undocumented conversations with Shoshone and non-Shoshone individuals. A recent letter from the BLM to the Western Shoshone Defense Project indicates that the BLM felt Mary Rusco had "exhausted" her avenues of inquiry. This is despite the recommendations in her report that the BLM conduct further consultations regarding the Traditional Cultural Properties. Mary Rusco also wrote in her report that she was unable to contact potentially knowledgeable individuals in Crescent Valley, Elko, and Wells because of time constraints. Since that time in 1992, the BLM has done nothing to initiate further consultations with Western Shoshone individuals, organizations, or governments which may have an interest in these lands or so called "cultural resources."

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R 13.11 - Please refer to previous responses R 1.5 and R 1.12 which address the Native American consultation process and opportunities for public participation under NEPA.

C 13.12

Why haven't Shoshone people been involved in the documentation and "mitigation" of archaeological sites?

*188 archaeological sites* _have been identified in the Project area_. The Battle Mountain BLM and the Nevada State Historic Preservation Office (SHPO) have decided that only 52 of these sites are eligible for the National Register of Historic Places. 46 of these sites would be disturbed or impacted by the proposed mine. 31 of these sites have already been subject to mitigation in the form of "mapping, inventory of features, surface collection of artifacts, shallow surface scrapes, controlled excavation units, backhoe trenching and auguring," and/or "analysis and reporting." This so called mitigation was conducted under "Programmatic Agreements" between the BLM, SHPO and the mining company. _No Western Shoshone people were informed or involved in this process_, **despite the fact that Mary Rusco's background study clearly indicated Western Shoshone concern about these sites.** The report reads:

> Known archaeological sites in the study area, particularly residential bases, hunting blinds, rock shelters, caches and rock art sites, are regarded by Battle Mountain people as an important part of their cultural heritage. Tribal members are ambivalent about archaeological excavation, with some opposed to the removal of artifacts left on the site by their ancestors. Others favor excavation of important sites when destruction is inevitable, **but all agree that Western Shoshone people should be consulted on archaeological excavations and on the ultimate curation and/or display of artifacts.**

This involvement could have been easily accommodated within the "Programmatic Agreements" as described under the National Historic Preservation Act providing for the inclusion and consultation of "Indian tribes" and "interested persons." *Despite these provisions the BLM has decided that Western Shoshone participation in decisions regarding the importance and fate of these "archaeological resources" was unnecessary.* It is important to note that Mary Rusco's report was completed in September 1992, and only one archaeological site had been "mitigated" at that point. Since then, 30 more have been *"mitigated."*

Many questions need answering :

C 13.13
- Who was consulted, when did it happen, and did those people understand that an official consultation was taking place?

C 13.14
- What does "mitigation" mean, how was it decided what mitigation would take place, and why were no Western Shoshone invited to participate in this process after they had expressed their desire to be informed?

C 13.15
- Were any artifacts removed, where are they now?

C 13.16
- Should Native Americans continue to participate in and "rubber stamp" background studies and have this be accepted as a "consultation" by the BLM? Should casual conversations with BLM staff at unrelated events constitute "consultation"?

C 13.17
- Why were no knowledgeable Western Shoshone consulted about the potential Traditional Cultural Properties?

C 13.18
- Why wasn't the petroglyph panel referred to in the June 19th BLM letter included in the DEIS as a Traditional Cultural Property?

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R 13.12 - Relative to Western Shoshone involvement in the archaeological work which took place for the Mule Canyon Project, no one contacted the BLM indicating any interest in the field work. If Native Americans wish to participate in archaeological activities on public land they may volunteer to participate, or they may approach the private consulting organization engaged to perform the work and ask to be employed by that firm. There is no legal requirement that Native Americans be involved in the mitigation of effects to archaeological sites on public lands.

R 13.13 - Please refer to previous response R 1.5 which addresses the issue of Native American consultation.

R 13.14 - Please refer to previous responses R 1.5, R 1.12, and R 13.12 which address the issues of Native American consultation, mitigation considerations, and opportunities for Western Shoshone involvement. Specific mitigation measures are also discussed in Section 3.11.4 of the DEIS.

R 13.15 - Artifacts recovered in conjunction with mitigation activities for the Mule Canyon Project Area were labeled, packaged to prevent damage, and most were shipped to the University of Nevada Museum of Anthropology for curation. Artifacts recovered from the site included stone tools and faunal and floral remains. No human remains were discovered, recovered or removed from the Project Area.

Of those artifacts not shipped for curation, twenty pieces of groundstone (some from private land owned by SFPGC) were donated to *AMUSEUM* (a children's "hands on" museum in Carson City), twelve pieces to the Washoe County Parks and Recreation, six pieces to the Washoe County School District Title 5 Native American Program, and five pieces to Dayton High School. Several pieces of groundstone (twelve) were retained by the archaeological consulting firm which did the field work to be used for teaching purposes, and a small number, (six) were retained by the Battle Mountain BLM for the same purpose.

R 13.16 - The level at which Native Americans choose to participate in background studies and/or consultation is left to the discretion of Native American individuals and tribal organizations. "Casual conversations" are not official consultation but may in some circumstances be the best medium for eliciting information and concerns.

R 13.17 - Please refer to previous responses R 1.5, R 1.12, and R 1.13 which address Native American consultation.

R 13.18 - The petroglyph panel(s) was discussed with Western Shoshone people by BLM personnel during a mine tour of a nearby area. The identified petroglyph panel(s) are well outside any area of anticipated mine disturbance or impact for the Mule Canyon Project and consequently have not as yet been subject to consultation.

C 13.19

A fully documented accounting from the Battle Mountain BLM on how they completed their "consultations" regarding the Mule Canyon Project should be made available to Western Shoshone and interested members of the public. Western Shoshone should also have access and input into the archaeological records and any further "mitigation" that is conducted at Mule Canyon. The BLM should do more consultation with people knowledgeable about the area. They certainly haven't made a "good faith effort" to involve Western Shoshone people in issues relating directly to Western Shoshone history and future.

Two articles in the U.N. Declaration on the Rights of Indigenous Peoples are of relevance to these particular comments.

Article 12

Indigenous peoples have the right to practice and revitalize their cultural traditions and customs. This includes the right to maintain, protect and develop the past, present and future manifestations of their cultures, such as archaeological and historical sites, artifacts, designs, ceremonies, technologies and visual and performing arts and literature, as well as the right to the restitution of cultural, intellectual, religious and spiritual property taken without their free and informed consent or in violation of their laws, traditions and customs.

Article 13

Indigenous peoples have the right to manifest, practice, develop and teach their spiritual and religious traditions, customs and ceremonies; the right to maintain, protect, and have access in privacy to their religious and cultural sites; the right to the use and control of ceremonial objects; and the right to the repatriation of human remains. States shall take effective measures, in conjunction with the indigenous peoples concerned, to ensure that indigenous sacred places, including burial sites, be preserved, respected and protected.

C 13.20

Who decides what is a significant site or a traditional cultural property?

Five potential Traditional Cultural Properties (TCP) were identified in Rusco's report. TCP is a designation allowing sites to be listed and afforded protection under the National Register of Historic Places because of "its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community." In the DEIS the BLM has unilaterally decided these five sites are ineligible as TCPs. This was done without consulting any knowledgeable Western Shoshone people about their feelings and beliefs towards these sites.

C 13.21

Another potential TCP, a petroglyph site, is mentioned in the June 19 letter to the W.S.D.P. but is not mentioned anywhere in the DEIS or any other documents on the "cultural resources" of the project area.

C 13.22

It is our feeling that the BLM has no right to be making unilateral decisions or assumptions about significant sites without Western Shoshone input.

The BLM must consider whether or not the Project Area and cumulative effects area represent and/or contain any traditional cultural properties as defined by National Register Bulletin No. 38. Before responding to the BLM's site evaluations individually, the following passage from the Bulletin should be kept in mind:

> A property may retain its traditional cultural significance even though it has been substantially modified. . . Cultural values are dynamic, and can sometimes accommodate a good deal of change. . . [T]he integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation.[3]

[3] "Guidelines for Evaluating and Documenting Traditional Cultural Properties," National Register Bulletin No. 38, U.S. Department of the Interior, National Park Service, Interagency Resources Division, p. 10.

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R 13.19 - Please refer to previous responses R 1.5 and R 13.12 which address the issues of Native American consultation and involvement. Archaeological records are exempt from the Freedom of Information Act and Federal law requires that they not be made available to the public to assure protection of the subject resources. No further mitigation is planned for the Mule Canyon Project at this time.

R 13.20 - Please refer to previous response R 1.5 which addresses Native American consultation. Section 3.11.5.4 of the DEIS describes the evaluation criteria for determining the significance of traditional cultural properties and the BLM's conclusions and rationale relative to determinations for prospective properties identified within the Mule Canyon Project Area.

R 13.21 - Please refer to previous response R 13.18 which discusses the referenced petroglyph panel.

R 13.22 - Please refer to previous responses R 1.12, R 1.13, and R 13.20 which address traditional cultural properties. While the professional ethnographer did discuss various cultural values in general terms she did not specifically identify or recommend any properties as traditional cultural properties. No additional information has been subsequently discovered or provided which would lead the BLM to determine that any traditional cultural properties exist within the Mule Canyon Project Area.

C 13.22
Cont.

Thus, the BLM cannot make the determination of what constitutes a traditional cultural property on its own. It must consult appropriate, knowledgeable Shoshones to find out if Shoshones still consider the sites to be significant.

- The DEIS says that the Beowawe Indian Colony townsite is not significant because its condition is uncertain and because it is outside the Project Area.[4] However, it is within the cumulative effects area,[5] and Shoshone people consider it to be a historically significant site.[6] As to its current condition, the BLM should investigate further, but must do so along with knowledgeable Shoshone people, who can more appropriately assess whether its current condition has changed its cultural significance to the Shoshone people.

- The DEIS does not mention Stony Point, which Rusco's report states was a Shoshone settlement site. The report says that Stony point "is recognized by Battle Mountain residents as the location of a prominent landmark, a large rock wall visible from Interstate 80. The structure is known to tribal members as an historic site. The construction of the wall is attributed to tribal members. . . [for] corralling wild horses."[7]

- The BLM dismisses traditional trails within the Project Area as ineligible for inclusion in the Register as traditional cultural properties because the BLM says that they have lost integrity of condition.[8] Again, this is not for the BLM to decide. The BLM must consult with Shoshones. Regardless, destruction of the pathways, whatever their current condition, would obstruct Shoshone access to sites in the area. These cultural areas will be affected by cutting off access. A traditional pathway is not diminished in importance merely because it has become a road in modern times. The pathway is still intact and has significant heritage value to Shoshones, and it still provides access to significant cultural resources in the Project Area. There is evidence that Shoshones have used this pathway for access to sites in recent years.

- The BLM further uses the incomplete background study to assert that the hot springs at and near Beowawe are not Register eligible because the nearby geothermal power plant has degraded their integrity of condition.[9] The background report is inconclusive on this matter, and actual consultation is necessary.

- The DEIS dismisses a prominent outcrop as not being a traditional cultural property because "a direct association between the outcrop and traditional practices or beliefs was not

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[4] DEIS pp. 3-106 – 3-107.

[5] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation," September 23, 1992, p. A-1.

[6] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation," September 23, 1992, p. A-12.

[7] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation," September 23, 1992, p. A-12.

[8] DEIS p. 3-106.

[9] DEIS p. 3-106.

C 13.22
Cont.

documented."[10] Once more, the BLM must actively pursue consultation with knowledgeable Shoshone people in order to determine its significance. The background report, however, does suggest that it is likely a power spot.[11]

- The DEIS also claims that traditional hunting and gathering areas are not significant traditional cultural properties because (1) they lack integrity of location; and (2) because the continuation of traditional activities in these areas are not important for the maintenance of Western Shoshone culture.

National Register Bulletin No. 38 provides some examples of significant traditional cultural properties, including:

> • a location where Native American religious practitioners have historically gone, and are known <u>or thought</u> to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and
>
> • a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historical identity. [emphasis added].[12]

The background study for the Native American Consultation, produced by Mary Rusco, provides information suggesting that the Project Area and cumulative effects area of the Mule Canyon Mine do contain sites corresponding to the Bulletin's description. Specifically, the report provides information that links reasonably specific hunting and gathering sites with religious activities. Rusco states:

> [T]here are several locations in the study area that Shoshone people still visit regularly to hunt and gather traditional food plants. These include an area known for deer hunting along the Argenta Rim and an area in the west portion of the study area on the slopes of the Shoshone Range where sage hen live year round and where many traditional food plants can still be harvested. Deer are hunted today in that area, extending into upper reaches of the Mule Canyon Project Area itself. Plants collected for food include wild onions, Indian spinach, choke cherries and squaw berries. There is also a deer wintering ground along the Humboldt River between Dunphy and Beowawe.[13]

The locations provided here appear to be relatively specific considering the nature of the traditional cultural activities. How specific a location is required? Animals and plants do not necessarily correspond to a single, overtly noticeable area. National Register Bulletin No. 38 notes an example which is similar in nature:

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[10] DEIS p. 3-107.

[11] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation." September 23, 1992, pp. A-11, A-13.

[12] "Guidelines for Evaluating and Documenting Traditional Cultural Properties," <u>National Register Bulletin No. 38</u>, U.S. Department of the Interior, National Park Service, Interagency Resources Division, p. 1.

[13] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation." September 23, 1992, pp. A-10 – A-11

C 13.22
Cont.

> A property may be regarded as representative of a significant and distinguishable entity, even though it lacks individual distinction, if it represents or is an integral part of a larger entity of traditional importance. The larger entity may, and usually does, possess both tangible and intangible components. For example, certain locations along the Russian River in California are highly valued by the Pomo Indians, and have been for centuries, as sources of high quality sedge roots needed in the construction of the Pomo's. . . basketry. Although the sedge fields themselves are virtually indistinguishable from the surrounding landscape, and certainly indistinguishable by the untrained observer from other sedge fields that produce lower quality roots, they are representative of, and vital to, the larger entity of Pomo basketmaking.[14]

Hunting and gathering activities in the areas described are significant traditional activities, particularly as they are connected with Shoshone religious practices. Rusco's study does reasonably specify the areas where traditional hunting and gathering activities have taken place.

Present day use is but an extension of historic use of the area for the same purposes, as Rusco points out in this portion of the background study:

> Numerous low rock-wall hunting blinds have been recorded during an archaeological survey of the Mule Canyon Project Area, indicating the importance of big game hunting in that area during prehistoric times.[15]

While Rusco also specifically notes that the hunting blinds are among the archaeological sites in the study area that Battle Mountain people regard "as an important part of their cultural heritage,"[16] the DEIS neglects to mention that this is the case.

Rusco also notes that Shoshone religious beliefs are tied very closely with the lands encompassed by Newe Sogobia, the traditional lands of the Western Shoshone. As the Project Area and cumulative effects area are not only located within Newe Sogobia, but have also been in continuous use by the Shoshone people from time immemorial, the religious significance of the land and of activities on the land must be considered. Rusco's research shows that there are

> several religious beliefs and practices which are relevant to land management within the traditional Shoshone homeland. These are (1) the importance of religious rituals to enlist spiritual help for deer hunting; (2) individual prayers to the spirits of plants, animals, prior to taking them for food; (3) the use of places where individuals can obtain spiritual power for healing; (4) the use of such areas for individual vision quests in connection with Sun Dance practices or other ceremonies. For this reason, two kinds of areas within the study area are regarded as likely to be highly important to traditional religious practitioners. These are

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[14] "Guidelines for Evaluating and Documenting Traditional Cultural Properties," National Register Bulletin No. 38, U.S. Department of the Interior, National Park Service, Interagency Resources Division, p. 12.

[15] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation," September 23, 1992, p. A-11.

[16] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation," September 23, 1992, p. A-12.

C 13.22 Cont.

> springs, which are often sources of power, and prominent land forms, usually the most prominent in the area, which may be used for vision questing.[17]

Rusco remarks that there are two prominent landforms in particular which should be considered as relevant to Shoshone spiritual beliefs and practices.

The background study does make it clear that the area does continue to be used for traditional purposes today. In doing so, Rusco emphasizes the integral relationship between hunting and gathering and Shoshone religious practices in the area:

> Prayers or other rituals of thanksgiving are traditionally associated with hunting and gathering, a practice which has persisted to the present. . . The traditional hunting/gathering areas shown on Figure 3a [in the background study] are thus places where prayers and other ritual practices can be expected to be regularly performed today.[18]

C 13.23

It is likely, according to Rusco, that there are burials in the vicinity of some of the archaeological sites, most likely around the two major settlements, the Beowawe Indian Colony and Iron Point. The report implies that more information must be acquired to ascertain whether this is so.[19]

Rusco's report states that, "Known archaeological sites in the study area, particularly residential bases, hunting blinds, rock shelters, caches, and rock art sites, are regarded by Battle Mountain people as an important part of their cultural heritage."[20] This part of Rusco's report is not mentioned in the DEIS. Additionally, Rusco says that Shoshone people do not agree that excavation of sites is acceptable and/or preferable.

BLM Violations of Cultural Resource Laws and Other Laws and Regulations Relevant to Native American Concerns

The impacts of this project to the Western Shoshone were not adequately considered in the DEIS. The BLM's dismissal of legitimate Western Shoshone cultural concerns as not amounting to significant cultural resources to be considered is cultural bias of the first order. The BLM's action will have significant impacts on the Western Shoshone people and their religious beliefs. The review criteria used by the BLM are not culturally relevant and must be revised and revisited. The Project Area is within the confines of the traditional, and present, homelands of

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[17] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation." September 23, 1992, p. A-13.

[18] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation." September 23, 1992, p. A-13.

[19] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosowihi* People, Western Shoshone Nation." September 23, 1992, p. A-13.

[20] Mary K. Rusco, "Background Study for BLM Consultation With Native Americans on Proposed Mining Development in the Mule Canyon Project Area, Shoshone Range Within the Traditional Territory of the *Tosawihi* People, Western Shoshone Nation." September 23, 1992, p. A-12.

19

R 13.23 - The townsite of Beowawe will not be directly impacted by the project and is not in the Project Area; Iron Point is many miles to the west/northwest of the area; and Stoney Point is to the north and across the Humboldt River and well outside the area of potential effect. While the ethnographer may have referred to these sites in the general context of regional ethnography, they will not be affected and are therefore not relevant to the analysis of project effects.

No burials or human remains of any kind were located in conjunction with the relatively extensive cultural resource investigations and subsequent archaeological mitigation activities for the project, nor does the BLM have knowledge of any burials in the area of potential effect or the immediate vicinity.

The statement that Mary Rusco's report identifies "known archaeological sites" is not accurate. Please refer to the actual report as referenced in Section 3.11.5 of the DEIS. Relative to excavation of archaeological sites, Rusco's report states that there is a difference of opinion among Battle Mountain Shoshone as to whether or not excavation is appropriate when important sites will inevitably be destroyed by a project.

the Western Shoshone. The Western Shoshone have lived on this land for thousands of years, before any other people. Known to the Western Shoshone as "Newe Sogobia," this land was given to the Western Shoshone by the Creator for them to care for. The lands, the waters within, and the air above are directly connected with Western Shoshone religious life. Springs and seeps are of particular importance. As such, the lands themselves hold not only great traditional value for the Western Shoshone people, who have long lived on and used them, but also critical religious values. The DEIS follows a pattern of decisions by the BLM and other federal, state, and local agencies which effectively ignore the Western Shoshone people and contributes to the eventual extinction of their culture.

C 13.24

The BLM has not correctly applied National Register guidelines for determining what sites are eligible for inclusion in the National Register of Historic Places, including as traditional cultural properties. However, by only considering cultural resources using National Register of Historic Preservation standards, the DEIS circumvents the Council on Environmental Quality (CEQ) NEPA regulations which define what constitutes significant impacts, namely,

> Unique characteristics of the geographic area such as proximity to historic or cultural resources. . .[21]

as well as:

> The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historic resources.[22]

Note that the regulations recognize a difference between resources of a primarily historic nature, and those of a primarily cultural nature. They also specifically make reference to the National Register of Historic Places, distinguishing cultural resources from sites which are necessarily NRHP-eligible sites. The CEQ NEPA regulations clearly and specifically state that eligibility for inclusion in NRHP is not the only determinant of what cultural resources are significant. National Register Bulletin No. 38 even warns that "no one should regard this Bulletin as the only appropriate source of guidance on its subject, or interpret it rigidly."[23] The BLM Manual on Native American Consultation also concurs that NRHP eligibility is not the only guideline for judging the significance of traditional religious or cultural properties.[24]

The BLM's decision-making process is biased in that it requires Western Shoshone to violate their religious values in order for the BLM to even consider protecting the source of those religious values. The DEIS claims that without specific information as to the location of various power spots identified by Shoshones, such sites cannot be considered significant cultural resources. This is another requirement of NRHP. Since NEPA does not require such sites to conform to the requirements of NRHP, site-specific information should not be necessary.

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[21] 40 CFR 1508.27(b)(3)

[22] 40 CFR 1508.27(b)(8)

[23] "Guidelines for Evaluating and Documenting Traditional Cultural Properties," National Register Bulletin No. 38, U.S. Department of the Interior, National Park Service, Interagency Resources Division, p. 3.

[24] BLM Manual Chapter III, Section D, III-7.

20

R 13.24 - Please refer to previous responses R 1.12 and R 1.13 which address traditional cultural properties. When Native Americans do not or will not identify and disclose the locations of sites or objects significant to the maintenance of their cultural identity, and those sites or objects fall within the area of potential effect for a project, the only available basis for evaluating any archaeological sites or objects discovered in the project area are the criteria for the National Register of Historic Places.

It is EuroAmerican and Judeo-Christian bias which demands that anything of religious significance be duly reported and recorded in a table or in a list. Everybody knows where churches are, so the BLM assumes that it is likewise acceptable to know where Western Shoshone religious sites are. Yet, Western Shoshone religious values are different from Judeo-Christian ones. Western Shoshone religious values do not permit Western Shoshone to disclose the location of power spots and other sacred locations to non-Western Shoshone.

Furthermore, when Western Shoshone have done so in the past, the sites have often been destroyed. Specific burial sites that have been pointed out have been moved so projects could continue. The Western Shoshone people have thus learned that in order to truly protect their sacred sites, they must not reveal their specific locations. So, instead, as in this case, they tell project anthropologists if there are sites in the project area or not. For the BLM to force Western Shoshone to sacrifice their own religious values in order to satisfy the BLM's curiosity is a violation of the Western Shoshone's right to religious freedom. The Western Shoshone are losing their culture, their lands, and their beliefs more and more. With the present course of the BLM, soon the Western Shoshone will be left with nothing at all. The BLM has been a party to this annihilation of Western Shoshone culture through prior actions. The Mule Canyon DEIS is another example of the BLM sacrificing Western Shoshone for mining. A mine such as the Mule Canyon Mine, which will affect over 9,000 acres of Western Shoshone land, is an affront to the Western Shoshone people, their culture, and their religious beliefs.

C 13.25

In addition, the BLM Manual warns that the majority of Native American issues are not to be treated as cultural resource issues:

> The fact that the BLM's cultural resource specialists are frequently the ones assigned to do the staff work for certain Native American issues could lead to some misunderstanding that Native American issues are cultural resource issues. From there it could be mistakenly deduced that Native American issues might often be resolved through mitigation methods such as archaeological data recovery. Such ideas would misinterpret the majority of Native American issues that managers must consider in decision making [emphasis added].[25]

If archaeological data recovery methods are not appropriate for mitigation of many Native American concerns, then such site-specific data also should not be necessary for the identification of Native American concerns.

The BLM's treatment of Western Shoshone concerns about the impacts of the Mule Canyon Mine are the result of the BLM's policy of relegating Native American issues to a second class status in its decision-making. It is BLM policy to ignore Native American concerns in favor of pressure from more politically powerful sources. The BLM Manual on Native American Consultation states:

> Native Americans' attribution of sacredness to large land areas is one of the most difficult issues for BLM managers to reconcile with other management responsibilities. From the viewpoint of traditional religious practitioners, a particular land area could be regarded as a hallowed place, devoted to special religious rites and ceremonies. Practitioners might perceive any secular use or

[25] BLM Manual Chapter II Section D. II-2.

R 13.25 - Please refer to previous responses R 1.12 and R 1.13 which address traditional cultural resources. In addition, please note the specific distinction between cultural resource values and Native American concerns evidenced in the discussions presented in Sections 3.11.4, 3.11.5, and 4. 9.1.

> development in such a place to be injurious to its exceptional sacred qualities or a sacrilege and, therefore, unacceptable from their view. <u>Nevertheless, the BLM manager might be put in the position of having to weight a proposal for a legally and politically supported use, such as mineral development, in an area regarded as sacred and inviolate</u> [emphasis added].[26]

C 13.26

One impetus for the passage of the American Indian Religious Freedom Act of 1978 was that "religious infringements result from the lack of knowledge or the insensitive and inflexible enforcement of Federal policies and regulations premised on a variety of laws."[27] The response of the Act was to remove such infringement on Native religious practices. The BLM's policy of favoring mining over protection of Native American religious freedom is a violation of the Act.

C 13.27

The DEIS does not show evidence of having followed Rusco's recommendations at the end of the background study. Specifically, Rusco suggests that further contact with Native Americans is necessary to establish whether or not the sites identified in the DEIS are eligible or not for National Register of Historic Places status as Traditional Cultural Properties.

Because the BLM failed to take the required actions to properly consult with the Western Shoshone people, the DEIS contains incomplete and insufficient information upon which to draw conclusions about significant impacts to the Western Shoshone. Thus, the BLM did not follow NEPA's admonition to apply scoping early in the NEPA process.[28] The public has therefore not had the opportunity to comment on a substantive DEIS, at least as far as the Native American consultation is concerned. It is expected, then, that if the BLM initiates a proper Native American consultation at this time, that the Final EIS will be the first opportunity that the public has to review and make comments on this subject.

[26] BLM Manual Chapter II Section C, II-2.

[27] American Indian Religious Freedom Act of 1978, paragraph 6.

[28] 40 CFR 1500.5(d).

22

R 13.26 - The BLM does not have a policy of, "...favoring mining over protection of Native American religious freedom...." either officially or unofficially. The BLM is acting under direction of the Congress of the United States in following applicable requirements of both the General Mining Act of 1872 and the American Indian Religious Freedom Act (AIRFA). In cases where the requirements of these governing statutes may conflict, the Supreme Court of the United States has ruled (*Lyng vs Northwest Indian Cemetery Protective Association, 108 S. Ct. 1319 [1988]*) that AIRFA does not provide for injunctive relief or Native American veto power over Federal actions when AIRFA is invoked. In addition, the BLM is obligated to adhere to Executive Order 13007 which defines "sacred sites" in a manner consistent with the BLM determination that no traditional cultural properties exist within the Mule Canyon Project Area since no Western Shoshone informant has revealed the existence of such sites in the Mule Canyon area of potential effect.

R 13.27 - Please refer to previous responses R 1.5, R 1.12, R 1.13, and R 13.16 which address the issues of Native American consultation and opportunities for public comment and involvement in the NEPA process. The NEPA scoping/comment process for the Mule Canyon Project has been ongoing for five years. Six public meetings have been held. The Mule Canyon Project has been widely publicized. There have been ample opportunities and adequate public notice during this five-year period for comment by all interested or affected individuals, groups, and government entities.

Sierra Pacific
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June 27, 1996

CERTIFIED MAIL Z705077956
RETURN RECEIPT REQUESTED

Mr. Christopher Stubbs
Bureau of Land Management
Battle Mountain District Office
50 Bastian Road
Battle Mountain, NV 89820

Re: Mule Canyon Mine Draft EIS

Dear Mr. Stubbs:

Thank you for allowing Sierra Pacific the opportunity to comment on the subject draft EIS. After review of **Section 2.4.15, Other Utility Installations,** Sierra Pacific offers the following comments:

C 14.1
- The mentioned substation in the vicinity of the proposed water supply wellfield will not be a Sierra Pacific facility. This substation will be owned, operated and maintained by SFPGC. This substation will be connected to our existing 60 kV powerline. It will not be located within the SPPCo easement.

C 14.2
- Any reference to 69 KVA in this document is incorrect. Sierra Pacific operates an existing 60 kV transmission line and is in the process of constructing a 120 kV transmission line within the subject area.

C 14.3
- No 60 kV powerline will be built from the wellfield substation westerly to the mine site.

C 14.4
- No SFPGC powerlines will be built within the 90 foot wide right-of-way N-59670.

C 14.5
- Paragraph 3 of the above referenced section is incorrect in that SFPGC will not be connecting to the 120 kV system in the initial phase.

R 14.1 through R14.8 - Section 2.4.15, Figure 1-2, and Tables 2-1 through 2-4 of the FEIS document been revised as appropriate to reflect the corrections and clarifications provided by Sierra Pacific Power Company.

C 14.6

- Currently, Sierra Pacific plans to serve the SFPGC mill facilities substation with 60 kV line from the Cortez Tap (N-56088) located in the NW corner of Section 14, Township 31 North, Range 47 East. Then underbuild the newly constructed 120 kV line from the Cortez Tap north to the 90 degree angle point in the SW corner of Section 2, Township 31 North, Range 47 East. At that point a new line will be extended west approximately 100 feet to Section 3. The powerline would then be metered and become a SFPGC line.

C 14.7

- The document does not reflect that N-59670 has been authorized and is a granted right-of-way.

C 14.8

- At this time Sierra Pacific plans to ask for an amendment to the approved right of way, N-59670, to include the underbuilt 60 kV across public lands in Section 14 and Section 2.

Thank you again for allowing Sierra Pacific the opportunity to comment upon this proposed mining plan.

Should you have any questions, please call me at (702) 689-4432.

Sincerely,

Robert J. Edwards
Manager, Right-of-Way/Real Property

RJE/bk

Building and Construction Trades Council of Northern Nevada

Chartered June 5, 1928

Affiliated with: Nevada State AFL-CIO
Building and Construction Trades Department, AFL-CIO

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Sprinkler Fitters
Teamsters

July 10, 1996

Christopher Stubbs, E.I.S. Project Manager
BLM Battle Mountain Office
P. O. Box 1420
Battle Mountain, NV 89820

Dear Mr. Stubbs,

The Building and Construction Trades Council of Northern Nevada Represents 6,000 construction workers in Northern Nevada. Our members live, work, hunt and fish in the Battle Mountain area and are concerned with the proliferation of mines in the area.

Included are comments on the draft E.I.S. for the Santa Fe Pacific Gold Company Mule Canyon Mine.

Please take these comments under advisement and send a copy of the F.E.I.S. to my office at the above address.

Very truly yours,

Richard Houts

Richard Houts
Secretary-Treasurer

RH:mw/opeiu #29 afl-cio

encl.

C 15.1

PAGE 1

NORTHERN NEVADA BUILDING TRADES COUNCIL COMMENTS REGARDING THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE SANTA FE PACIFIC GOLD COMPANY (SFPGC) MULE CANYON MINE

AIR QUALITY--CONFLICT BETWEEN PROJECT DESCRIPTION IN THE DEIS WITH THE PROJECT DESCRIPTION IN ITS AIR PERMIT

The DEIS for this proposed mine claims there will be 2,931 acres of surface disturbance (Table 2-6). In Nevada, an air permit must be obtained by a mine, from the Nevada Department of Environmental Protection (NDEP) prior to beginning surface disturbance, and prior to constructing and operating most types of air pollution sources. The Mule Canyon Mine has already obtained its Nevada air permit for this proposed project (AP1041-0593). The DEIS states that :

"Under the provisions of the approved NDEP Air Quality Permit to Construct/Operate for the Mule Canyon mine, SFPGC will comply with all applicable air emission standards and requirements." (p. 3-133)

This statement implies that the construction and operation of the Mine which is described in the DEIS, will comply with the provisions of this air permit which it has already obtained. But in sharp contrast to the 2,931 acres of disturbance claimed for this project in the DEIS, the Mine's air permit allows only 1136 acres of disturbance. In other words, this Mine's plans, as described in the DEIS, may not be in compliance with the terms of its already-obtained air permit, if the Mine disturbs over 1136 acres.

For instance, the DEIS at Table 2-6 claims that the Mine will have 517 acres of Access/Haul roads, that another 409 acres of Main Access Roads will be constructed, and that there will be 239 acres of current and future exploration roads.

. But the Mine's current air permit allows 358 acres of Access/Haul Roads only, not this 1149 total acres of roads cited in the DEIS project description. These conflicting acreage figures are significant, since much of the air pollution from the Mine will potentially come from dust raised by heavy truck traffic on the Mine's unpaved roads. An increase of almost 300% in the surface areas of the Mine's roads may produce a significant increase in the amounts of dust and air pollution from this proposal, that is not currently regulated under the Air Permit.

The DEIS Table also lists 241 acres of disturbance for a heap leach facility, and 574 acres of Borrow Source Areas. But the Mine's air permit for its potential and future operations do not list these additional surface disturbances. Again, these are significant conflicts regarding the project description.

These clear inconsistencies between the project as described in the DEIS, and as it is currently permitted by the State of Nevada, should be explained. The DEIS' claim that the Mine will comply with the provisions of its approved air permit, should be reconciled with this plain

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R 15.1 - The surface disturbance area as noted in the approved air emissions permit for the Mule Canyon Mine corresponds to the maximum area of active disturbance which could be a source of dust emissions during the life of the air emissions permit (through June, 2000). Active disturbance under the air emissions permit does not include mill sites, tailings ponds, leach pads, and other areas that do not represent sources of airborne dust. Nor does this designation include short-term construction activities. On the other hand, the surface disturbance area noted in the DEIS refers to the total area of surface disturbance over the life of the project. The two disturbed area acreage figures are admittedly different because they represent different area designations and are being used for two entirely different purposes.

Anticipated dust emissions due to wind erosion have been calculated using a separate set of disturbance area figures, which represent the maximum area of active disturbance for any given year. A large portion of the total surface disturbance area as listed in the DEIS will not be disturbed, will be kept moist, or will be reclaimed, thereby generating no dust emissions, during any particular year. The wind erosion dust emissions values listed in both the DEIS and the air emissions permit application are based on the maximum area disturbed during any given year (year 1999 was identified as the year of maximum surface disturbance due primarily to maximum ore and overburden/interburden production levels and associated mine pit and overburden/interburden disposal area expansion) and represent maximum anticipated dust emission levels.

C 15.1 Cont.

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PAGE 2

conflict between the amounts and types of allowable surface disturbances listed in the air permit, compared to the amount of surface disturbance described in the DEIS.

The Mine will need to obtain a new or amended air permit if it truly intends to disturb over twice as many surface acres as it is currently permitted to disturb by its air permit.

C 15.2

POSSIBLE INACCURATE DESCRIPTION OF AIR QUALITY RULES AFFECTING THE MINE

The DEIS claims that the Mine's air emissions must comply only with the 10% opacity limits for its conveyor transfer points, and the 15% opacity rule for its limestone processing circuit (3-133). These limits are set out, according to the DEIS, in Subpart LL and OOO of the New Source Performance Standards. However, Subpart LL has additional provisions potentially relevant to the Mine's air pollution sources: a particulate matter emissions limit of .05 gram/dry standard cubic meter and a 7% opacity limit for any stack emissions. According to the Mine's air permit, there will be air pollution sources at this facility that discharge through a stack and/or control device which will potentially have to comply with these additional provisions of Subpart LL.

C 15.3

AIR QUALITY IMPACTS FROM THE MINE ARE POSSIBLY UNDERESTIMATED AND NOT MITIGATED ADEQUATELY

The DEIS claims that the air emissions from this Mine will have an effect only upon receptor within 4.3 miles of the mine's mill. (3-136) But there is no evidence of citations to support this bold claim that the Mine's air pollution will have "no effect" beyond 4.3 miles. the Mine's air emissions may be capable of travelling over 4.3 miles and producing significant and adverse impacts beyond that distance, contrary to the unsupported assertion in the DEIS.

The Mine's potential to produce air quality impacts is illustrated in the DEIS in Table 4-13, which demonstrates that the Mine will produce over 2 million pounds of air pollution annually. The Mine's operation will cause emissions of over 250 tons per year of each of three air pollutants: fine particulate (PM 10) oxides of nitrogen (NOX) and Carbon Monoxide (CO).

The 250 ton per year figure is especially important in weighing whether these amounts of air pollution are significant and adverse. For comparison, the federal Prevention of Significant Deterioration (PSD) air quality rules considers stack emissions from an air pollution source to be significant if over 250 tons per year per pollutant is emitted. While the mine's air pollution is not channeled exclusively through a stack, and thus does not fall directly under the strictures of the PSD rules, it is nonetheless illustrative of the large volumes of air pollution from this mine to compare its emissions to the PSD thresholds of significance. Since the Mine will emit significant amounts of three pollutants, there is a potentially adverse and significant air quality impact from this proposed project. These impacts should be substantially mitigated.

In response to these potentially major impacts, The DEIS states that:

R 15.2 - The air emissions standards noted by the commentor are applicable only to stack or vent emissions from those sources listed in 40 CFR Subpart LL (60.380(a)). None of the Mule Canyon Mine air emission sources included in the Subpart LL listing will have stack or vented emissions so the noted emission standards are not applicable.

R 15.3 - The "area of impact" is defined by regulation as the maximum area in which any pollutant regulated by an ambient standard would have an impact exceeding "significant" concentrations. The threshold for "Significant" impacts is indirectly defined by the U.S. EPA (40 CFR 51.165, Subpart b, 2) by stating that those impacts that are of no consequence even in a non-attainment area are not significant. Below the significance level, any elevated air emission concentrations and resultant impacts are, for all practical purposes, considered to be non-existent. For the Mule Canyon Mine, the 24-hour PM_{10} concentrations represent the maximum emission level and have the maximum area of impact (the 24-hour PM_{10} non-attainment area significant concentration is 5 $\mu g/m^3$) and it is this area that defines the maximum radius of 4.3 miles from the mill as modeled in the air emissions permitting process.

Anticipated project emissions, emissions controls, and resultant impacts are characterized in both the DEIS and the air emissions permit application. Both the information presented and the calculated air emissions meet all applicable Nevada and Federal air emissions and impact standards, therefore, the Nevada Bureau of Air Quality has approved and issued the required Air Quality Operating Permit (AP1041-0593) for the Mule Canyon Mine.

C 15.3 Cont.

PAGE 3

"Potential project-related air emissions would also be effectively controlled and mitigated through ongoing compliance with the NDEP Air Emissions Permit, consequently no supplemental mitigation would be required." (4-83)

The problems with this assertion in the DEIS, as discussed previously, is that the project as described in the DEIS, will apparently **not comply** with the NDEP Air Emissions Permit, regarding the amounts of surface disturbance and roads at the Mine. Thus, the DEIS' reliance on the current NDEP permit as an adequate mitigation measure is possibly misplaced, given that the permit does not address the total impacts from the Mine's surface disturbance and road building, as described in the DEIS.

C 15.4

The DEIS also may mischaracterize the amounts and types of air pollution that will be produced by this mine. Table 4-14 claims that only 5.3 tons/year of the highly noxious and toxic gas hydrogen sulfide will be emitted at the mine. But according to the mine's air permit, the mine may actually emit over 7 tons/year of hydrogen sulfide from the Autoclave alone.[1] This inconsistency should be explained in a new DEIS.

There may be other sources of airborne hydrogen sulfide at the Mine, such as the degassing of the Mine's pit water. For instance, the nearby Lone Tree Mine produces hydrogen sulfide air emissions from its pit dewatering system. It is possible that Mule Canyon's pit dewatering system may also produce additional emissions of hydrogen sulfide. Additional sources of airborne H2S could contribute to a significant air quality impact, in combination with the autoclave H2S emissions. This subject was not dealt with adequately in the DEIS.

It is also likely that there is at least one additional source of hydrogen sulfide in the immediately vicinity of the mine, namely the nearby geothermal power plant. The DEIS admits that:

"Hydrogen Sulfide (H2S) ... is emitted from the nearby geothermal power plant (which) ... does have fugitive emissions." (3-134)

In spite of this admission of a nearby hydrogen sulfide source, the air quality impact modelling in the DEIS at Table 4-15 shows **no** baseline or background concentrations of H2S present in the Mine area. But since the geothermal plant emits H2S, it is probable that there is a background level of H2S already present. This failure to provide an accurate background concentration of H2S means that the DEIS may have underestimated the cumulative effect of the additional H2S emissions from the Mine.

Since the DEIS has apparently significantly underestimated the permitted H2S emissions from the mine, and has possibly failed to consider other potential and actual sources of H2S at

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[1] 1.60 lb/hr. times 8760 hours of operation per calendar year.

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R 15.4 - The air emissions permit states that the autoclave has the potential to emit 1.6 lb/hour of H_2S which, if emitted over an entire year (8,760 hours), would equal 7.1 tons per year. The stated hourly emission level is based on a short-term limit. The long-term (annual) limit is derived from another permit condition limiting process ore feed to 1,100,000 tons per year. It is this limit, coupled with the emission factor found in Appendix A of the permit application (9.63 X 10^{-3} lb H_2S/ton of ore) that limits potential emissions of H_2S to 5.3 tons per year.

There are and will be no other known H_2S sources within the Project Area. Based on baseline sampling and hydrologic modeling results and the fact that the source of pit water is dissimilar to that of SFPGC's Lone Tree Mine, pit water is not expected to contain significant concentrations of H_2S.

The geothermal plant must meet the emission standard of 112 $\mu g/m^3$ for H_2S as imposed by the plant air emissions permit at its boundary, which is approximately 3,000 feet from the plant in the direction of Mule Canyon (to the northwest). Since emissions from the geothermal plant are uncontrolled fugitive emissions, which means that they escape as small leaks from plant piping, these emissions discharge at or near ground level. Concentrations for this type of emissions decrease rapidly with downwind distance due to the natural effects of dissipation, dispersion, and mixing. Assuming that geothermal plant emissions are at the maximum permitted level of 112 $\mu g/m^3$ at the boundary, natural effects would reduce concentrations to well below 40 $\mu g/m^3$ at the nearest Mule Canyon fence line, which is four times the distance from the geothermal plant to it's boundary. This concentration combined with the highest possible concentration at the fence line from Mule Canyon Project of 71 $\mu g/m^3$ (specified by permit) would still be below the Nevada standard of 112 $\mu g/m^3$. Moreover given prevailing winds, the maximum impact from the Mule Canyon Mine emissions would occur to the north-northeast , and the geothermal plant is southeast of the mine. For the maximum additive effect described above to occur, winds would have to blow from the northwest and southeast simultaneously, which is highly unlikely. Clearly, potential exceedance of allowable H_2S levels is not a substantive issue.

C 15.4
Cont.

and near the Mine (the pit dewatering system and the geothermal power plant), then it is likely that the DEIS has presented inaccurate information on the H2S impacts from this proposal. Any errors regarding this subject should be corrected in a new DEIS.

C 15.5

THE DEIS FAILED TO DESCRIBE THE TOXIC AND HAZARDOUS FRACTIONS OF ITS PARTICULATE EMISSIONS

This mine's operation will produce 469 tons per year of fine particulate emissions. But many studies show that a portion of particulate emissions from metal mines is composed of highly toxic materials such as lead, copper, mercury, zinc, selenium, silica, arsenic and other metals and materials. These metals and toxins, when they are present as a fraction of airborne particulate matter emitted from a mine, can present widely recognized health risks to the exposed population. This should be an issue discussed in a new DEIS, since there is a town sited just a few miles from this proposed mine. As the federal EPA has warned:

> "Toxic metals can also be carried away from mining sites by high winds as particulates or contaminated dust. Rock and tailings piles can be eroded by wind; the ~~wind may carry~~ small particles of dust and toxic metals to populations living downwind. At some sites, decreased visibility has been noted downwind from large tailings piles as metal-containing dust is blown towards nearby towns. The result is human exposure to toxic metals via inhalation, or the breathing of contaminated air. For certain metals, such as cadmium, this route of exposure can be particularly dangerous."

> "(T)he carcinogenic potency of arsenic is estimated by some to be approximately one order of magnitude greater when the metal is inhaled than when it is ingested. Dust ... inhaled by individuals living nearby (mines) is therefore of paramount concern."

> "Chronic inhalation of cadmium is known to cause an emphysema-like condition. Inhalation of cadmium dust is known to cause increased occurrence of prostate cancer in workers. Inhalation exposures are therefore an important concern at mining sites."

> "Nickel ... is known to be carcinogenic when inhaled."

C 15.5
Cont.

Since metal mining takes place in areas of high mineralization, it is probable that there will be elevated levels of metals, silica and related materials in this mine's dust. For instance, air quality sampling on the grounds of the nearby Santa Fe Pacific Rabbit Creek Mine, revealed that

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R15.5 - Concerns regarding metals as a constituent of airborne fugitive dust have been addressed by the Nevada Bureau of Air Quality and were found to not be an issue or a significant health concern unless ambient standards for PM[10] emissions are exceeded. There are no ambient standards for constituent emissions (including metals) separate from the PM[10] standards, on either the Nevada or Federal levels. Potential metals emissions have, however, been quantified and submitted to the Bureau of Air Quality for the purposes of determining the Mule Canyon's source status with respect to Title V permitting as summarized by the following table:

Pollutant	Process	Non-Process
Formaldehyde	0.01 tons/year	----
As	0.03	0.02 tons/year
Hg	1.40	0.02
Cr	----	0.10
Cd	----	0.0003
Mn	----	1.32
Pb	----	0.01
Ni	----	0.03
Se	----	0.003
Sb	----	0.01
Total HAPs	1.44	1.51

The bureau of Air Quality, based on this information, has confirmed that metals or other hazardous air pollutants are not a concern for the Mule Canyon Mine. The trigger for major source status is 10 tons per year for any single pollutant or 25 tons per year for all hazardous pollutants. Based on the noted values it is clear that potential Mule Canyon emissions are well below these thresholds.

C 15.5 Cont.

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some airborne particulate samples were composed of over 30% of crystalline silica, a known carcinogen. Another indication of the site's intensive mineralization can be found in the area's water quality sampling results. Elevated levels of many metals and toxins are present in the Mine area's groundwater, indicating the possibility that these metals and toxins will also be present in elevated concentrations in the Mine's dust to be emitted during its operations.

For instance, several metals and toxins were detected in the bedrock groundwater, including arsenic and manganese, the exploration adit contained high levels of many substances such as Arsenic, cadmium, chromium, copper, Manganese, Mercury, Nickel, Zinc, and Selenium, in concentrations exceeding surface water quality standards. Since these substances are in elevated concentrations in the area's groundwater, it is possible that these materials will be present in elevated concentrations in the Mine's particulate emissions.

But the DEIS failed to deal with the potential adverse impacts of highly mineralized dust emissions from the mine. The DEIS failed to mention this probability, and failed to provide an analysis of the probable concentrations of metals and toxins in the mine's dust, and failed to model the expected concentrations of these metals and toxins at the project boundary and sensitive receptor points. The subject should be discussed in detail in a new DEIS.

But the DEIS failed to provide estimates of the metals and other toxics, such as respirable crystalline silica, that will be potentially present in the mine's dust emissions. These materials could produce potentially significant and adverse health impacts, that should be studied in a new DEIS.

C 15.6

THE MINE'S PM 10 EMISSIONS ARE A SIGNIFICANT ADVERSE IMPACT THAT IS NOT MITIGATED ADEQUATELY

The DEIS Table 4-15 demonstrates plainly that the Mine's operation and the resulting pollution will cause an increase of 80 ug/M3 in the airborne concentrations of PM 10, producing a total of 93 ug/M3, as a 24 hour average.

Many recent studies show that an increase far less than the admitted 80 ug/M3 impact from the Mine in the concentration of PM10 will have clear and measurable adverse human health impacts.[1] For instance, short-term increases of only 50 ug/M3 of PM10 have been implicated in increases of up to 19% in the death rate among an exposed community. Since the Mine may produce an increase of 80 ug/M3 or more, there is a potential for a measurable increased health risk in the exposed community.

The DEIS also admits that it may have underestimated the Mine's impact on airborne pollutant concentrations, so an increase greater than 80 ug/M3 for PM 10 (and corresponding increases for other pollutants such as H2S) may actually result. As the DEIS states:

"...(S)hort term air quality impacts were calculated based on average daily emissions ... (I)t is possible that actual short-term emissions for specific periods could exceed the

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R 15.6 -The predicted ambient concentrations of PM_{10} are well below the applicable National Ambient Air Quality Standards (NAAQS), defined for both 24-hour and annual averaging periods. The NAAQS are health-based standards, and therefore by definition health risks are not an issue when the standards are not exceeded.

The short-term (24-hour) PM_{10} impacts were calculated based on maximum daily emissions from the process sources and average daily emissions from the fugitive mining sources. Although extremely unlikely, it is possible that all the process sources could operate at their maximum design rates simultaneously so this very conservative process emissions situation was identified as the maximum emissions scenario. It is, however, not operationally feasible to have all mining sources operating at maximum capacity simultaneously. The mining process involves various activities, with each occurring at variable rates, often independent of the other activities. These activities include drilling, blasting, removal of overburden and interburden, removal of ore, ore and overburden/interburden haulage, road maintenance, reclamation, and other related activities. The mine, however, will not have the manpower or equipment to simultaneously perform all of these activities at full capacity. Maximum daily emissions were not, therefore, utilized for mining sources as the maximum mining fugitive emissions scenario. Use of the highest annual average emissions for the mining activities provides a reasonable maximum 24-hour impact scenario. Thus, maximum impacts from fugitive emissions are reasonably estimated based on daily maximum rates with the estimate of 24-hour PM_{10} impacts as provided in the DEIS representing maximum impacts.

The long-term average baseline PM_{10} concentration, considered to be representative of baseline conditions, is added to the modeled concentrations corresponding to short-term impacts to determine maximum emission levels. This approach is used because baseline concentrations tend to be high when modeled impacts are low and vice-versa in rural areas of Nevada. Calculated maximum emission concentrations occur only when wind speeds are low (poor pollutant dispersion) while measured background concentrations reach maximum levels when wind speeds are high, since high winds more readily pick-up and transport dust. Maximum baseline would not occur concurrently with maximum impacts so the average baseline value provides a reasonable baseline level for periods of maximum impact.

SFPGC will comply with all applicable conditions and provisions of the approved air emissions permit and therefore, will meet all applicable air quality standards (i.e., NAAQS, NSPS). Thus, supplemental mitigation to reduce potential mine air emissions are not justified or necessary.

C 15.6
Cont.

PAGE 6

emissions rates used in air quality modeling, resulting in incrementally greater impacts ... local impacts could exceed those predicted by the model." (4-81)

The DEIS may also have underestimated the levels of PM 10 that will be present after the Mine begins operation, because in its modelling, the DEIS used as a baseline figure, the average, not the peak levels of PM 10 already present in the Mine area's air shed.

The DEIS should have presented additional modelling results for PM 10 and other pollutants, using estimated peak emissions, and the peak levels of PM 10 already detected in the area, to provide a clearer picture of the probable maximum and cumulative impacts on the area's airborne PM10 concentrations that will be produced during the Mine's operation.

Despite these several current scientific reviews of the health risks from increase in PM10 that are equivalent to the increases to be caused by this proposed Mine, the DEIS never discusses the health impact implications of this large increase in PM 10 concentrations. This potential impact should be studied in a new DEIS, especially since as noted above, the mine's particulate emissions may contain fractions of metals and toxins, and air quality impacts may be underestimated.

Because of these air quality concerns, the DEIS should have discussed additional mitigation factors to reduce the mine's potential air pollution. Two possible mitigations would be a requirement that the main access and haul roads would be paved. This would tend to vastly reduce the amount of dust stirred up by the mine's constant stream of truck traffic. Many studies demonstrate that dust from unpaved mining roads can be a significant source of PM 10. Another possible mitigation is for the mine to vent its crushers and conveyor drop and transfer points through enclosed baghouse, rather than by controlling the dust with water sprays. Water sprays generally have about a 70% pollution control efficiency, compared to the 99+% control efficiency for baghouses.

C 15.7

SOCIO-ECONOMIC IMPACTS

During the construction phase of a mine's development, some mine owners typically hire construction contractors who do not employ qualified, local Nevada construction workers. Instead, these contractors frequently bring in out-of-state workers to construct the mine. These out of state workers often work for low wages, and without health and pension benefits. At times, the towns near Nevada mine construction sites resemble scenes from "Grapes of Wrath."

In those instances out of state construction workers are camped out in parks in tents, trailers, and RVs, or motels that offer weekly rates. Their families are cooking over open fires, hot plates and hanging their laundry to dry from motel railings. Other workers who came to the mine in futile hopes of obtaining a construction job, who were not hired, are clustered on street corners or camped in bars, drinking up their last few dollars.

Under these circumstances, the construction phase of a mine can produce significant

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R 15.7 - It is important to note that due to significant recent and continuous growth in the mining industry in this general area, most local workers who would be qualified for either skilled or unskilled labor positions are currently employed. Availability of a local workforce is generally limited to any workers who may have been recently laid-off from other mining operations or workers who might transfer from current positions at other mining operations in the area. The BLM cannot stipulate or dictate contractor hiring practices except to specify compliance with all applicable State and Federal laws and requirements. Given current labor force demographics in Nevada, the recommended mitigation stipulation that a certain percentage of the construction and mine workforce be Nevada residents is impractical. This stipulation would unnecessarily limit SFPGC's ability to obtain a qualified workforce, would result in little change in potential socioeconomic impacts given the considerations noted above, and is not required under any applicable law or regulation. To the extent that qualified workers are available from the local and regional areas, however, SFPGC has indicated their intent to recruit and train these individuals as full-time employees. The Human Resources Department of SFPGC has stated that SFPGC is having difficulty filling vacant positions at Twin Creeks and Lone Tree Mines. In fact, Twin Creeks Mine has never reached full employment.

Excluding the local workforce which already resides in the general project area, the impacts associated with any workers who would come from other areas, whether in-state or out-of-state, would be similar. The DEIS in Section 4.10, identifies and discusses the range of potential

C 15.7
Cont.

PAGE 7

adverse socio-economic impacts on a nearby community. There will be a heightened demand for a variety of social services, by the imported workers, their families, and the unlucky ones who didn't get hired or who are freshly laid off.

These imported workers will be putting their children in local schools. Their families, and the laid off or not hired workers will be going on unemployment, welfare, and food stamps. The workers will place great pressure on the available housing supply. These workers and their families will be using the local parks and libraries, and seeking care at the emergency of the local hospital. Some of the imported workers and their families will turn to crime, especially under the stress of living under often uncomfortable conditions in a strange town, among strangers, sometimes working long hours at low wages, sometimes being laid off unexpectedly.

For example, recently the Magma Robinson mine was constructed in White Pine County, Nevada, largely by out of state workers. During the period of construction in 1995, the crime rate for a variety of offenses in White Pine County rose sharply compared to the prior year, according to the county sheriff's statistics:

WHITE PINE COUNTY	1994	1995
Driving Under (the Influence (DUI)	45	77
Felony Arrests	27	57
Misdemeanor Arrests	193	348
Traffic Accidents investigated	284	390
Citations	622	910

These statistics illustrate one of the many potential impacts on the socio-economics of a community near a mine construction site, and the possible demands that a mining construction project can inflict on an area's social service providers.

The DEIS admits that the construction period of the Mule Canyon Mine will produce cumulative socio-economic impacts, in combination with several other mine construction projects that are currently underway or which will occur concurrently with the Mule Canyon mine construction project. (ES-7)

The DEIS also states that 75% of the construction work force on this project will be non-local in Table 4-7. This and other Tables in the DEIS may underestimate the impact of an imported construction crew, by assuming, without citation, that only 10% of the workers will bring their families. Since the job will last at least one year, a higher percentage of workers may bring their families. Other studies of socio-economic impacts from large industrial construction projects have assumed that 50% of the construction workers will bring their families to the site of an extended job.

These statistics indicate that significant adverse socio-economic impacts will occur during this Mine's construction phase. The DEIS states that housing supplies are already

(R 15.7 Cont.) socioeconomic impacts which may result from mine construction, development, and future ongoing operations. This discussion acknowledges some of the unique impact considerations which relate to immigration of both temporary construction and permanent mine workers from other locations.

The assumptions utilized in the socioeconomic analysis are based on recent economic trends for this area of Nevada as documented in available published research findings (NENDA, 1993 and others). The potential for construction workers to relocate their families will be dependent on a number of factors including, but not limited to, the length of the construction project and the availability of suitable housing. At the present time, most relevant factors indicate that the percentage of construction workers who would relocate their families would be well below the 50 percent figure quoted by the commentor.

The commentor notes that construction-related impacts would not be adequately addressed by normal market forces since mine-related revenues would not be available for mitigation until after construction is completed and mine operations begin. It should initially be clarified that neither NEPA nor other applicable regulatory requirements of the BLM or State agencies require that potential project-related impacts be mitigated to a level of non-significance. The inference that market forces would not provide mitigation for construction-related impacts is not entirely true, since expenditures for materials and supplies required during the construction phase and purchases of goods and services by construction workers and their families would generate significant revenues in the form of sales and use taxes. The recommended approach of "up-front" mitigation payments, while having some conceptual appeal is frequently not effective in directly addressing mining-related socioeconomic impacts. SFPGC has demonstrated a willingness and desire to work in close cooperation with local government entities to recognize and define problems and concerns as they develop and then to address them through directed cooperative action. This approach may represent a more effective short- and long-term solution to potential socioeconomic impacts.

C 15.7
Cont.

stressed, construction workers have camped out in the project area and on federal lands in the past, and that schools and law enforcement services could experience adverse impacts, that public assistance will have an increased demand, health services and law enforcement are currently very strained, fire protection is understaffed, and there will be increased traffic and crime in addition to these negative impacts that are already occurring, partly because of the influx of out of state workers into this area. But in response, local governments will experience increased expenditures with little increase in revenues during the construction phase, according to the DEIS. (4-58 to 4-63)

The DEIS says that no direct mitigation will be offered for these significant impacts; that "market forces" will address these problems. But there is no citations or evidence offered in the DEIS to demonstrate that market forces will mitigate these impacts to a reasonable r insignificant level. At some point, government agencies may realize increased revenues from additional taxes generated by the Mine's operation, but that income will come long after the occurrence of the significant and adverse socio-economic impacts from the imported mine construction work force.

Two mitigations should have been discussed in the DEIS. First would be a requirement in the Plan of Operation that a high percentage of mine construction workers should be Nevada residents of at least one year's duration. A second potential mitigation measures that should have been discussed in the DEIS, would be a requirement that the Mine owner be required to make straightforward mitigation payments to the affected social service agencies; for instance buying 5 patrol cars for the police department, financing construction of new school buildings, providing financing for the hiring of new staff at area health care service providers, and so on.

In some instances, Mine owners have willingly and voluntarily provided these types of mitigation payments in Nevada, whether in the form of gifts and grants, or in the form of guaranteed bonds to finance development of a community's infrastructure. In other states, such as Alaska and Wyoming, mine owners are required by state law to reimburse local agencies for the costs of providing social services to an out of state mine construction work force. Often, these sums exceed hundreds of thousands of dollars. This Mine owner should be required to calculate, and reimburse the financial impact on local social services, if his construction contractor chooses to import an out of state construction crew.

C 15.8

GENERATION OF ACID MINE DRAINAGE AND RELEASES OF PROCESS CHEMICALS

As mentioned previously, the Mine area is heavily mineralized, and also features deposits of pyrite and similar materials that could produce acid drainage, which would liberate the metals and toxins that are present in the area's rock. The resulting acid mine drainage (ARD) could produce significant and adverse impacts on the environment. The existing ARD from the exploration adit amply demonstrates that ARD is a realistic possibility at this site.

The Mine would rely largely on groundwater monitoring to determine if ARD or process chemicals is seeping from some the leach pad. This is appropriate especially since apparently the

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R 15.8 - Please refer to previous responses R 1.10, R 1.14, R 2.5, R 2.6, R 2.8, R 2.9, R 2.10, R 2.11, R 2.12, R 5.7, R 6.3 and R 13.3 which address the potential for acid rock drainage and other water quality monitoring and mitigation considerations.

C 15.8 Cont.

leach pad is lined only with compacted soils of unstated permeability.

However, it does not appear that any such groundwater monitoring will take place during or after the mine life, at the over-and-interburden (waste rock) disposal areas, which are apparently not lined, even though the DEIS says these dump sites could produce ARD. (4-16)

The DEIS should have discussed additional mitigation to limit the environmental damages from ARD, including but not limited to synthetic liners beneath both the leach pad and the waste rock areas.

C 15.9

BACKFILLING THE OPEN PITS

A related topic is the status of the open pits after mine closure. Water will gather in some of these basin, and water quality will exceed water quality standards for many years, if not forever. The DEIS at Table 4-2 illustrates the modelled water quality after specified time periods, and compares the results with drinking and surface water standards. However, this table neglects to compare the pit water quality with several federal water standards, which apparently ar more stringent than the Nevada standards that are provided.

For instance, this table lists the Nevada aquatic standard for Copper, which is 1 mg/l, compared with the pit water quality after 40 years, which will have Copper at .034 mg/l. But the federal "Gold Book" chronic standard for copper is only .012, indicating that Copper in the pit water would exceed the federal surface water standard. Likewise, the DEIS failed to calculate the water quality standards for several hardness-dependant metals, such as silver, zinc, cadmium, and barium. It appears that federal water quality standards will be violated in the pit water for some of these metals also. For instance, the resulting levels of zinc in the pit water of 2.8 mg/l, with a $CaCO_3$ concentration of only 82 mg/l, would far exceed the federal standard for zinc of .12 at 100 mg/l $CaCO_3$. Similarly, after 40 years, the pit water would contain cadmium at .0048 mg/l (with 82 mg/l $CaCO_3$), compared with the federal chronic standard of .001 (at 100 mg/l $CaCO_3$).

These water quality standard violations are significant, inadequately mitigated, and adverse impacts that may violate Nevada state law and federal standards. These pit fluids represent a hazard to ground water quality if and when conditions develop that cause the pit water to flow into the groundwater aquifer, and in the event that aquatic and avian life contact the pit waters.

Because of these issues, backfilling the pits should be the chosen alternative in the Record of Decision and Plan of Operation.

C 15.10

HABITAT LOSSES

Backfilling the pits would also decrease the amount of land that is ultimately and permanently withdrawn from potential wildlife habitat. This is an important issue because the implementation of large scale surface mining in Nevada has caused massive losses of acreage of

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R 15.9 - Please refer to previous responses R 2.2, R 2.5, and R 6.3 which address final pit water quality considerations. The commentor compares the predicted concentrations of several constituents in the pit lake predicted to form at the site with Federal water quality standards, suggesting that potential impacts to wildlife have not been adequately assessed. The expanded ecological risk assessment referenced in Sections 2.4.8, 4.3.3.2, and 4.8.3.3 of the DEIS and completed subsequent to distribution of the DEIS addresses the issue of final pit water quality and associated risks. Although not all potentially applicable water quality standards were included in Table 4-2 of the DEIS, a wide range of standards and results of toxicological studies were considered in the ecological risk assessment. The potential impacts on wildlife that might use a pit lake or pond as a source of water or food were evaluated, and the potential risks quantified. A summary of the findings of the ecological risk assessment is included in Appendix E of the FEIS, and the full document, available for review in the BLM Battle Mountain Office, can also be reviewed for a full description of water quality standards and lake use scenarios evaluated.

The commentor also questioned whether water from the pit lake might flow into ground water in the future, thus affecting ground water quality. Hydrologic modeling described in the *Post-Closure Hydrology and Pit Lake Geochemistry Report* (SMI/BCI, 1995b) indicates that water will be lost from the predicted lake to evaporation, with ground water flowing into the pit from all directions to compensate for the evaporative losses. There will, therefore, be little or no water movement from the lake into the ground water system, and no effects on ground water quality near the pit lake.

C 15.10
Cont.

every kind of wildlife habitat, thus decreasing the ability of Nevada lands to support the hunting and fishing that many Nevada residents enjoy.

Of special concern to the Building Trades Council is the potential losses of mule deer and chukar habitat, because of the cumulative impacts on deer habitat caused by mining throughout northern Nevada, at mine site after mine site. This mine would primarily impact the mule deer and chukar, according to the DEIS. (4-42) Over 320 acres of habitat would be permanently lost, even after reclamation, partly because of the open pits and roads left after mine closure. Since apparently the reclamation of mined lands will not restore the entire amounts of appropriate sagebrush habitat most conducive to both the deer and the chukar (and sage grouse).

For these reasons, regarding the net losses of habitat even after mine reclamation, the DEIS should consider requiring the Mine owner to developer and improve substitute areas of habitat to replace all lost habitat, at a ratio of at least 2 acres of replacement habitat for every acre of habitat lost at the mine site, after reclamation.

07-05-96 03:44PM (619) #11

R 15.10 - Please refer to previous responses R1.7, R 5.8, R 5.9, and R 9.3 which address the issues of mine reclamation and habitat replacement, mitigation, and enhancement. Planned reclamation activities including selective revegetation and water development are expected to improve wildlife habitat conditions compared to the existing environment. Reclamation objectives for wildlife habitat will benefit a wide diversity of species including the referenced big-game species.

ENDNOTES

1. (United States Environmental Protection Agency. Mining Wastes in the West: Risks and Remedies. August, 1987. p. 4-6)

2. "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/

Sansinena Ranch

July 3, 1996

Mr. Christopher Stubbs
EIS Project Manager
Bureau of Land Management
Battle Mt. District Office
Post Office Box 1420
Battle Mt.. Nevada 89820

Dear Mr. Stubbs:

I am writing to provide comments on the Mule Canyon Mine DEIS. I am writing on behalf of the Sansinena Ranch which I operate.

C 16.1

We have a BLM grazing permit in the Argenta Allotment. The Mule Canyon Mine is located in the heart of our BLM summer range and will cause major consequences to our range livestock operation.

As a bit of mitigation for the consequences of the mine, we request that we be allowed to start grazing in the Horse Heaven Fire Rehab Area Commencing with the 1997 grazing season.

C 16.2

We urge that the BLM not use the Mine Project as an excuse to make grazing reductions beyond a reasonable estimate of the grazing capacity that will be excluded by the Mine perimeter fence.

C 16.3

When cattle are hit by vehicles on the roads, we urge that the Mine be required to provide us market value compensation for the loss.

C 16.4

We have been told that the Mine perimeter fence may be moved back somewhat from the boundary shown in the DEIS. We urge that this be done. Moving the fence back will reduce the adverse impacts to our livestock operation.

Even with the fence moved back as we were shown, the fenced Mine Project Area is still located in the heart of our Summer Range. The best summer forage is right square in the area excluded by the perimeter fence. The forage gets stronger, higher quality and more productive as you move up higher on the Shoshone Ridge due to increased precipitation. The Mine straddles the top of the Ridge.

R 16.1 -The rehabilitated Horse Heaven burn area may be made available for grazing during the 1997 grazing season provided it has met rehabilitation objectives. A determination as to when grazing can commence within this area will be subject to field examination by BLM personnel. The rehabilitation area is scheduled for monitoring in the summer or fall of the 1996 grazing year. The results of site-specific field monitoring will determine if it will be made available for grazing use and authority to graze this area will not be issued until such time as field conditions are found to warrant such use.

R 16.2 - Any reduction in grazing that occurs as result of the Mule Canyon Project will be based on the size of the mine area which is excluded from grazing due to fencing. Any grazing reductions will be based on the original adjudications on which the Argenta allotment grazing permits are based. Use of current production measurements would be limited site evaluations relative to bond release criteria.

R 16.3 - Under applicable provisions of open range laws, any individual or other entity responsible for livestock damage or loss is liable for reasonable compensatory damages. As the mine operator, SFPGC will be responsible for any livestock losses due to collisions with company-owned vehicles. It should be noted that responsibility under the law does not extend to losses due to collision with private vehicles of mine employees or private or commercial vehicles owned by contractors or suppliers over which SFPGC has no authority or control.

R 16.4 - Please refer to previous response R 5.9 which addresses reduction of the fenced mine area. In response to concerns regarding the magnitude of the impact to grazing permittees, the BLM has requested and SFPGC has agreed to revise its perimeter fencing plan to limit the area enclosed by the perimeter fence until such time as construction of the mill and associated tailings facility becomes economically viable. This temporary mitigation measure will be effective in reducing the number of springs excluded from livestock access and increasing the available AUMs. Springs outside the interim fenceline may, however, be impacted in the future by mine dewatering activities.

Mr. Christopher Stubbs
July 3, 1996
Page 2

C 16.4 Cont.

Furthermore, the fence will still exclude the three (3) best springs in Sections 4 and 33. We have had a water right application pending with the State Engineer (Application #56395) since May 1991 for the Spring located in the NW¼ SE¼ of Sec 4. These live waters service the high quality feed and they are irreplaceable. No number of wells can replace a free running maintenance free spring. Wells require regular maintenance at considerable expense. Also one is never sure when they might break down and leave the cattle dry and thirsty.

C 16.5

Partly because the fenced area sits on the good feed and water, it also constitutes a complication to the development of a workable Allotment Management Plan and grazing management system for the whole allotment. It doesn't make it impossible, but it clearly complicates the matter.

We understand that mining has a place, but in fairness there should be mitigation of these consequences to our operation. Our ranch should at least be provided just compensation for the major disruption and losses. Our ranch has been in my family for four generations *(including my daughter)*.

We wish the Mine weren't going to be here, but we appreciate that they have approached us and indicated they are willing to compensate us. Nevertheless, the full amount of compensation hasn't been determined yet.

Thank you for giving us the opportunity to comment.

Sincerely,

Mike Sansinena

Mike Sansinena
Sansinena Ranch

MS:jm

Sansinena Ranch

R 16.5 - Reduction of the area excluded from grazing should serve to lessen the magnitude of project impacts on forage and stock water availability, and grazing management. With respect to lost stock waters, Waters of the State are regulated by the Nevada State Engineer. The State Engineer requires mitigation for loss or impairment of flow for existing water rights and retains approval authority over proposed mitigation.

With respect to lost forage, no legal or administrative requirement exists for mitigation. Any mitigation considered is a matter solely between SFPGC, as the project proponent, and the grazing permittees.

Development of an Allotment Management Plan (AMP) is a complicated task, especially considering the inherit complexity of multiple land owners. The mine may complicate matters some but site fencing may actually aid in the management of livestock within the allotment both during and following completion of active mining operations.

July 8, 1996

Mr. Christopher Stubbs
EIS Project Manager
Bureau of Land Management
Battle Mountain District Office
P.O. Box 1420
Battle Mountain, Nevada 89820

Dear Mr. Stubbs,

On behalf of Julian Tomera Ranches, I'm sending these suggestions and comments on the Mule Canyon Mine EIS.

We graze our cattle for 10 months of the year in the Argenta Allotment. The Mule Canyon Mine will greatly affect the grazing in its vicinity.

The following are a list of our major concerns and ways that we could solve some of the problems.

C 17.1

1. The haul road

A. If cattle are injured or killed, the Mine will pay quickly, with no hassle.

B. There will be a reasonable and enforced speed limit.

C. Trash and garbage will be kept at a minimum.

D. If, in the future, it becomes necessary to fence the road, stock water must be developed on both sides of the roadway

C 17.2

2. Water Development

A. Wells are always second best, compared to natural springs.

B. Tomera Ranches have vested water rights to springs affected by the Mine

R 17.1 - Please refer to previous response R 16.3 which addresses the issue of compensation for livestock losses. A speed limit appropriate for mine roads will be established, posted, and enforced by SFPGC. Similar traffic controls will be implemented by Lander and Eureka Counties for access roads in the area.

As designated county roads, Lander and Eureka Counties would be responsible for the collection and removal of garbage and refuse along the Beacon Light Road and other county access roads in the area. In cooperation with the counties, SFPGC will also periodically collect and remove roadside trash and refuse and will control trash disposal within the mine area as noted in Section 2.4.13 of the DEIS.

Fencing of the Beacon Light Road and other mine access roads is not being considered at this time. If, at some time in the future, it is deemed appropriate to construct such a fence, its impacts on grazing practices would be considered as a part of an application-specific environmental review process. The possible need for stock waters on both side of the roadway would be considered as part of that process.

R 17.2 - Please refer to previous responses R 1.6, R 2.7, R 6.2, and R 16.5, which address existing water rights and mitigation of mining-related impacts to springs and seeps.

C 17.2
Cont.

C. Water rights and all other paper work for stock water wells and water development must be taken care of promptly.

D. Water developments of several wells to compensate for loss of use of the Mine area (both in grazing and water loss) made on both the Tomera and Sansinena side

C 17.3

3. Fence around Mine site

A. It is my understanding, that under Plan 2 (which will be used) there would be less area under fence, than in the original Plan 1. This is good.

B. Mine will have full responsibility for prompt repair and maintenance of fence.

C. All roads will have cattle guards at the fences and all gates must be checked and kept closed by the Mine.

D. Any problem involving our cattle should be promptly reported to Tomeras.

C 17.4

4. BLM grazing permits and loss of AUMs.

A. Any loss of AUMs will reduce the value of the entire ranching operation.

B. Fair compensation for loss of irreplaceable AUMs, (part of these, we are still paying for.)

C. As Tomeras have 71% of the AUMs in the Argenta Allotment, we will take the largest loss, if the AUMs are reduced.

D. As compensation for the loss of the AUMs, we would rather trade AUMs or deeded property, than be compensated financially. This would minimize

R 17.3 - Please refer to previous responses R 5.9 and R 16.4 which address reduction of the fenced mine area. SFPGC, as the mine operator, will assume responsibility for fence maintenance and repair and will construct and maintain fences to control livestock access to mine areas. There is no legal requirement that SFPGC report any livestock conflicts or problems, however, they have demonstrated a willingness and desire to cooperate and discuss any concerns.

R 17.4 - Please refer to previous response R 16.5 which addresses the issues of AUM reductions and associated compensation.

C 17.4
Cont.

the reduction of the value of our present ranching operation

The people of Mule Canyon Mine have been very willing to work with us to make the best of this situation. We appreciate this, as well as having the opportunity to comment on their EIS.

Sincerely,

Pete Tomera
Julian Tomera Ranches, Inc.
P.O. Box 276
Battle Mountain, Nev 89820

June 9, 1996

Gerald M. Smith, District Manager
Bureau of Land Management
Battle Mountain District
50 Bastian Road
P. O. Box 1420
Battle Mountain, Nevada 89820

Re: draft *MULE CANYON MINE, Environmental Impact Statement*

Dear Jerry:

The proposed action will have an effect on the quality of life in my neighborhood. I live on 3300 East Street in the New Town subdivision.

C 18.1

Santa Fe Pacific Gold Corporation proposes to use Airport Road (frontage road south of Interstate 80, east of Battle Mountain). This road is access to several residential areas including New Town. It is also a school bus route with 3 or 4 active stops. I feel that use of this road for a haul road is an unacceptable safety hazard.

When reviewing the draft EIS, I find that the use of Airport Road is barely addressed. The following are specific comments:

Use of this road as a haul road was not part of the proposed action during public scoping.

Chapter 2, Proposed Action, pp. 2-26 & 2-27 -- Use of Airport Road is not identified as part of the proposed action. Discussion of access ends when Beacon Light Road intersects the frontage road.

Chapter 3, pp. 3-129 & 3-130 -- Airport Road is not discussed under affected environment. Residences on Airport Road are closer to the road than the 500 feet mentioned for Beacon Light Road. Airport Road is also a school bus route with at least 3 active stops. It also needs to be recognized under affected environment that Airport Road was never built to handle the heavy ore truck traffic identified in the proposed action.

Chapter 4, Environmental Consequences, pp. 4-71 -- 4-75: Effects on Airport Road are barely mentioned; all that is discussed is the number of vehicles per day during the various phases of the proposed project. At the very least the need for more frequent maintenance, and most likely the need for a complete upgrade of the entire road, should be discussed. Under safety the effects of increased light vehicle as well as truck traffic on Airport Road's use as a school bus route need to be discussed. Also, the Nevada Department of Transportation needs to be consulted concerning what would be needed to upgrade the road for the projected traffic load.

R 18.1 - Please refer to previous responses R 1.1, R 1.3, R 1.4, and R 2.1 which address transportation-related considerations for the West Access Road. The commentor is correct in noting that ore haulage was not discussed during the Public Scoping Meetings. As a result of overall review of SFPGC operations in Northern Nevada, SFPGC modified the Proposed Action during preparation of the DEIS. Mine-related transportation considerations and potential impacts, including the use of the existing road network, are presented and discussed in Sections 2.2.5.2, 2.4.3, 2.4.9.2, 2.4.17, and 4.11 of the DEIS. Modification of a Proposed Action during preparation of the DEIS is allowable under NEPA since the DEIS provides a reasonable mechanism for public review and comment on any changes. The purpose of the Public Scoping Meetings is to present the Proposed Action and elicit questions or comments as a basis for identification of issues and determination of the level of analysis for the DEIS. The DEIS was presented in a public meeting on June 5 and ore haulage considerations and related potential impacts were noted and discussed.

In addition to the above, I suggest that two additional transportation alternatives be examined:

1. Construction of a new interstate interchange at the end of Beacon Light road; and

2. Extension of Beacon Light Road to the Argenta Interchange.

1. would eliminate all mine traffic from Airport Road thus reducing conflicts with the school bus route and most local residential traffic. 2. would get all truck traffic and all traffic from the east off Airport Road. I believe that when compared with the cost of upgrading Airport Road to standards needed for heavy truck traffic that at least one of these alternatives would be feasible.

If you have any questions, please contact me at 635-4063 (work) or 635-2557 (home).

Sincerely,

RL McGonagle

Roberta L. McGonagle, PhD
1515 3300 East Street
Battle Mountain, Nevada 89820

C 19.1

July 16, 1996

Bureau of Land Management
Battle Mountain, Nevada

I live at ~~1598~~ 3300 East Street and have for over thirteen years. As the airport/frontage road is the main travel road for us, I have a few objections to the use of the frontage road by the haul trucks from the Mule Canyon project.

1. The road is not designed or constructed for the number and weight of the haul trucks. The road was only graded before the blacktop was laid down from re-surfacing I 80 about eight years ago — an overlay won't make it better.

2. The combination of haul trucks and ordinary traffic is not a good mix at all, especially with the speed of various vehicles.

R 19.1 - Please refer to previous responses R 1.1, R1.3, R 1.4, R 2.1, and R 18.1 which addresses the noted transportation concerns.

C 19.1
Cont.

3. The frontage road is also the school bus route with the bus stopping at various spots right on the road.

4. The frontage road is too narrow for heavy travel and the shoulders are so soft with no compaction at all.

Those are a few of my concerns and I hope they are taken for consideration.

Thank you,

Liz Heimbigner
PO Box 549
Battle Mountain, Nevada

Received June 5, 1996
C. Stubbs

Public Comments

Mule Canyon 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 *July 10, 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, Mule Canyon EIS Project Manager
P.O. Box 1420
Battle Mountain, Nevada 89820

Name:	**Address:**	**Affiliation (If any):**
Corbin Harney	POB 926 Battle Mt	Western Shoshone

Comment(s):

C 20.1

Think about the poisonous dust that the people will be breathing and how the water supply will be full of cyanide. I hope the people who live nearby can survive with that stuff but I'm concerned. Another thing is the road issue hasn't been figured out well enough to consider the safety of the people and keeping up road conditions.

It sounds like it's too late to do anything about this; this so called consultation doesn't fairly show the impact to Shoshone people. I don't agree with mining operations it is not our way to violate mother earth for riches. I am sick of the mistreatment of Native people. Our concerns are repeatedly ignored but we are the people who know how to care for this land.

Corbin Harney

R 20.1 - Please refer to previous responses R 1.5, R 1.6, R 1.10, R 2.7, and R 4.2 which address the issues of impacts to springs and Native American consultation.

C 21.1

Public Comments

Mule Canyon Mine
Draft Environmental Impact Statement

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Bureau of Land Management
Battle Mountain District Office
Attn: Christopher J. Stubbs, Mule Canyon EIS Project Manager
P.O. Box 1420
Battle Mountain, Nevada 89820

Name: CORBIN HARNEY **Address:** POB 926 BM **Affiliation (If any):** WESTERN SHOSHONE ELDER

Comment(s):

I AM CONCERNED ABOUT WHAT THE MINING IS DOING TO THE LAND AND THE WATER ESPECIALLY. THE SPRINGS ARE GOING TO DRY UP IF MINING CONTINUES. THE BLM SHOULD LOOK AT THE TOTAL IMPACT OF WHAT MINING IS DOING TO THE LAND AND WATER IN BATTLE MOUNTAIN AND ACCROSS THE COUNTRY, NOT JUST PROJECT BY PROJECT. YOU PEOPLE ARE SUPPOSED TO TAKE CARE OF THE LAND NOT JUST ABUSE IT.

MULE CANYON SHOULD BE LEFT ALONE. IT'S TOO CLOSE TO THE HOMES, AND SOON WE WON'T HAVE CLEAN AIR TO BREATHE.

I ALSO WANT TO BRING OUT THAT YOUR CONSULTATION PROCESS IS A SHAM. THE SHOSHONES WERE NEVER PROPERLY CONTACTED, AND BY THE TIME IT GETS TO THAT IT'S ALREADY A DONE DEAL. WE ARE SICK OF BEING PATRONIZED.

R 21.1 - Please refer to previous responses R 1.1, R 1.3, R 1.4, R 12.3, R 13.2, R 13.3, and R 15.6 which address the issues of air pollution, water pollution, road safety and other concerns, and Native American consultation.

Received June 5, 1996
C. Stubbs

Public Comments

Mule Canyon 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 ***July 10, 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, Mule Canyon EIS Project Manager
P.O. Box 1420
Battle Mountain, Nevada 89820

Name: NINA RAFFAELE **Address:** POB 926, B MT **Affiliation (If any):**

Comment(s):

C 22.1

IN THE PRESENTATION YOU MAKE IT SOUND SAFE, BUT IT'S NOT. AS FAR AS THIS PUBLIC COMMENT THING ALL IT IS IS TOKENISM BUT I WILL SAY MY PIECE. THE BLM WAS CHARGED TO TAKE CARE OF LAND NOT JUST HANDING IT OVER TO MINING OUTFITS TO POISON AND TAKE UP ALL THE WATER. NO MATTER WHAT PLANS ANYONE HAS TO SO CALLED RESTORE THE AREA THERE IS NO WAY ANYTHING CAN LIVE ON POISON. YOUR AGENCY SHOULD LOOK AT THE LAND AS A WHOLE NOT JUST EACH MINING OPERATION. NEVADA AND MOST OF THE WEST IS GOING TO BE UNINHABITABLE. OUR WATER IS BECOMING SCARCE AND DISAPPEARING DON'T SACRIFICE THE ELEMENTS THAT SUSTAIN ALL LIFE ON EARTH FOR GREED OF MONEY, FOR A JOB THINK ABOUT THE FUTURE. ONCE YOU ALTER WATER AND SOIL THERE IS NO WAY TO BRING IT BACK ~~ON~~ TO IT'S NATURAL STATE AND WE CANNOT RELY ON SCIENCE TO SAVE US.

R 22.1 - Please refer to previous responses R 1.14, R 2.2, R 12.3, R 13.2, R 13.3, R 15.5, and R 15.6 which address the issues of air and water pollution.

CHAPTER 5

CONSULTATION AND COORDINATION

MULE CANYON MINE ENVIRONMENTAL IMPACT STATEMENT

CHAPTER 5 - CONSULTATION AND COORDINATION

5.1 INDIVIDUALS INVOLVED IN PREPARATION AND REVIEW

The following listed individuals have had primary responsibilities in developing, preparing, and reviewing the information presented in this Draft Environmental Impact Statement. Their responsibilities have included research, technical analysis, document preparation, review, and editing, and NEPA process management.

USDI - BUREAU OF LAND MANAGEMENT

Battle Mountain District Office

Chris Stubbs - Project Manager, NEPA Coordination
Gary Foulkes - Cultural Resources and Native American Concerns
Walt Brown - Geology and Visual Resources
Dr. Earl Verbeek - Geology
Duane Crimmins - Wildlife and Threatened and Endangered Animal Species
Mary Craggett - Realty

Winnemucca District Office

Gerald Moritz - NEPA Coordination
Mike Zielinski - Soils and Vegetation
Ken Loda - Reclamation
Duane Wilson - Range Management and Grazing

Nevada State Office

Paul Meyer - Socioeconomics
Dr. Tom Olsen - Surface Water Hydrology, Ground Water Hydrology, Water Quality, Geochemistry

U.S. ARMY CORPS OF ENGINEERS

Kevin Roukey - District Engineer

U.S. FISH AND WILDLIFE SERVICE

John Miesner - Wildlife Biologist

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION

Doug Zimmerman - Bureau Chief - Bureau Mining Regulation and Reclamation

NEVADA DIVISION OF WILDLIFE

Rory Lamp - Wildlife Biologist

TERRAMATRIX INC.

Jerry Nettleton - Project Manager, Geology and Mining
Rich Burtell - Geochemistry

KATHOL & ASSOCIATES

Jennifer Kathol - Socioeconomics, Transportation, Recreation, and Wilderness

HYDRO-GEO CONSULTANTS

Vladimir Straskraba - Ground Water Hydrology
Mike McDermid - Surface Water Hydrology
Janet Shangraw - Watershed and Surface Water Hydrology

CEDAR CREEK ASSOCIATES

Mike Phelan - Wildlife
Steve Viert - Vegetation, Grazing, Land Use, and Reclamation

McVEHIL-MONNETT ASSOCIATES, INC.

Dr. George McVehil - Air Quality

ARCHAEOLOGICAL RESEARCH SERVICES, INC.

Dr. Tom Burke - Cultural Resources
Mary Rusco - Native American Concerns

ENSR CONSULTING, ENGINEERING, AND REMEDIATION

Dr. David Pillard - Toxicology

AIR SCIENCES, INC.

Rodger Steen - Air Quality

BAKER CONSULTANTS, INC.

Dr. Fred Baker - Ground Water Hydrology (Modeling, dewatering, wellfield design)
Hannah Pavlik - Ground Water Hydrology (Modeling, dewatering, wellfield design)

RESOURCE CONCEPTS, INC.

Charles Zeier - Project Management and Cultural Resources
C. Rex Cleary - Grazing and Range Management
Sheila Anderson - Vegetation, Wildlife, and T&E Species
Leslie Burnside - Soils, Wetlands, and Waters of the U.S.

SHEPHERD MILLER, INC.

Barry Carlson - Mining and Reclamation Plans
Randy Kloberdanz - Facility Designs
Tom Doyle - Surface Water Hydrology, Water Quality, and Geochemistry
Dr. Donald Runnells - Water Quality and Geochemistry

WESTEC

Val Sawyer - Geochemistry
Daniel Davis - Geochemistry

INTERMOUNTAIN RESEARCH

Cashion Calloway - Cultural Resources

INDEPENDENT CONSULTANTS

Jim Nyenhuis - Soils
Dr. James Firby - Paleontology

5.2 LISTING OF AGENCIES, ORGANIZATIONS AND INDIVIDUALS TO WHOM COPIES WERE SENT

5.2.1 Federal Agencies

Environmental Review Coordinator, EPA Region VIII
U.S. Environmental Protection Agency, Office of Federal Activities
HQ-USAF/LEEV, Environmental Division
Office of Deputy A/S of the USAF Environment, Safety, Occupational Health
Office of Environmental Compliance (EH-23), Department of Energy
Office of Environmental Coordination
Office of Environmental Policy (HEV-1), Federal Highway Administration
Office of Transportation and Regulatory Affairs, Environmental Division

U.S. Army Corps of Engineers, Chief, Planning Division, North Pacific Division
U.S. Army Corps of Engineers, Chief, Planning Division, Southwestern Division
U.S. Army Corps of Engineers, Regulatory Section
U.S. Bureau of Land Management, Mineral Resources NV-920, Deputy State Dir.
U.S. Bureau of Reclamation, Denver Federal Center (D-150)
U.S. Department of Agriculture, Soil Conservation Service
U.S. Department of the Interior, Division of Environmental Compliance (762), National Park Service
U.S. Department of the Interior, Division of Environmental and Economic Analysis
U.S. Department of the Interior, Environmental Affairs Program, U.S. Geological Survey, National Center (423)
U.S. Department of the Interior, Offshore Environmental Assessment Division, Minerals Management Service
U.S. Fish and Wildlife Service, Division of Environmental Coordination
U.S. Forest Service, Humboldt National Forest, Mary Beth Marks
U.S. Forest Service, Toiyabe National Forest

5.2.2 State Agencies

Nevada Department of Transportation
Nevada Division of Water Resources, Tracy Taylor
Nevada Department of Wildlife, Habitat Section
Nevada Division of Minerals, Russ Fields, Administrator
State of Nevada, Department of Minerals, Linda Wells
State of Nevada, Department of Wildlife

5.2.3 Other Government Agencies

Nye County
Eureka County Commissioners
Lander County Commissioners
Lander County Extension, Jerry Neufeld

5.2.4 Companies/Organizations

Agri-Beef Company
Batttle Mountain Band of the TeMoak Tribe of Western Shoshone Indians, Paul Snooks
Battle Mountain Band, Delores Conklin, Chairman
Battle Mountain Bugle
Battle Mountain Road and Gun Club, Tony Carone, Chairman
Beowawe Geothermal Plant
Carson Commuity, Jim Bender, Chairman
Citizen Alert
Commission for the Preservation of Wild Horses, Catherine Barcomb
Consumer Health Protection Service
Corporate Pointe
Death Valley Gateway Gazette
Echo Bay Exploration, Dave Emmons
Elko Band, Davis Gonzales, Chairman
Elko Band of the TeMoak Tribe of Western Shoshone Indians
Elko Band, Davis Gonzales, Chairman
Eureka Livestock Company, Filbert Etcheverry

Eureka Sentinel
Filippini Ranching Company, Henry Filippini
Independence Mining Company, Inc., Scott Lewis, Manager Environmental Resources
Inter-Tribal Council of Nevada, Inc.
JBR, Rita Bates
JD Ranch, Gary Buchanan
Julian Tomera Ranches, Pete Tomera
KAME TV, News Department
Landau Associates, Inc., Dale A. Stirling
Midwest Media Group, Douglas J. Rathe, Editor
Mining Support Group, Gene Gustin, Secretary
Mining World News, Dorothy Kosich, Managing Editor
Nevada Cattlemen's Association
National Wildlife Federation
Nevada Indian Commission
Nevada League of Women Voters, Ms. Norma Cox
Nevada Miners and Prospectors Association, Dave Parkhurst
Nevada Mining Association
Nevada Outdoor Recreation Association, Inc., Mr. Charles S. Watson, Jr.
Nevada Urban Indians
Newmont Gold Company, David A. Baker, Vice President, Environmental Affairs
Newmont Gold Company, Pat Rogers
Oxbow Corporation
Pahrump Valley Times
Plumbers and Pipefitters, Mr. Jack Chesney
PTI Environmental Services, Jennifer Sampson
Reese River Reveille
Reno/Sparks Colony, Robert Shaw, Chairman
SAI Corporation, Mr. Bob Wheeler
SFPGC, Mr. John Young
Shoshone National Council, Raymond Yowell, Chair
Shoshone-Paiute Tribes of the Duck Valley Reservation
Sierra Club, Glenn Miller
Sierra Club, Marjorie Sill
Sierra Club, Great Basin Group, Rose Strickland
Sierra Club, Toiyabe Chapter, Las Vegas Group
Sleeper Mine, Todd Lewis, Chief, Environmental Services
Smith Detroit Diesel, Mr. Wes Farnsworth
Te-Moak Bands of Western Shoshone
Te-Moak Tribes, Anthony Tom, Chairman
The Nature Conservancy, Jan Nachlinger
The Wilderness Society, Mr. Jay Watson
TIC, Western Regional Office, Mr. Roy Boyd
Tonopah Times-Bonanza, Central Nevada Newspapers
TS Ranch, Dan Grabian
Wells Band of the TeMoak Tribe of Western Shoshone Indians, Gracie Begay, Chairman
Western Shoshone Defense Project
Western Shoshone National Council Waysack, Raymond Yowell, Chief
Wild Horse Organized Assistance, Ms. Dawn Lappin, Director
Winnemucca Colony, Glenn Wasson, Chairman
Yomba Reservation, Levi Hooper, Chairman
Yomba Shoshone Tribe, Maurice Frank

5.2.5 INDIVIDUALS

Richard Allison
Maynard Alves
Jim Arnold
Mark G. Bennett
Julia Bosma-Douglas
Joy Brandt
Honorable Richard Bryan
Pat Campbell
Robert Chiara
Paul Clifford
Doug Driesner
Ken and Barbara Dugan
Timothy M. Dyhr
George Espen
Heather Estes
Leonard L. Evans
Dan and Eddyann Filippini
Stan Foo
Van Fowers
Gregory French
Steven Fulston
Gary Goodrich
Dan Gralian
Helene Hannon
Bruce Harvey
Leroy Horn
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Bernadette Lenz
Scott Lewis
Cheryl Lyngar
Dave Mako
Pat Malley
Tammy Manzini
Jim Mullin
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Norm Panning
Honorable Harry Reid
Claudia J. Richards
Patrick Rogers
Charlie Rose
Ray Salisbury
Paul & Teresa Sansinena
Mike and Dacia Sansinena
Emanuel Schaner
Chris Sewall
Jeff Snyder
Bob Spengler
Kendell Strong
Jim Sutheres
Charles Swanson
Pat Tarkalson
John Taylor
Glenn D. Thackray
Dennis Thomas
Paul Tomera
Lynn Tomera
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