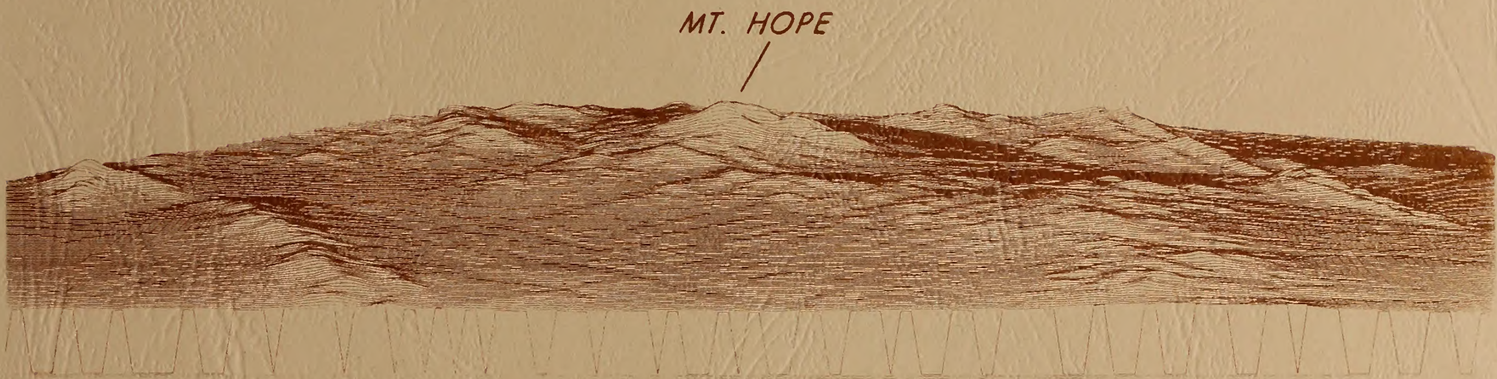
DRAFT ENVIRONMENTAL IMPACT STATEMENT
for the
MT. HOPE MOLYBDENUM PROJECT
of
EXXON MINERALS COMPANY



View from the south looking north

U.S. DEPARTMENT OF INTERIOR

BUREAU OF LAND MANAGEMENT

BATTLE MOUNTAIN, NEVADA

DECEMBER 1984

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for the

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EXXON MINERALS COMPANY

DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BATTLE MOUNTAIN DISTRICT

Edward F. Spang
Nevada State Director

This Draft Environmental Impact Statement has been prepared in response to an EXXON Minerals Company proposal submitted to the Bureau of Land Management for the acquisition of public lands under Section 203 of the Federal Land Policy and Management Act (FLPMA) of 1976. Although the land acquisition proposal is the action which occasions the Environmental Impact Statement (EIS) process, there are other federal actions evaluated in the EIS. Among these are powerline, waterline, and highway rights-of-way proposals and the proposed plan-of-operation. This draft EIS is not a decision document. A final EIS will be prepared and made available to the public subsequent to public review and comment. The Record of Decision (the decision document) will be prepared and be available for public review no earlier than 30 days after the final EIS has been filed.

Based on the provisions of Section 1508.25 of the Council on Environmental Quality (CEQ) regulations, all aspects of the project will be addressed in this EIS. Technical Reports containing the project-specific analysis in support of the environmental impact findings are available upon request.

For further information contact: H. James Fox, District Manager, Bureau of Land Management, P. O. Box 1420, Battle Mountain, Nevada 89820 or telephone (702) 635-5181.

Date by which comments must be received: MAR 0 8 1985

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SUMMARY

INTRODUCTION

The Battle Mountain District of the Bureau of Land Management (BLM) proposes to sell 2,440 acres located in the Shoshone-Eureka Resource Area of north-central Nevada. The unit sale of public lands would be conducted in accordance with the provisions of the Federal Land Policy and Management Act (FLPMA) of 1976.

The primary purpose of the proposed sale of public lands involves the planned activities of EXXON Minerals Company (EXXON), an operating division of EXXON Corporation, which has for some time been conducting preliminary feasibility studies assessing the development of a molybdenum deposit in the vicinity of Mt. Hope near Eureka, Nevada. EXXON has determined that early land acquisition is an integral part of the development process and has therefore proposed to the BLM to acquire secure title to the public lands hereafter referred to as the Mt. Hope land acquisition area.

A primary alternative to the proposed action has been prepared for analysis purposes. As Alternative 1-B, the analysis concerning molybdenum deposit development has included a review of the General Mining Law of 1872 and applicability to the proposed EXXON activity. In accordance with the provisions of the National Environmental Policy Act (NEPA) providing for the simultaneous assessment of like-connected actions, this Environmental Impact Statement (EIS) has also been prepared to encompass a number of proposed EXXON activities requiring federal decision-making. Thusly, a total of nine alternatives, of which only five are developed, were identified for purposes of identifying reasonable availability, mitigation potential and environmental impact assessment. Within the limits of best management practices and land use criteria, each alternative is action component oriented and differs significantly in the balance of resources used.

The proposed action plan was identified because of its compatability with the intent of the Federal Land Policy and Management Act and as subsequently required by such a decision. Compatability with the intent of FLPMA was based on the determination that the EXXON proposed land acquisition would: 1) represent best management use plans for the proposed land use scenario and activities presented for consideration; 2) effectively and beneficallly transpose the current land use purposes; and 3) promote the beneficiation of public objectives, including community and economic development.

An EIS, that analyzes the significant environmental impacts which would result if a reasonably available alternative were implemented, is an integral part of the required decision-making process.

ISSUES

While the EXXON proposal to the Bureau was limited to a request that public lands be made available for sale, numerous issues were brought forward by the public and several regulatory entities that directly concerned not the manner or result of land tenure review, but the direct environmental effects of EXXON's proposed activity once land title was secured. As detailed in Appendix A of this EIS, the following impact issues need to be addressed in addition to consideration of a FLPMA land sale.

1) What chemical environmental effects would be associated with the mine and process plant facility development? Particularly with respect to air quality and groundwater contamination in the agriculturally important Diamond Valley.

2) What physical environmental effects would be associated with project operation? Particularly the effects of withdrawing supply water from Kobeh Valley aquifers and the topographic alterations represented by mining activity.

3) What socioeconomic effects would accrue to the presently rural environment? Would a new community be developed to house employees, and if so, how would it be coordinated within the existing community and what would the new community consist of in terms of resident services and activities?

4) How would the present economy and lifestyles be affected?

ALTERNATIVES UNDERGOING DETAILED ANALYSES

The Proposed Action

Through implementation of the proposed action, the BLM would seek to maximize public objectives within the most stringent bounds applicable for environmental protection goals.

Under the proposed action 2,440 acres of public lands within a 10,000 acre block tract (hereinafter referred to as the Mt. Hope site) would be made available for sale under the authorizing provisions of the Federal Land Policy and Management Act of 1976. This parcel would be used to develop a tailings impoundment and a minerals processing plant. Within the same 10,000 acre tract, approximately 700 acres in the area of the ore deposit would be acquired via mining claims for the purpose of developing an open pit mine at a later date. Approximately 5,760 acres required for operation of the mine complex would be acquired via the General Mining Law of 1872 and/or mechanisms provided by FLPMA.

Coincident with the decision process, the BLM would, in compliance with NEPA, assure the analyses necessary to evaluate comprehensive project impacts; both separately and as an all encompassing impact potential.

Subsequent to analytical review allowing affirmative decision-making, the BLM would recommend: 1) right-of-way granting for a proposed 22-mile power line routing extending the near-length of western Diamond Valley; 2) right-of-way granting for an 11-mile proposed water supply pipeline corridor extending from central southeastern Kobeh Valley to the project site; and 3) right-of-way granting for a proposed 6-mile relocation of State Route 278. Although not the subject of federal decision-making at this time, the proposed action additionally includes and addresses impacts of implementation of a proposed tailings pond development of 3,460 acres proximate to the process plant; development of two non-mineralized material storage areas totalling 2,400 acres and a full production molybdenum concentrate process plant; and the provision of an EXXON-assisted housing subdivision for employee purposes.

Alternatives Considered

Alternative 1 - Land Acquisition Component: One reasonably available alternative was identified following project review. Alternative 1-B implementation would involve EXXON development of the Mt. Hope project under the provisions of the General Mining Law of 1872. The General

Mining Law of 1872 gives EXXON the right to conduct such activity on mining claimed land.

Alternative 2 - Power Line Routing Components: Two alternative power line routing corridors (Alternatives 2-B and 2-C) have been identified for impact analysis. Alternatives 2-B and 2-C would traverse lands generally parallel to State Route 278 and would be 21 and 23 miles in length, respectively.

Alternative 3 - Water Line Routing Components: Two alternatives have been developed: 1) Alternative 3-B beginning at Kobeh C well field and extending 9 miles north-south, and 2) Alternative 3-C beginning in northwestern Kobeh Valley at Kobeh A well field and extending 8 miles, east-west.

Alternative 4 - Tailings Pond Site Components: Two alternate tailings pond sites were identified for impact assessment. Alternative tailings pond 4-B would be located in Diamond Valley and would encompass 5,650 acres. Alternative tailings pond 4-C would require approximately 2,173 acres in northern Kobeh Valley. The selection of either alternative tailings pond would effectively negate the purpose of an EXXON acquisition of land proposed for tailings pond 4-A. As such, the proposed Mt. Hope land block would be reduced in area, with alternate lands acquired in the area of tailings pond 4-B or 4-C, dependent upon site selection. It has correspondingly been assumed that the EXXON proposal to purchase 2,440 acres would then equate to 100 acres (the area of process plant acreage) and that tailings pond 4-B or 4-C lands would be acquired by the provisions of either the General Mining Law of 1872 or FLPMA.

Alternative 5 - Housing Development Component: Under this alternative, the impacts associated with the absence of an EXXON-assisted subdivision have been assessed. The alternative was defined on the assumption that non-local workers would distribute themselves among the existing communities of Eureka, Carlin and Elko.

Alternative 6 - Highway Relocation: No alternative routings were identified for the proposed project component involving the highway relocation. The proposed routing was developed in cooperation with the Nevada Department of Transportation and took into account environmental factors including the location of cultural resources and severely limiting topography. Thus, the single alternate action related to the proposed highway relocation would be a denial of right-of-way, which has been assessed under the no action alternative.

Alternatives 7 and 8 - Mine and Non-Mineralized Storage Areas: No alternatives were identified as being reasonably available due to the absolute dependence of these project components on the location of the ore body.

Alternative 9 - Process Plant Component: No alternatives were considered appropriate in light of the worst-case impact analysis utilized to present the proposed action (e.g., maximum production facility).

The No Action Alternative

Under this alternative, the proposed project would not take place. Neither the proposed action or alternatives would occur. Public lands would not be made available for sale under the provisions of FLPMA and rights-of-way would not be available for project purposes.

Table S-1 details the environmental consequences of each alternative in comparative form.

Table S-1 Summary Comparison of Potential Environmental Effects and Reasonably Available Alternatives

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LAND ACQUISITION ALTERNATIVES - There are no environmental effects associated with the acquisition per se; thus, it is not possible to provide a comparative analysis. Effects of actions pursuant to the acquisition are covered in succeeding sections.

POWER LINE RIGHT-OF-WAY ALTERNATIVES - None of the three alternative power line rights-of-way (2-A, 2-B, 2-C) would have significant effects on topography, geology, air quality, hydrology, vegetation, cultural resources, land use, transportation or socioeconomic environments.

Soils - There would be some erosional losses during construction, but these would be minor and nearly equal for each of the right-of-way alternatives due to similarity in length and routing. The no action alternative would, however, not result in impacts to soil resources.

Biota - The largest impact would be associated with potential disturbance of sage grouse strutting grounds. Alternatives 2-B and 2-C traverse two such grounds in Diamond Valley while route 2-A passes within 0.5 mi (0.8 km) of a small, isolated strutting ground. Additionally, noise levels during construction, if occurring during strutting activities, may cause an adverse effect.

WATER LINE RIGHT-OF-WAY ALTERNATIVES - Neither the proposed action or alternatives present potential significant adverse impacts to topography, geology, meteorology/air quality, hydrology, soils, cultural resources, land use, transportation, noise or socioeconomic environments.

Biota - Significant adverse impact upon a regionally important sage grouse strutting grounds area would result upon implementation of Alternative 3-C. Alternatives 3-A and 3-B pose the potential for impact due to proximity to sage grouse strutting grounds.

TAILINGS POND - There are three alternative sites: 4-A (proposed); 4-B (Diamond Valley); and, 4-C (Kobeh Valley). None of the tailings pond alternatives would significantly affect geology, meteorology/airquality, biota, cultural resources, transportation, noise or socioeconomic environments. The no action alternative precludes project impacts.

Topography - All project-action alternatives would substantially alter existing land forms. Site 4-A would create an embankment face and partially fill a drainage basin landform. Site 4-C would not alter the topography as extensively but there would be increased visual degradation due to lesser topographic screening. Alternative 4-B is similarly disposed to lack of screening and compounded visibility frequency. Additionally, Alternatives 4-B and 4-C increase the cumulative region of impact because of greater distance from the mine area.

Table S-1 Summary Comparison of Potential Environmental Effects and Reasonably Available Alternatives (continued)

Soils - There would be significant losses (greater than 5.0 tons per year) of soil due to water erosion from the faces of the alternative tailings dams during the early stages of reclamation. In tons/acre/year following revegetation, the ponds would rank in order of descending loss: 4-C (5.6 tons), 4-A (5.0 tons), 4-B (4.8 tons). Aeolian erosion from surface of all alternative tailings ponds would be minor.

Hydrology - A worst-case analysis shows that seepage from the tailings pond site 4-A would affect groundwater quality in Diamond Valley. The extent and duration of groundwater quality effects would be variable. In the short-term, groundwater concentrations of total dissolved solids and sulfate would exceed drinking water standards from year 5 of operation until completion of reclamation (year 60). Groundwater concentrations of iron and manganese, both of naturally high background levels, would exceed secondary drinking water standards on a long-term basis. Based on the worst-case assumptions, a significant impact would therefore result as related to compliance with regulatory standards.

Seepage rate and quality from tailings pond Alternatives 4-B and 4-C would be similar, although the former would include a more equidimensional northeastward flow in Diamond Valley, and the latter would flow south or southwestward toward the center of Kobeh Valley.

Visual Resources - All project-action alternatives represent a significant change in visual resources. A narrow portion of site Alternative 4-A might be visible with an aided eye device from Roberts Mountain, a Wilderness Study Area. Alternative 4-B would be highly visible to travelers along State Route 278.

POPULATION DISTRIBUTION ALTERNATIVES - Two project alternatives were examined, subdivision and decentralized work force. The no action alternative would preclude project population impact.

Population - Significant population increases would accrue to the Town of Eureka. At the seventh quarter (21 months from project start-up) peak of project employment, this increase would be 4.9 and 4.2 times the existing population in Eureka for the subdivision and decentralized work force alternatives, respectively.

Housing - There may be a 1.5 to 2 year shortfall of housing units required beyond those located in the subdivision. Housing costs in the area would substantially increase as a result of demand influence.

Table S-1 Summary Comparison of Potential Environmental Effects and Reasonably Available Alternatives (continued)

Fiscal Impacts - Total revenues generated by the project would exceed total costs to the affected jurisdictions under both alternatives. However, a large portion of revenues would be retained at the state or distributed to "needy" jurisdictions. To the extent that this revenue is not returned to the jurisdictions affected by the Mt. Hope Project, there would be significant budgetary shortfalls to these jurisdictions.

Schools - Approximately 323 school-aged children would be associated with the project. Significant impacts would accrue to school systems in Eureka and Elko counties. Under the subdivision alternative, thirteen and two classrooms would be needed in Eureka and Elko, respectively. Under the decentralized work force alternative, ten and five classrooms would be needed in Eureka and Elko, respectively.

STATE HIGHWAY RELOCATION RIGHT-OF-WAY - Neither the proposed action or the no action alternative present potential significant impacts to topography, geology, meteorology/air quality, hydrology, soils, biota, cultural resources, land use, transportation, noise or socioeconomic environments.

MINE/NON-MINERALIZED MATERIAL STORAGE - The proposed action and no action alternative would not appreciably adversely affect geology, air quality, soils, biota, cultural resources, transportation, noise or socioeconomic environments.

Topography - Creation of the pit and the non-mineralized material storage areas would cause a major and permanent change in the existing landforms. No effect would occur under the no action alternative.

Visual Resources - Degradation of visual resources would occur. A small portion of the pit and tip of one non-mineralized material storage area could be seen with an aided-eye device from Roberts Mountain, proposed for Wilderness Area designation. No effect would occur under the no action alternative.

PROCESS PLANT - The process plant (proposed action) would have no significant adverse impact on topography, geology, soils, biota, cultural resources, land use, transportation, noise or socioeconomic environments.

Air Quality - The process plant would emit total suspended particulates (TSP), nitrous oxides (NO_x) and sulphur dioxide (SO_2). These emissions would not lead to any violation of federal National Ambient Air Quality Standards (NAAQS) or state air quality standards. The no action alternative would preclude project air emissions.

Table S-1 Summary Comparison of Potential Environmental Effects and Reasonably Available Alternatives (continued)

Hydrology - Water supply for the process plant, pumped from Kobeh Valley, may draw down water supplies in that valley. This drawdown would not exceed 35 feet at the well site nor 15-18 feet within a six-mile radius. Of the six wells in the area of influence, only one may not be deep enough to accomodate the decrease in water level. No effects would be incurred under the no action alternative.

NON-COMPONENT SPECIFIC IMPACTS - The impacts summarized below are related to the mine/process plant as a whole. The no action alternative generally precludes impacts to the environment other than those expected as status quo progresses without project influence.

Air Quality - Based upon a worst-case visibility impairment analysis, no emissions (including mobile) were large enough to create a degradation of visibility or to cause an effect in the Roberts Mountain Wilderness Study Area.

Cultural Resources - During the cultural resources survey, numerous prehistoric and historic sites were identified in and around the Mt. Hope site and alternative tailings pond sites. Some of these sites would be subject to disturbance during construction and/or inundation. Determination of eligibility for listing on the National Register of Historic Places has been made in accordance with 36 CFR 800 and appropriate mitigating measures are being implemented. No significant adverse impacts would be incurred.

Land Use - There would be a short-term and long-term (operation and reclamation period of 60 years) loss of government controlled grazing equal to approximately 311-381 animal unit months (AUMs) in the Romano Allotment and 47-57 AUMs in the Roberts Allotment (total loss 358-438). Permanent loss in vegetation productivity would approximate a long-term (post-reclamation in excess of 60 years) loss of 180 to 215 AUMs. These AUM losses would affect the operations of two ranching operations in the Romano and Roberts Allotments by less than 10 percent and 1 percent, respectively.

There would be a significant increase in vehicular traffic. Impact is expected to occur primarily on State Route 278.

CHAPTER 1.0
PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

In 1969, the U.S. Congress enacted the National Environmental Policy Act (NEPA) which requires that each federal agency, as part of its decision-making process, prepare an Environmental Impact Statement (EIS) on any major federal action that may significantly affect the human environment. As legislation designed to enhance the national protection of the environment, NEPA outlines the intended purpose of an EIS - to provide an objective evaluation of the environmental impacts associated with a proposed federal action and alternatives in order that decision-making can be made in an informed manner. Thusly, an EIS must be prepared early enough to be part of the decision-making process; must be adequately informative to assure appropriate discussion of significant impacts as well as the reasonable alternatives which would avoid or minimize adverse impacts; and finally, must be prepared by the federal agency or agencies responsible for decision-making.

Certain components of the EXXON Mt. Hope Molybdenum Mine/Process Plant Project, including the proposed acquisition of public lands and obtaining rights-of-way, will require several land management decisions. Several laws provide for and delegate such land management decision responsibility, in general, to the U.S. Department of Interior. The administration of the public lands of concern is conducted by the Bureau of Land Management (BLM).

Subsequently, in its role of public lands administrator and as a direct response to the EXXON request for major federal decision-making, the BLM has directed the preparation and public release of this EIS. In describing the components of, alternatives to, and environmental consequences of implementing the proposed actionsale of public lands, mining development and rights-of-way grantingthis EIS and its content have been prepared and outlined in accordance with the requirements of NEPA.

In conjunction with this EIS, nine Technical Reports have been prepared to provide detailed review of the information and analysis pertaining to BLM decision-making. Technical Report No.1 includes details concerning the legal foundation of authority for development of this EIS. The following is presented as a brief summary of Technical Report No.1 detail.

1.2 Summary of Purpose and Need for Action

Under the authority of several laws enacted by the U.S. Congress, including the Federal Land Policy and Management Act of 1976 (FLPMA) and the General Mining Law of 1872, the BLM has been delegated administrative responsibility for certain public lands managed by the U.S. Department of Interior. The regulations addressing BLM's role as administrator of public lands, a large percentage of which are associated with metallic mineral mining potential, may be found in Title 43, Chapter II of the Code of Federal Regulations (CFR).

The need for BLM action entailing land management decision-making is a direct result of the statuatory requirements of the authorizing laws and the location of lands involved - specifically, public lands under the administration of the BLM Battle Mountain District of Nevada (recently revised to include appropriate lands within

Esmeralda County, Figure 1-1).

The primary purpose of action decision-making involves the activities of EXXON Minerals Company (EXXON), an operating Division of EXXON Corporation, which has for some time been conducting preliminary feasibility studies assessing the possibility for development of a molybdenum deposit in the vicinity of Mt. Hope near Eureka, Nevada (Figure 1-1). EXXON has determined that early land acquisition is an integral part of the development process and has therefore proposed to the BLM to acquire secure title to the public lands identified as the project area (Figure 2-1, Chapter 2.0). Secondarily, rights-of-way which will require BLM approval would be needed as part of the proposed action.

As provided for by the abovementioned laws and regulations, the proposed land acquisition may occur via one or more mechanisms:
1) land sale;
2) claims development;
3) lease or permit;
4) land exchange.

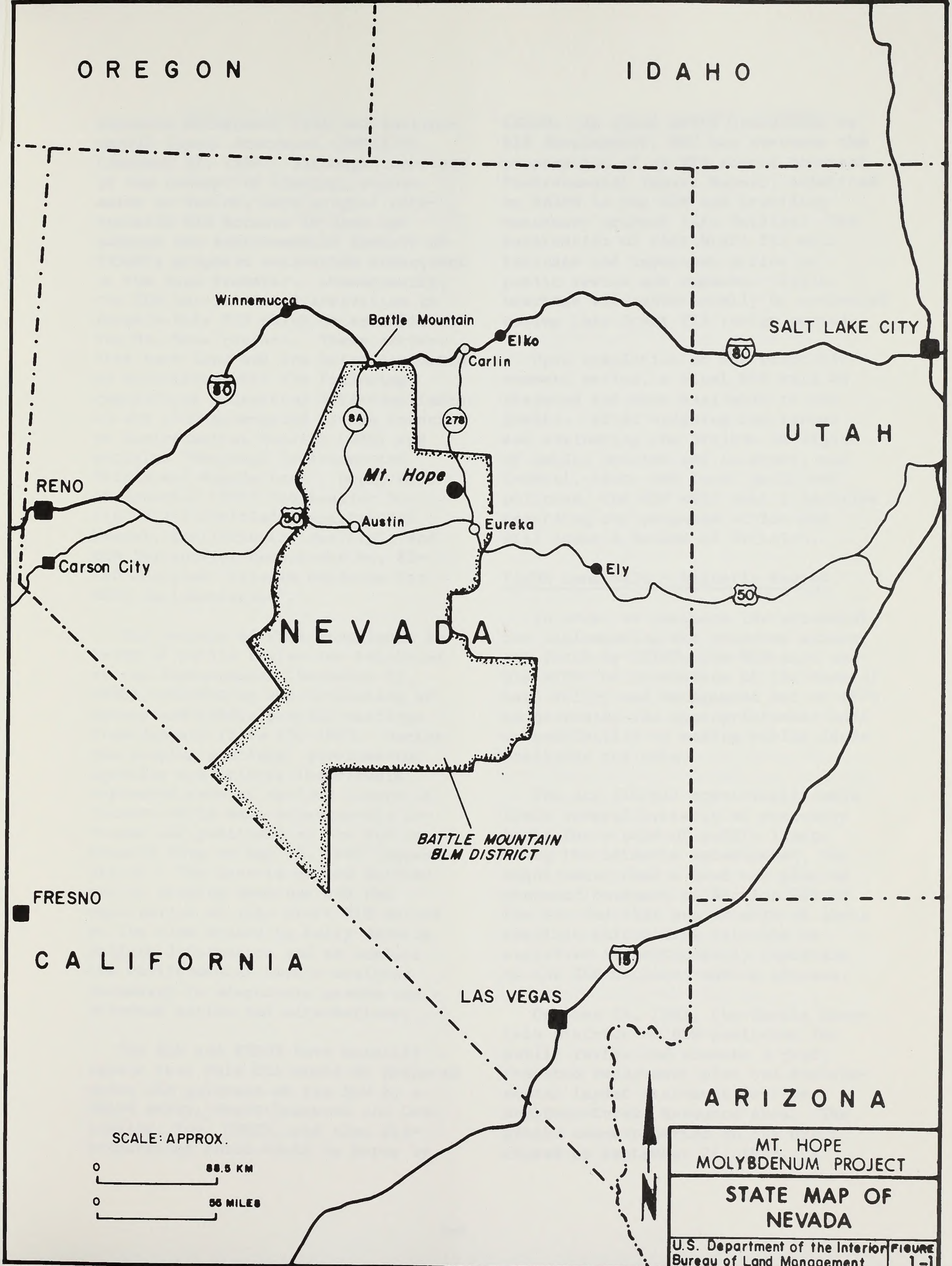
Under the provisions of the General Mining Law of 1872, upon patenting, claim lands become private lands. Until that time, BLM authority extends to requiring EXXON to prepare a Plan of Operation which is subject to BLM approval. To date, EXXON owns several hundred unpatented mining and millsite claims in the vicinity of Mt. Hope.

Due to the limitations of land use leases and permits (Chapter 2.0, Land Acquisition Alternatives discussion) EXXON has not made application for such leases or permits relative to the Mt. Hope project. Applications for the various rights-of-way required for the project would be filed with the BLM at least six months prior to the date the rights-of-way would be needed.

Disposition of public lands via sale or exchange is authorized in FLPMA by Sections 203 and 206, respectively. The regulations governing exchanges are in 43 CFR 2200; sale regulations are in 43 CFR 2700. On December 6, 1982, EXXON proposed that the BLM make available for sale, under the intent of FLPMA, a portion of land in the vicinity of Mt. Hope up to but not to exceed 10,000 acres. Since this initial proposal, EXXON has determined that 2,440 acres would be requested for acquisition via Section 203 of FLMPA at this time. An additional 6,460 acres would be required for mine development purposes and be acquired via the provisions of the 1872 General Mining Law of 1872 or FLMPA. This EIS addresses the BLM decision-making process of determining lands available for sale. Land sales in excess of 2,500 acres are subject to Congressional review.

The need to prepare an EIS was not triggered by EXXON's previous filing of mining and millsite claims as such action is considered nondiscretionary/nonenabling and is thus exempt from NEPA compliance (South Dakota vs. Andrus, 1980). Were EXXON to propose a granting of mineral leases, land use permits, or land exchange, compliance with NEPA would be required (leases/permits - 43 CFR 2920.5-2, land exchange - NEPA compliance addressed in National Forest Preservation Group vs. Butz (1973) (U.S. Court of Appeals, Ninth Circuit)).

NEPA requires that an Environmental Impact Statement (EIS) be written for a "major federal action significantly affecting the human environment". BLM has concluded that the proposed FLPMA land sale and subsequent development of the mine on the sale lands requires an EIS. The BLM has also decided that its Final Shoshone-Eureka



MT. HOPE MOLYBDENUM PROJECT

STATE MAP OF NEVADA

U.S. Department of the Interior
Bureau of Land Management

FIGURE 1-1

Resource Management Plan and Environmental Impact Statement (RMP/EIS) (January 27, 1984), although important to the concept of tiering, cannot serve as the Mt. Hope project site-specific EIS because it does not address the environmental impacts of EXXON's proposed activities subsequent to the land transfer. Consequently, the BLM has initiated activities to prepare this EIS which is specific to the Mt. Hope project. These activities have been and are being conducted in accordance with the following regulations addressing NEPA-compliance: 40 CFR 1500 promugated by the Council on Environmental Quality (CEQ) and entitled "National Environmental Policy Act Regulations"; Department of Interior (DOI) Publication No. 516 DM 1-7 entitled "Departmental Manual, Environmental Quality"; and BLM Instruction Memorandum No. 82-150 entitled "Interim Guidance for NEPA Implementation".

The process of NEPA compliance in terms of public review was initiated by the announcement (December 23, 1982), scheduling and conducting of agency and public scoping meetings from January 11 to 13, 1983. During the scoping meetings, governmental agencies and private individuals expressed several various issues of concern which were subsequently reviewed and published by the BLM in summary form on May 18, 1983 (Appendix A). The interim period between public scoping meetings and the publication of this Draft EIS served as the time needed to fully develop project information and to conduct the environmental impact analyses necessary to adequately assess the proposed action and alternatives.

The BLM and EXXON have mutually agreed that this EIS would be prepared under the guidance of the BLM by a third party, Wyatt Research and Consulting, Inc. (WRC), and that EIS-preparation costs would be borne by EXXON. As third party consultant to EIS development, WRC has overseen the preparation of an EIS source document Environmental Impact Report, submitted by EXXON to the BLM and providing necessary project plan details. The publication of this Draft EIS will initiate the important period of public review and comment. Public hearings will additionally be conducted during this Draft EIS review period.

Upon completion of the Draft EIS comment period, a Final EIS will be prepared and made available to the public. After weighing the issues and evaluating the project in light of public opinion and interest, and federal, state and local goals and policies, the BLM will make a decision regarding the proposed action and will issue a Record of Decision.

FLPMA Land Sale - Criteria Review

In order to evaluate the potential for implementing the proposed action put forth by EXXON, the BLM must comply with the provisions of the Federal Land Policy and Management Act of 1976 to determine the appropriateness and/or possibility of making public lands available for sale.

The Act (FLPMA) specifically sets forth several criteria of statutory basis for a sale of public lands. Among the criteria established, the requirement that a land use plan be prepared pursuant to Section 202 of the Act and that one or more of three specific suitability criteria be satisfied is particularly important to the BLM decision-making process.

On June 24, 1983, the Battle Mountain District of BLM published for public review and comment a draft resource management plan and environmental impact statement for the Shoshone-Eureka Resource Area. The public comment period on the draft closed on September 21, 1983. A final RMP/EIS was published January 27, 1984. The purpose of the plan is to guide the long-term management policy of the resource area and to set forth specific actions to resolve management issues.

Early in its planning efforts, the BLM identified five issues where management efforts needed to be concentrated. These five issues were carried forth and analyzed in the Final Shoshone-Eureka RMP/EIS. One of these issues concerned the need for land tenure adjustment within the resource area to satisfy long-term land use management goals.

As part of its preferred alternative, the BLM identified a pool of 104,959 acres potentially suitable for disposal. These lands met the preliminary criteria for disposal as outlined in Section 203 of FLPMA. Disposal would meet needs for recreation or other public purposes, community expansion, economic development, agriculture and the creation of blocked ownership patterns which would result in improved land management. The block of public lands within the proposed Mt. Hope land acquisition area was included in the 104,959-acre pool (USDI, Final Shoshone-Eureka RMP/EIS, 1984).

The suitability criteria of FLPMA allow that, if as a result of land use planning it can be demonstrated that: 1) a tract is difficult, uneconomic or unsuitable for federal management; 2) is no longer required for the purpose for which it was acquired; or 3) its disposal will serve important public objectives, a sale of public land may be implemented.

This EIS effort has taken into consideration and analysis the applicability, if any, of all three criteria. Technical Report No.8 (Land Use, Transportation and Noise) presents in detail the multiple evaluations conducted regarding criteria satisfaction.

Neither Criteria 1 or 2 were determined to adequately address the proposed action. With respect to the criterion of serving important public objectives (Criterion 3), the action of making lands available has been determined to definitively satisfy FLPMA requirements and thusly, the need for such action is present. This determination is based on a review of the land-use goals identified in the Shoshone-Eureka RMP/EIS and the intent, as demonstrated by the Congressional Record, of the Act itself.

Additionally, criteria for the disposal of lands include a Battle Mountain District criterion concerning the existence of sites eligible for inclusion in the National Register of Historic Places (USDI, 1984). It has been determined that the cultural resources mitigation plan developed in accordance with 36 CFR 800 satisfactorily fulfills this disposal criteria.

The public objectives most affected by a BLM decision to approve or disapprove the proposed action of a FLPMA sale have been determined to be economic and environmental in nature; specifically the fiscal benefits to federal and local entities and the necessity to analyze and formulate environmental mitigation plans, including comments from public review.

The fiscal benefits identified with implementation of the proposed action are derived as a result of differences between the patenting process of the General Mining Law of 1872 and a FLPMA land sale. Under the provisions of the General Mining Law of 1872, no monies (excepting nominal patent fees) are generated as the public land is transferred to private ownership during the process of claim patenting. A FLPMA land sale requires that the sale be conducted, in most cases, on the basis of competitive bidding. To afford the preference rights authorized by the bill, the Secretary of Interior may grant a right of first refusal or make any other appropriate modification of competitive bidding. The end result of the competitive bidding is represented by a dollar per acre amount to be paid in purchase to the Department of Interior. If past experience holds true based on the sale of similar type lands, a FLPMA land sale of the Mt. Hope lands could conservatively be expected, at fair market price, to generate in excess of $244,000 ($100 per acre). Competitive bidding could result in significantly greater costs per acre, with EXXON perhaps equaling the highest competitive bid if right to first refusal was granted by the Secretary.

The monies generated by a FLPMA land sale would go into the general treasury and be available to the government for public lands improvement and administration. In addition to the fiscal benefits derived directly from a FLPMA land sale, certain tax monies and related economic advantages are affected by the implementation of a land sale or development of the land through the provisions of the General Mining Law of 1872. First, taxes in the form of ad valorem property taxes would be immediately assessable to EXXON in the event of a FLPMA sale. Under the conditions of claim patenting, the ad valorem property taxes could not be assessed on the land value since ownership would remain public until such time that patenting was completed. The patenting process may require three years. The annual increment of ad valorem taxes assessable to the land value (not property such as mill, equipment, machines, etc.) would approximate $854 at a land sale price of 244,000 dollars (correspondingly, a land sale equal to 2.5 million dollars ($1,000/acre) would generate approximately 8,750 dollars annually). The assessable tax base would accrue to EXXON immediately upon land purchase, regardless of eventual mine development timing. The monies so generated would be directly distributed to Eureka County, Town and School District.

It may additionally be noted that EXXON need not take the claims to patent before initiating mine operations. In a worst-case analysis, EXXON could proceed with life-of-mine operations without claim patenting (or FLPMA sale) which would result in up to $43,750 or more (.44 million if land purchased at 2.5 million dollars) not being assessed over the first 50 years of project life.

The decision to proceed with EIS preparation for the proposed FLPMA sale has assured that an instrument of review input for mitigation planning and environmental protection on a project comprehensive basis is provided in an open-forum manner early in the project and in an orderly way. This EIS would not necessarily be prepared and reviewed were EXXON to proceed first with lode and millsite patenting and then with initiation of mine/process plant development. In such an event, federal agency actions would be limited to determining rights-of-way approval or disapproval which in total might not encompass an EIS effort. A Plan of Operation would also not necessarily be prepared or require an EIS as once patented, action upon the lands would not require BLM decision-making.

Perhaps most significant in an environmental sense is the effect that FLPMA sale criterion regarding cultural resource protection has relative to claim development and approval of a Plan of Operations. Specifically, should a FLPMA land sale proceed it would be required that EXXON complete, at its own cost, the cultural resources mitigation plan to assure that adverse impact not occur opon those resources potentially affected by the proposed action implementation. If such land development were conducted under the provisions of the General Mining Law of 1872, the obligation to fulfill cultural resource mitigation plans would reside with the BLM in this case and could not, if delayed for whatever reason, solely preclude the eventual approval of a Plan of Operations. The potential exists, therefore, that land development could occur, under the provisons of the General Mining Law of 1872, without the successful completion of the important cultural resources mitigation plan.

CHAPTER 2.0
ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 Introduction

This chapter documents particularly important information used throughout the EIS decision-making process. It is in this chapter that the proposed action and identified alternatives are defined for further analysis and evaluation. As described in the following subsection, the EXXON Mt. Hope project involves several BLM decisions or actions. Specifically:

1.) Method of land transfer;
2.) Right-of-way for a power line;
3.) Right-of-way for a water line;
4.) Right-of-way for highway relocation.

Additionally, project components involving the mine, process plant, non-mineralized material storage, tailings pond, and housing have been analyzed.

As a whole, the action components put forth by EXXON comprise the proposed action requiring NEPA compliance. In addition to the EXXON proposed action, several alternative components have been identified which are reasonably available and which may, following analysis and review, become part of the Record of Decision.

Thus, this chapter presents the project component details necessary to understand the environmental impacts associated with implementing either the proposed action and/or any of the alternative components. The following section (2.2) summarily describes the manner in which identification of alternatives and definition of EIS scope has been undertaken. Section 2.3 defines in detail the proposed action and alternatives. Section 2.4 presents discussion concerning important NEPA compliance issues and impact assessment methods, including the concepts of tiering and worst-case analysis. This chapter is concluded with Section 2.5, a discussion identifying mitigative measures that would eliminate or reduce environmental impacts. Extensive detail concerning NEPA compliance measures and very specific information about EXXON's proposed activity at the Mt. Hope project are presented as a Technical Report (Technical Report No.1) to this EIS.

2.2 Identification of EIS Scope and Alternatives

In December, 1982, EXXON proposed that the BLM offer public lands in the vicinity of Mt. Hope for sale. In January, 1983, the BLM sponsored a series of meetings with the public and Nevada State Clearinghouse. These meetings were held in accordance with Section 1501.7 of the CEQ regulations for the purpose of "determining the scope of the issues to be addressed and for identifying the significant issues related to a proposed action". On May 18, 1983, the BLM published an analysis of the issues brought out during the scoping process (Appendix A). A review of this summary indicates that the public is most concerned about the potential environmental impacts accruing from the possible construction and operation of a mine/process plant rather than the method of land transfer.

In addition to addressing the issues brought forward during the scoping process, the NEPA effort and EIS scope of content has been further determined by the CEQ regulations which require that connected actions be discussed in the same EIS (See

Technical Report No.1). Although EXXON's proposal was only that the BLM offer public lands for purchase (thereby triggering the NEPA compliance process), there are several connected federal decisions such as rights-of-way granting and permitting which are actions associated with the proposed Mt. Hope project that will be required before the project proceeds.

The definition of alternatives to the proposed action required preliminary review of EXXON's proposed project plans by BLM. Alternative components were outlined and developed by individual component decisions, as necessitated by the project characteristics (i.e., siting of the mine was defined by ore body location; only components of the project such as power line routing were variable in terms of environmental impact mitigation). As noted during the public scoping meetings and in the December 23, 1982 Federal Register (FR), the alternatives to the proposed action that have been identified on the basis of potentially representing impact mitigation options include:

1.) No Action
2.) Land Acquisition Alternatives, individually and in combination
    a. Federal Land Policy and Management Act (FLPMA) Exchange
    b. FLPMA Use Permit
    c. Lode claims and millsite claims
3.) Alternative Right-of-way Routings
4.) Mine/Process Plant Alternatives
    a. Alternative mill sites
    b. Alternative overburden and waste rock disposal sites
    c. Alternative tailings pond sites
    d. Housing development

These alternatives, detailed in the following subsection, have been analyzed in this EIS to evaluate the potential they allow for impact mitigation relative to the proposed action. The analysis provided in this EIS will allow decision-makers and the public a comparative basis for review.

2.3 Description of Proposed Action and Alternatives

Nine alternatives have been identified and prepared for analysis purposes. Five of the nine alternatives represent component factors of required BLM decision or action. For example, Alternative 1 - Land Acquisition Component - deals specifically with the manner in which public lands could alternately be transferred and/or used for the purpose of the Mt. Hope project development. Alternative 1, including such components as land use by claims, lease/permit or a transfer by FLPMA exchange instead of a FLPMA land sale, has been analyzed in terms of legal implications or limitations, environmental consequences, economic impact and effects upon the welfare of public interest.

The proposed action and alternatives are described in the following section. Significant analyses determining the consequences of implementing the proposed action or any of the alternatives are presented in Chapter 4.0 of this EIS.

2.3.1 Summary of Proposed Action and Alternative Components

Table 2-1 summarizes the proposed action and alternatives including the no action alternative.

Proposed Action. The proposed action includes the following elements and is depicted on Figures 2-1 (Land Acquisition) and 2-2A and 2-2B

Table 2-1 Summary Details of the Proposed Action and Alternatives Including the No Action Alternative

Proposed Action Components	Alternative Components	No-Action Alternatives
	Alternative 1 - Land Acquisition Components	
1-A Land Transfer In Part By FLPMA Sale	1-B Mineral Claims 1-C Land Use Lease 1-D Land Use Permit 1-E Land Exchange	Negative or no decision regarding land sale.
	Alternative 2 - Power Line Routing Components	
2-A Power Line Routing A (Figure 2-1)	2-B Alternative Routing 2-B (Figure 2-3) 2-C Alternative Routing 2-C (Figure 2-3)	No power line right-of way granted. Assumes the Mt. Hope Project will not proceed.
	Alternative 3 - Water Line Routing Components	
3-A Water Line Routing A (Figure 2-1)	3-B Alternative Routing 3-B (Figure 2-3) 3-C Alternative Routing 3-C (Figure 2-3)	No water line right-of-way granted. Assumes the Mt. Hope Project will not proceed.
	Alternative 4 - Tailings Pond Sites Components	
4-A Tailings Pond at Location 4-A (Figure 2-1)	4-B Alternative Site 4-B 4-C Alternative Site 4-C	Not part of federal decision-making. Assumes no project implementation.
	Alternative 5 - Housing Components	
5-A Subdivision	5-B Decentralized Workforce Housing	Not part of federal decision-making. Assumes no project implementation.
	Alternative 6 - Highway (State Route) Relocation	
6-A Highway Relocation Routing 6-A (Figure 1-3)	No reasonable alternatives available	No road relocation right-of-way granted.
	Alternative 7 - Mine	
7-A Mine at Location 7-A (Figure 1-3)	No reasonable alternatives available	Not part of federal decision-making. Assumes no project implementation.
	Alternative 8 - Non-Mineralized Material Storage Areas	
8-A Non-Mineralized Material Storage at Location 8-A (Figure 1-3)	No reasonable alternatives available	Not part of federal decision-making. Assumes no project implementation.
	Alternative 9 - Process Plant	
9-A Process Plant at Location 9-A (Figure 1-3)	No alternatives proposed. (Proposed action is worst-case. See text).	Not part of federal decision-making. Assumes no project implementation.

(Operation Components).

- Land Acquisition: BLM approval to make 2,440 acres of public land available for sale in accordance with the provisions of Section 203 of the Federal Land Policy and Management Act of 1976 (FLPMA) is requested by EXXON. Additionally, another 700 acres would be acquired via the General Mining Law of 1872. The remaining 5,760 acres would be acquired via General Mining Law of 1872 and/or mechanisms provided by FLPMA. The land acquisition would be within the Mt. Hope Acquisition Area depicted on Figure 2-1.

- Power Line Routing: Power to the Mt. Hope site would be provided by Mount Wheeler Power Inc. located in Ely, Nevada. Operational power requirements of 50 megawatts would be provided by a 230 kilovolt line with the proposed alignment shown on Figure 2-2A (Proposed Power Line 2-A).

- Water Line Routing: EXXON proposes that a water supply line right-of-way be granted from a well field in Kobeh Valley (Kobeh Test Site) to the Mt. Hope project. Total water supply has been estimated to be approximately 5,400 gallons per minute. The proposed supply routing is depicted on Figure 2-2A (Kobeh Test Site, Water Line/Well Field 3-A).

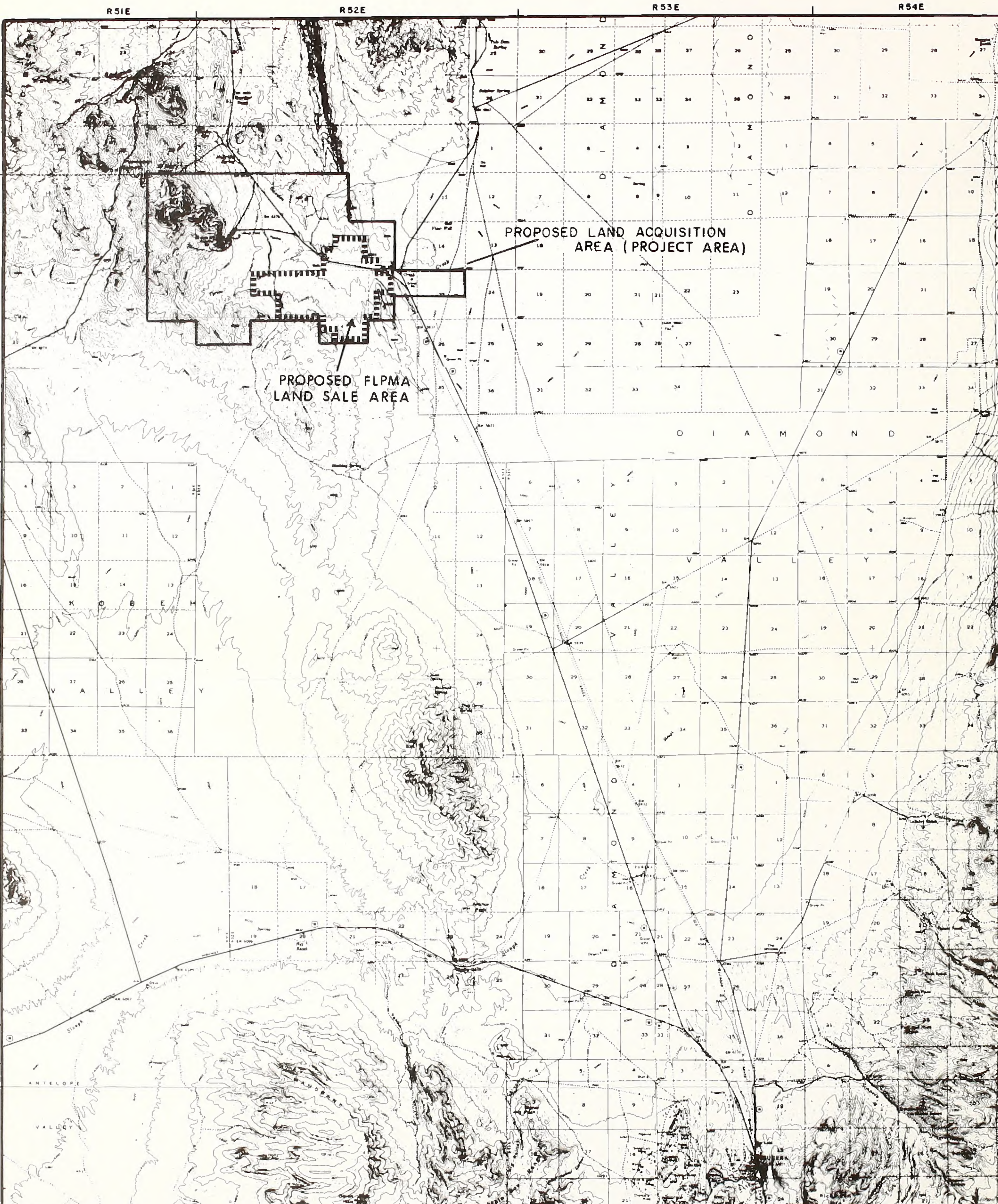
- State Route Relocation: EXXON proposes the development of a tailings pond that will, because of its intended location, require an approximate 6 mile relocation of State Route 278 as shown in Figures 2-2A and 2-2B (Proposed Action Component 6-A). The Nevada Department of Transportation designed the alignment for relocation and will be responsible for actual construction and formal application for the right-of-way.

- Mine/Process Plant: EXXON proposes the development of 1) an open pit mine (Component 7-A); 2) two areas of non-mineralized material storage (Component 8-A); 3) a process plant complex to produce ferromolybdenum (Component 9-A); 4) a single tailings pond located within the Mt. Hope acquisition border area (Component 4-A); and, 5) EXXON assisted subdivision housing (Component 5-A). Excepting the specific land tract of proposed housing, the location and general extent of the proposed action components are shown on Figures 2-2A and 2-2B.

Alternatives (Alternatives 1-9)

Alternatives 1 through 9 were defined on the basis of the nine component actions identified during the scoping process. Impact analyses can best be conducted on a component alternative basis, and allows (as presented in Chapter 4) a cumulative overview of the decision-making consequences. The following presents summary detail of Alternatives 1 through 9.

Alternative 1 - Land Acquisition Components: Preliminary consideration of this alternative included four separate categories of land acquisition/use that may have possibly satisfied the purpose of the proposed action. The Alternative 1 components include: 1) land use by claims as per the General



——— PROPOSED LAND ACQUISITION AREA (PROJECT AREA)

▪▪▪▪▪▪▪▪ ESTIMATION OF APPROXIMATE FEDERAL LAND POLICY AND MANAGEMENT ACT (FLPMA) SALE AREA

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

N

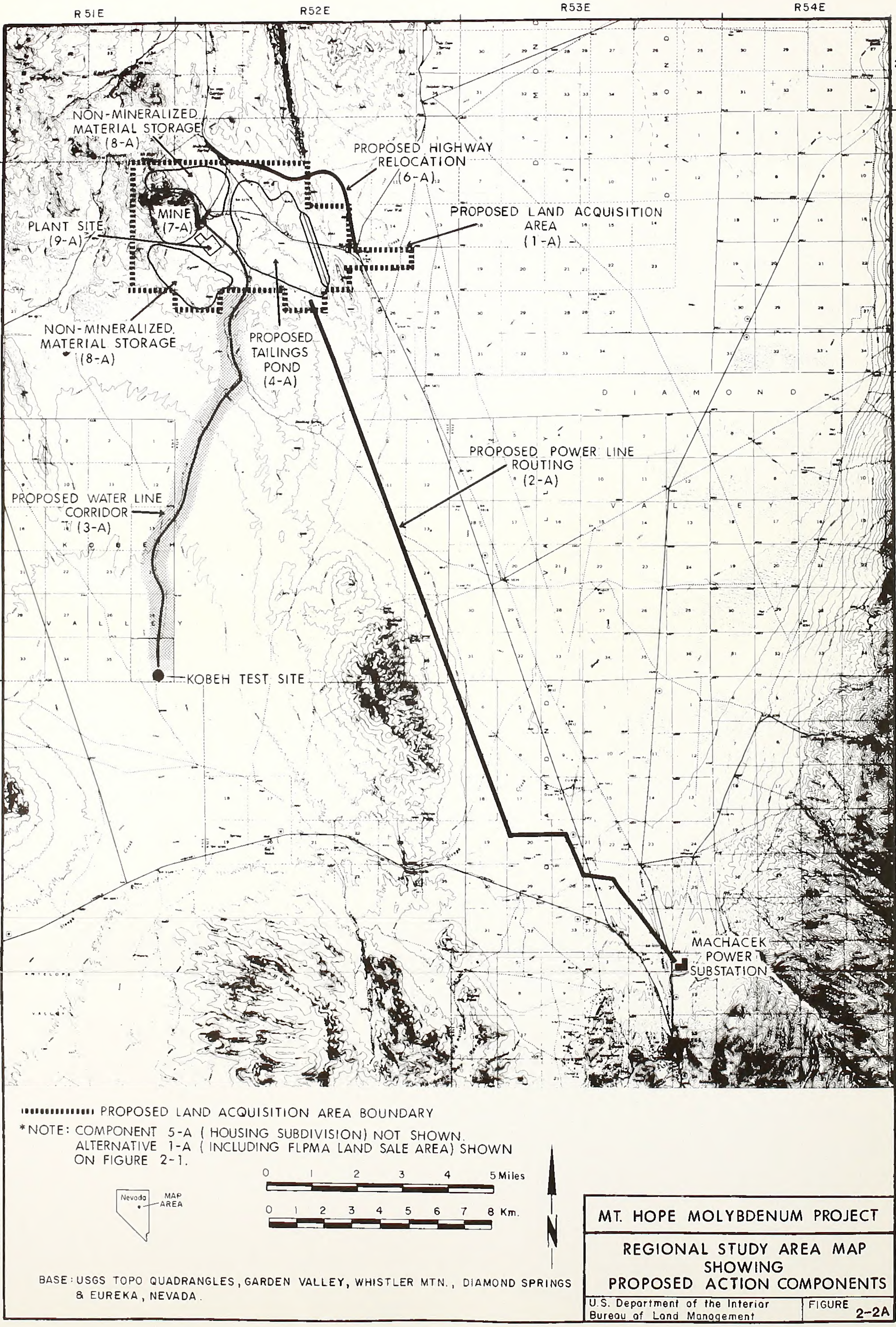
BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

PROPOSED PROJECT AND LAND ACQUISITION AREA MAP ALTERNATIVE I-A

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-1

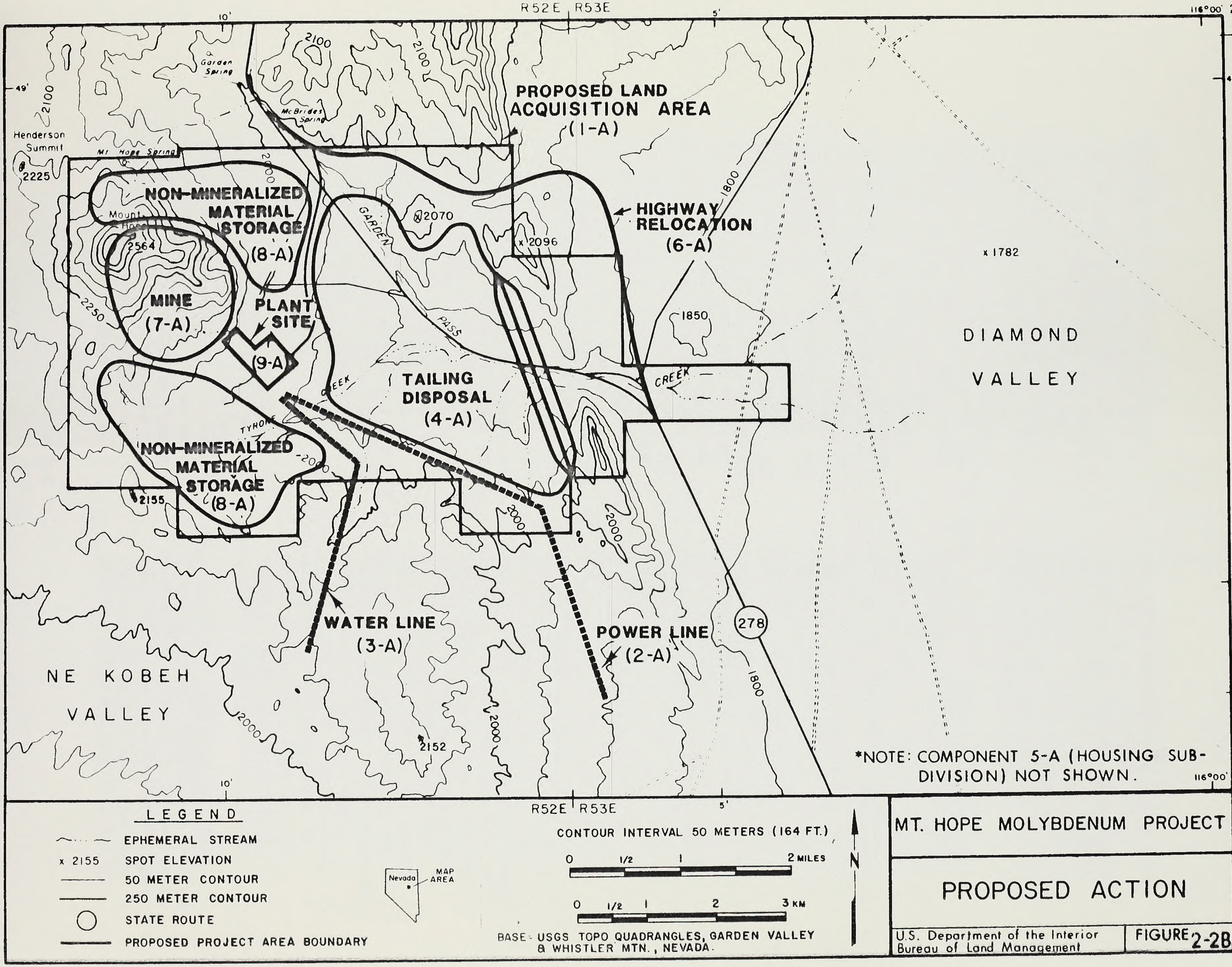


MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING PROPOSED ACTION COMPONENTS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-2A



MT. HOPE MOLYBDENUM PROJECT

PROPOSED ACTION

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-2B

Mining Law of 1872 (Alternative 1-B); 2) land use by FLPMA land use leases (Alternative 1-C); 3) land use by FLPMA land use permit (Alternative 1-D); and, 4) land acquisition by means of a FLPMA land exchange (Alternative 1-E). As discussed in Section 2.3.3, Alternative 1 - Land Acquisition Details, land use by means of the General Mining Law of 1872 represents a viable and reasonable alternative to EXXON's proposed acquisition by purchase. However, the available components of land use by FLPMA lease, use permits or land exchange would not provide reasonable means of satisfying the purpose of the proposed action. Use permits are, by definition, of short term duration and are intended for purposes contrary to those of the proposed action. Land use by lease arrangements has been determined to be inconsistent with Mt. Hope project goals as defined by EXXON corporate policy to secure title. A land exchange within the District is not considered possible or beneficial by the BLM (see Section 2.3.3).

Thus, in reviewing the proposed action with respect to EXXON's proposed acquisition of land, the analyses in this EIS concern the actual proposal of FLPMA land sale (Proposed Action Component 1-A), consideration of Alternative 1-B to the proposed land sale (land use by the provisions of the General Mining Law of 1872 claims) and the no action alternative.

Alternative 2 - Power Line Routing Components: Two alternative power line routing corridors have been identified for environmental impact review and comparison to the proposed action. Depicted on Figure 2-3A, Regional Study Area Map Showing Alternative Components 2 and 3 to the Proposed Action, the route alternatives 2-B and 2-C (2-A being the proposed action route) extend further into Diamond Valley somewhat parallel to State Route 278. While routings differ, construction materials and structure type are identical to plans for the proposed action.

Alternative 3 - Water Line Routing Components: Water line routings, both that of the proposed action (3-A) and the alternatives (3-B, 3-C) have largely been determined during the process of locating water sources adequate for project purposes and subsequent water rights granting. While the scoping document (Appendix A) identified six sites in three valleys as potential water supply sources, subsequent investigations have resulted in EXXON's application for, and Nevada State Engineer's conditional granting of, water rights within Kobeh Valley (at two sites, Kobeh A and Kobeh C). Thus, the four sites located in Diamond and Pine/Garden valleys are no longer considered alternatives based on the effect of the State Engineer's decision. For the purposes of environmental impact analysis, three corridors have been identified. The proposed action (water line routing 3-A) entails a corridor extending from the Kobeh Test Site to the Mt. Hope project area. Alternative 3-B is similar in routing to the proposed action but of shorter length, originating at the Kobeh C site. Alternative 3-C originates at Kobeh A site and represents an entirely different water line corridor routing (Figure 2-3B).

Alternative 4 - Tailings Pond Site Components: Two alternative tailings pond sites, 4-B and 4-C, have been identified for environmental impact analysis (Figure 2-3C). As described in Section 2.3.6, tailings pond sites 4-B and 4-C were ranked second and third, respectively to the proposed action site (4-A) based on criteria from a site selection study for storage capacity, proximity to Mt. Hope, hydrologic characteristics, and antiquities or environmentally sensitive areas. It should be noted that either Alternative 4-B or 4-C would, if implemented, negate the need for acquisition of lands presently identified within the tailings pond 4-A area of the proposed action. As a result, EXXON would seek to initially purchase 100 acres within the Mt. Hope tract of land (Process Plant, Figure 2-3D). As depicted in Figure 2-3C, a boundary of acquisition lands different from that of the proposed action would occur. Lands of either tailings pond alternative would be acquired via the General Mining Law of 1872 or FLPMA.

Section 2.3.6 presents a detailed description of the tailings ponds. Technical Report No.1 includes the site selection study results.

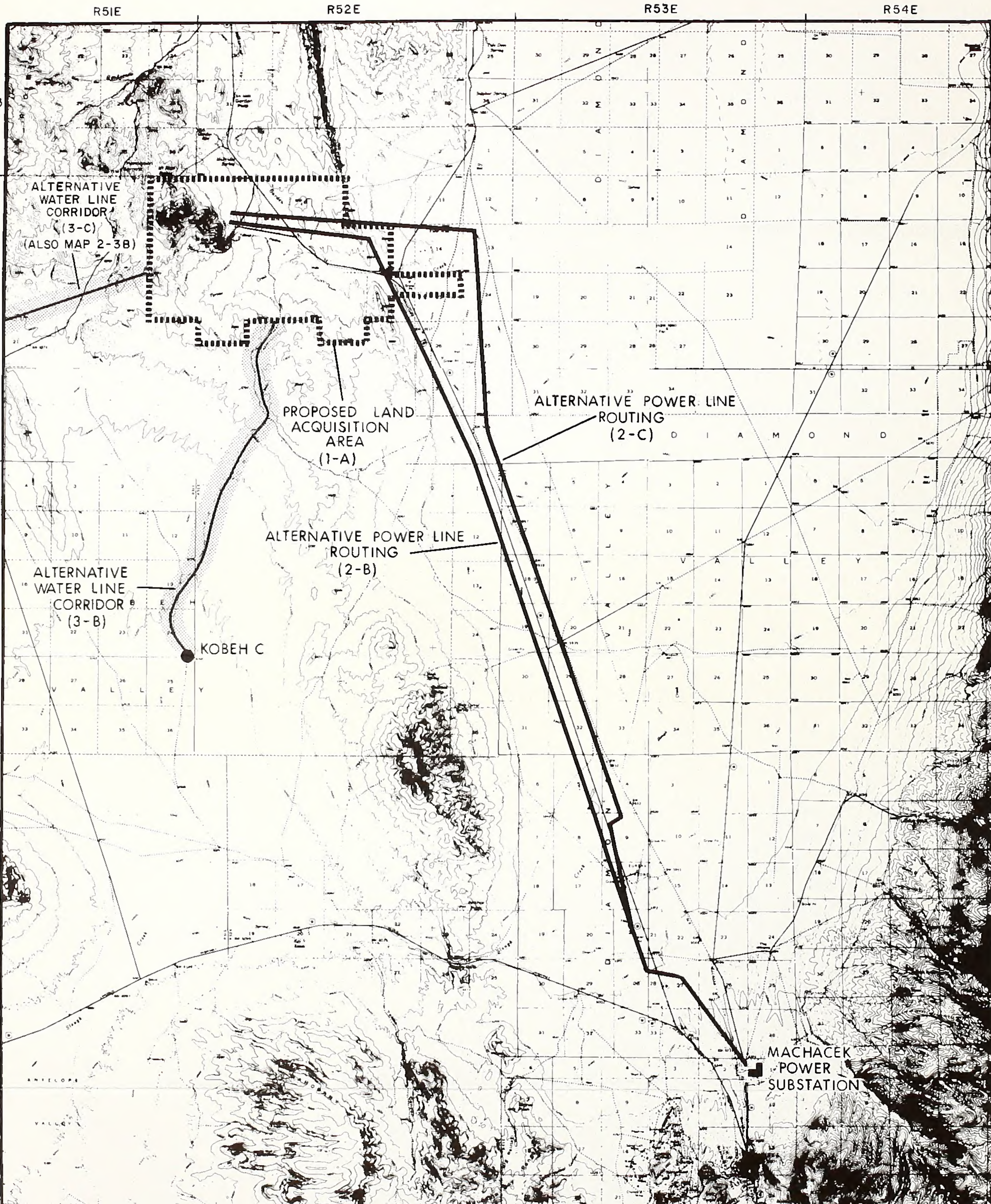
Alternative 5 - Housing Development Component: Two basic housing development scenarios have been identified relative to the Mt. Hope project (the proposed action 5-A and one component 5-B). While eventual development in response to project implementation might be expected to lie somewhere between the two basic scenarios, the analysis in this EIS of the two extreme scenarios allows a "worst-case analysis" approach as outlined by CEQ regulations (see Section 2.4).

The two scenarios identified for impact analysis in this EIS are: 1) the proposed action of developing an EXXON-assisted subdivision (5-A) and 2) the decentralized workforce alternative (5-B). In the case of the proposed action, a housing subdivision located near the mine/process plant or the Town of Eureka would be made available on a free choice basis to employees. In the alternative case of a decentralized workforce, housing conditions and locations would be determined by the distribution of employees, absent the availability of an EXXON-assisted subdivision.

Alternatives 6 through 9 - State Route Relocation, Mine, Non-Mineralized Material Storage and Process Plant Components:

No alternative to the proposed state route realignment (Alternative 6) is presented since the existing topography severely limits options for road relocation. The proposed routing was developed in cooperation with the Nevada Department of Transportation and took into account environmental factors. It is considered to be the optimal routing and any variation would only be for the purpose of cultural resource avoidance. This variation would be so slight (within a few hundred yards) as to render any change in environmental effects negligible. No purpose would be served in defining alternatives. No state route realignment would be necessary if the proposed tailings pond 4A were not developed.

No alternatives are reasonably available regarding components of alternatives 7 and 8 due to the absolute dependence of these facilities on the emplacement of the ore body. In addition, process plant components (Alternative 9) are not presented because the project is in the earliest stages of development, and the final selection of process



PROPOSED LAND ACQUISITION AREA BOUNDARY

*NOTE: ENTIRE EXTENT OF WATER LINE CORRIDOR 3-C NOT SHOWN, REFER TO FIGURE 2-3B

Nevada MAP AREA

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

N

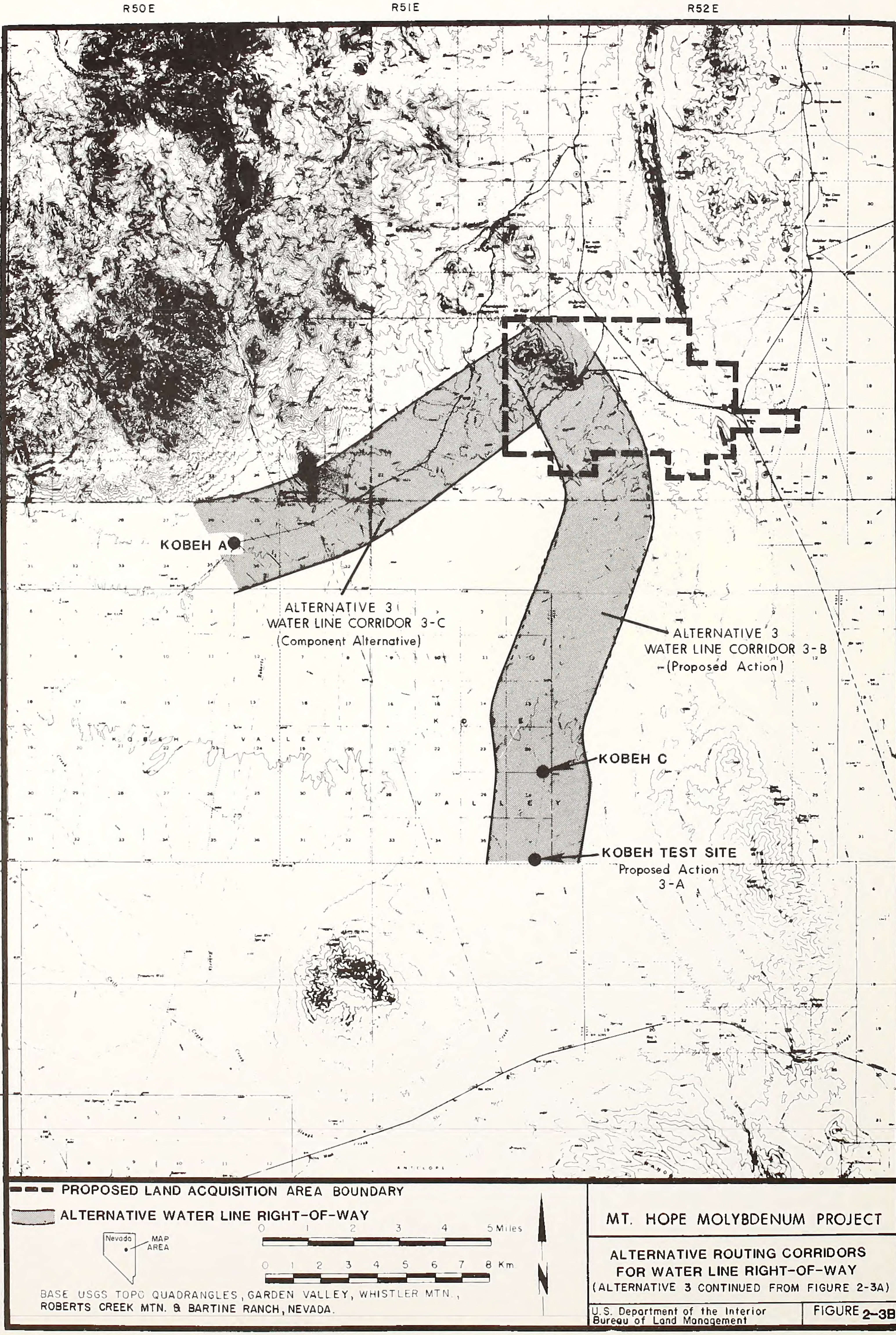
BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING ALTERNATIVE COMPONENTS 2 AND 3 TO THE PROPOSED ACTION

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-3A



BASE USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., ROBERTS CREEK MTN. & BARTINE RANCH, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

ALTERNATIVE ROUTING CORRIDORS FOR WATER LINE RIGHT-OF-WAY
(ALTERNATIVE 3 CONTINUED FROM FIGURE 2-3A)

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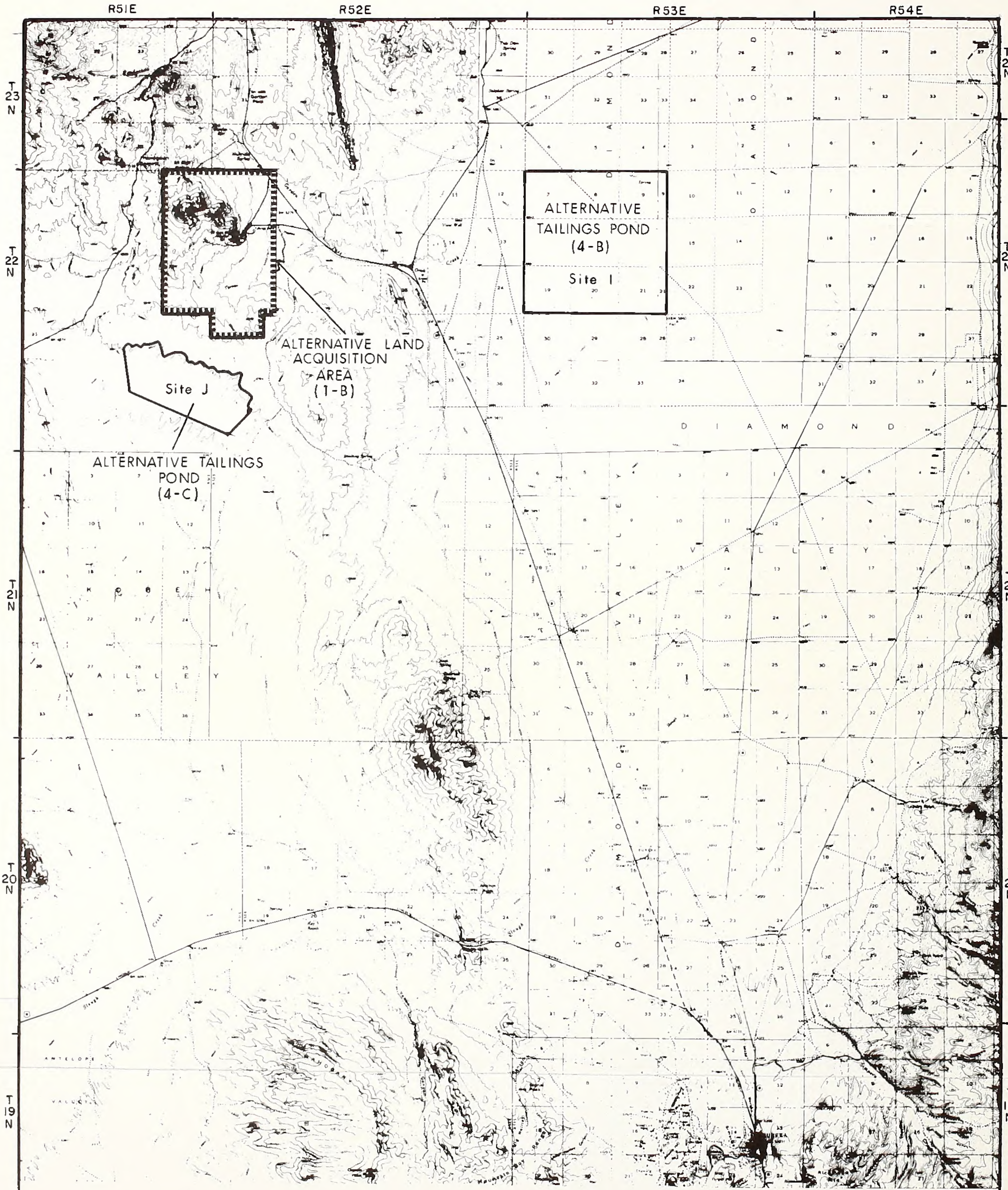
FIGURE 2-3B



ALTERNATIVE LAND ACQUISITION AREA BOUNDARY

Nevada MAP AREA

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

N

BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

REGIONAL STUDY AREA MAP SHOWING ALTERNATIVE COMPONENT 4 TO THE PROPOSED ACTION

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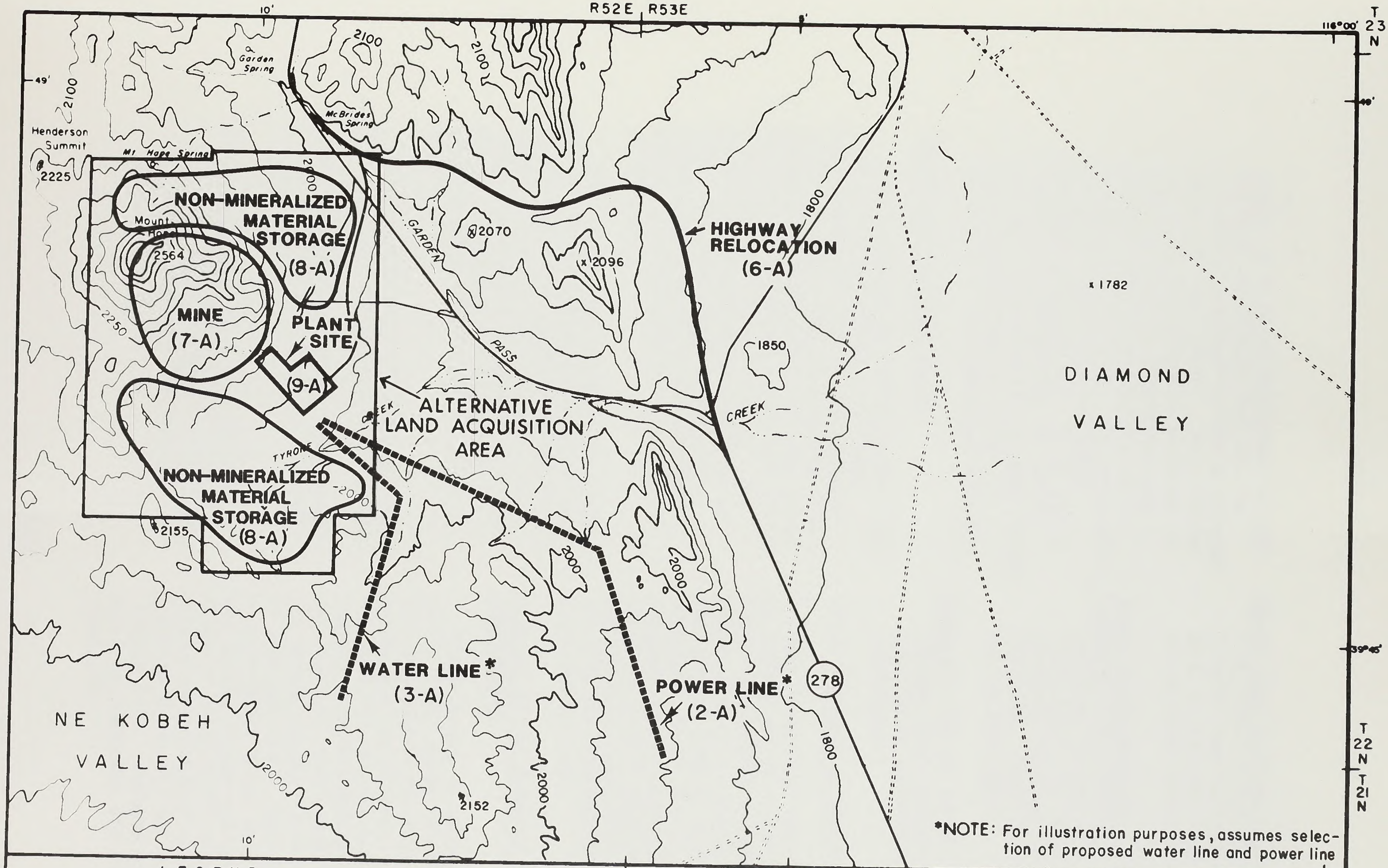
FIGURE 2-3C


T 23 N
115°00'
R52E | R53E
10'



*NOTE: For illustration purposes, assumes selection of proposed water line and power line

LEGEND

- EPHEMERAL STREAM
- x 2155 SPOT ELEVATION
- 50 METER CONTOUR
- 250 METER CONTOUR
- STATE ROUTE

MAP AREA
Nevada

CONTOUR INTERVAL 50 METERS (164 FT.)

0 1/2 1 2 MILES

0 1/2 1 2 3 KM

N

BASE- USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA.

MT. HOPE MOLYBDENUM PROJECT

ALTERNATIVE LAND ACQUISITION AREA

U.S. Department of the Interior
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FIGURE 2-3D

design must await decisions of permitting authorities and will be partially governed by the molybdenum market of the future. The alternative that is presented is based on state-of-the-art literature and EXXON's best understanding of the project at this time. It represents a "worst case" from an impact analysis perspective. It is not a commitment on the part of EXXON, and any alterations in project design would definitionally result in a lessening of environmental effects.

The No Action Alternative

In accordance with NEPA guidelines, a no action alternative has been determined relative to the proposed action. Under this alternative, the proposed project would not take place. Neither the proposed action nor any of the alternatives would occur. The resulting effects from taking no action have been compared with the effects of permitting the proposed action or an alternative activity to go forward.

CEQ regulations require the analysis of the no action alternative even if the agency is under a legislative command to act. This analysis provides a benchmark, enabling decision-makers to compare the magnitude of environmental effects of the action alternatives.

Under the no action alternative the following BLM actions are anticipated.

Land Acquisition - Public lands would not be made available for a FLPMA land sale.

Power Line Routing - For analytical purposes, it has been assumed that no power line routings of any type would be available for project purposes.

Water Line Corridor Routing - For analytical purposes, it has been assumed that no water line corridors of any type would be available for project purposes.

State Route Relocation/Tailings Pond Location - For purposes of impact analyses, it has been assumed that State Route 278 would remain as presently aligned and as constructed. Tailings pond 4-A would not be developed.

Housing - The no action component assumes that housing conditions and future activity would be unaffected.

2.3.2 Details of the Proposed Action

This subsection describes in detail, as determined relevant to Chapter 4 impact assessment discussion, the proposed action. A complete review of the project plan is presented in Technical Report No.1. The following proposed action description is outlined in general sequence to the alternatives identified, e.g., land affected by acquisition, power line requirements, etc.

Details of the Proposed Land Acquisition

EXXON wishes to acquire approximately 8,900 acres of public land in the vicinity of Mt. Hope near Eureka, Nevada for the purpose of developing a molybdenum mine/process plant complex. Approximately 700 acres in the mine pit area would be acquired via mining claims, 2,440 acres would be acquired via a land sale and another 5,760 acres would be acquired via mining claims and/or FLPMA mechanisms to total 8,900 acres. The area within this boundary is hereafter referred to as the Mt. Hope site (Figure 2-1). Primary land requirements by component are shown on Table 2-2.

Table 2-2 Areal Extent of Major Mt. Hope Project Components

Components	Acres By Component		
	Proposed Action	Alternative 4-B	Alternative 4-C
Tailings Pond (4-A, 4-B, 4-C)	3,460	5,650	2,170
Pit	700	700	700
Non-Mineralized Material Storage Areas	2,400	2,400	2,400
Evaporation Pond	165	165	165
Plant Site and Auxiliaries	100	100	100
Subdivision Site	200	200	200
Site Access Road 1/	30	30	30
Spacing Acreage	1,845	150	150
Total 2/	8,900	9,395	5,915

1/ Exclusive of access roads paralleling rights-of-way.

2/ Varying totals result on the basis of tailings pond selected, i.e., 8,900 acres would be utilized under the proposed action and tailings pond 4-A; 9,395 acres under Alternative 4-B; and, 5,915 acres under Alternative 4-C.

SOURCE: EXXON Minerals Company

Land sale is proposed to occur via the provisions of the Federal Land Policy and Management Act of 1976 (FLPMA). FLPMA provides for the sale of public lands, as a result of land use planning, if the tract is difficult, uneconomic or unsuitable for federal management; is no longer required for the purpose for which it was acquired; or its disposal will serve important public objectives. Sales of tracts in excess of 2,500 acres are subject to Congressional review. Sales may be conducted through competitive bidding, modified competitive bidding or by direct sale. On July 1, 1980, regulations promulgated by the BLM implementing this provision became effective.

In January, 1984, the BLM published the Final Shoshone-Eureka Resource Management Plan and Environmental Impact Statement (Shoshone-Eureka RMP/EIS). Proposing to implement a resource management plan for the long term interests within the Shoshone-Eureka Resource Area, the BLM Battle Mountain District outlined in its preferred alternative an adjustment of land tenure pattern through the potential disposal of approximately 104,959 acres of public land. Preliminary criteria of disposal were based upon meeting needs for recreation or other public purposes, community expansion, economic development, agriculture and for block-ownership patterns which would result in improved land management. The block of public lands proposed for the Mt. Hope project was included with the 104,959 acres preliminarily identified as lands suitable for disposal (USDI Final Shoshone-Eureka RMP/EIS, 1984).

The actual method of an eventual land sale (e.g., competitive bid, modified bid, direct sale) will be determined as a function of the Record of Decision process (see Chapter 1.0, Introduction).

<u>Details of the Proposed Action Power Line Routing</u>

Power to the Mt. Hope site would be provided by Mount Wheeler Power, Inc. (MWP) located in Ely, Nevada, and formal application to the BLM for the right-of-way would be made by that company. Information contained in this section was supplied directly by MWP (Appendix B), or derived therefrom. Power would be provided in two phases. Project construction requirements of approximately three to five megawatts would be supplied by a 69-kilovolt (kV) line. Operational requirements of 50 megawatts would be provided by a 230-kilovolt (kV) line. Both of these lines would originate at the Machacek power substation located near Eureka. The proposed routing is shown in Figure 2-2A. Construction of the project power line is dependent upon upgrading the Machacek power substation. However, this upgrading would occur with or without the Mt. Hope project and is not addressed in this EIS. If the upgrading occurs prior to EXXON requiring power for construction needs, the 230-kV line would be constructed initially and the need for the 69-kV line would be eliminated.

The following assumptions are equally applicable to constructing all of the rights-of-way (proposed and alternate routings) and form the basis for determining environmental loading factors:

1. For the purpose of impact assessment, it has been assumed the right-of-way would be 125 feet (ft) in width and an area up to 3.5 acres/mile of route would be disturbed during construction of the 22-mile line.

2. Construction would proceed at the rate of two miles (mi)/week.

3. The labor force would be composed of 60 people working one ten-hour shift, five days per week.

4. Schematics of the power structures are presented in Appendix B. Because the proposed and alternative routings are similar in length, the number of towers that would be needed do not vary; they include 175 tangent structures, two medium angle structures and two dead-end structures. Each structure would have two poles as support. The area radius around each pole would not be maintained free of vegetation.

5. On the average, 20 pieces of equipment including such items as bulldozers, graders and work trucks would be in operation at any one time. Typical equipment that would be used during construction is listed in Appendix B, page B-4.

6. Access to and along the right of-way will be guaranteed. Overland trail will be permitted for maintenance and emergency repairs where existing roads/trails do not presently exist.

7. The right-of-way will be subject to avoidance routing changes in order that impacts to sensitive environmental resources can be minimized or negated (e.g., cultural resources encountered during preconstruction surveys).

Environmental loadings occurring during construction are itemized in Table 2-3. For comparative purpose, the environmental loadings associated with alternative routings 2-B and 2-C are also shown. Air emissions and manpower expended during operation would be negligible.

<u>Details of the Proposed Action Water Line Corridor</u>

During operation phases, the Mt. Hope project would require fresh water in the amount of approximately 5,400 gallons per minute (gpm). Actual use is expected to be 4,730 gpm, allowing a 670 gpm unpumped reserve.

In March, 1983, the Nevada State Engineer agreed to grant water rights to EXXON at two sites (Kobeh A at Section 26, Township 22 North, Range 50 East and Kobeh C at Section 24, Township 21 North, Range 51 East) in Kobeh Valley on the condition that EXXON install flow meters and monitoring wells to measure drawdown. EXXON agreed to drop its previously filed water rights applications in Pine/Garden Valley and Diamond Valley.

EXXON anticipates that pump tests at the Kobeh Test Site will reveal that the full 5,400 gpm may be obtained from that site alone. For the purposes of impact analysis, the most distant site, the Kobeh Test Site, was identified as the proposed action. The proposed location of the well field at the Kobeh Test Site and the approximate routing of the two-mile wide corridor of the 11-mile long associated pipeline are shown on Figure 2-2A. The corridor method of routing presentation is considered appropriate by the BLM in that eventual right-of-way alignment will be flexible to mitigate environmental impact (e.g. cultural resources possibly encountered during preconstruction surveys). The actual right-of-way will only be 25 feet in width and would contain the water pipeline and associated power line. Assumptions used to estimate the environmental loadings associated with the pipeline rights-of-way are presented in the following:

Table 2-3 Environmental Loadings Associated with Construction of Proposed Action and Alternative Power Lines

	Proposed Action	Alternative 2-B	Alternative 2-C
Length (miles)	22	21	23
Area Disturbed (acres)	77	73.5	80.5
Permanent Acreage Disturbed	40	38	41
Disturbance Period (weeks)	11	10.5	11.5
Employee Months (total)	206	197	215
Air Emissions			
- Sulphur Oxides (SO_x)(lbs/day)	14.5	14.5	14.5
- Nitrous Oxides (NO_x)(lbs/day)	195.5	195.5	195.5
- Total Suspended Particulates (lbs/day)	14.1	14.1	14.1

SOURCE: EXXON Minerals Company, Mt. Wheeler Power Company, WRC EIS Team

1. A 24-inch (in) diameter welded steel pipe buried 24 inches below the ground surface would convey the water from the well field to the site facilities.

2. A 15-ft wide gravelled service road would be constructed and maintained parallel to the pipeline.

3. At the well field, four wells on a one-mile spacing would be constructed. Each well would be capable of producing 2,700 gpm; two wells would be pumped continuously and two would be maintained as back-up.

4. A 25-ft wide corridor including the 15-ft wide service road would be permanently maintained. During construction any necessary disturbances outside the 25-ft wide corridor may be allowed after approval of an application to BLM for a Temporary Use Permit. At a maximum, it has been assumed for impact assessment a that 100-ft wide corridor would be disturbed during construction.

5. At each well site, 0.25 acre (ac) would be disturbed during construction. The same area (drill pad and pump station) would be permanently gravelled and maintained. Appropriate permits would be obtained from the BLM and State Engineer.

6. Construction would proceed at an average rate of 500 ft/day. A construction crew of approximately 30 individuals would be required.

7. Equipment required on-site is listed in Technical Report No. 1. Typical equipment includes dump and water truck, bulldozer, motor grader and back-

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5. At each well site, 0.25 acre (ac) would be disturbed during construction. The same area (drill pad and pump station) would be permanently gravelled and maintained. Appropriate permits would be obtained from the BLM and State Engineer.

6. Construction would proceed at an average rate of 500 ft/day. A construction crew of approximately 30 individuals would be required.

7. Equipment required on-site is listed in Technical Report No. 1. Typical equipment includes dump and water truck, bulldozer, motor grader and back-

Table 2-4 Environmental Loadings Associated with Construction of Proposed Action and Alternative Water Lines from Kobeh Valley

	Proposed Action	Alternative 3-B	Alternative 3-C
Road/Pipeline Length (miles)	11	9	8
Area Disturbed (acres)	132	108	96
Permanent Acreage Disturbed	42	34	25
Duration of Disturbance (weeks)	16.5	13.5	12
Employee Months (total)	21.7	17.7	15.8
Air Emissions			
- Sulphur Oxides (SO_x)(lbs/day)	9.9	9.9	9.9
- Nitrous Oxides (NO_x)(lbs/day)	134.0	134.0	134.0
- Total Suspended Particulates (lbs/day)	5.7	5.7	5.7

SOURCE: EXXON Minerals Company and WRC EIS Team

construction:

Length (ft)	Width (ft)
20,592	84
9,504	105
1,584	126

2. Construction would require approximately eight months.

3. A work crew of 30 to 50 persons comprised of equipment operators, truck drivers, laborers and fence erectors would work an 8-hour day, five days per week.

4. Equipment required during construction is listed in Appendix B. On the average, 70 percent of the equipment would be in operation at any one time, including diesel-fueled rollers, a crusher plant and hot plant.

5. Areas of varying width which would be permanently disturbed are as follows. The actual right-of-way approved would be 200 feet in width.

Length (ft)	Width (ft)
20,592	80
9,504	100
1,584	120

Environmental loadings occurring during construction are listed in Table 2-5. Environmental loadings associated with operation amount to a permanent land disturbance of 63 acres. Air emissions and manpower expended during operation would be negligible.

Details of the Proposed Mine/Process Plant

The following describes construction and operation activities at Mt. Hope that would be addressed in further detail by a Plan of Operation upon submittal to the BLM. As discussed later in this chapter (Section 2.4), approval of a Plan of Operation requires NEPA compliance activities and as such, is appropriately considered in this EIS. Additionally, it is important that this EIS present the information necessary to understand the environmental impacts and significance thereof discussed in Chapter 4.0. Thus, to the extent necessary, certain information such as chemical processes and plant layout has been presented in the following. A thorough discussion of EXXON's planned mine/process plant is presented in Technical Report No.1.

Overview of Proposed Mine/Non-Mineralized Material Storage Sites and Process Plant

The project components that would be developed can be divided into five parts: mine pit/non-mineralized material storage, process plant, auxiliary components, tailings pond and subdivision. Each of these segments are sequentially described in the following. The location of the mine/non-mineralized material storage sites are shown in Figure 2-2B. The location of the pit is dependent upon mineralization and consequently, no siting alternatives exist. Environmental loadings in terms of area disturbed, air emissions, effluents and solid waste, etc., that would be generated are identified for construction and operational phases of each project component. Post-operation or reclamation phases are addressed in Mitigating Measures/Monitoring Programs (Section 2.5).

In general, workers would be onsite 250 to 300 days per year (one 10-hour shift/day) during construction. During operations, the mine and process plant would operate 350 to 360 24-hour days/year (3 shifts/day), respectively. A discussion of socioeconomic factors including number of employees and potential distribution

Table 2-5 Environmental Loadings Associated with Construction of State Route Relocation

	Proposed Action Tailings Pond 4-A
Total Length (miles)	6
Area Disturbed (acres)	67
Duration of Disturbance (months)	8
Employee Months 1/	400
Air Emissions	
- Sulphur Oxides (SO_x)(lbs/day)	21.8
- Nitrous Oxides (NO_x)(lbs/day)	283.2
- Total Suspended Particulates (lbs/day)	11.9

1/ Based on a work crew of 50 persons.

SOURCE: EXXON Minerals Company, Nevada Department of Transportation and WRC EIS Team of these employees appears in the final paragraphs of this section.

Mine and Non-Mineralized Material Storage Area Details

Mining would be by open pit methods. Development of the mine would occur over a multi-year period with the final pit configuration being attained after approximately fifty years of production. Ultimately, the high and low walls of the pit would be approximately 3,600 and 2,300 ft high, respectively. The greatest distance across the pit would be approximately 6,900 feet. Table 2-6 shows the rate of land disturbance. Preproduction stripping (the removal of non-mineralized overburden) would occur during the first two years when capital facilities are being built. Approximately 46 million tons (21 million cubic yards assuming no expansion) of material would be removed and deposited in the non-mineralized material storage areas. Equipment that would be engaged in preproduction stripping, detailed in Technical Report No.1, includes approximately 70 items in use during a work period and ranging from 500 horsepower drills to 120 ton haul trucks. Table 2-7 itemizes the air emissions associated with the construction of the entire mine/process plant complex.

If the project goes forward, it is possible that the anticipated mine life would be not less than fifty years with an operational daily ore production rate of approximately 30,000 tons. Approximately 95 equipment items would be used in the pit during a work period. Electric and diesel shovels would be used for primary loading purposes.

Approximately 120,000 tons of rock per day would require blast hole drilling and blasting. A blasting crew normally working daylight hours, would place about 1,000 pounds of explosives in each hole of a 40-hole cluster. The 40 holes would be simultaneously detonated. The explosive is expected to normally consist of an ammonium nitrate (fertilizer grade)/ fuel oil mixture.

Once the rock is broken by blasting, large electric-powered shovels (15 cubic yard capacity) would load the broken rock into diesel-powered haul trucks with a carrying capacity of 120 to 170 tons per load. On a three shift/day average, 3 to 4 shovels would load 20 to 25 trucks. Ore material would be hauled out of the pit a distance of less than one mile to a primary crusher.

Approximately 90,000 tons (42,000 cubic yards assuming no expansion) of non-mineralized material would be removed each day. This material would be hauled out of the pit a distance of over one mile to areas adjacent to the mine and placed in layered piles. Each pile would be 300 to 900 ft in height. The horizontal surfaces of these areas would be kept smooth by bulldozers that would push material over the edge as haulage trucks dump their loads. Runoff from these storage areas would be channelled to the tailings pond for water conservation purposes and collection of any dissolved constituents. (See Section 2.5, Mitigating Measures/Monitoring Programs, for a more detailed discription of runoff collection and control systems.)

Air emissions from mine pit operations are shown in Table 2-7. An additional environmental factor is the possible inflow of groundwater into the pit. The mine would be free of groundwater for about the first five years. Thereafter, discontinuous or perched groundwater is expected to contribute 200 to 600 gpm of intermittent inflow that would be utilized to suppress dust on the haulage roads, with the surplus being pumped to the

Table 2-6 Rate of Areal Disturbance During Pit Development and Non-Mineralized Material Storage Area

Year	Pit	Storage Area	Total
	(acres)	(acres)	(acres)
5	173	857	1,030
10	193	1,598	1,791
50+	695	2,745	3,440

SOURCE: EXXON Minerals Company

Table 2-7 Air Emissions (Mobile and Total Suspended Particulates) Associated with Construction and Mine Operation

Emissions (lbs/day)	Pre-Production Stripping	Process Plant Construction	Mine Operation
Sulphur Oxides (SO_x)	21.8	44.1	29.1
Nitrous Oxides (NO_x)	291.0	573.2	389.1
Total Suspended Particulates (TSP)	16.3	35.7	22.5

SOURCE: EXXON Minerals Company and WRC EIS Team

process plant or tailings pond. The quality of the water encountered would be the same as existing groundwater (see Section 3.5).

Process Plant Details

The process plant would be composed of three parts - concentrator, hydrometallurgical plant and conversion plant. Construction of the process plant facilities is scheduled to occur at the same time as preproduction stripping, i.e., during the first two years of project life. Land disturbance for the entire plant site area including auxiliary facilities would be approximately 100 acres. Typical equipment that would be operational during the construction period includes dump trucks, front-end loaders, 8-ton to 150-ton cranes and water trucks. During a work period approximately 148 units of equipment (gasoline and diesel-fueled) are expected to be in use.

During the scoping process of this EIS, major questions and concerns (Appendix A) were brought forward concerning the atmospheric emissions and effluent characteristics associated with operation of the process plant. The primary atmospheric emissions associated with the construction of the process plant are detailed in Table 2-7. Quality characteristics of primary process plant effluent, atmospheric emissions and solid wastes during operation are detailed in Table 2-8. A generalized water balance and flow diagram is presented as Figure 2-4. The following discussion details process information necessary to understand the mechanism of environmental loadings and the impacts discussed in Chapter 4.0.

End Product. If the project goes forward, it is anticipated the process plant would produce in sequence several potentially marketable molybdenum products: molybdenite concentrates, technical grade molybdic oxide (TMO) and ferromolybdenum (FeMo). EXXON has no current plans to recover non-molybdenum by-products for sale. An overall conceptual process flow diagram is shown in Figure 2-5. Technical Report No.1 presents extensive process and product details.

Concentrator Process Details. The concentrator process involves the performance of several ore crushing, ore grinding and flotation steps. Using froth flotation methods, the concentrator would produce a raw molybdenite concentrate which would then proceed to the hydrometallurgical plant for the removal of impurities and concentrate drying.

Before initiating the concentrator process, ore material will have been crushed to a size less than 6.5 inches by a dry crusher and then conveyor transported to a storage stockpile. Dust collection and suppression systems throughout ore crushing are proposed by EXXON (see Section 2.5).

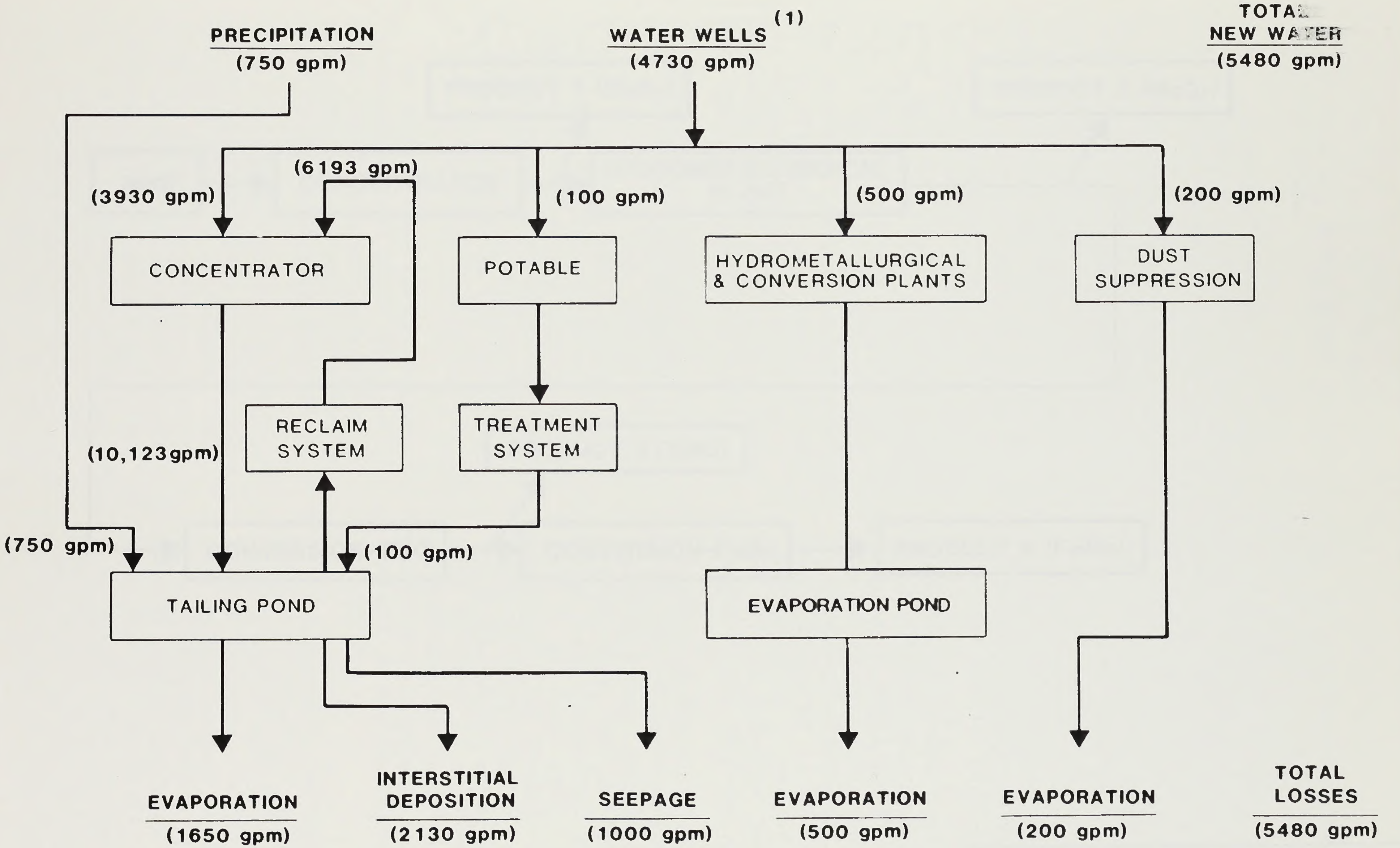
The concentrator process would be initiated by wet-grinding of the crushed ore in closed-circuit, semi-autogenous grinding (SAG) mills and ball mills. Conducted by keeping the ore in a slurry form (ore-water mixture) throughout the process, the SAG and ball milling objective would be to produce molybdenite grains of a size fine enough to allow waste mineral separation by froth flotation.

Froth flotation basically involves the use of chemical reagents to enhance fine particle separation (ore from waste). Individual flotation step concentrates would be repetitively reground by ball mill and refloated to eventually produce a raw concentrate containing approximately 15 percent moisture. The reject, or tailings, material produced by product separation would additionally undergo repetitive flotation reagent cleaning

Table 2-8 Summary of Primary Air Emissions, Effluents and Solid Wastes from Process Plant

Concentrator -	Air	- Crusher/Stockpile Reclaim - Release of suspended particulates at the rate of 450 lb/day.
	Water	- Tailings from dewatering and grinder with aqueous fraction characteristics described in Table 2-10.
	Solid Wastes	- Tailings from dewatering of concentrate with solid fraction characteristics shown in Table 2-9.
Hydrometallurgical Plant -	Air	- Chlorine Scrubbing Tower - Intermittent release of chlorine gas not to exceed regulatory limits.
	Water	- Wastewater Treatment Plant - Assuming 95% treatment efficiencies, total effluent of 154 ton/day will contain 0.52 ton/day CaO_2, 0.06 ton/day Fe, 0.02 ton/day Cu and 0.0006 ton/day Pb. Effluent would be discharged to a lined evaporation pond.
	Solid Wastes	- No major solid wastes.
TMO Production -	Air	- Roaster Flue Gas - Scrubber assumed to achieve 97% removal efficiencies. Final emission rate is assumed to be approximately 3.17 tons/day SO_2 and 0.002 tons/day of particulates.
	Water	- Scrubber - Effluent stream would be $CaSO_3$ and $CaSO_4$ with some TMO solids and some unreacted $Ca(OH)_2$. Approximate stream flow of 1985 ton/day would be discharged to a lined evaporation pond.
	Solid Wastes	- Approximately 44 ton/day of gas scrubber process. Slurry of $CaSO_4$, $CaSO_3$, $CaCO_3$, CaO_2, MoS_2, and MoO_3. Effluent would go to a lined evaporation pond.
FeMo Production -	Air	- No major atmospheric emissions.
	Water	- No liquid effluent would be generated.
	Solid Wastes	- Process slag generated at 10.2 tons/day containing inert silicate.

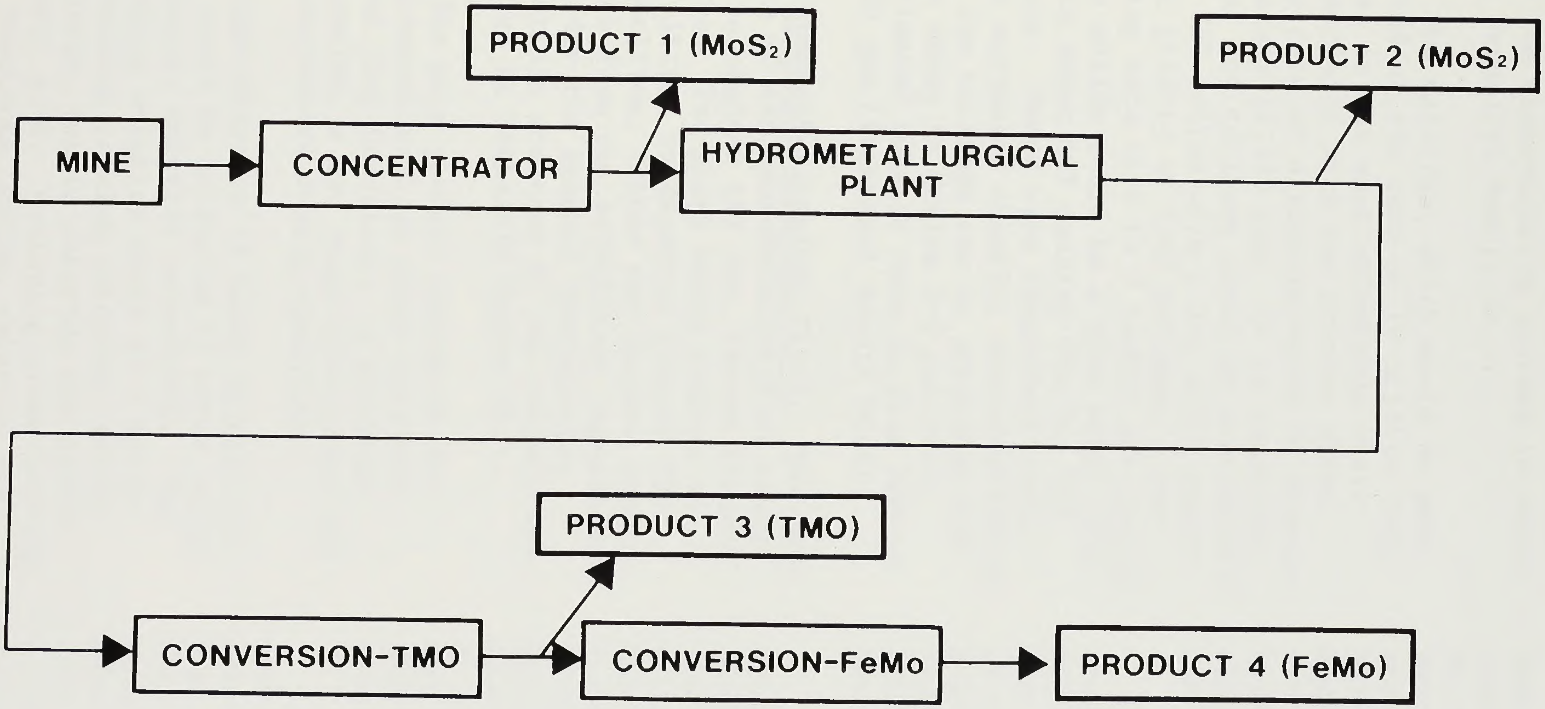
SOURCE: EXXON Minerals Company and WRC EIS Team



(1) EXXON HAS A WATER APPROPRIATION OF 5400 gpm IN KOBEH VALLEY. THIS BALANCE SHOWS AN UNPUMPED RESERVE OF 670 gpm.

SOURCE: EXXON MINERALS COMPANY

MT. HOPE MOLYBDENUM PROJECT	
PROVISIONAL WATER BALANCE AT YEAR 20	
U.S. Department of the Interior Bureau of Land Management	FIGURE 2-4



SOURCE: EXXON MINERALS COMPANY

MT. HOPE MOLYBDENUM PROJECT

PROCESS FLOWSHEET

U.S. Department of the Interior
Bureau of Land Management

FIGURE 2-5

to maximize ore recovery and reduce water use totals.

An estimate of materials consumed by the concentrating process is shown in Technical Report No.1.

The tailings, which would be produced at the rate of 10 million tons/year is the most voluminous waste associated with the process plant. The rate of discharge would be approximately 12,350 gpm. It is estimated that the tailings would be approximately 35% solids with a dry solid specific gravity of 2.65 and have a settling rate of 6 to 7 inches per second. The solids would be a fine sandy silt with about 60% passing the No. 200 sieve. Based upon laboratory tests, the estimated chemical characteristics of the tailings can be projected and are shown in Tables 2-9 and 2-10. Estimated seepage rate is from 500 to 1000 gpm (Technical Report No.4).

Hydrometallurgical Plant. The purpose of the hydrometallurgical plant is to upgrade the raw, impure concentrate. The plant would consist of facilities to dissolve (leach) the impurities, filter the leached concentrate from the solubilized impurities, and dry the leached concentrate. Materials consumed by the process are listed in Technical Report No.1.

The main process stream of the hydrometallurgical plant involves three step functions: a leaching operation, a two stage filtration and a concentrate drying operation.

Approximately 15 leach batches per day would be conducted in three steam jacketed, agitated autoclaves. The leaching solution would be a brine containing calcium chloride, ferric chloride, cupric chloride and hydrochloric acid. Following steam heating, the reactants (brine, chlorine gas, and raw molybdenite concentrate) would be cooled and pumped to one of two fully automated plate-and-frame filter presses.

First stage filtration would produce a filter cake containing 14% leachate. The leachate solution would be stored in a covered brine tank. Second stage filtration would proceed with water-washing of the retained filter cake. The washed filter cake would be automatically discharged to a storage bin in preparation for final drying. The solution from second stage filtration would be stored in a cake-wash storage tank.

Collected leachate solutions would eventually accumulate excessive impurities which would inhibit leach extraction efficiency. To prevent the loss in extraction efficiency, it is expected that up to 30% of initial leach solution volume for each batch will be rejected from the system and treated in the effluent plant.

Drying of the stored filter cake would involve the continual use of a jacketed dryer. This dryer would be a screw type, indirect heat exchanger using a hot thermal oil to transfer heat to the dryer feed. Heat would be supplied to the thermal oil by an oil-fired heater burning No. 2 fuel oil. Dried concentrate would be discharged from the dryer at a moisture content of approximately five percent by weight and conveyed by an "en-masse" conveyor to the dry concentrate storage bin.

In addition to the main process stream of leaching-filtration-drying, there would be several other ancillary support systems. Included as ancillary support systems to the hydrometallurgical plant are: 1) a brine make-up system combining water, calcium chloride and ferric chloride; 2) a liquid chlorine storage and handling system; 3) a hydrochloric acid storage tank (7,500 gallon capacity); 4) a water, steam and oil supply system;

Table 2-9 Estimated Composition of Solid Fraction of Tailings

Element Determined	Weight % as Mineral	
Cu	0.04	($CuFeS_2$)
Fe	0.39	(FeS_2)
Fe	1.03	(Fe_2O_3)
Zn	0.06	(ZnS)
Pb	0.01	(PbS)
As	0.02	($FeAsS$)
Cd	not detected	
Bi	not detected	
Mn	0.06	(Mn_2O_3)
Na	0.46	(Na_2O)
K	6.52	(K_2O)
Si	79.10	(SiO_2)
Al	10.16	(Al_2O_3)
Sn	not detected	
W	0.04	($(Fe,Mn)WO_4$)
Ba	0.05	($BaSO_4$)
P	0.04	(P_2O_5)
Total	98.45	

SOURCE: EXXON Minerals Company

Table 2-10 Estimated Composition of Aqueous Fraction of Tailings

Element	Concentration After Eight Cycles (ppm)	Estimated Equilibrium Concentration (ppm) 1/
Ag	0.01	-
Al	0.16	-
As	<0.063	-
B	0.012	-
Ba	0.058	-
Be	**	-
Ca	40.0	-
Cd	0.0091	-
Co	**	-
Cr	0.0068	-
Cu	0.0041	<1.0
Fe	0.21	1.0
K	58.1	-
Li	0.058	-
Mg	11.04	-
Mn	0.278	5.0
Mo	1.083	-
Na	48.54	-
Ni	0.0068	-
P	1.611	-
Pb	**	-
Pt	**	-
Sb	**	-
Se	**	-
Si	3.58	-
Sn	1.26	-
Sr	0.08	-
Ti	**	-
Tl	**	-
U	**	-
V	**	-
W	**	-
Zn	0.035	<1.0
Cn-	1.858	1.0
Total Sulfur	94.5	-
SO_4=	86.9	500
CO_3=	0.65	-
HCO_3-	159.7	-
TOC	17.24	-
TDS	621.0	1000

** Below detectable limit.

1/ First column represents laboratory results of metallurgical testing using Kobeh Valley water recycled eight times. For most constituents these estimates approximate equilibrium concentrations. Those constituents which may further build up are shown in the second column with the extent of build-up having been estimated based on operating experiences at other similar molybdenum processing facilities.

SOURCE: EXXON Minerals Company

and 5) an effluent treatment system.

Process effluent would be lime treated and the resulting sludge would be pumped to a lined evaporation pond of approximately 165 acres located inside the plant boundary. (See Section 2.5, Mitigating Measures/ Monitoring Plan, for detailed description of this system.)

Conversion Plant. Further processing of the concentrate from the hydrometallurgical plant would occur in the conversion plant which consists of two parts, Technical Molybdic Oxide (TMO) and Ferromolybdenum (FeMo) production.

The materials that would be consumed by TMO production are listed in Table 2-11. Dried concentrate would be transported by bucket elevator from the leach plant concentrate storage bin to one of two roaster feedbins. Heat for the roaster operation would be provided partly from fuel oil, partly from the combustion of residual mineral oils contained in the flotation concentrate and mostly (70% of total heat) from the oxidation of the sulfur in the molybdenite concentrates.

Roaster gas, typically containing from 0.5 to 1.5% (volume) SO_2 and entrained solids, would pass through cyclones and dry-plate-type electrostatic precipitators. Solids eliminated in this way would be collected for recycle to the roasters. The composition of the entrained material is expected to consist of approximately equal parts of unroasted concentrate and TMO. Cleaned gas from the electrostatic precipitator would pass through induced draft fans to a gas scrubber for 97% removal of sulfur dioxide (removal efficiency assumption based on technology to be used). An aqueous slurry containing scrubber action by-products would be pumped from the plant to an impoundment area for storage.

Roaster products would be water-cooled from 1,000° to 210°F. Water consumption for cooling would be approximately 8 gpm per cooler and warm water leaving the coolers would be used in lime slurry make-up.

Cooled product would be transported to a storage bin having a nominal capacity of approximately 45 tons. From storage, the product would be 1) conveyed to the FeMo plant for further purification, 2) conveyed to a briquette plant, or 3) drummed and stored for shipment.

The second part of the conversion plant would produce ferromolybdenum (FeMo) in batches by the "thermit" process which uses the exothermic heat of reaction developed when aluminum and silicon reduce molybdenum trioxides to molybdenum metal. When iron is present in the initial charge as EXXON proposes, the final product is a ferromolybdenum alloy. A normal batch "burn" would consume the quantities of material shown in Table 2-11. Up to seven batches/day would be burned at temperatures as high as 3,500°F.

Very little gas would develop during a normal burn. However, if limestone or hydrated lime was present in the lime charged to the reaction, the water present in the hydrated lime and the CO_2 in the limestone would produce a gas. Typically, however, there would be no visible emissions from the baghouse exhaust stack. Dust collected in the cyclones or baghouse would be recycled to subsequent burn charges. (See Appendix C, Mitigating Measures/ Monitoring Programs, for a more detailed description of this control technology.)

The cooled reaction product would consist of a cohesive button-shaped mass about 6 ft in diameter and 16 inches thick. After cooling is complete, the button would be broken and

Table 2-11 Materials Typically Consumed During TMO and FeMo Production

	Material	lb/day	
TMO Production	Lime (Hydrated, Air Classified 98% $Ca(OH)_2$)	105,000	
	Water (untreated)	4,141,000 (500,000 gal)	
	Electrical Power	7,200 kwh	
	Fuel Oil (No. 2)	900	
		Weight	
		lb	kg
FeMo Production	TMO	23,000	10,500
	FeSi (75%)	7,000	3,200
	FeSi (15%)	5,400	2,400
	Fe_2O_3	4,600	2,100
	CaO	3,500	1,600
	Al (Metal)	1,100	500
	Fe (Metal)	770	350
	CaF_2	700	320

SOURCE: EXXON Minerals Company

the alloy manually separated from the slag and transported to the alloy crusher. The slag would be transported to a slag bin with a 10-ton capacity crane.

An alloy crushing plant circuit, consisting of three jaw crushers, would produce alloy in three size fractions - furnace size (-25 mm to +6 mm), ladle size (-6mm to +841 micron) and small ladle size (less than -841 micron). The crushed fractions of ferromolybdenum alloy would be stored in three separate bins and packaged in steel drums for shipment.

Slag would be taken daily by truck to the slag storage area. The slag, at an assumed -8 in size, would have a bulk density of about 1.3 ton/yd^3. At this bulk density and assuming a 5.0 ft high pile and production of slag over a period of 50+ years, approximately 14 acres of land would be required to stockpile the slag. Slag piles would be trimmed occasionally using either a rubber-tired front-end loader or a small bulldozer.

In addition to the ancillary systems considered a part of the hydrometallurgical plant, there would be several other support facilities present as shown on Figure 2-6. The entire area designated as the plant site would cover approximately 100 acres. There would also be approximately four miles of access road connecting the plant site to State Route 278. Some areas of the property would be lit continously including the plant site and those areas of the pit and non-mineralized material storage areas being worked. Vehicles would rely on self-lighting between runs. Also, for security reasons the property would be fenced. The exact placement of fencing would be mutually acceptable to the Nevada Department of Wildlife, BLM and EXXON. Figure 2-6 includes the EXXON proposal to date concerning fence type (Type D-4, strand barb wire with smooth wire top strand and chain link) and perimeter extent.

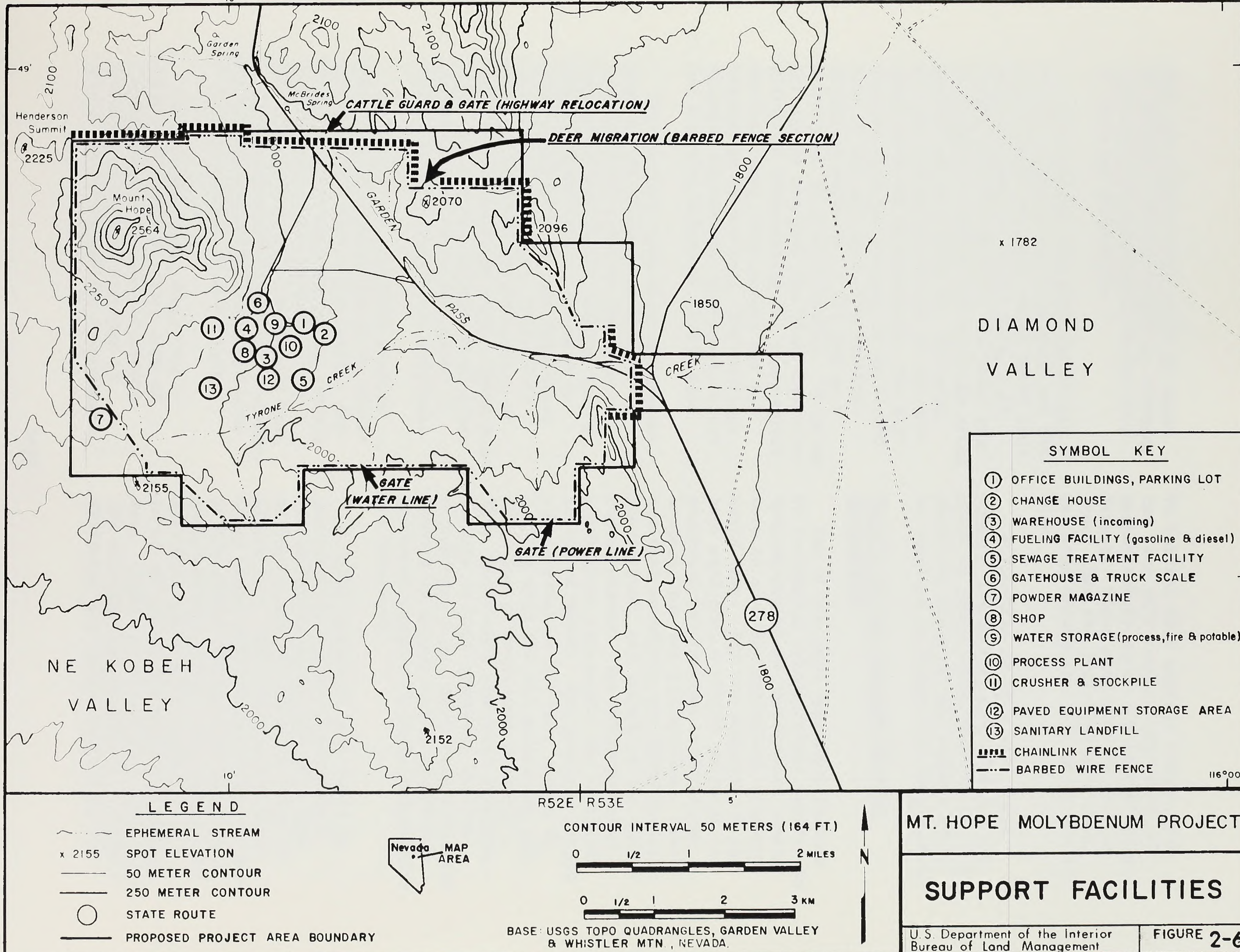
Details of the Proposed Tailings Pond

Following detailed studies, EXXON has proposed the development of a tailings pond within the project area. A review of the studies conducted to evaluate the alternatives of site location, disposal methods and construction methods is presented in Technical Report No.1.

The location and extent of the proposed tailings pond is presented in Figure 2-2B. The tailings pond will involve disposal behind a cycloned tailings embankment constructed by the centerline method. The method of tailings disposal behind a cycloned embankment was selected because the tailings material appeared suitable for dam construction and the relatively large retention embankments required were prohibitive with respect to earthfill costs and quantity of fill needed. (Technical Report No.1).

Both centerline and downstream methods of tailings dam construction were determined suitable methods of tailings disposal using high embankments. However, the downstream method of construction required a larger quantity of tailings sand for embankment construction and more intensive tailings management for dam construction. Because of this, and since using a downstream construction method was considered by EXXON not to have significant advantages for the Mt. Hope project, the centerline method of tailings dam construction was selected.

Approximately 390,000 acre-feet of storage would be required for the 715 million tons of tailings produced during the project life. For the comparison of alternatives, it was assumed



MT. HOPE MOLYBDENUM PROJECT

SUPPORT FACILITIES

U.S. Department of the Interior
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FIGURE 2-6

that the starter dams would be sized to provide 6,650 acre-feet of storage. This would be equivalent to one year of tailings production.

The tailings transport facilities for the proposed tailings pond and the two alternatives were sized based upon daily tonnage of 33,000 tons, 2.65 solids specific gravity, tailings pulp at 35 percent solids and tailings grind with 60 percent minus No. 200 mesh. For the conceptual design of the proposed pond and alternatives, the production rate was assumed to be 30,000 tons of ore per day. The tailings discharge would be 12,350 gpm at a density of 35 percent solids. To allow for surges and give the plant the capability of compensating for unscheduled shutdown days, this number was increased by 25 percent. The tailings disposal system was, therefore, sized for a slurry volume of 15,440 gpm.

The cycloned sand tailings embankment at the proposed pond would be located about 2,000 ft upstream of the narrow gap in the Sulphur Spring Range (Figure 2-2B). The site is located adjacent to, and downstream of the process plant. Table 2-12 presents selected specifications of the proposed tailings pond. Specifications for the two identified alternative sites have also been given in Table 2-12 for comparative purposes.

Initially, an earthfill starter dam would be constructed to an elevation of 6,144 feet. The starter dam would be 95 ft high and would contain 1.12 million cubic yards (yd^3) of material. The starter dam would have a 30-ft crest width and 2.5H:1V slopes. The ultimate tailings dam would have a crest elevation of 6,447 feet.

The proposed site would have a relatively large drainage area of 12,352 acres. However, diversion facilities could be provided to direct runoff around the impoundment. To control soil erosion losses, the dam face will require terracing for approximately every 165 feet of slope length. Since this site is located lower than the preferred mill site, tailings transport could be by gravity flow.

Utilization of this site would require abandoning approximately two miles of paved state road (Route 278). About six miles of new highway would be required to bypass the impoundment.

Details of the Proposed Housing Development

One of the most important factors in evaluating socioeconomic impacts is determining where individuals coming into an area for employment purposes would live. For the purposes of impact analysis, a single proposal is presented for housing construction workers; but two alternatives, decentralized workforce and EXXON-assisted subdivision, are presented for operational phases. The EXXON-assisted subdivision represents the proposed action of EXXON. The proposed action and alternative has been chosen in keeping with the CEQ guidelines and allow for a "worst-case analysis". This "worst-case analysis" brackets impacts in that opposite, extreme situations, i.e., maximizing projected impacts to Eureka versus maximizing projected impacts to other communities, are evaluated.

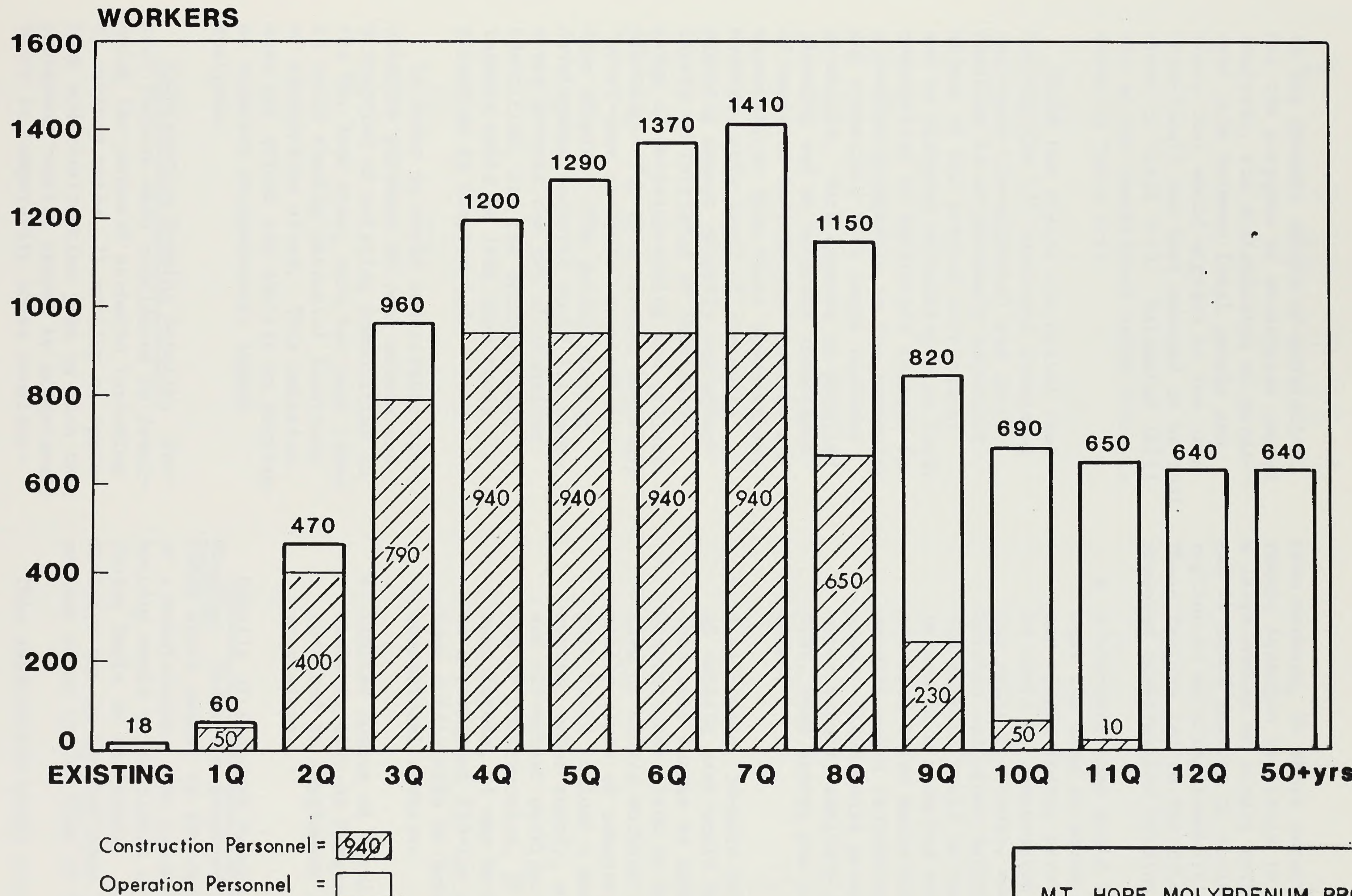
A large number of jobs would be generated by the Mt. Hope project. The workforce associated with construction and operation is shown in Figure 2-7. The construction workforce would peak at approximately 940 people midway through the three year construction period. The operational workforce would grow steadily and level off at an estimated 640 employees. EXXON has stated that estimating the distribution of jobs is extremely difficult and highly subjective due

Table 2-12 Comparison of Proposed Action and Alternatives Tailings Disposal Site Characteristics

Pond Specifications	Proposed Action	Alternative 4-B	Alternative 4-C
	Garden Pass	Diamond Valley	Upper Kobeh Valley
Lineal Distance from Mill Site - mi	2.1	6.3	3.6
Areal Extent -			
5 yr - ac	519	425	667
10 yr - ac	840	850	988
20 yr - ac	1,358	1,700	1,358
40 yr - ac	2,643	4,250	2,099
Ultimate - ac	3,458 1/	5,650	2,173 1/
Drainage Area - ac	12,352	5,650	3,930
Starter Dam Crest Elevation - ft	6,144	5,864	6,426
Starter Dam Height - ft	95	21	56
Starter Dam Volume - million yd^3	1.12	1.00	2.43
Ultimate Dam Crest Elevation - ft	6,447	5,922	6,619
Ultimate Dam Height - ft	397	78	249
Ultimate Dam Volume - million yd^3	32.3	30.6	66.5
Tailings Conveyance Type of Flow	Gravity	Gravity	Pumped
Length of Tailings Line - mi	4.4	15.0	7.5
Reclaim Water Pump-Back - gpm	3,500	1,500	3,000
Reclaim Water Return Line Length - mi	3.7	8.0	5.3
Access Road Length - mi	3.2	7.0	3.6

1/ Acreages have been rounded to nearest ten in EIS text (e.g. 3,458 to 3,460).

SOURCE: EXXON Minerals Company



Q = Quarter Year (3 months)

SOURCE: EXXON MINERALS COMPANY

MT. HOPE MOLYBDENUM PROJECT

TOTAL WORKFORCE ESTIMATE

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FIGURE 2-7

to the dynamic nature of population. For the purposes of worst-case impact analysis, the distribution of permanent jobs between local people and those that would migrate to the area (non-local) has been assumed to be that shown in Table 2-13. Estimated skill mix of the operational labor force is shown in Table 2-14.

EXXON has stated its belief that housing the 525 non-local permanent employees (in-migrants) and their families is an extremely important aspect of its project development and is planning on working with local communities to ameliorate impacts in a fashion acceptable to the community and compatible with sound business practices. Much depends on detailed planning and an accurate assessment of impacted individuals' desires and expectations from their communities. However, this level of community planning cannot properly and effectively be initiated at this early stage of decision-making and project planning. For this reason, the above "worst-case analysis" approach has been adopted. The actual housing development scenario would lie somewhere between the two alternatives identified, and the socioeconomic impacts would be less than those presented in Chapter 4.0.

In order to avoid undesirable speculative purchase of real estate and disruption of existing communities in the Mt. Hope area, care has been taken to avoid showing potential locations of subdivision sites. This omission does not affect the ability to perform an accurate socioeconomic impact analyses.

Construction Housing Details. Several factors were considered in developing the proposed scenario including 1) vacancy rates, 2) overlap of operating and construction jobs is such that permanent housing cannot be prematurely built to temporarily house construction workers, 3) short duration and remote location is likely to attract a large number of single workers, and and 4) EXXON desires to minimize disruption to existing communities. These factors led to the following proposed construction housing plan.

- A 450-unit camp would be built near the mine to house single and single-status personnel. It would be constructed of modular units for rooms, mess hall/kitchen and other buildings. The workers would be housed one person to a room and would be provided three meals/day, maid service and a recreational program. EXXON would provide for water supply, sanitary facilities, road access and electric power.

- A 415-space, 50-acre recreational vehicle park would be developed near Eureka or near the mine/process plant to house married or single workers who own mobile homes or campers. The park would include a sanitary system, water supply, streets and off-street parking. At the end of construction, if located near Eureka, it may be converted to a permanent 210-lot mobile home subdivision to house operational workers.

- Limited number of hotel/motel rooms in Elko or Eureka may be retained to supplement housing provisions.

Details of Proposed Permanent Housing. Under the proposed action, EXXON would assist in the development of a subdivision. The subdivision housing would be available on a free choice basis to employees. The subdivision may be located near the mine/process plant or the Town of Eureka.

This subdivision would require

Table 2-13 Local and Non-Local Distribution of Total Workforce

	Existing	1Q	2Q	3Q	4Q	5Q	6Q	7Q	8Q	9Q	10Q	11Q	12Q
Local Personnel 1/													
Construction	2	5	40	80	94	94	94	94	65	23	5	1	0
Operation	--	4	12	30	47	63	78	84	90	106	115	115	115
Non-Local Personnel													
Construction	14	45	360	710	846	846	846	846	585	207	45	9	0
Operation	2	6	58	140	213	287	352	386	410	484	525	525	525
TOTAL	18	60	470	960	1,200	1,290	1,370	1,410	1,150	820	690	650	640

1/ Local Personnel are defined as workers currently living close enough to Mt. Hope (approximately 90 miles driving distance) so as not to require housing provisions.

Q = quarter year, 3 months; 3Q = third quarter, 4Q = fourth quarter, etc.

SOURCE: EXXON Minerals Company and WRC EIS Team

Table 2-14 Estimated Skill Mix of Operational Labor Force

Skill	Number
Management/Professional Staff	130
Clerical	34
Technicians	39
Shovel Operators	16
Heavy Equipment Operators	127
Drillers/Blasters	14
Mechanics	104
Welders	18
Electricians	20
Machinists	4
Millwrights	28
Process Operators	53
Other	53
Total	640

SOURCE: EXXON Minerals Company

approximately 150 acres of land (200 acres if the 415 unit RV park previously discussed is included). Single family dwellings, multifamily dwellings and mobile home lots would be provided in proportion to anticipated demand from non-local workers. It is estimated that the mix of unit types would be approximately equal to the mix of net housing additions in Eureka and Elko counties over the period 1970-1980. During that period, single family dwellings accounted for 24% of net housing additions and multifamily dwellings accounted for 32%. Mobile homes represented the balance, or 44%, of net housing additions.

A variety of single family housing sizes, types and styles would be expected to be built. Multifamily units would likely be garden style apartments of modular construction, including studio, 1, 2 and 3 bedroom units. Consistent with county requirements, the new subdivision would include adequate parkland dedication and improvements (approximately 16 acres of parkland). If sufficient retail services have not been conveniently provided by others, the new subdivision would also include land for 10,000 to 20,000 square feet of retail construction to meet residents' needs. This would provide space for such uses as a small grocery store, laundromat, hair stylist, dry cleaner, variety store, auto service, etc.

2.3.3 Details of Alternative 1 - Land Acquisition

As summarized in Section 2.3.1, four separate categories of land acquisition/use were identified which might possibly satisfy the purpose of the proposed action. The four components to land acquisition by FLPMA sale to be evaluated were land use pursuant to the General Mining Law of 1872 (1-B), FLPMA lease (1-C) or use permits (1-D), and FLPMA land exchange (1-E). As outlined in the following, the review of possibly available alternatives has limited this EIS analysis to Alternative 1-B, land use by claim rights.

The General Mining Law of 1872 gives individuals the right to go upon open (unappropriated and unreserved) public lands for the purpose of mineral prospecting, exploration, development and extraction. This right is initiated by prospecting for minerals and upon discovery thereof, by locating the lands upon which such discovery has been made. A location is made by staking the corners of the claim, posting notice of location thereon, and recording the location with appropriate state authorities and the BLM. In order to hold possessory right to the claim, the filer must annually file with the BLM proof of assessment work (not less than $100 worth of labor or improvements made thereon annually) or a notice of intention to hold the claim.

Claims are of three types: mining, tunnel site and millsite. Locators of mining claims have possessor interest to use as much of the surface of their claim as is reasonable and incident to mining, processing and related activities. Tunnel site claims give the claimant "possessory right to 1,500 feet of any blind lodes cut, discovered, or intersected by such tunnel which were not previously known to exist within 3,000 feet from the face or point of commencement of such tunnel". Millsite claims may be filed for the purpose of occupying nonmineral lands for mining, milling, processing, beneficiation or other operations in connection with mineral extraction. Surface fee ownership may be conveyed in patents to either mining or millsite claims.

The proposed action is a land acquisition via a combination of mining claims and land sale. The exclusive use of mining and millsite claims, Alternative 1-B, is analyzed in this EIS effort to allow comparison with the proposed action. EXXON's intent to purchase lands for the development of project components other than the open pit mine is based on a corporate preference that secure title to lands be obtained prior to substantial capital investment. The patenting of claims, a measure which allows property rights similar to title securance but which may also present substantial obstacles to project success (e.g., claim right litigation) was determined by EXXON not to meet corporate goals.

A land use lease/permit may be issued under the authority of FLPMA. A permit conveys no possessory interest, but is merely an authorization for use of public lands not to exceed three years where either little or no land improvement, construction or investment is planned, or where investment can be amortized within the term of the permit. A lease conveys a possessory interest for use of public lands involving substantial construction, development or land improvement and is issued for a term having no regulatory restriction other than that it be consistent with the time required to amortize the capital investment. Review by the BLM does not indicate that either land use leasing or permitting are appropriate to satisfy the purposes of the proposed action. First, the Mt. Hope project anticipates a plus-50 year period of activity significantly affecting the lands involved. A land use permit would not be authorized and as such would be prohibited by the construction and investments planned which are contrary to the intent of land use permits. Second, while the applicability of FLPMA lease provisions to a project with a planned life in excess of 50 years is uncertain and although some benefits to public land management efforts may occur as a result of a leasing arrangement, no project benefits would be derived. Leasing would clearly not secure the land position necessary for EXXON's project goals and is assumed to be significantly less desirable than claim patenting.

FLPMA also provides for the exchange of public lands for private lands within the same state. In making the exchange decision, the Secretary of the Interior must consider federal land management goals and the needs of state and local residents. Regulations delineating exchange procedures were promulgated by the BLM on January 6, 1981.

Initial Mt. Hope project discussions between EXXON and BLM reviewed EXXON's request to consider the possibility of a land exchange. Due to the large percentage of public lands within the State (greater than 69 percent of all lands) that were already under BLM administration and the absence of other available lands suitable for the purposes of public land ownership, the BLM determined that a FLPMA land exchange was neither desirable or reasonably available as an alternative to the proposed action.

2.3.4 Details of Alternative 2 - Power Line Right-of-Way

As discussed earlier, two alternate power line routings have been selected for alternative analysis. Depicted on Figure 2-3A, the alternatives (2-B and 2-C) would be identical in structure and nearly identical in lineal distance. The routes of alternative power lines 2-B and 2-C do extend further into Diamond Valley, generally alongside State Route 278. The pertinent characteristics of Alternatives 2-B and 2-C are detailed in Table 2-3.

2.3.5 Details of Alternative 3 - Water Line Right-of-Way

As briefly summarized in Section 2.3.1, two components to the proposed action water line corridor have been identified for analytical and comparative purposes. Alternative 3-B would primarily involve a similar but shorter routing corridor, originating from a developed well field at Kobeh C as opposed to the Kobeh Test Site.

The use of a corridor decision would allow mitigation throughout the linear alignment process. The linear alignment would, however, be developed within the identified two-mile corridor (alternative or proposed action) eventually selected. The actual right-of-way would be 25 feet wide. Both alternatives (3-B and 3-C) would also be constructed underground. Environmental loading factors during contruction are presented in Table 2-4.

Alternative 3-C would originate from Kobeh Site A located northwest of Kobeh Site C (Alternative 3-B) and the Kobeh Test Site (Proposed Action, 3-A).

The characteristics of Alternatives 3-B and 3-C water line corridors are detailed in Table 2-4 and shown on Figure 2-3B.

2.3.6 Details of Alternative 4 - Tailings Pond Siting

Alternative 4 includes two alternate EXXON pond sites; Alternative 4-B located in the alluvial flats of northwestern Diamond Valley and Alternative 4-C located in upper Kobeh Valley (Figure 2-3C). Alternative 4-B, approximately seven miles east of the Mt. Hope site would consist of a large ring dike impoundment, ultimately having an impoundment area of 5,658 acres. The initial earthfill starter dike for this alternative would be 21 feet high, three miles long, and require about 1.0 million cubic yards of material. The ultimate tailings dam would have a crest elevation of 5,922 feet. Table 2-11 presents selected specifications of tailings pond Alternative 4-B as well as Alternative 4-C and the proposed action. Since this alternative is a ring dike scheme, the impoundment would have essentially no contributory drainage area. This site is located down-gradient from the preferred mill site. Tailings transport for this alternative would be by gravity flow with reclaim water return requiring pumping.

Alternative 4-C, approximately four miles south of the Mt. Hope site would require that an initial starter dam be constructed to an elevation of 6,426 feet. The starter dam would be 56 feet high and contain about 2.43 million cubic yards of material. The ultimate tailings dam would have a crest elevation of 6,619 feet. Alternative 4-C would have a relatively small drainage area of 3,930 acres. Diversion channels would be utilized to direct storm runoff around the impoundment. Because of the location of this alternate site with respect to the preferred mill site, both tailings transport and reclaim water return would require pumping.

An additional aspect of Alternatives 4-B and 4-C is characterized by the results of implementing a tailings pond site selection other than that proposed (i.e., tailings pond 4-A). Selection of either tailings pond 4-B or 4-C would negate the need for land purchase as proposed by EXXON (2,440 acres, Figure 2-1). As such, it has been determined that the total land purchased in the event of alternative tailings pond selection would, on a worst-case basis, equal only 100 acres in the area of the process plant facility. While EXXON may eventually acquire lands in the vicinity of the alternative tailings pond site selected, the present-day policy requirement that mining claims be forfeited prior to a land sale precludes an EXXON determination of what lands might be sought for purchase as adequate mineralization data (for demonstration of non-mineralization) is not available. Figure 2-3C illustrates the alternative project boundary that would result from selection of a tailings pond other than 4-A.

2.3.7 Details of Alternative 5 - Housing Development

Under this alternative (5-B), the decentralized workforce housing scenario, it is assumed that non-local workers would distribute themselves among the existing communities of Eureka, Carlin and Elko as fits their individual desires. For the purposes of impact analysis, the distribution of the nonlocal permanent workforce (total 525 employees) is assumed to be the following: 356 employees locating with the Town of Eureka and vicinity, 128 employees locating in Elko City, and 41 employees residing in Carlin. This alternative does not involve consideration of an EXXON-assisted subdivision.

2.3.8 Details of the No Action Alternative

In order to evaluate the impacts of implementing the no action alternative, it has been necessary to determine the specific and probable end-results of a no project action. Specifically:

1.) Public lands would not be made available for sale under the provisions of FLPMA. While EXXON could proceed with mining and mineral processing via mining and mill site claim rights provided for by the General Mining Law of 1872, Alternative 1-B, the no action alternative assumes that such activity would not occur.

2.) The no action alternative assumes that construction and operation of the mine/process plant complex not be implemented.

3.) The no action alternative assumes alternative power line rights-of-way would not be developed.

4.) While a denial to grant proposed or alternative water line corridor rights-of-way would still allow EXXON to reapply its water rights in Kobeh Valley to Pine/Garden and/or Diamond Valley or to purchase existing rights from the same valleys, the no action alternative assumes that no such action would be taken.

5.) The no action alternative assumes that relocation of State Route 278 as proposed by EXXON would not occur.

6.) The proposed housing development scenario is assumed not to be required without project implementation under the no action alternative.

2.4 NEPA Compliance and Impact Assessment

Compliance with the National Environmental Policy Act (NEPA) is critical to an evaluation of the adequacy and legal basis of an environmental impact statement. Compliance with NEPA is largely defined by appropriately addressing the regulatory guidelines concerning NEPA requirements as set forth by the Council on Environmental Quality (CEQ) and published in the Code of Federal Regulations (40 CFR 1500).

Substantial effort has been put forth to assure that the activities conducted to date and this EIS document fulfill NEPA requirements. In addition to fulfilling standard regulations, particularly those applicable to content of an EIS and objectivity of impact analysis, certain requirements of the CEQ regulations are especially pertinent to the development of the Mt. Hope EIS. These include, but are not limited to, the concepts of worst-case impact analysis, tiering, cost-benefit analysis and the applicability of NEPA requirements to federal permitting actions.

Technical Report No.1 includes considerable discussion relating the interpreted legal basis of this EIS and the proposed FLPMA land purchase. The particularly important aspects of NEPA compliance discussed above are addressed in the following paragraphs.

2.4.1 Impact Assessment - "Worst-Case" Analysis

Section 1502.5 of the CEQ regulations require that an agency "commence preparation of an environmental impact statement as close as possible to the time the agency is developing or is presented with a proposal". For proposals to the agency, such as EXXON's, this commencement shall be no later than immediately after the proposal is received.

The regulations also encourage and provide authority for combining actions within a single EIS. Section 1502.4 identifies the following situations when actions should be combined:

1.) proposals that are so closely related as to constitute a single course of action; and,

2.) actions occurring in the same general location.

Most often when applications/proposals from members of industry trigger the NEPA compliance process, it is very early in that company's project planning. Final engineering design has often not been initiated and indeed frequently depends on the decision that will be made by the federal agency and which is the subject of NEPA documentation. In the absence of final engineering design, some uncertainty must necessarily exist regarding the quantitative estimates of environmental loadings (e.g., air emissions, effluent quality, areal disturbance, etc.). Such is the case for EXXON's Mt. Hope project. To accommodate this situation and fulfill the above-stated requirements, the concept of "worst-case analysis", as provided for in Section 1502.22 of the CEQ regulations, has been utilized.

Alternatives, including those associated with the mine/process plant, have been described based upon state-of-the-art technology and represent EXXON's best understanding of project components at this time. Environmental loadings (e.g., air emissions) are estimated assuming the installation and proper operation of federally-required best available control technology. Based on accepted procedures and best engineering judgement, environmental impacts have been determined by imposing these loadings on the existing environment and estimating changes to that environment (e.g., change in ambient air quality). Where appropriate, accepted modeling techniques have been applied (e.g., predictive air dispersion modeling) as a means of assessing impacts.

During the years of project maturation and design optimization, there may be changes introduced in the process which cannot be forseen at this time and therefore cannot be described in this EIS. However, due to the "worst-case analysis" approach these changes would not result in impacts that are more severe than those described in this document.

To the extent known at this time, the activities that would occur on-site during construction and operation phases of the mine/process plant have been described in Section 2.3. Deactivation or reclamation is considered a mitigating measure and is addressed in Section 2.5 and Appendix C.

2.4.2 Study Area Definition

For the purposes of impact analyses two study areas, regional and site specific, have been defined and are shown in Figures 2-2A and 2-2B, respectively. In performing a socioeconomic impact analysis the regional study area has been enlarged to include communities considered to be those most likely affected by the population influx.

2.4.3 Tiering

The CEQ regulations address the concept of tiering in a number of sections (40 CFR 1500.4, 1502.4, 1502.20 and 1508.28). The purpose of tiering is "to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for discussion at each level of environmental review". EIS's that address site-specific actions that are part of a larger federal program or policy for which a EIS has been prepared should incorporate by reference the issues that have previously been addressed in the EIS and are common to both actions. The Final Shoshone-Eureka Resource Management Plan and Environmental Impact Statement referred to in Chapter 1.0 and the EXXON Mt. Hope Molybdenum Project EIS are related. Consequently, the latter will be tiered to the former, and discussions in the former pertinent to the Mt. Hope Molybdenum Project EIS are incorporated by reference.

2.4.4 Cost-Benefit Analysis

The concept of cost-benefit analysis is addressed in Section 1502.23 of the CEQ regulations; it states "... the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations". Preparation of a cost-benefit analysis is not mandatory and occurs only if relevant.

Costs to potentially affected communities have, however, been assessed via a fiscal impact analysis. This fiscal impact analysis answers the basic question of whether revenues (tax or otherwise) that would accrue to communities from the project would cover the cost of providing services to the project. This aspect of addressing project economics has been determined to be appropriate and necessary for EIS purposes.

2.4.5 Federal Permit Actions

EXXON would have to obtain several state and federal permits before most aspects of construction and all aspects of operation at Mt. Hope could commence. The permits known to be required are listed in Table 2-15. The CEQ regulations identify federal permitting as an action that is generically subject to NEPA. Of the permits or similar type approvals required by EXXON, only one federal action would require NEPA compliance documentation potentially in the form of an EIS. The action triggering NEPA compliance documentation would be the BLM approval of a Plan of Operation. This EIS serves to fulfill NEPA compliance requirements as related to all permitting activities, given that the proposed action has not substantially changed upon submittal of the permit application (e.g. Plan of Operations).

Table 2-15 - Mt. Hope Project Permitting Requirements

Permit/Approval	Statutory Authority	Permitting Authority
1. Plan of Operation	43 CFR 3809	U.S. Bureau of Land Management
2. Prevention of Significant Deterioration (PSD) Permit 1/	NRS 445	Nevada Division of Environmental Protection
3. Explosives Transport Permit 2/	18 USC Chapter 4	U.S. Department of Treasury
4. Notification of Commencement of Operations and Closing of Mines 3/	30 CFR 57.26	U.S. Mine Safety and Health Administration
5. Camp Site Permit	Regulations Governing Individual Sewage Disposal Systems (10/19/72) Regulations Governing Mobile Homes and Mobil Home Parks (9/21/70)	Nevada Division of Health, Nevada Division of Manufactured Housing
6. Modification of Habitat Permit	NRS 501.105 NAC 504.520	Nevada Department of Wildlife
7. Permit to Construct Tailings Dam	NRS 535.010	Nevada State Engineer, Nevada Department of Wildlife
8. Solid Waste Permit	NRS 444	Nevada Division of Environmental Protection
9. Notification of Commencement or Closing of Mine Operation 3/	NRS 512.160	Nevada Inspector of Mines
10. Historic Preservation Notification 3/	—	Nevada Division of Historic Preservation and Archaeology
11. Zero Discharge or Subsurface Injection/Infiltration Permit 4/	NRS 445	Nevada Division of Environmental Protection
12. Permit to Appropriate Public Waters 5/	NRS 553, 534	Nevada State Engineer

1/ PSD permitting authority was delegated to Nevada in June, 1983. State requirements are found in NRS 445 and include acquiring an Air Quality Permit to construct/operate.

2/ This permit will be required only if EXXON Minerals Company will be transporting explosives across state lines. EXXON Company, U.S.A. already holds such a permit (TX 33-10) and it could be made equally applicable to EXXON Minerals Company in approximately two months.

3/ This is not a permit per se, but a notification to responsible agency.

4/ According to the State of Nevada which administers the National Pollutant Discharge Elimination System (NPDES), the Mt. Hope Project would not require an NPDES permit because there are no surface waters in the vicinity of Mt. Hope to which an intermittent, accidental, or continuous discharge could flow. However, the project would be required to obtain a zero discharge or subsurface injection/infiltration permit relative to tailings pond infiltration.

5/ This permit has been conditionally granted to EXXON for water rights in Kobeh Valley.

NOTE: The above is based upon regulations in place at the time of writing. It is possible that other requirements may be promulgated between the time of EIS completion and permit acquisition. This is especially true of Resource Conservation and Recovery Act (RCRA) related regulations.

2.5 Mitigating Measures

Certain technologies, practices and procedures are available that could be implemented at EXXON's Mt. Hope mine/process plant site to lessen or eliminate adverse environmental effects. This section presents the mitigation plans and/or activities that would be implemented to lessen or eliminate environmental impact. The majority of mitigation plans presented have been developed independently by EXXON prior to review by the BLM. The balance of mitigation measures were developed in coordination by EXXON, the BLM and certain interested parties (e.g., the Nevada Department of Wildlife, reduction of mule deer migration path obstacles).

Appendix C presents detailed discussion of the Mt. Hope mitigation program established to date. Additionally, the monitoring programs necessary to provide early detection of any excursions from allowable pollutant discharges are detailed in Appendix C.

2.5.1 Mitigation of Impacts to Land Surface (Reclamation)

Based on reclamation regulations currently in force, EXXON has presented a reclamation program that would be conducted in three phases (post construction, operational, postmining) and which would involve the actions outlined in the following.

Post Construction Reclamation

Areas of temporary disturbance, such as the right-of-way corridors and areas of the process plant site between structures would be reclaimed. Adverse effects, consisting mostly of destruction of vegetation cover and some erosion, would be mitigated by regrading and revegetating as soon as possible after the construction activity is complete. Revegetation would consist of establishing a ground cover. The recommended cover (USDI, 1982b) is a mixture of crested wheatgrass, pubescent/intermediate wheatgrass and four wing saltbrush applied at the rate of six, three and one lbs/acre, respectively.

During construction, topsoil and overburden would be removed and stockpiled for use during reclamation. Most of the topsoil will be salvaged from within the tailings disposal area and to a limited extent from the plant site and non-mineralized storage areas. If the topsoil stockpiles are to exist for more than one year, they would be seeded for stabilization. Techncial Report No.1 includes an illustration depicting proposed topsoil stockpile areas.

Operational Reclamation

The primary reclamation effort conducted during the operational period (50 years plus) would involve erosion and surface water runoff controls.

Constructing the tailings pond at the proposed site (site 4-A, Figure 2-2) would allow all facilities to be located within the Garden Pass drainage subbasin. Such placement of components would simplify containment and control of surface runoff and minimize erosion.

Surface runoff from the site, including that from non-mineralized material and ore storage areas, would be collected and routed to the tailings pond. As appropriate, stone rip rap and diversion ditches would be constructed to control runoff and erosion. If necessary, small catchment basins would be included in the control plan. A larger basin would be constructed at the foot of the tailings dam to intercept and collect runoff from the dam face. The collected water would be intermittently pumped to the tailings pond.

Any detected erosion problems would be corrected in a timely manner as an EXXON standard operating procedure.

Final Postmining Reclamation

EXXON has planned that final reclamation would be implemented in such a way as to comply with applicable regulations. The following actions, as described on a component by component basis, would be undertaken during final reclamation of the site.

The open pit mine would remain as it would exist at the end of mining. Because the non-mineralized material storage areas would be composed of large rocks, EXXON does not plan to attempt recontouring or reclamation.

The process plant and other capital facilities would be salvaged as much as possible. Unsalvagable portions would be demolished and disposed of either offsite or in the on site landfill. The surface would be cleaned up, graded as necessary, and revegetated. Revegetation would be with the same cover described previously.

After the tailings pond surface has dried out, approximately two feet of rock from the non-mineralized material storage areas would be placed over the tailings. As much as possible, this rock layer would then be covered with the overburden/topsoil stockpiled during construction. The cover would then be seeded with the BLM recommended groundcover previously detailed and pinyon and/or juniper trees would be planted. This cover would be contoured so as to minimize seepage of precipitation into the tailings. Also, runoff from surrounding areas would be diverted around the reclaimed tailings basin to further reduce infiltration.

The slope of the final cover surface would be graded appropriately, and the downstream face of the tailings pond dam would be recontoured to the extent necessary to maintain stability and control erosion during the tailings basin dry-out period.

2.5.2 Mitigation of Impacts to Hydrologic Regime

No surface water discharge has been proposed by EXXON. The process design would achieve a no-discharge standard for two point source category segments (ore mining and dressing, molybdenum manufacturing) by employing measures recommended by the EPA, and considered by that agency to be best available demonstrated technology (BADT). Among these measures are recycling process water from the concentrator, employing the tailings pond and lined pond as evaporation/settling basins, and lime precipitating wastewater flow from the hydrometallurgical plant.

Sanitary wastewater from both the subdivision and the mine/process plant would be treated to applicable state and federal standards. In general, primary and secondary treatment would be used and levels of pollutants would not exceed those specified by the EPA. Treated mine/process plant effluent would be discharged to the tailings pond and the sludge (approximately 100 lbs/day) would be disposed of on site in a solid waste disposal facility.

In the case of the proposed EXXON-assisted subdivision, sanitary wastewater treatment would depend on the location of the subdivision. If it is proximal to Eureka, it would be treated by that community's existing system. EXXON would work with Eureka to provide any upgrade or alteration of facilities that might be needed as a result of the increased flow. If the subdivision is proximal to the mine/process plant, a secondary system would be sized, constructed and operated to treat the combined sanitary wastewaters from the subdivision and the mine/process plant.

Groundwater seepage from the tailings basin would be regulated through issuance of a Zero Discharge or Subsurface Injection/Infiltration permit by the State of Nevada Division of Environmental Protection. Which of these permits is issued would depend upon the nature of the seepage and the design of the tailings pond.

Because EPA toxicity tests showed that the tailings would not be classified as hazardous and worst-case impact analyses demonstrated that there would be no long term deleterious effects to groundwater from seepage from the tailings pond (see Section 4.5), EXXON has not proposed that a clay or synthetic liner be installed. Instead, it has proposed a tailings management plan that it believes would best minimize and control seepage. This plan includes the segregation of tailings via cycloning and deposition of tailings such that the finest size fraction would form a self seal. Also, monitoring wells would be installed downgradient of the tailings pond, and groundwater quality would be monitored throughout the operational life of the project and during the dry-out period of the tailings pond. If necessary, seepage would be intercepted and pumped back to the tailings pond. Final reclamation would require that these downgradient monitoring wells would be appropriately plugged and abandoned. The final decision as to whether this plan would sufficiently protect the groundwater resource or whether another plan, possibly including installation of a liner, should be adopted will be made in cooperation with the Nevada Division of Environmental Protection at that stage of project engineering which coincides with project permitting.

2.5.3 Mitigation of Impacts to Air Quality

Appendix C presents a detailed overview of the air quality regulations that EXXON will be required to address. The primary mitigation measure will involve EXXON's obtaining and compliance with a Prevention of Significant Deterioration Permit. The permit conditions will detail specific emission limitations and approval of best available control technology (BACT). Because the EXXON project will not emit any of the hazardous pollutants currently identified by air quality regulations, the primary concern of air quality control will entail total suspended particulates and sulfur dioxides. Based on the control technologies presently planned for use by EXXON, the air quality impacts determined by analysis and presented in this EIS (Chapter 4.0) were not deemed to require exceptional mitigation programs beyond those associated with eventual permit conditions.

Fugitive dust, not controlled by permitting, would require mitigation and has been proposed by EXXON. It would be standard practice to wet down disturbed land surfaces during construction activities. This practice would hold true also for roads in routine use during construction and operation phases of the project. Fugitive emissions from the surface of the tailings pond would be minimized by the deposition design planned to date. Material prone to dusting would be separated with cyclone classifiers and confined within a small area of the tailings pond. The surface area susceptible to aeolian (wind) erosion would be much smaller than if distributed throughout the pond and segregated by natural sedimentation. This smaller area would be sprayed with cyclone overflow and would cake upon drying, thereby reducing the potential for erosion.

2.5.4 Mitigation of Impacts from Solid Wastes

EXXON would construct and operate a land disposal facility for non-process wastes (trash, refuse, garbage, etc.) in accordance with State of Nevada solid waste management regulations. The kind of disposal facility used would depend on the number of people it serviced and consequently, whether the subdivision was located near the Mt. Hope site or Eureka. If the subdivision is located near the mine, this facility would be sized to handle refuse generated by the mine/process plant and the subdivision. If the subdivision is located near Eureka, EXXON would work with the Town of Eureka to use its landfill facility for waste generated by the subdivision and the landfill at the Mt. Hope site would handle only that generated at that location. The regulatory controls imposed would include measures to minimize or eliminate unsightliness, odors, wind-scattered debris, livestock access, and percolation of surface waters. Appendix C details EXXON's plans prior to final permitting.

Sewage sludge would not be disposed of in the non-process waste landfill(s) but a separate site designed in accordance with the Nevada Solid Waste Management Regulations would be constructed and operated.

2.5.5 Mitigation of Impacts to Cultural Resources

Impacts to cultural resources would be mitigated by following procedures outlined in 36 CFR 800 developed in fulfillment of the National Historic Preservation Act. A detailed description of the steps taken to date may be found in Technical Report No.7. In summary, field studies have been conducted to identify cultural resources associated with the site, a determination of eligibility has been made in consultation with the State Historic Preservation Offices (SHPO) and a mitigation plan has been submitted to the Advisory Council. Upon Advisory Council approval and prior to transfer of title, EXXON would implement this mitigation plan.

Mitigative measures involving the Pony Express Trail encountered on site would emphasize coordinated planning and activities with the National Pony Express Association.

2.5.6 Mitigation of Impacts to Wildlife

Initial impact analyses identified the potential for impact to mule deer and sage grouse populations in the vicinity of the Mt. Hope project. As a result of the early impact identification, EXXON, in coordination with the BLM and Nevada Department of Wildlife, will develop a final fencing plan to reduce the significant impact to mule deer migration (a high number of road kills). At this time the fencing plan does not involve lands to the extent that would prevent migration between summer and winter use areas.

Potentially well-developed sage grouse strutting grounds have been identified within close proximity (1.5 miles or less) to the alternative tailings pond sites, power line routings, and water line Alternative 3-C. EXXON and BLM plan to mitigate the potential impact caused by power line construction and predator use through coordinated on-the-ground avoidance alignment. No mitigation plans have been developed for the potential impacts associated with tailings pond alternates or water line Alternative 3-C in close proximity to the sage grouse strutting grounds.

2.5.7 Mitigation of Impacts to Grazing

The Mt. Hope project would directly affect two grazing allotments within the land acquisition boundary area. In total, approximately 358 to 438 AUMs (animal unit months) in the Roberts Mt. and Romano allotments would ultimately be removed from federal government control. Under the proposed action, use of the grazing land would come under the land authority of EXXON as private land owner. Under Alternative 1-B (claim development) grazing uses would be under EXXON's control only if grazing interfered with mining development (e.g. BLM authority retained).

To reduce the impact of AUM loss upon former grazing permittees/lessees, FLPMA and the Grazing Administration Regulations (43 CFR 4110.4-2(b)) require two years advance notice (except in emergencies) that a grazing permit or lease is to be cancelled because the land is being devoted to another public purpose, including disposal. The intent of the Congress in enacting that requirement was to lessen the economic impact of a loss of grazing privileges by providing time for a permittee/lessee to make necessary adjustments in his/her operation.

The Department of the Interior's policy in this regard for Public Law 94-579 land sales is two-fold. The first aspect of the Department's policy is to issue notice to any grazing permittee or lessee whose grazing authorization may be affected by a land sale. The notice will be issued as soon as it is reasonably certain that the land will be offered for sale. Second, the successful bidder may be required under a condition of sale to take the land subject to the existing active grazing use of any permittees/lessees. The grazing use shall continue for at least two years from the date of notification that the land is to be offered for sale. The condition of sale extending the grazing use beyond the actual sale of the land meets the intent of Congress to allow permittees/lessees at least two years to adjust their operations. Consequently, the land may be sold at any time, as long as the condition of sale provides for a minimum of two years continued grazing after the permittee/lessee is notified that the land is to be sold.

For both leases and permits with more than two years remaining at the time the notice is given, a condition of the sale will provide for continued grazing by the current permittee/lessee until such time as the grazing permit or lease would have terminated, unless the permittee/lessee waiver rights to such continuance. This is consistent with private real estate practice, where sales of leased property do not automatically terminate the lease.

CHAPTER 3.0
AFFECTED ENVIRONMENT

3.1 Introduction

The purpose of this chapter is to describe the regional and Mt. Hope site area environmental components potentially affected by the proposed action and alternatives. The content of this chapter is intended to be responsive to the directives in Sections 1502.7 and 1502.15 of the National Environmental Policy Act (NEPA) regulations pertaining to an Environmental Impact Statement (EIS). Specifically, the environmental characteristics of the regional and Mt. Hope site areas have been presented in brief and are generally limited to information required for achieving an understanding of potential environmental impact significance.

Material presented in this chapter has been summarized from specific environmental technical reports prepared as background documentation for the EIS. The manner in which these technical reports were prepared, including data collection and data use, is detailed in each technical report. The detailed discussion and data text of each technical report may be referred to if additional information is required.

To adequately preface the reader's review, a brief delineation of the "regional", "site study" and Mt. Hope "area" boundaries is presented in the following paragraphs. These three area definitions have been established to appropriately discuss environmental characterizations. The definition of "regional" area extent has been determined in consideration of two factors: 1) potential extent of worst-case environmental impacts and 2) public scoping meeting comments. In defining the potential extent of worst-case environmental impacts, the historical significance of geographic or topical "entities" (e.g., valleys, hydrologic regimes) was superimposed upon anticipated extent of project influences to assure appropriate consideration. For example, although the potential air quality impacts associated with the proposed action were anticipated to be limited to a few miles, the regional area air quality description extends to encompass all of Diamond Valley, an area of agricultural value.

The evaluations resulted in a regional area definition generally represented by Figure 3-1, Regional Topography, and entailing the geographic area bordered by central Kobeh Valley, eastern Diamond Valley, the Town of Eureka and the area north of Garden Pass. (Socioeconomic regional area has been defined to be substantially larger due to impact nature.) To discuss resource data more specific to the project, an area defined as "site study area" has been outlined to follow the areal extent of Figure 2-2. The site study area allows a review of proximal effects and environment.

The definition of "Mt. Hope" or "site" area extent has been determined primarily on an intrinsic basis, i.e., the block of lands within the proposed project land acquisition boundaries (Figures 2-2 and 3-1). In certain topical discussions, such as that pertaining to geology, the "Mt. Hope area" should be inferred to include proximate lands (e.g., perimeter of one to two miles) in addition to the delineated project land acquisition boundaries.

The delineations of "regional" and "Mt. Hope" areas have been reviewed following subsequent environmental impact analyses and have been determined to be appropriate.

3.2 Topography

Mt. Hope lies within the Great Basin Division of the Basin and Range Physiographic Province as described by Fenneman (1931). The province is characterized by abruptly rising, north-south trending mountain ranges separated by alluvial valleys. Three figures are presented to illustrate topography as well as a regional perspective. Figure 3-1 illustrates the regional elevational features. Figures 3-2A and 3-2B illustrate four perspectives of the Mt. Hope area topography. Figure 3-3 depicts a LANDSAT photograph of the general region.

The major mountain ranges in the Mt. Hope regional area are the Roberts Mountains, Sulphur Spring Range and the Diamond Mountains. The Roberts Mountains are roughly triangular in shape and attain a maximum elevation of 10,133 feet (ft). Most of the crest altitudes of the Diamond Mountains are 9,000 ft or higher. Most of the crests of the Sulphur Spring Range are between 7,000 and 7,500 feet.

The major valleys in the Mt. Hope regional area are Diamond Valley, Kobeh Valley and Garden Valley. In relation to Mt. Hope, Garden Valley lies to the north between the Roberts Mountain to the west and the Sulphur Spring Range to the east. To the immediate east of Mt. Hope lies the southern portion of the Sulphur Spring Range, with Diamond Valley on the other side and the Diamond Mountains further east. Kobeh Valley lies south of the Roberts Mountains and west of the southern portion of the Sulphur Springs Range.

In the foothills demarking the southern limit of Diamond Valley, the Town of Eureka is located in a canyon on the flanks of the Diamond Mountains, at a benchmark elevation of 6,481 ft. Mt. Hope reaches an elevation of 8,411 ft and lies in the low foothills of the southeast flank of the Roberts Mountains. Areas to the immediate northeast, east and southeast gently slope from elevations of 6,800 to 6,300 feet. The north-northeast area would accommodate one of the proposed non-mineralized storage areas. A low lying area or hollow lies between Mt. Hope and the Sulphur Spring Range to the east. This hollow, where the proposed mine/process plant facilities and tailings pond site 4-A would be situated, descends to an elevation of 6,080 ft and is generally encircled by elevationally higher ground. Also located within the hollow would be portions of the power line right-of-way and a portion of the proposed water line right-of-way.

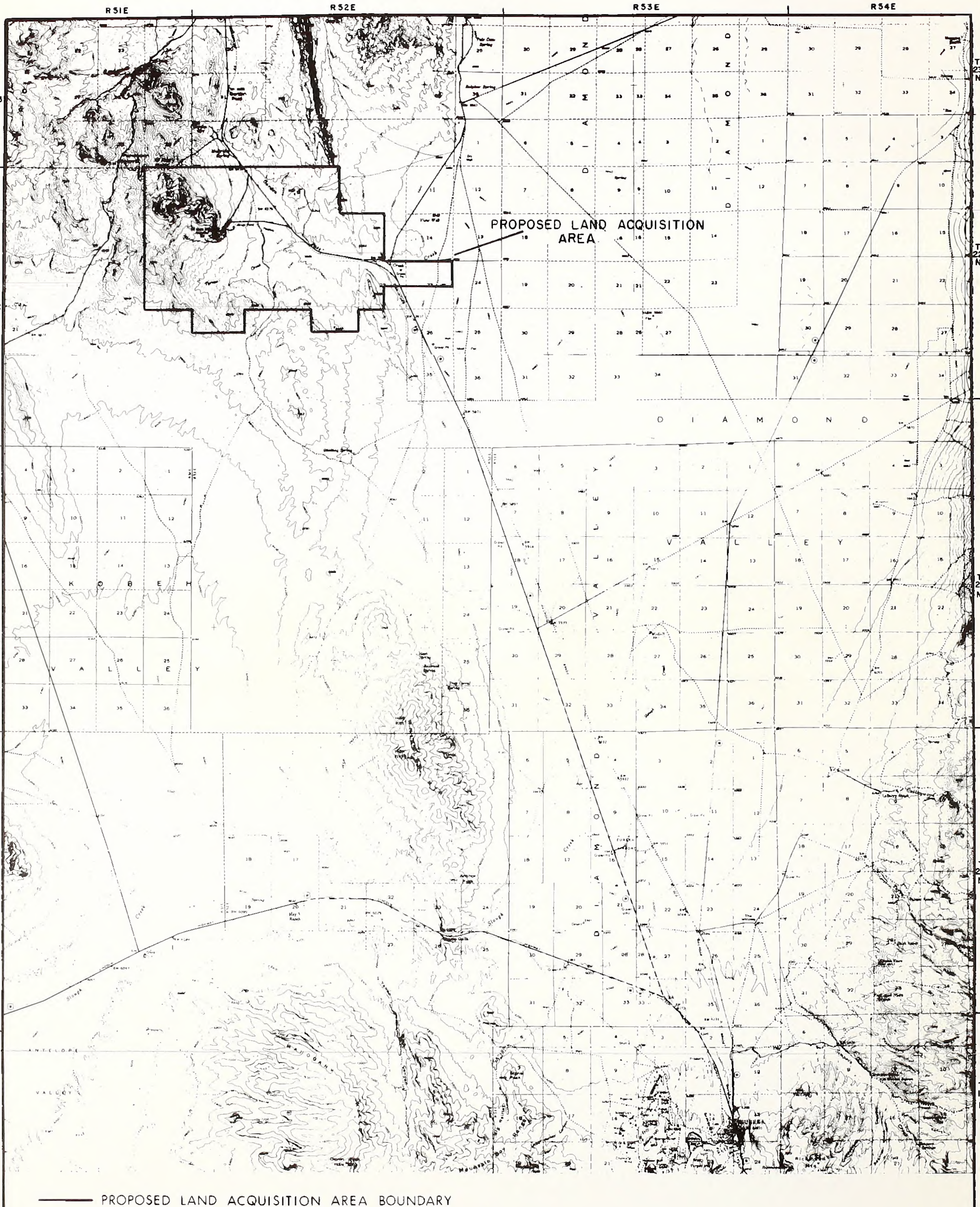
Beyond the ridge topography encircling most of the Mt. Hope site area, both Diamond and Kobeh valleys represent the major topographic character of the regional area. The elevations of Diamond Valley range from approximately 5,843 to 5,857 ft with slopes of zero to two percent. The northeastern edge of Kobeh Valley has a general elevation of 6,400 ft and slopes gently to moderately to the south and southwest where the elevation is approximately 6,100 ft in the area of the proposed water supply field. An elevational ridge connecting with the hills south of Mt. Hope and having summits of from 6,800 to 7,200 ft extends southeast to Whistler Mountain and separates Diamond Valley from Kobeh Valley.

3.3 Geology

A detailed review of the Mt. Hope geology is described in Technical Report No.2, Topography and Geology.

3.3.1 Regional Geology

The regional geologic setting of east-central Nevada is characteristic of the Basin and Range Physiographic Province in which it is located. This province consists of north-south trending mountain ranges formed by prominant normal block faulting of Tertiary to



BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

MT. HOPE MOLYBDENUM PROJECT

REGIONAL TOPOGRAPHY

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-1

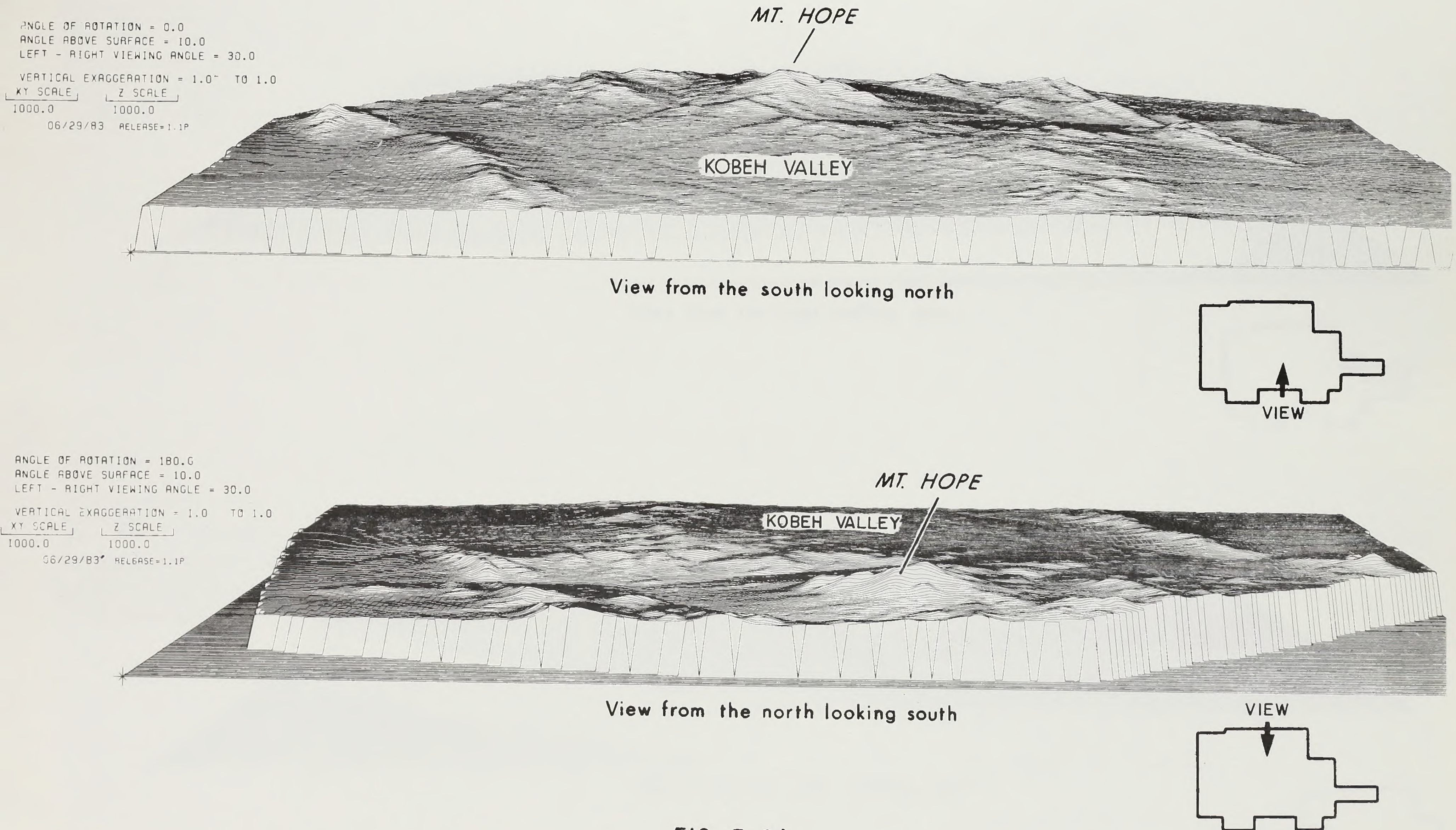
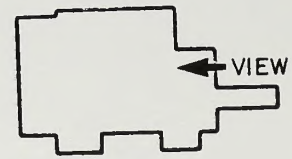
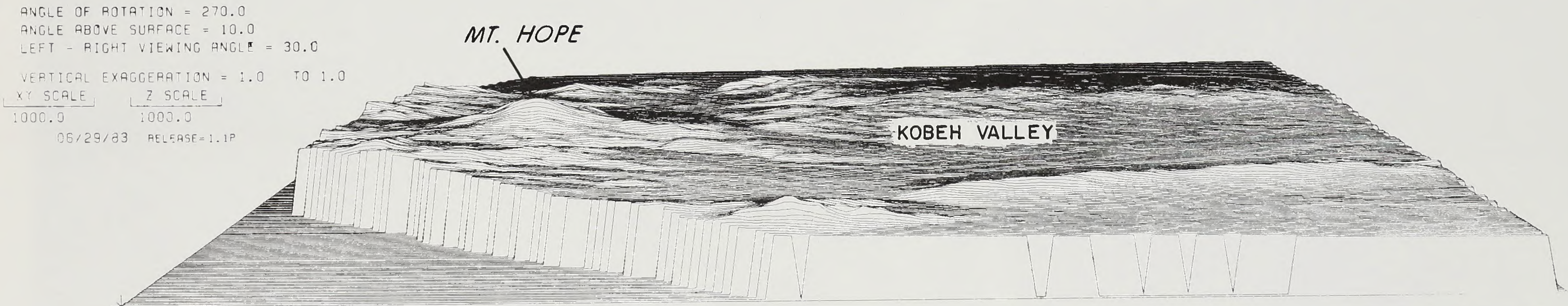


FIG. 3-2A
PERSPECTIVE OF THE EXISTING TOPOGRAPHY OF MT. HOPE

View from the east looking west





View from the west looking east

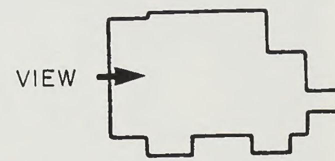


FIG. 3-2B

PERSPECTIVE OF THE EXISTING TOPOGRAPHY OF MT. HOPE

FIGURE 3-3
LANDSAT PHOTOGRAPH

Recent age and separated by alluvium filled valleys. The primary physiographic features adjoining the Mt. Hope area are evidence of this faulting and include the Roberts Mountains, Sulphur Spring Range, and Diamond, Garden and Kobeh valleys.

The mountain ranges are composed primarily of a thick sequence of complexly faulted and folded Paleozoic sedimentary rocks, mostly carbonates, in addition to minor amounts of Mesozoic and Cenozoic igneous rocks. An abundance of Tertiary igneous rocks are also present.

The valleys (basins) have been partly filled with unconsolidated and semi-consolidated alluvium composed of clay, silt, sand and gravel derived from the surrounding mountains and adjacent regions. Alluvial fans and valley fill are of Tertiary to Recent age. Beneath the alluvium, valleys contain the same rocks that crop out in the adjacent ranges.

3.3.2 Regional Seismicity

The Mt. Hope area is considered a Zone 2 seismic risk area, and as such, moderate damage could be expected as a result of earthquake activity (NOAA, 1973). However, the interior Great Basin, of which the Mt. Hope area is part, has experienced little recent seismic activity. Wallace (1981) has identified Mt. Hope as being in a specific region where no large fault scarps have broken the surface for more than 500,000 years. Figure 3-4 shows earthquake epicenters within a 155 mile (mi) radius of the site.

The faults at Mt. Hope are of two types: 1) those formed during the Antler Orogeny of Devonian and Mississippian age (Roberts Mountains thrust) and 2) basin and range faulting of Cenozoic age (Tertiary and Quaternary) involving high angle normal faulting and tilting of Basin and Range blocks accompanied by igneous intrusion. The low angle Mt. Hope thrust fault is associated with the Roberts Mountains thrust. Other minor faults of Mt. Hope may be associated with this event, however, the numerous high angle faults and the arc-shaped normal Mt. Hope and Ravine faults are associated with the Tertiary igneous intrusive episodes of the Mt. Hope suite, as well as the Mt. Hope Spring fault and the Upper and Lower Lorraine faults.

3.3.3 Mt. Hope Geology

Mt. Hope exhibits Paleozoic sediments, Tertiary igneous intrusives and Tertiary-Quaternary alluvium. The Paleozoic rocks consist of the Ordovician Vinini Formation and a basal limestone member of the Permian Garden Valley Formation. Multiple intrusive episodes, dating from 40 million to 20 million years ago (mid Tertiary), have intruded the Paleozoic sediments causing extensive fracturing, shearing and faulting of the igneous rocks and country rock. Intrusive porphyries have contact metamorphosed the Vinini Formation, which is often a host for molybdenum mineralization. The Garden Valley basal limestone has been highly altered to a calc-silicate or marble skarn, also due to contact metamorphism by intrusive episodes. This skarn is the host rock of zinc ore which the previous Mt. Hope mine workings were extracting.

Schwarz (1983) has identified two deep coaxial stocks which "merge at depth and localize asymmetric haloes of alteration and molybdenum mineralization mostly in typical quartz porphyry, the major host for molybdenum mineralization". Drill holes reveal that the areas of molybdenum mineralization around the two stocks overlap and interpenetrate, providing a large body of good grade molybdenum.

The Tertiary-Quaternary alluvium is located in the hollow east of Mt. Hope and in Diamond Valley. Because the alluvial deposits are found in the upper reaches of the regional drainage system, they are relatively thin and probably do not exceed several hundred feet in thickness.

3.4 Meteorology and Air Quality

A detailed review of the regional meteorology and air quality is presented in Technical Report No.3. The climate of east-central Nevada falls under the classification of mid-latitude steppe and mid-latitude desert. This is characterized by a continental temperature regime with semi-arid to arid conditions. Regional climatic characteristics are primarily determined as a result of the topographical variations within the Great Basin and interior continent location. It is assumed that the mesoscale climatic features at Mt. Hope can be derived from the regional meteorological data base. Observational data from nearby Diamond Valley and the Town of Eureka have been used to evaluate climatological conditions specific to Mt. Hope.

3.4.1 Precipitation

Large differences in precipitation occur between the valleys and mountain ranges. The higher altitudes receive more precipitation while the valleys receive the least. Consequently, the valleys are commonly semi-arid to arid and the higher elevations are sub-humid to semi-arid. Some of the higher mountains may receive as much as 25 inches (in) of annual precipitation as opposed to as little as 3.3 in for some of the valleys.

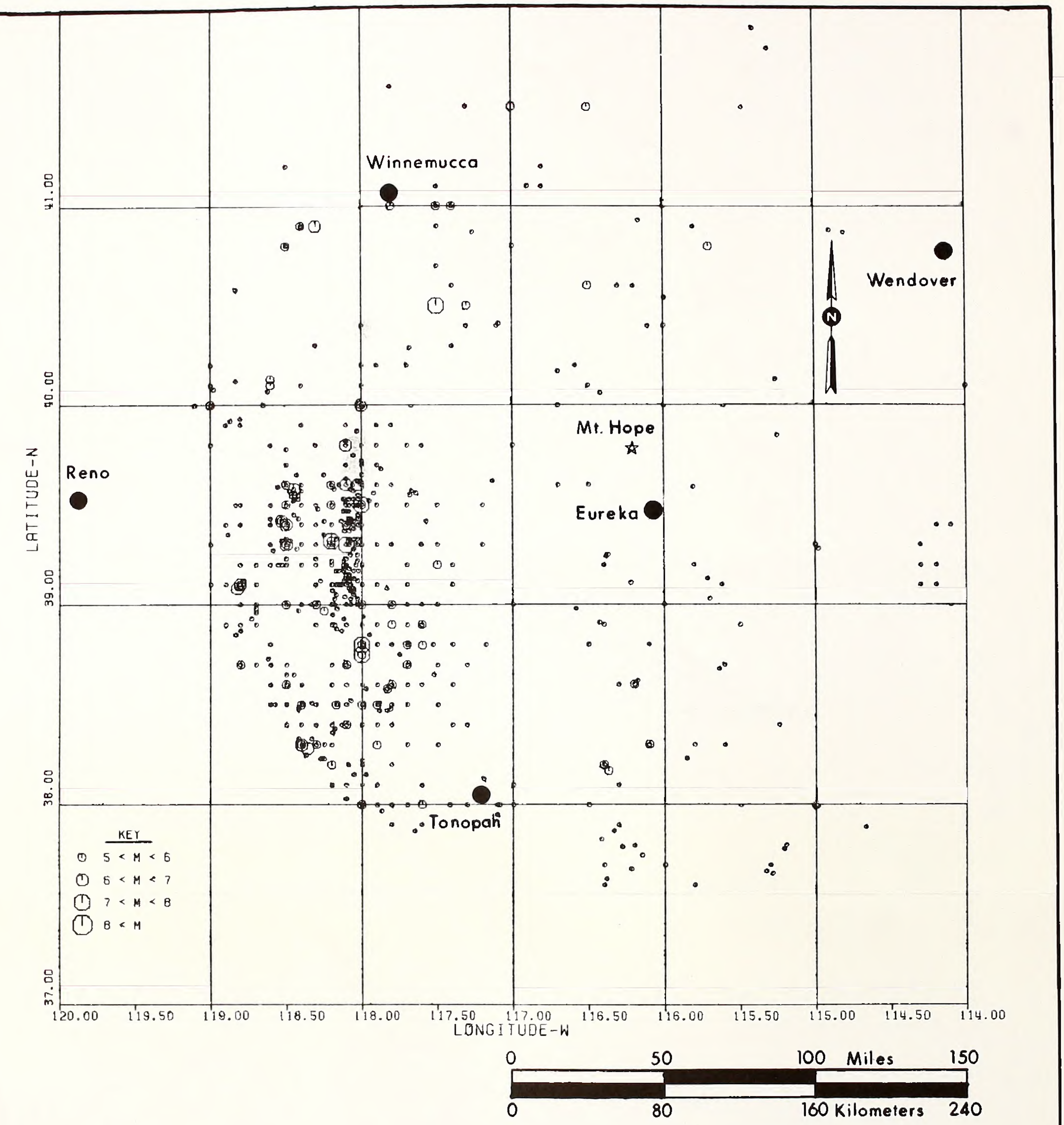
Regionally, annual average precipitation ranges from 4 to 16 in. Most precipitation occurs as snowfall moderately well distributed over the winter months. Localized thunderstorms of short duration account for the remaining precipitation.

During the period of 1976 to 1983 (Eureka County Extension Service, 1983) total annual precipitation in Diamond Valley ranged from 4.9 to 11.8 in, averaging 8.2 in annually. Excepting high-low years of record, total annual precipitation approximates 7.5 in. The Town of Eureka, located at a higher elevation than Diamond Valley, has recorded as much as 80 percent greater precipitation than Diamond Valley. It is estimated that the Mt. Hope site receives between 10 to 15 in of rain annually with mean annual snowfall ranging from 10 to 40 in. Kobeh Valley precipitation ranges from 8 to 12 in at higher elevations and 8 to 10 in at lower elevations (Rush and Everett, 1964).

3.4.2 Temperature

Seasonal and diurnal temperature ranges are extreme on a regional and local basis. The area experiences large seasonal and diurnal temperature ranges. Daily temperature fluctuations during all seasons may be as much as 40°F and frequently exceed 50°F during the fall season. The coldest and warmest months are January and July, respectively.

Locally, Diamond Valley temperatures are influenced by the surrounding mountain ridges. The abrupt rise of the mountain peaks is conducive to frequent inversions in the valley, as cold air drains from the mountainsides to the valley floor. The 1982 weather summary of Diamond Valley indicates annual temperature extremes of -36.9° to 93.0°F. Monthly average temperatures range from highs of 32° to 86°F to lows of -3.5° to 44°F. The 1967 to 1981 period of record indicates a similar distribution of temperature data with high and low excursions (e.g., 98°F and -33°F).



NOTES: DATA PRESENTED ARE THOSE WITHIN A 155 mi. RADIUS OF THE SITE

M – RICHTER MAGNITUDE (THE MAXIMUM AMOUNT OF GROUND MOVEMENT MEASURED AT A FIXED DISTANCE FROM AN EARTHQUAKE'S POINT OF ORIGIN; THE RICHTER SCALE RANGES FROM 1 TO 10).

SOURCE: EXXON MINERALS COMPANY

MT. HOPE MOLYBDENUM PROJECT	
EPICENTER MAP OF EARTHQUAKES WITHIN LAST 50 YEARS	
U.S. Department of the Interior Bureau of Land Management	FIGURE 3-4

3.4.3 Growing Season

The growing season is relatively short with lower altitude areas often having an even shorter average growing season due in part to thermal inversions which occur about 45 percent of the time. The growing season in the Diamond Valley area averages 90 days, but it has ranged from 66 to 101 days during the period of record for 1967 to 1982 (Eureka County Extension Service, 1983).

3.4.4 Evaporation

The two principal means by which water is lost in the Great Basin area are evaporation of shallow groundwater and transpiration from phreatophyte plant groups. Surface water evaporation estimates range from 3.5 to 5.0 ft per year (Henningson, Durham & Richardson (HDR), 1980a). Transpiration is estimated at 0.2 ft for scattered vegetation and up to 1.5 ft for wetlands and springs (HDR, 1980a).

Average percentage of possible sunshine is about 80 percent (Houghton et al, 1975). Since sunshine is abundant, lake evaporation is high, averaging slightly more than 45 inches per year in the Diamond Valley area (SCS, 1980). Water ponding on the playas rapidly evaporates.

3.4.5 Winds

Prevailing westerly winds are typical. Surface wind direction and speed are greatly influenced by local topography and strong diurnal heating and cooling. The mountain ranges create a tendency for the lower level winds to follow the valleys. Because of this, winds in the valleys are predominantly southerly or northerly with some variation. For instance, during winter and spring, wind direction is often southeast to south-southwest, generally following the valleys with variation due to the orientation of each storm. With the approach and passing of an eastward moving front, a gradual progression of wind direction around to westerly takes place, rather than a definite shift from southerly to west or north, but with alternate backing and veering of from 30 to 90° as successive squalls of rain or snow pass through the area (Strojie, 1968).

This type of wind activity is known to occur in Diamond Valley, where the short term wind direction can be extremely variable, particularly during storms. In Diamond Valley, the average wind speed is estimated to be less than 20 miles per hour. Historical wind records are not available in the valley, but statistics in outlying counties suggest that gusts of 70 miles per hour can be expected, on an average, once in 50 years (SCS, 1980). Gusty surface winds are strongest when associated with passing storms, but non-storm valley winds can also reach high speeds (SCS, 1980).

3.4.6 Air Quality

Air quality conditions in Eureka County reflect that which might be expected in consideration of the area's topographic, vegetative, demographic and industrial characteristics. Specifically; major industrial sources of criteria pollutant emissions do not exist in Eureka County; topographic relief represents a major factor influencing atmospheric stabilities; vegetative types (representative of a semi-arid climate and dry soils) limit natural wind erosion controls and, a rural population of relatively low density limits significant or major man-induced air quality impact.

Excepting dust storm excursions, the overall air quality of Eureka County and Eureka Township may be characterized as excellent. The county is designated as an NAAQS (National Ambient Air Quality Standards) attainment area for all critera pollutants: total suspended particulates (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), nitrous oxides (NO_x), hydrocarbons (HC), lead (Pb) and ozone (O_3). Although ambient air quality measurements are not presently made in Eureka County it is reasonable to assume by virtue of the lack of anthropogenic sources and from measurements made at similar latitudes elsewhere in the United States, that the existing ambient levels in Eureka County would be comparable to the background levels established for rural areas in the United States. Suspended particulate matter would be expected to register variable concentrations dependent on temporal conditions of wind speed, humidity, precipitation occurrence and extent of any land surface disturbance activity (e.g., construction, dirt road travel, etc.). Population centers such as the Town of Eureka may be expected to frequently and/or normally register pollutant concentrations of TSP, NO_x and CO above non-detectable limits but substantially lower than established NAAQS limits.

On a regulatory basis, the air quality of Nevada's three Air Quality Control Regions (AQCR 013, 147, 148) is characterized in detail by individual hydrographic sub-basin boundaries. Developments potentially affecting existing baseline conditions are evaluated by the Air Quality Section of the Nevada Division of Environmental Protection (NDEP). The Mt. Hope area is located in AQCR 147 including parts of Diamond Valley hydrographic sub-basin (No. 153) and the extreme northern boundary of Kobeh Valley hydrographic sub-basin (No. 139). The extreme southern portion of the Pine Valley hydrographic sub-basin (No. 53) is adjacent to the proposed site boundary. Figure 3-5 illustrates the AQCRs by hydrographic basin.

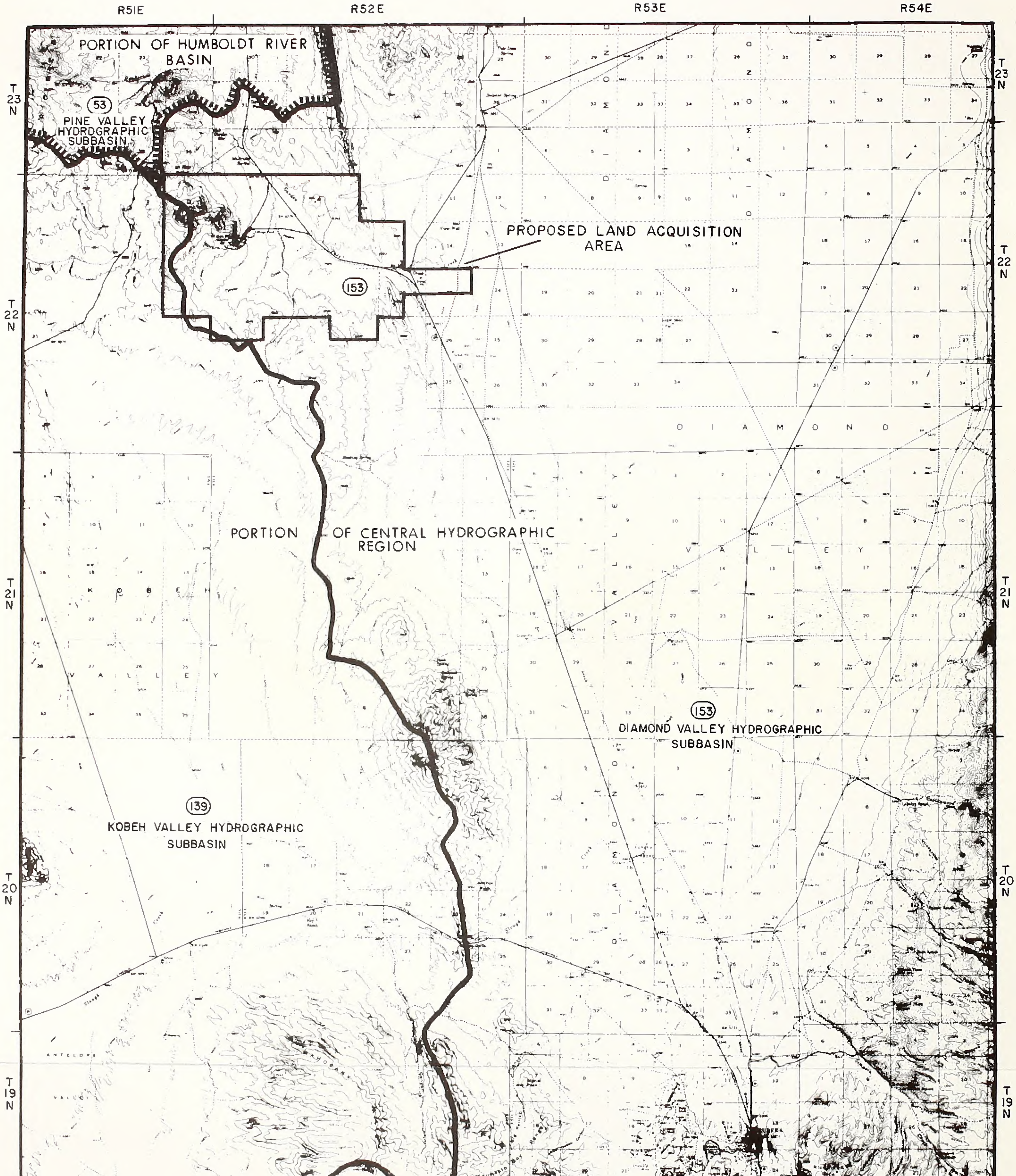
Historically, less than 15 tons of particulate matter in the three hydrographic sub-basins are produced by stationary and mobile industrial sources. Diamond Valley source contributions, mostly agriculture related, account for approximately 50 to 65 percent of the total anthropogenic regional amounts recorded.

Indicative of the area's natural influence upon air quality is the historical ratio of natural particulate generation to human-related source contribution which is nearly 6 to 1 (20,200 tons to 3,500 tons in 1977). Diamond Valley source contributions of particulate matter total approximately 11,000 tons, of which 9,500 tons are characterized as natural fugitive dust. Sources of natural contribution may be attributed to lack of significant vegetative cover, low seasonal precipitation during summer, wind storm occurrences and generally unconsolidated soils in natural areas. Anthropogenic source contribution may be largely attributed to agricultural purpose surface land disturbance. For regulatory and impact assessment purposes, the NDEP applies a regional average of 25 micrograms (ugm)/cubic meter as a TSP concentration throughout the area.

No Class I (pristine) areas are designated within Eureka County. The State of Nevada has only one such area located distantly near the northeastern border adjoining Idaho State. The nearest nonattainment zone is located approximately 100 miles northeast of the project area near Battle Mountain hydrographic sub-basins Nos. 59 and 64. The Roberts Wilderness Study Area approximately 5.6 miles west-northwest of the project area may, upon official wilderness designation, be considered by the State for possible designation as a Class I air quality control area.

3.5 Hydrology

Technical Report No.4 presents detailed information regarding surface



PROPOSED LAND ACQUISITION AREA BOUNDARY

REGIONAL HYDROGRAPHIC BOUNDARY

AQCR BOUNDARY & HYDROGRAPHIC SUB-BASIN BOUNDARY

HYDROGRAPHIC SUB-BASINS

(53) PINE VALLEY

(139) KOBEH VALLEY

(153) DIAMOND VALLEY

BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.

Nevada MAP AREA

N

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

MT. HOPE MOLYBDENUM PROJECT

AIR QUALITY CONTROL REGIONS AND HYDROGRAPHIC BASINS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-5

and groundwater resources in the regional and Mt. Hope areas.

3.5.1 Surface Water

Definition of the surface water hydrology characteristics of the Mt. Hope area are primarily based on existing information obtained during investigations performed cooperatively by the U.S. Geological Survey (USGS), the U.S. Soil Conservation Service (SCS), the State of Nevada, the BLM and additional field reconnaissance/studies by Hydro-Search, Inc. (1982, 1983).

Surface water is very scarce and generally of an intermittent or ephemeral nature. The Mt. Hope area experiences surface water flows in early spring when the snows melt and during summer thunderstorms.

Precipitation and snow melt runoff from the mountain slopes is rapid, spreading across the alluvial fans where much of it infiltrates through the soil and into the alluvial aquifers within the surrounding valleys (i.e., Diamond and Kobeh). Some of the surface water may percolate further into the deeper carbonate aquifer, however, the volume of this transmitted water is not known.

Mt. Hope is located near the intersection of three primary drainage basins: 1) Diamond Valley to the east, 2) Kobeh Valley to the south and west, and 3) Pine Valley to the north and west (Figure 3-6). No perennial streams exist in the Mt. Hope area with the exception of a portion of a tributary to Henderson Creek which originates from springs. This tributary lies in Garden Valley and is approximately 2.8 miles northwest of the summit of Mt. Hope. Garden Pass Creek, Tyrone Creek and Henderson Creek are the geographically major ephemeral streams in the area. Garden Pass Creek and Tyrone Creek drain Mt. Hope, the surrounding slopes and the small basin between Mt. Hope and the erosional gap of the Sulphur Spring Range to the east. It is through this gap that any surface water then drains into Diamond Valley. The northeast and northcentral portions of Kobeh Valley and the eastern flank of the Sulphur Spring Range are drained by numerous small ephemeral streams.

Steamflows in Diamond Valley and Kobeh Valley terminate in the playas on the valley floors. The upper portions of principal stream channels in the area are normally slightly incised with no significant associated flood plain and moderately to heavily vegetated with little streambed erosion or deposition. The lower stream portions of Garden Pass and Tyrone Creek however, have deeply incised channels that get wider and flatter downstream. Above the incised channel is a flat, wide floodplain. The channels are moderately to heavily vegetated on the streambed and banks. The stream banks are generally steep and prone to erosion tending to undercut and slough into the channel during high flows, leaving little evidence of historic flooding (Hydro-Search, Inc., 1982, 1983).

The only streamflow data for the area are annual maximum discharges at crest-stage partial-record stations on Garden Pass Creek and a tributary of Garden Pass Creek. Annual maximum discharges at a tributary of Garden Pass Creek were 0 cubic feet per second (cfs) and 0.2 cfs for 1981 and 1982, respectively (Squires, 1983).

Three types of floods occur in the Great Basin area: snowmelt, rain-on-snow and thunderstorms. Generally, the maximum annual and most frequent type of flood in the Mt. Hope area is caused by thunderstorm activity (HDR, 1980a).

Although thunderstorms may occur on many days in one season and affect a large area, high intensity rainfall is limited to small areas. The 6-hour and 24-hour 100 year storm events for the Mt. Hope area have been estimated at 1.9 in and 2.8 in, respectively (Miller, et al, 1973).

The potential for flooding appears to be small and exists only in the lower reaches of Garden Pass Creek and Tyrone Creek (Figure 3-6) based on the estimates of storm runoff and general characteristics of the stream channel cross sections and runoff estimation points of the Mt. Hope area.

Two springs, the Mt. Hope spring and McBrides spring, are present near the northern border of the Mt. Hope site (Figure 3-6). Both springs have been intercepted with piping such that discharge can enter livestock watering troughs. Flow records are not available for either spring, estimates of flow generally equal less than 1 to 0.5 gpm. A spring seep exists in the lower lying hollow area east of the Mt. Hope creek. Flow has not been observed.

3.5.2 Groundwater

The same hydrographic basins identified for surface water also represent the affected groundwater environment (Figure 3-5). The estimated groundwater storage capacities and perennial yields of the three basins, Pine Valley, Diamond Valley and Kobeh Valley, are shown in Table 3-1.

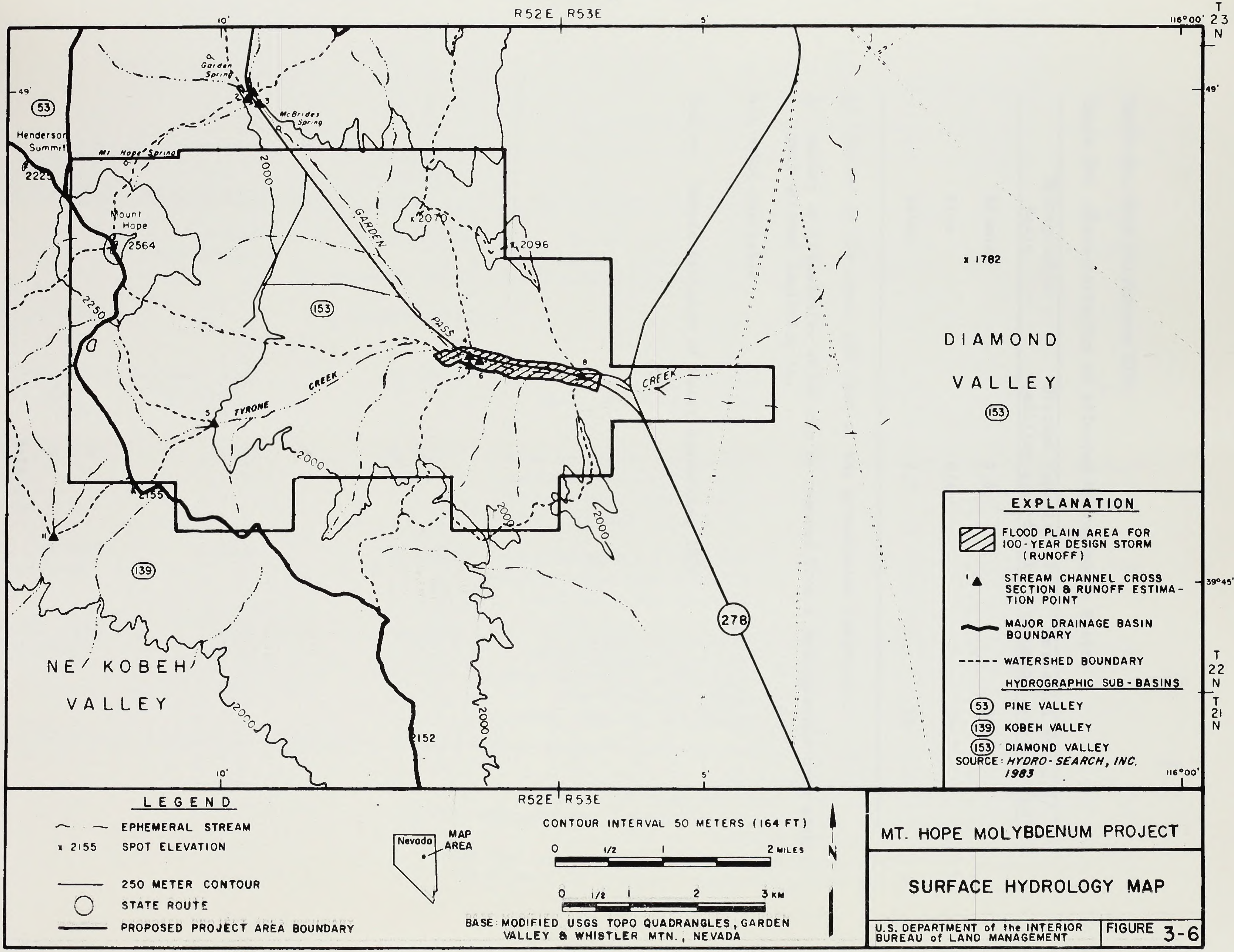
Of the five major geologic units present in the vicinity of the Mt. Hope site (Table 3-2), only the Quaternary-Tertiary alluvium (QTa) has sufficient primary permeability to store and transmit groundwater. The undifferentiated Paleozoic Eastern Assemblage carbonate rocks (EA) and a portion of the undifferentiated Paleozoic Overlap Assemblage rocks (OA) are of considerable thickness and probably have developed sufficient secondary permeability due to faulting and solution activity to transmit and yield major quantities of water. Minor, secondary permeability exists in other units (Western Assemblage and Tertiary Igneous rocks), but these are not considered major water producing units.

Existing wells in all three basins are generally less than about 400 feet in depth and tap the alluvium resource. The Mt. Hope project would also rely on this resource. Estimated aquifer coefficients for the alluvium in each of the valleys are shown in Table 3-3. Groundwater budgets for each of the basins as estimated by Hydro-Search, Inc. (1982) are shown in Tables 3-4 through 3-6. Detailed information on the hydraulic characteristics of the alluvium and the other major geologic units may be found in Technical Report No.4.

Groundwater flow in the alluvium of Kobeh Valley follows the direction of surface flow (west to east). Recharge from the surrounding mountains moves toward the valley floor. Precipitation in Roberts Mountains and interbasin transfer from Monitor Valley to the southwest are the major sources of recharge. The major source of discharge is evapotranspiration. Water levels in the valley floor are very near the surface (5 ft).

Groundwater in the shallow Diamond Valley alluvium moves from south to north toward the large playa developed at the northern end of the valley where water levels are at or very near the surface. Recharge sources include direct precipitation, flows from Pine/Garden Valley across the Sulphur Spring Range and from surplus snow melt runoff in Kobeh Valley. Discharge occurs via evapotranspiration, springs and evaporation from the playa.

Groundwater in the Pine Valley alluvium regionally moves from south to north toward the Humboldt River. Water levels are fairly close to the surface.



R52E R53E
10'
5'
116°00'
T 23 N
49'
53
Henderson Summit
2225
Garden Spring
McBrides Spring
Mt Hope Spring
Mount Hope
2564
2250
2000
GARDEN
PASS
CREEK
x 2070
x 2096
153
TYRONE
CREEK
2000
2155
139
NE KOBEH
VALLEY
2152
278
x 1782
DIAMOND
VALLEY
153
39°45'
T 22 N
T 21 N
EXPLANATION
FLOOD PLAIN AREA FOR 100-YEAR DESIGN STORM (RUNOFF)
STREAM CHANNEL CROSS SECTION & RUNOFF ESTIMATION POINT
MAJOR DRAINAGE BASIN BOUNDARY
WATERSHED BOUNDARY
HYDROGRAPHIC SUB-BASINS
53 PINE VALLEY
139 KOBEH VALLEY
153 DIAMOND VALLEY
SOURCE: HYDRO-SEARCH, INC. 1983
LEGEND
EPHEMERAL STREAM
x 2155 SPOT ELEVATION
250 METER CONTOUR
STATE ROUTE
PROPOSED PROJECT AREA BOUNDARY
Nevada
MAP AREA
CONTOUR INTERVAL 50 METERS (164 FT)
0 1/2 1 2 MILES
0 1/2 1 2 3 KM
N
BASE: MODIFIED USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA
MT. HOPE MOLYBDENUM PROJECT
SURFACE HYDROLOGY MAP
U.S. DEPARTMENT of the INTERIOR
BUREAU of LAND MANAGEMENT
FIGURE 3-6

Table 3-1 Characteristics of Affected Hydrographic Basins

Hydrographic Basin	Storage Capacity 1/ (million acre-feet)	Perennial Yield 2/ (thousand acre-feet/yr)
Diamond	2.8	30
Pine	N/A	20
Kobeh	2.7	16

1/ Stored in the upper 100 feet of the groundwater reservoir.

2/ Amount of groundwater which can be removed from a hydrographic area each year without depleting it.

N/A = Not available

Source: Nevada Division of Water Resources, 1971

Table 3-2 Summary of Characteristics of Geologic Material

Geologic Unit	Age	Lithologic Description	Maximum Thickness feet	Estimated Rating: Primary Permeability	Estimated Rating: Secondary Permeability
Alluvium	Tertiary-Quaternary (QTa)	Poor to well sorted clays, sands, and gravels; intermixed and interbedded.	5,000 (Kobeh) 1/ 7,500 (Diamond) 2/ 10,000 (Pine) 2/	Good to Excellent	-
Igneous Rocks	Tertiary (Ti)	Undifferentiated flows, tuffs, breccias, plugs and stocks.	2,000 3/	Poor, locally could be Fair	Poor, locally could be Fair
Overlap Assemblage (Garden Valley Fm.-carbonate member)	Paleozoic (OA)	Dominantly limestone with some calcareous sandstone, chert-pebble conglomerate, and cherty limestone beds.	500 4/	Poor	Poor 5/
Eastern Assemblage (carbonates)	Paleozoic (EA)	Dominantly limestone and dolomite with minor amounts of shale and quartzite.	14,500 4/	Poor	Good to Excellent
Western Assemblage (Vinini Formation)	Paleozoic (WA)	Dominantly shale, siliceous shale, chert, quartzite, siltstone with minor limestone and andesitic volcanic rocks.	Unknown	Poor	Poor, locally could be Fair

1/ Thickness estimated from gravity data.
2/ Thickness determined from drill hole information.
3/ Thickness estimated from cross section of Merriam and Anderson (1942).
4/ Thickness estimated by Roberts (1967).
5/ Overall secondary permeability is considered low because only the lower part of the Garden Valley Formation consists of carbonates.

Source: Hydro-Search, Inc., 1982.

Table 3-3 Alluvial Aquifer Coefficients

Well Field	Saturated Thickness in Well (ft)	Hydraulic Conductivity(K) (gpd/ft^2) 1/	Transmissivity(T) (gpd/ft)	Storage Coefficient(S) (unitless)
Kobeh	850	200	170,000	0.01
Diamond	350	750	262,500	0.1
Garden	400	500	200,000	0.01

1/ gpd - gallons per day

Source: Hydro-Search, Inc., 1982.

Table 3-4 Groundwater Budget for Kobeh Valley 1/

Recharge Sources				
	Precipitation Zone (inches)	Estimated Annual Precipitation (acre-feet)	Estimated Annual Recharge	
			Percent of Precipitation	Acre-Feet
Precipitation	< 12	350,000	0	0
	12-15	74,000	7	5,200
	15-20	32,000	15	4,800
	> 20	3,700	25	920
Interbasin Transfer	-	-	-	6,000
Total Recharge				17,000
Discharge Quantity				
Evapotranspiration				15,000
Interbasin Transfer (Through Devils Gate alluvium)				negligible
Imbalance (Recharge-Discharge)				2,000

1/ Modified from Rush and Everett (1964), Hydro-Search, Inc., 1982.

Table 3-5 Groundwater Budget for Diamond Valley 1/

Recharge Sources	Precipitation Zone (inches)	Estimated Annual Precipitation (acre-feet)	Estimated Annual Recharge Percent of Precipitation	Estimated Annual Recharge Acre-Feet
Precipitation	< 8	81,000	0	0
	8-12	167,400	3	5,000
	12-15	104,000	7	7,300
	15-20	41,000	15	6,200
	> 20	11,500	25	2,900
Interbasin Transfer				
Garden Valley				9,000
Kobeh Valley 2/				2,000+
Total Recharge				32,000+
Discharge Quantity				
Evapotranspiration				
Near-surface groundwater				15,000
Spring discharge areas				10,000
Northern playa				5,000
Subtotal				30,000
Agricultural Use 3/ (approximate)				56,000
Interbasin Transfer				0
Total Discharge				86,000
Imbalance (Recharge-Discharge)				-54,000

1/ Modified from Harrill and Lamke (1968), Hydro-Search, Inc., 1982.
2/ Rush and Everett (1964).
3/ Estimate by Hydro-Search, Inc., 1982

Table 3-6 Groundwater Budget for Pine Valley 1/

Recharge Sources	Precipitation Zone (inches)	Estimated Annual Precipitation (acre-feet)	Estimated Annual Recharge Percent of Precipitation	Estimated Annual Recharge Acre-Feet
Precipitation				
	8-12	254,810	3	7,700
	12-15	286,720	7	20,000
	15-20	93,440	15	14,000
	> 20	19,250	25	4,800
Interbasin Transfer				0
Total Recharge (rounded)				46,000
Discharge Quantity				
Evapotranspiration				19,000
Discharge to Pine Creek				5,000
Interbasin Transfer 2/				9,000
Total Discharge				33,000
Imbalance (Recharge Discharge)				13,000

1/ Modified from Eakin (1961), Hydro-Search, Inc., 1982.

2/ Harrill and Lamke (1968).

Recharge is apparently derived totally from precipitation; discharge occurs via evapotranspiration and flow into Pine Creek and Diamond Valley.

Chemical analyses representative of the groundwaters from the three hydrographic basins from the major geologic sources are presented in Tables 3-7 through 3-9. Because no wells are completed in the Eastern Assemblage carbonates in the area of study, water chemistry for this aquifer is inferred from springs issuing from Eastern Assemblage outcrop areas in various locations.

Generally, the groundwater in all three hydrographic basins and both major aquifers appears to be relatively low in total dissolved solids (TDS). Sodium, calcium and magnesium are dominant cations and bicarbonate is the predominant anion. This appears to be true regardless of the source and location. Elevated levels of iron and manganese have been detected in some samples.

3.6 Soils

Technical Report No.5 presents detailed discussion of the methodology employed in the mapping and impact assessment of the potentially affected soils within the regional and Mt. Hope areas. This section presents summary information concerning the general types and associated capabilities of the project area soils. Soils data and interpretation are based on study inventory results of the SCS (November, 1980).

3.6.1 Physical Properties

Low precipitation results in sparse vegetation cover and little organic matter (humus), thus forming light colored soils. Leaching of the soluble weathering products is limited. Figure 3-7 illustrates soil types of the Mt. Hope site area including twelve aridisols, eleven mollisols, four entisols and one inceptisol. An abbreviated description (HDR, 1980b) of the soils characteristic to the physiographic features in the area follows.

1) The playas and their associated soils (e.g., Dianev and Playas) consist of deposits that are light-colored, deep and clayey with very strong accumulations of salt and alkali. In general, permeability and surface runoff are very slow and the erosion hazard is slight on undisturbed surfaces.

2) The valley bottoms and floodplains have smooth to gently undulating slopes (0 to 4 percent) with deep and moderate to very strongly alkaline and saline soils (e.g., Bruffy, Kobeh and Shipley). The surface textures range from loams to silty clay loams, while the subsoils range from fine-loamy to fine-silty. Permeability ranges from very slow to moderately rapid and the hazard of wind erosion of the undisturbed soil is moderate throughout the bottom land areas.

3) Alluvial fans and stream and lake terraces make up the largest areas in the valleys. Slopes range from smooth to rolling (0 to 15 percent) and the soils are shallow to deep and mildly to strongly alkaline (e.g., Hayeston, Silverado and Ratto). The surface textures range from fine sands to gravelly sandy loams and silty clay loams, while the subsoils range from sandy to loamy-skeletal (loam with over 35% rock fragments) to fine-loamy. In general, the gravel content of the deposits increases near mountain fronts. The permeability of these soils ranges from slow to rapid. Duripans exist as indurated, virtually impermeable layers that limit effective root penetration. During high intensity rainstorms,

Table 3-7 Water Chemistry of Groundwater in Diamond Valley

Parameter	Well or Spring Identification Number				
	20/53-21ad	21/53-3db	22/54-8ad	22/54-34ab	23/52-13ca
Geologic Source of Water 1/	QTa	QTa	QTa	QTa	QTa
Temperature (°F)	57.9	51.9	---	53.9	62.0
pH	7.6	7.8	7.98	7.4	8.3
Total Dissolved Solids 2/	302	---	538	458	346
Electrical Conductivity 3/	467	569	---	709	560
Constituent 2/					
HCO_3	220	216	427	356	264
CO_3	0	0	0	0	4
Cl	14	47	27	16	25
SO_4	45	67	48	77	45
F	0.3	---	0.62	0.6	0.4
NO_3	2.7	---	9.8	5.5	0.6
PO_4	---	---	---	---	---
Na	17	Na+K 69	86	27	39
K	5.1	"	30	5.5	8.2
Ca	51	16	40	78	41
Mg	20	30	33	36	27
SiO_2	39	---	---	37	26
As	---	---	---	---	---
Fe	0	---	0.82	0.13	0.01
Mn	---	---	0.09	---	---

1/ QTa = Alluvium

2/ Concentrations are in milligrams per liter

3/ Electrical conductivity is in microhmos/cm @ 25°C (77°F)

Source: Hydro-Search, Inc., 1982

Table 3-8 Water Chemistry of Groundwater in Pine Valley

Parameter	Well or Spring Identification Number		
	(McCloud Spring) 23/52-5ac	(Tonkin Spring) 23 1/2/49-1cc	26/50-34
Geologic Source of Water 1/	OA	WA	QTa
Temperature (°F)	---	---	---
pH	7.25	7.95	7.38
Total Dissolved Solids 2/	253	184	553
Electrical Conductivity 3/	---	---	---
Constituent 2/			
NCO_3	245	200	573
CO_3	---	35	0
Cl	16.5	6.27	11
SO_4	34	20	35
F	---	---	0.35
NO_3	1.1	0.92	0
PO_4	---	---	---
Na	24.5	10	Na+K 64
K	2.1	1.2	
Ca	16.7	16.1	93
Mg	---	---	36
SiO_2	---	---	---
As	---	---	0
Fe	---	---	2.07
Mn	<0.01	0.01	---

1/ QTa = Alluvium, OA = Overlap Assemblage, WA = Western Assemblage

2/ Concentrations are in milligrams per liter

3/ Electrical conductivity is in microhmos/cm @ 25°C (77°F)

Source: Hydro-Search, Inc., 1982

Table 3-9 Water Chemistry of Groundwater in Kobeh Valley

Parameter	Well or Spring Identification Number				
	(Hot Spring) 19/50-5aa	(Warm Spring) 19/50-18ba	(Lone Mtn. Spring) 20/50-12dd	(Mud Spring) 20/51-6ba	(Well or Spring) 22/49-27d
Geologic Source of Water 1/	QTa	QTa-OA 4/	EA	EA	EA 4/
Temperature (°F)	---	---	---	---	---
pH	7.5	8.6	8.5	8.4	8.2
Total Dissolved Solids 2/	354	265	188	334	---
Electrical Conductivity 3/	---	---	---	---	280
Constituent 2/					
HCO_3	76	100	76	158	132
CO_3	40	16	40	12	0
Cl	8	11.5	6.5	14.5	10
SO_4	11	28	11	18	18
F	---	---	---	---	---
NO_3	<0.02	0.11	0.04	0.17	---
PO_4	---	---	---	---	---
Na	14	66	14	22	23
K	5.1	7.9	5.1	10	---
Ca	74	11	30	130	26
Mg	---	---	---	---	6.3
SiO_2	---	---	---	---	---
As	---	---	---	---	---
Cu	---	---	<0.02	<0.02	---
Fe	---	---	0.06	0.92	---
Mn	<0.02	<0.02	<0.02	0.11	---
Zn	0.1	---	0.1	0.08	---

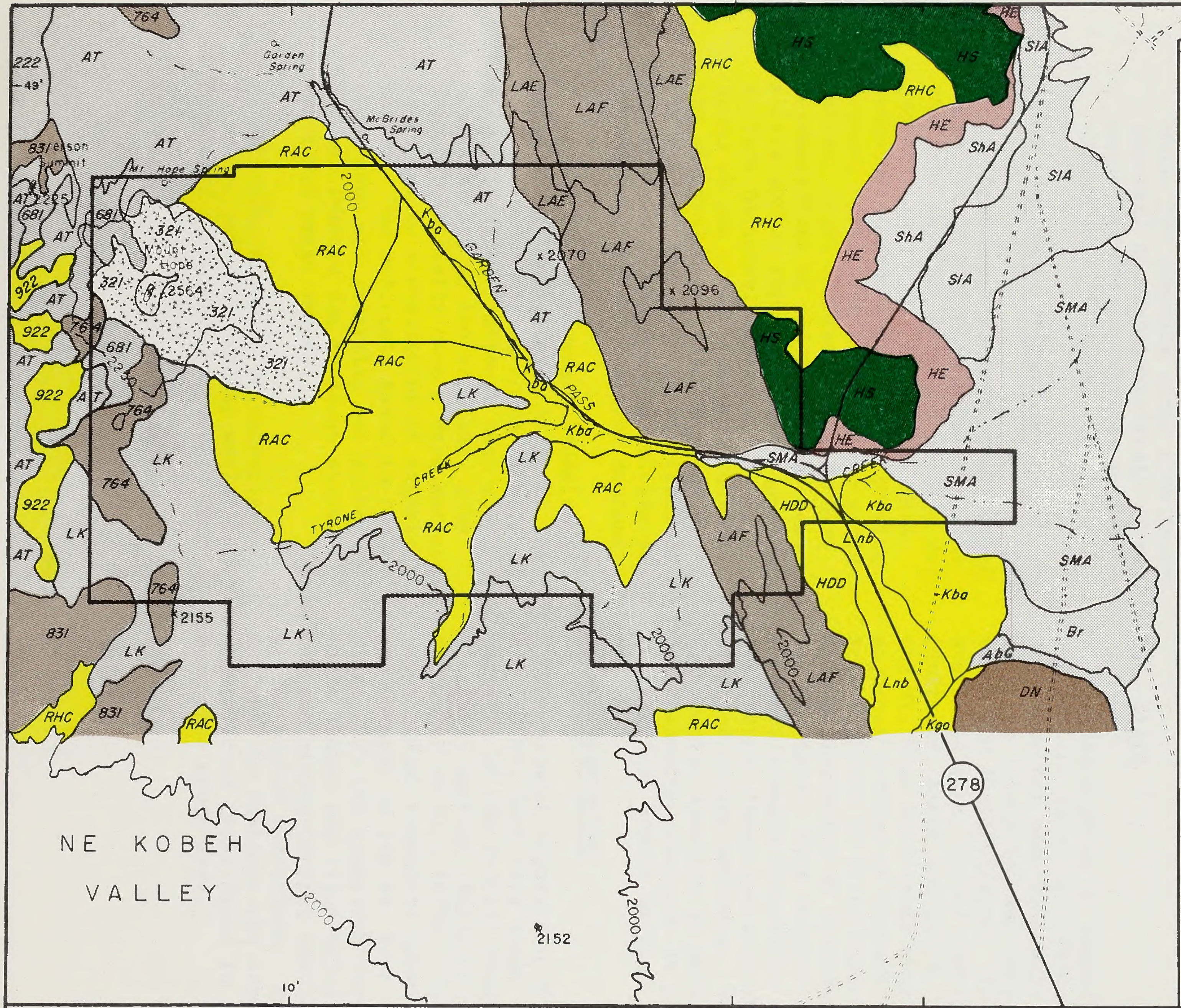
1/ QTa = Alluvium, OA = Overlap Assemblage, EA = Eastern Assemblage

2/ Chemical concentrations are in milligrams per liter

3/ Electrical conductivity is in micromhos/cm @ 25°C (77°F)

4/ Exact geology of water source uncertain

Source: Hydro-Search, Inc., 1982.



SYMBOL KEY

SOIL		ORDER	
	ARIDISOLS		ENTISOLS & MOLLISOLS
	ENTISOLS		ENTISOLS & ARIDISOLS
	INCEPTISOLS		MOLLISOLS & ARIDISOLS
	MOLLISOLS		ARIDISOLS, ENTISOLS & MOLLISOLS

SOIL ASSOCIATIONS & MAPPING UNITS

AbC	Alhambra fine sandy loam, hummocky
AT	Atrypa association
Br	Bruffy silt loam
DN	Dianev silt loam
HDD	Handy gravelly loam, 4-15% slopes
HE	Hayeston - Silverado association
HS	Hopeka - Sheege association
Kba	Kobeh sandy loam, 0-2% slopes
Kga	Kobeh gravelly sandy loam, 0-2% slopes
LAE	Labshaft - Locane association, steep
LAF	Labshaft - Locane association, very steep
LK	Labshaft - Rock outcrop complex
Lnb	Lone gravelly loam, undulating
RAC	Ratto gravelly fine sandy loam, 2-8% slopes
RHC	Rubyhill fine sandy loam, 2-8% slopes
ShA	Shipley silt loam, 0-2% slopes
SlA	Shipley silt loam, moderately saline - alkali, 0-2% slopes
SMA	Shipley silt loam, occassionally flooded, 0-2% slopes
222	Decan - Coils association
321	Mau - Shagnasty - Eightmile association
681	Chad - Cleavage - Softscrabble association
764	Shagnasty - Roca - Rock association
831	Atrypa - Mau association
922	Handy loam, 2-8% slopes

LEGEND

- EPHEMERAL STREAM
- x 2155 SPOT ELEVATION
- SOIL MAPPING UNIT BOUNDARY
- 250 METER CONTOUR
- STATE ROUTE
- PROPOSED PROJECT AREA BOUNDARY

Nevada — MAP AREA

R52E R53E

CONTOUR INTERVAL 50 METERS (164 FT.)

0 1/2 1 2 MILES

0 1/2 1 2 3 KM

BASE: MODIFIED USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA.

MT. HOPE MOLYBDENUM PROJECT

SOILS OF THE MT. HOPE AREA

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-7

the soils of the alluvial fans undergo sheet erosion and rill and gully formation.

4) The uplands and mountains have slopes ranging from moderately steep (15 to 30 percent) to very steep (over 50 percent) and have shallow to deep, moderately alkaline to medium acid soils (e.g., Atrypa, Labshaft and Shagnasty). Surface textures range from gravelly and cobbly sandy loams and loams, while the subsoils range from loamy-skeletal to clayey-skeletal. These soils are often underlain by bedrock within 20 inches.

3.6.2 Agronomic Properties

The dominant soil order represented in the study region is aridisols. As the name implies, they are usually dry and are never moist more than three consecutive months during the growing season. Aridisols are low in organic matter, light colored, and many have accumulations of calcium carbonate, silica and/or gypsum in their subsurface horizons. These soils are found in the study area primarily on the alluvial fans, lake terraces and the valley bottoms. The aridisols of the study area can only be cultivated if properly irrigated and/or drained.

On the higher mountain sideslopes surrounding the valleys, soils of the mollisol order may be found associated with aridisols. Although they are almost as dry as the aridisol, they characteristically have a dark surface layer due to accumulation of organic matter. The mollisols found in the study area are generally not suited for cultivation due to steep slopes and rapid water runoff.

Entisols, an order of recently-formed or actively eroding soils, lack developed subsurface horizons. They are found associated with aridisols on the landscape. The entisols found within the study area will only be productive if adequately fertilized and irrigated. Frequently, however, restrictions due to their depth or water holding capacity preclude their cultivation.

Soils of the inceptisol order are found in the study area on floodplains, low terraces and on margins of playas. They are suitable for cultivation if adequately irrigated, fertilized and drained.

3.7 Biota

The description of faunal and floral populations existing within the Mt. Hope area has been primarily based on existing literature and data from previous BLM field studies. To supplement available data, aerial photography (infrared, black and white, color) of the Mt. Hope site study area and adjacent portion of Diamond Valley has been analyzed to allow current evaluation or expansion of literature-based and BLM data. This chapter section presents summary discussion concerning vegetation, fauna and protected species and unique habitats. Detailed information specific to each biological community component is presented in Technical Report No.6.

3.7.1 Vegetation

The natural vegetation of the regional and Mt. Hope site areas is characteristic of the Central Great Basin Floristic section (Billings, 1951; Cronquist et al., 1972). Two major vegetational community types are encountered in the Mt. Hope site area: (1) the sagebrush zone of the basin floors and ridge bajadas; and, (2) the pinyon-juniper woodland zone of the higher elevations. Figure 3-8 depicts the dominant and subdominant vegetational types found in the Mt. Hope site study area.

The sagebrush zone of the valley floors and bajadas is characterized as a community of fairly dense to open gray-green shrubs, usually three feet or less in height, with an understory of perennial bunchgrasses. Percent cover, forage value and component community plant species are highly variable depending on precipitation, soil types, level of disturbance and grazing pressure.

The pinyon-juniper woodland zone occupies elevationally higher grounds of mountain slopes experiencing annual precipitation of 12 to 18 inches. Generally represented by a plant community of small evergreen trees rarely exceeding an individual height of 15 ft in the project area, substantial understory is present in the pinyon-juniper woodland zone in the form of shrubs and grasses extending from the sagebrush zone.

The dominant species of the vegetation communities in the area (Figure 3-8) include singleleaf, or one-needle pinyon (Pinus monophylla), Utah juniper (Juniperus osteoperma), black sagebrush (Artemisia arbuscula nova), big sagebrush (A. tridentata), and shadscale (Atriplex confertifolia). Secondary and codominant species include rubber rabbitbrush (Chrysothamnus nauseosus), Douglas rabbitbrush (C. viscidiflorus), Sandberg bluegrass (Poa sandbergii), crested wheatgrass (Agropyron cristatum), squirreltail (Sitanion hystrix), indian ricegrass (Oryzopsis hymenoides) and black greasewood (Sarcobatus vermiculatus) (U.S.D.I., 1983c).

Distribution by acreage of the vegetational types within the approximate project boundaries equals: 4,478 of pinyon juniper - black sage (45%); 3759 of big sage (38%); 733 for black sage pinyon juniper (7%); 334 of big sage pinyon juniper (3%); 163 of winterfat (2%); 127 of big sage - black greasewood (1%); 117 of black sage (1%) and 12 of big sage - black sage (<1%). The vegetational type found in the areas of power line routings (Alternatives 2-B and 2-C), water line routings (Alternatives 3-B and 3-C) and off-site tailings ponds (Alternatives 4-B and 4-C) is predominately big sagebrush.

Vegetation cover has been estimated at 30 percent for the two major types in the site study area: sagebrush and juniper-pinyon with grass understories. Characteristically, percent cover can be expected to range from 15 to 40 percent in all but the shadscale-type community which may exhibit near-zero covers in strongly alkaline areas.

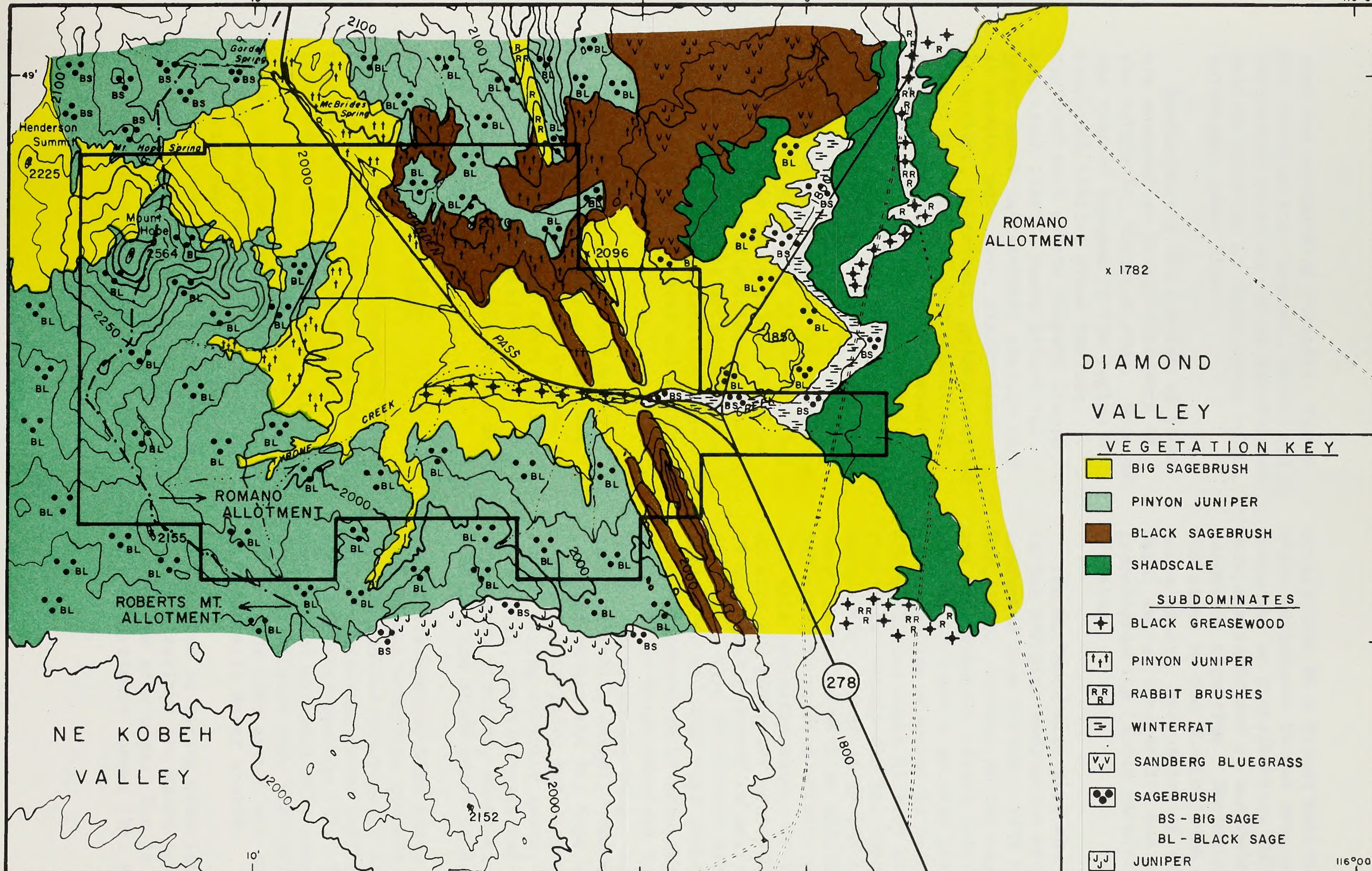
Compared to the more temperate areas in the United States, the existing characteristics of the Mt. Hope area vegetation generally limit forage value. Use as rangeland, presently for cattle grazing, is limited by low water availability, the presence of variable soil types and associated percent cover, and grazing by wild horses. Grazing values are highest in localized areas of wheatgrass, winterfat and spring associated vegetation. Carrying capacity of the proposed project area ranges from 7 to 43 acres per animal unit month (AUM) (U.S.D.I., 1964).

As discussed in subsection 3.7.3, no federally or state listed rare, endangered or threatened (RET) species of vegetation are known to exist within the proposed project boundaries or perimeter zone (1.5 miles).

3.7.2 Fauna

Regional Characteristics

Faunal use within the Mt. Hope project area is typical of that associated with the generic habitat types broadly defined by predominant vegetation: specifically, the big sagebrush community and pinyon-juniper woodland habitat types. In the Mt. Hope site



R52E R53E 10' 5'

LEGEND

EPHEMERAL STREAM
x 2155 SPOT ELEVATION
50 METER CONTOUR
250 METER CONTOUR
STATE ROUTE
PROPOSED PROJECT AREA BOUNDARY
RANGE ALLOTMENT BOUNDARY

NEVADA MAP AREA

CONTOUR INTERVAL 50 METERS (164 FT.)

0 1/2 1 2 MILES

0 1/2 1 2 3 KM

N

BASE: MODIFIED USGS TOPO QUADRANGLES, GARDEN VALLEY & WHISTLER MTN., NEVADA

MT. HOPE MOLYBDENUM PROJECT

VEGETATION COMMUNITIES AND BLM RANGE BOUNDARIES

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-8

area and surrounding vicinity, faunal use patterns are, however, additionally influenced to an extent by man-induced habitat creation or improvement (e.g., buildings, power lines).

Approximately 300 species of fauna are seasonal or yearly residents of the Battle Mt. District area. Some of the typical species of the region's sagebrush habitat areas include reptiles such as the leopard lizard, sagebrush lizard, fence lizard and great basin rattlesnake; mammals such as coyote, mule deer, blacktailed jackrabbit, cottontail, golden-mantled ground squirrel and deer mouse; and avifauna such as the western meadowlark, horned lark, chukar partridge, sage grouse, sage sparrow, red-tailed hawk and the common crow.

Fauna of the regional pinyon-juniper habitat are generally similar to that encountered in the sagebrush habitat although increased species density and diversity may be anticipated due to greater water availability, increased vegetation cover and multiple land forms.

Fauna species of primary economic importance in the regional area include mule deer and sage grouse. Trapping of bobcat and sport hunting of chukar and cottontail rabbit additionally occur in the region and within the Mt. Hope area.

Mt. Hope Site Study Area

To supplement broad regional habitat descriptions and fauna characterizations, the BLM Battle Mountain District initiated a terrestrial fauna habitat inventory of the Shoshone-Eureka Resource Area. Designed to provide baseline data for medium to long range resource management planning, the fauna inventory emphasized identification and evaluation of "Special Habitat Features" (SHF). Defined as an anomaly or area within or adjacent to a larger habitat site which influences faunal population, movements or distribution, SHF sites were characterized as man-made or naturally occurring. Evaluation of SHF sites by the BLM included a literature search, evaluation of existing data, aerial observation and selected ground-proofing (field observations) of data.

The Mt. Hope site area was included in the SHF site evaluation studies conducted from October, 1979 to November, 1980. Results of the regional and site specific (field observation) studies included a general listing of fauna species observed in order that SHF qualities could be very broadly typified. Within the Mt. Hope site boundaries a total of 16 SHF sites were identified with an additional 14 SHF sites identified offsite within a 1.5 mile perimeter zone. Of the 30 on site and perimeter zone SHF sites, 19 were characterized as man-made features. Five of sixteen SHF sites within the Mt. Hope site boundary were considered to be naturally occurring; all of which involved rock or boulder outcroppings (e.g., solitary cliff including crags). Man-made features within the Mt. Hope site boundaries included building structures, mining activity areas, power line poles, inactive railroad line structure, pipeline, material sites, windmill and stock water tank.

Offsite natural SHFs sites included sage grouse strutting grounds (2), rock or boulder outcrops, a small group of riparian trees and/or shrubs and cold water springs (2). In addition to the man-made SHFs noted on site, offsite SHFs included stock water ponds (one group) and an adjacent domestic water source.

In terms of spring-associated habitat, two springs are known to exist within the site area. One is located at the northwest corner (Mt. Hope spring) and one unnamed spring/seep was located within the low-lying tailings disposal area. The Mt. Hope spring is in a pinyon-juniper area and issues from a pipe, providing a small quantity (0.5-1.0 gpm) of flow into a trough. Overflow water then disappears into the ground within 50 feet of the trough. A small amount of grasses and herbs grow within a short distance of the spring but riparian vegetation is neither extensive or abundant. The second spring exhibits itself as a muddy trampled area within a sagebrush (exposed eastern exposure) slope. No riparian habitat was evident.

Due to particular management goals (e.g., range land use, species protection, hunting), some species inhabiting or frequenting the proposed project area and vicinity are considered by the BLM as being of special interest when assessing land use quality. Fauna of special interest in the Mt. Hope region include mule deer (migratory routing), sage grouse (strutting grounds), golden eagle (raptor nesting potential), prairie falcon (population status) and wild horses (grazing utilization).

Mule Deer

The Mt. Hope site study area lies within the Roberts Creek Mountain zone of mule deer winter rangeland. The site study area additionally includes distinct migratory routes (Figure 3-9A) of winter range access to and from the Bald Mountain winter range area. Range values (regional) are reportedly fair. During severe winters, southward migration can extend to Nye County (Final Shoshone-Eureka RMP/EIS, 1984).

Sage Grouse

Sage Grouse strutting grounds do not occur within the site study area. Within Kobeh and Diamond Valleys, however, numerous strutting grounds exist; some of which are well established while others appear as annual isolates. Figures 3-9A and 3-9B illustrate generalized areas in which strutting grounds were observed or where a high potential existed for such activity.

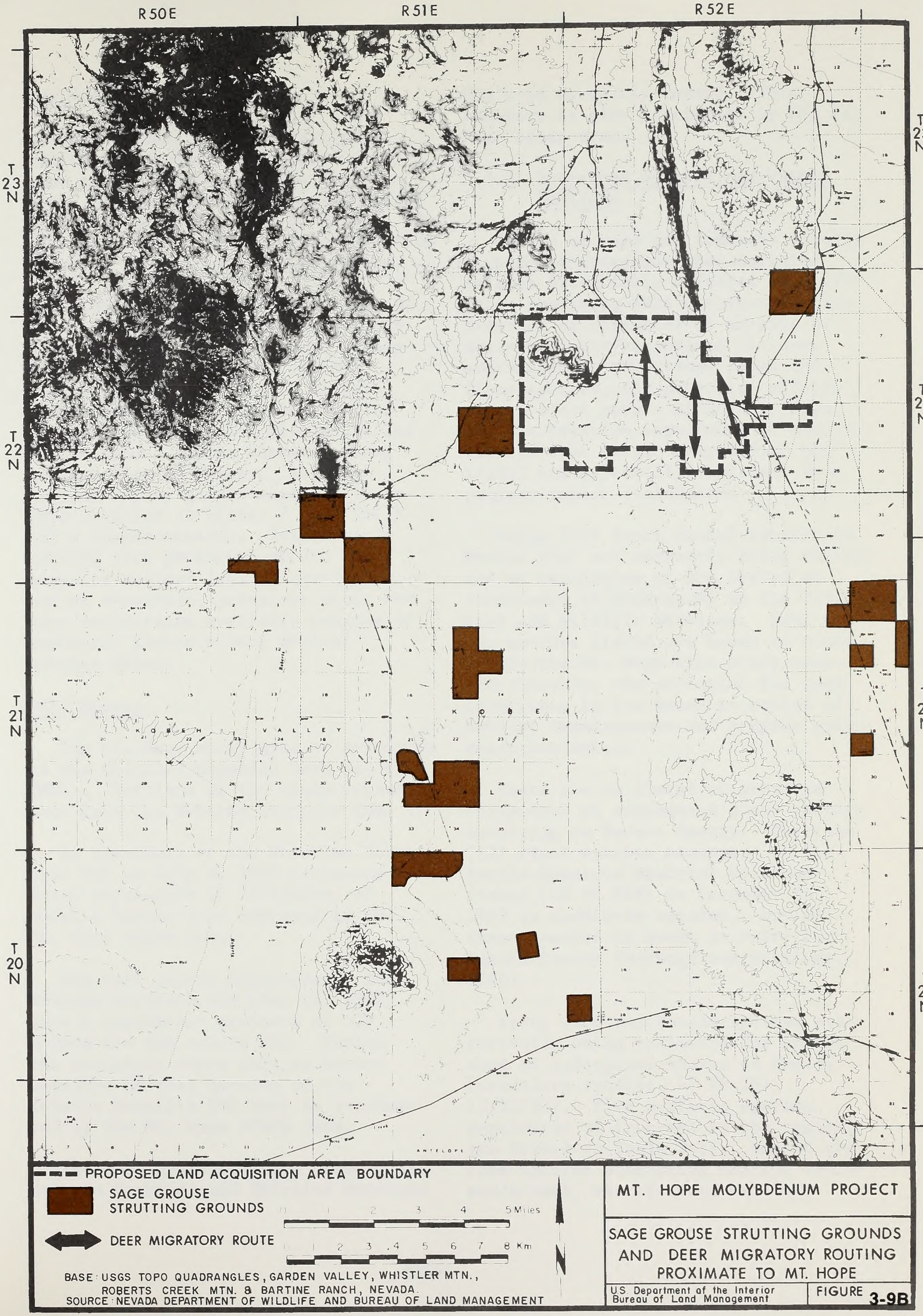
The sage grouse strutting ground depicted northeast of the proposed land acquisition area (Township 22 North, Range 52 East, Section 2) represents an historically active strutting area. Although one male sage grouse was observed on this strutting ground in 1983, no strutting activity was observed. The strutting ground located on the west edge of the Mt. Hope study site was not inventoried in 1983. It was not active in 1981 based on an aerial inventory conducted by BLM.

The most active of sage grouse strutting grounds in the project area involves the section of northern Kobeh Valley (Township 22 North, Range 50 East) in the immediate vicinity of water supply field Alternative 3-C (Figure 3-9B). The strutting grounds closest to Alternative 3-C (Sections 35 and 36) were recorded as active in 1967, 1976, 1981 and 1983 with 40 birds being counted during the 1983 survey. The area is considered by the BLM to be regionally very important.

The strutting grounds in Township 22N, Range 51E, Section 30, were reported active in 1963, 1973 and 1976. No birds were observed in the 1981 inventory. The Section 32 strutting grounds area was recorded as active in 1973 with no birds observed in the 1981 inventory.

Future activity in the three areas includes maintenance of existing seedings for livestock management (Roberts Creek Seedings).

R51E
R52E
R53E
R54E
T 23 N
T 22 N
T 21 N
T 20 N
T 19 N
PROPOSED LAND ACQUISITION AREA
D I A M O N D
V A L L E Y
K O B E H
V A L L E Y
ANTELOPE VALLEY
LEGEND
SAGE GROUSE STRUTTING GROUNDS
DEER MIGRATORY ROUTE
Nevada
MAP AREA
0 1 2 3 4 5 Miles
0 1 2 3 4 5 6 7 8 Km.
BASE: USGS TOPO QUADRANGLES GARDEN VALLEY, WHISTLER MTN., DIAMOND SPRINGS & EUREKA, NEVADA.
SOURCE: NEVADA DEPARTMENT of WILDLIFE and BUREAU of LAND MANAGEMENT
MT. HOPE MOLYBDENUM PROJECT
SAGE GROUSE STRUTTING GROUNDS AND DEER MIGRATORY ROUTING PROXIMATE TO MT. HOPE
U.S. Department of the Interior
Bureau of Land Management
FIGURE 3-9A



MT. HOPE MOLYBDENUM PROJECT

SAGE GROUSE STRUTTING GROUNDS AND DEER MIGRATORY ROUTING PROXIMATE TO MT. HOPE

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-9B

Raptors

Bald eagles, a federally-listed endangered species, are occasionally seen in the Shoshone-Eureka Resource Area, however no winter concentrations or roost sites are known to exist. Additionally, no peregrine falcon nesting is known to occur within the region.

Golden eagle utilization of the Mt. Hope area environ is concentrated as predation activity in Diamond Valley (USDI, 1983d). A Bureau of Land Management eagle survey of winter, 1983, indicated three golden eagles observed along western Diamond Valley and 10 golden eagles observed along eastern Diamond Valley. Reported Diamond Valley golden eagle kills in 1983 totalled 13 birds; 7 road kills and 6 electrocutions. Golden eagle nesting site potential within the proposed project area is considered low as elevation, prevalent winds and site positioning available (angles of exposure) indicate very minimal habitat value.

Wild Horses

The Mt. Hope study area is primarily in the Whistler Mountain Herd Use Area (HUA). Portions of the study extend over into the Roberts Mountain HUA.

An inventory of the Whistler Mountain HUA on July 6, 1983 estimated a total population of 25 horses, of which 4 horses were observed in the Mt. Hope study area.

The most recent inventory of the Roberts Mountain HUA (May 18, 1982) gave a population estimate of 127 horses for the entire HUA. During the inventory there were no horses observed in that portion of the Roberts Mountain HUA that is overlapped by the Mt. Hope study area.

The contiguous boundary between the Roberts Mountain and Whistler Mountain HUA's is currently fenced. This boundary is also overlapped by the Mt. Hope study area.

3.7.3 Protected Species and Unique Habitats

Unique or rare environments require particular attention when defining an area potentially affected by activities involving NEPA compliance. The presence or potential of on-site or near-proximity occurrence of rare, endangered or threatened fauna and flora species, the potential effects of a project upon a wilderness area, and the relative importance of unique habitat type (e.g., geographic, biologic) are especially important to a project impact evaluation.

Table 3-10 lists faunal species in Nevada that are currently being evaluated as candidates or are listed as threatened or endangered by the U.S. Fish and Wildlife Services. None of the species listed are known to occur within the Mt. Hope site study area. Additionally, the potential for such occurrence is low based on review of habitat requirements and project area characteristics.

There are no listed or proposed threatened or endangered plant species occurring in Eureka County. Thirteen (13) plant species occurring in the Battle Mountain District were published (48 FR 229) on December 28, 1983 as candidate species. One of these species is known to occur in Eureka County (Mozingo and Williams, 1980).

Forty nine vertebrate species are currently being evaluated for threatened or endangered status in Nevada (candidate species, 47 FR 251, 12/30/82). Five avifauna species, considered of interest in the region, are listed in Table 3-11. One of the five species undergoing review, Swainson's Hawk, was observed on power

Table 3-10 Federal and State Listed Threatened or Endangered Species in Nevada with Known Eureka County Occurrence

FAUNAL SPECIES

Common Name	Scientific Name	Group
Bald Eagle 1/	Haliaeetus leucocephalus	Endangered
American Peregrine Falcon 1/	Falco peregrinus anatum	Endangered

1/ Population Status: Transients or very isolated occurrence - not nesters or common visitors (USDI, 1983d).

Table 3-11 Species Being Considered for Addition to Endangered and Threatened Listing and of BLM Interest in the Area

Common Name	Scientific Name
Faunal Species 1/	
Spotted Bat	Euderma maculatum
Swainson's Hawk	Buteo swainsoni
Ferruginous Hawk	Buteo regalis
Long-billed Curlew	Numenius americanus
White-faced Ibis	Plegadis chichi
Floral Species 2/	
One Leaflet Torrey Milkvetch	Astragalus calycosus monophyllidius

1/ Source Federal Register Vol 47 No 251, Category C-1 defined as:

"taxa for which information now in possession of the Service (U.S. Fish and Wildlife) indicates that proposing to list the species as Endangered or Threatened is possibly appropriate, but for which substantial data are not currently available to biologically support a proposed rule. Further biological research and field study will usually be necessary to ascertain the status of the taxa in this category, and it is likely that some of the taxa will not warrant listing."

2/ Source Federal Register Vol 45, No. 242, Category C-2 defined as:

"taxa for which information now in the possession of the Service (U.S. Fish and Wildlife) indicates the probable appropriateness of listing as endangered or threatened, but for which sufficient information is not presently available to biologically support a proposed rule. Further biological research and field study will usually be necessary to determine the status of the taxa included in this category."

lines in the project area during the 1979-1980 SHF study.

3.8 Wilderness and Significant Natural Areas

Currently, one designated wilderness area exists in Nevada: the Jarbidge Wilderness Area in the Humboldt National Forest of northeastern Nevada (140 miles northeast of Mt. Hope). Following extensive review of potential wilderness inventory areas, the BLM has proposed among others the Roberts Wilderness Study Area (WSA-NV-060-541) as suitable and meeting national wilderness area criteria. The eastern boundary of the 15,090 acre Roberts WSA is approximately 5.6 miles west-northwest of the Mt. Hope site area western boundaries. An environmental assessment and recommendations for the Roberts Wilderness Study Area was part of the Final Shoshone-Eureka Resource Management Plan/ Environment Impact Statement. However, as stated in the cover letter of the Shoshone-Eureka RMP, the wilderness recommendations are preliminary and subject to change during administrated review. Final recommendations will be published in a separate wilderness EIS when recommendations are sent to Congress.

The Roberts Mountain area was additionally included in a Nevada Natural Heritage Study and was recommended in the Great Basin Review Board for inclusion in the National Natural Landmarks Inventory. The heritage site eastern boundary is within 2.0 miles (Nevada Division of State Parks, 1983) of the proposed land acquisition boundaries.

3.9 Cultural Resources

Cultural resources are the remains of human activity and consist of sites (geographic locations and artifacts) that are products of human behavior. They are nonrenewable and generally fragile and thus easily impacted. The following sections present pertinent information regarding the cultural resources of the Mt. Hope regional area (Section 3.9.1) and prehistoric/ historic on-site resources (Section 3.9.2). Complete descriptions provided by Intermountain Research (1983) are presented in Technical Report No.7.

3.9.1 Cultural Resources - Eureka and Vicinity

In addition to an extensive research effort conducted throughout the project area by Intermountain Research during 1983 (Section 3.9.2), over a dozen limited cultural resources surveys have been carried out in the vicinity of Mt. Hope during the last eight years. Numerous sites designated as depicting historical background have been recorded in the project area, including the Mt. Hope Mine, Twenty Mile Shack, the Eureka Palisades Railroad and the Pony Express Trail. Other cultural resources more distant from the Mt. Hope area but within Eureka County include the Eureka Historic District (National Register of Historic Places, NRHP), Pine Valley Archaeological District, Roberts Creek Station, Sulphur Springs Station, Romano Ranch, and several rock art sites (petroglyphs) as reported by Heizer and Baumhoff, 1962.

The regional culture of the Mt. Hope project vicinity is largely defined by the history and peoples of the Town of Eureka. Its founding, development and present day characteristics are reflective of the land use patterns established by early settlers and the industries that formed the social and economic infrastructures allowing people to remain.

Eureka, like many towns of Nevada, was developed during exploitation of the mineral resources in the surrounding area. The Eureka area and Diamond

Valley had been opened up by the route of the Overland Stage in 1859. Excepting the native Shoshone and Paiute Indians, the only inhabitants of the area occupied the Diamond Springs and Robert's Creek Station along the stage and Pony Express route.

Rich ores had been discovered in Pony Canyon by William Talcott and the Reese River Mining District was formed in 1862. The ensuing activity brought about the formation of Lander County in the same year and it was from the Reese River Mining District that the founders of Eureka emmigrated.

The smelting methods during that time were not suited to treat the oxidized gold-silver-lead ores rich in iron that characterized the Eureka District. In 1869, a new smelting technique was developed and rich ore bodies were also discovered in Ruby Hill; Eureka became a prosperous mining district. The ensuing boom caused the legislature to create Eureka County in 1873, formerly the eastern half of Lander County. The Town of Eureka became the county seat, claimed the largest population in central Nevada, and possessed the richest ore deposit outside the Comstock Lode at that time. Between 1871 and 1880, Eureka had a population of over 9,000 people.

The first farming in the area was associated with the raising of livestock. The grazing lands in Eureka County were homesteaded and the farming and ranching were established around springs, supplementing the mining.

Extensive clearcutting of pinyon, juniper and mahogany trees from the surrounding mountainsides was conducted in order to supply the charcoal for the smelters. During the peak of the district's production (1870's-1880's), the smelters engaged approximately 2,000 men in the production of charcoal.

After 1880, the major ore bodies of Eureka that had been discovered were depleted and production continued on a lesser scale. With the reduction in silver prices in 1890, activities de-escalated to such an extent that for the next 25 years Eureka almost became deserted. Eureka did not experience another boom until 1917, when the war renewed activity at various mines.

The hills surrounding Eureka have, to the present, produced approximately $122 million in lead, silver and gold. The present economy is mainly based on the government services and farming, but mining, tourism and recreation all supplement. Since 1958, there has been farming on Desert Land Entries in Diamond Valley, one of the largest farming districts in the state. Main crops in the valley include high altitude alfalfa and small grain. Most of the harvest is fed locally to beef cattle and the remainder is sold and transported outside the area. Local merchants of Eureka offer services and products to the surrounding agricultural and mining communities of Diamond Valley, Crescent Valley and Beowawe.

Because of Eureka's old buildings and rich history, it was designated a National Historic District in 1973 (44 FR 7524).

3.9.2 Cultural Resources Site Study Area

A Class II cultural resources survey of the Mt. Hope site and alternative tailings pond sites was conducted during the spring of 1983 by Intermountain Research. After review by the BLM of recommendations for further work, a Class III survey was conducted on selected areas in the fall of 1983. Both survey reports are included in

Technical Report No.7. In accordance with concepts of avoidance routing, field surveys along the proposed rights-of-way have been deferred until actual siting (e.g. preconstruction survey).

The site files of the BLM, Battle Mountain District and the Nevada State Museum were examined to determine the findings of earlier cultural resource surveys in the project area and to identify archaeological sites which may have been recorded prior to this work. The results of the archives research are presented in Technical Report No.7. The National Register of Historic Places was consulted with the result that no National Register properties had been listed as occurring in or near the project area.

3.9.2.1 Prehistoric Resources

Within the area investigated by the Class II and Class III surveys for cultural resources, 68 prehistoric sites and isolates were found (Table 3-12). Fifty-nine sites are within the Mt. Hope site area, one site is within the tailings pond alternative site 4-B area (Diamond Valley) and eight sites were recorded at tailings pond alternative site 4-C (Kobeh Valley).

Mt. Hope Site. Fifty-four (79%) of the prehistoric sites in the Mt. Hope site are isolated artifacts or small scatters of artifacts covering fewer than 1,300 square feet. The artifacts in these small sites are all either isolated projectile points or small flake scatters, with or without points, left from the manufacture and/or repair of bifacial tools. The points probably represent hunting losses and the flake scatters may represent stations where hunters maintained their gear as they waited for game, or actual kill sites where butchering tools were sharpened.

Several sites are larger than 1,300 square feet and contain artifacts other than points and flakes. Some of these sites are undoubtedly field camps because they contain seed processing implements or tools for the manufacture and repair of other tools. Three other sites are somewhat different in artifact content. It is perhaps no coincidence that four of the six larger prehistoric sites contain historic components, reflecting the fact that criteria for good camping places cross cultural and temporal boundaries.

Alternative 4 - Tailings Pond Site 4-B.

The site consists of an isolated find, classified as a location.

Alternative 4 - Tailings Pond Site 4-C.

The eight finds at site 4-C are all locations.

3.9.2.2 Historic Resources

Within the cultural resource survey area, 65 historic sites and isolates were found (Table 3-13). Sixty-three sites are within the Mt. Hope site and two sites at alternative tailings pond site 4-C. There were no sites found at alternative tailings pond site 4-B.

Mt. Hope Site. Almost half of the historic sites are connected to 1870's and 1880's charcoal production. These consist of 26 sites with charcoal pits or lenses and two woodcutting sites. Based on the historical record, these sites are inferred to have been the work of Italian Carbonaris although no evidence of any particular ethnicity was found at the sites.

The other 36 historic sites include three railroad associated,

Table 3-12 Summary of Prehistoric Sites Recorded in the Mine Area

Site No.	Elev. (ft)	Vegetation Zone	Site Type	Area (sq ft)	Period	Cultural Remains
Mt. Hope Site						
26EU788	6560	P-J 1/	Field Camp	90720	Archaic/Numic	Elko and Desert side-notched point, biface, man stonecircles(?), chert, obsidian, basalt flakes
26EU789	6660	P-J	Location	Isolate	—	Chert flake
26EU790 2/	6200	Sagebrush	Base Camp	49680	Archaic	Elko Eared point; biface, core, flakes
26EU793	6040	Sagebrush	Location	11	—	Rock circle, flake
26EU808	6950	P-J	Location	1080	—	Chert flakes
26EU809 2/	6960	P-J	Base Camp	48600	Archaic	Corner-notched arrow point, point fragments, drill
26EU812	6880	P-J	Location	Isolates	—	Chert and rhyolite flake
26EU814	6210	Sagebrush	Location	270	—	Chert flakes
26EU826	6540	P-J	Location	Isolate	—	Point tip fragment
26EU829	6240	Sagebrush	Location	Isolate	—	Chert flake
26EU874	7160	Big Sage	Location	Isolate	Unknown	Secondary flake
26EU882	7300	P-J	Location	Isolate	Unknown	Point midsection, utilized flake
26EU885	6730	J-Sage	Location	Isolate	Unknown	White chert flake
26EU888	6740	Big Sage	Location	Isolate	Unknown	Fused shale flake
26EU891	6760	J-Sage	Location	Isolate	Unknown	Six biface thinning flakes
26EU892	6760	J-Sage	Location	Isolate	Unknown	One white chert secondary flake
26EU893	6790	J-Sage	Location	Isolate	Unknown	One white chert secondary flake
26EU896	6730	P-J	Location	Isolate	Unknown	Chert point tip
26EU922	6500	J-Sage	Location	Isolate	Unknown	White chert flake
26EU929	6615	P-J	Location	Isolate	Unknown	Modified chert flake
26EU930	6620	P-J	Location	Isolate	Unknown	Biface fragment
26EU932	6600	P-J	Location	Isolate	Unknown	Unidentified point fragment
26EU938	6380	P-J	Location	Isolate	Unknown	Two flakes
26EU946	6210	Big Sage	Location	Isolate	Unknown	Biface reduction flake
26EU948	6160	Big Sage	Location	Isolate	Unknown	Utilized assay flake
26EU949	6350	J-Sage	Location	Isolate	Unknown	White chert flake
26EU950	6280	J-Sage	Location	Isolate	Unknown	Unidentified point fragment
26EU951	6285	J-Sage	Location	Isolate	Unknown	Point tip
26EU955	6560	J-Sage	Location	Isolate	Unknown	Scraper fragment
26EU956	6470	P-J	Location	Isolate	Unknown	Unidentified point fragment
26EU958	6280	Big Sage	Location	Isolate	Unknown	Retouched flake
26EU959	6240	Big Sage	Location	Isolate	Unknown	Chert biface fragment
26EU960	6280	Big Sage	Location	Isolate	Late Archaic	Desert Side-notched point, flake
26EU961	6350	J-Sage	Location	Isolate	Unknown	Biface fragment
26EU970	6680	J-Sage	Location	Isolate	Unknown	Decortification flake
26EU979	7180	P-J	Field Camp	—	Unknown	Bifaces, flakes
26EU980	6040	Big Sage	Location	11	Unknown	Stone circle
26EU982	6430	P-J	Cache	22	Unknown	Stone circle
26EU983	6280	Big Sage	Field Camp	63612	Middle Archaic	Basalt scraper, core, Elko Eared point, etc.

Table 3-12 Summary of Prehistoric Sites Recorded in the Mine Area (Continued)

Site No.	Elev. (ft)	Vegetation Zone	Site Type	Area (sq ft)	Period	Cultural Remains
26EU984	6260	P-J	Field Camp	13500	Unknown	Bifaces, drill utilized flake
26EU985	6340	P-J	Location	2160	Protohistoric/ contact	Shoshone Brownware pottery
26EU986	6330	Big Sage	Field Camp	16200	Protohistoric/ contact	Shoshone Brownware pottery, tools and flakes
26EU995	6440	P-J	Field Camp	14040	Middle Archaic	Elko point, bifaces and tools, flakes, metate
26EU996	6350	Big Sage	Location	—	Unknown	Point fragment, flakes
26EU997	6320	Big Sage	Location	486000	Unknown	Two metates, point tip, 4 flakes (diffuse)
26EU1000	6380	P-J	Location	540	Unknown	Flakes
26EU1001	6400	P-J	Location	324	Early Archaic	Gatecliff point, biface, utilized and other flks
26EU1003	6640	P-J	Location	—	Unknown	Flakes only
26EU1004	6455	P-J	Field Camp	216	Unknown	Hammerstone, biface, utilized and other flakes
26EU1009	6840	P-J	Field Camp	—	Unknown	Bifaces, drill, flakes
26EU1011	7400	P-J	Field Camp	972000	Middle, Late Archaic	Elko, Rosegate, cottonwood pts., mano, tools, flakes
26EU1012	7140	P-J	Field Camp	6750	Middle, Late Archaic	Rosegate, Elko points, biface, flakes
26EU1013	7300	Big Sage	Field Camp	21600	Unknown	Rosegate point, cores, bifaces, flakes
26EU1017	6760	P-J	Location	—	Late Archaic	Rosegate point, bifaces, scraper, flakes
26EU1029	6860	P-J	Location	1080	Unknown	Utilized flake, flakes
26EU1031	6850	P-J	Location	6750	Unknown	Point tip, flakes
26EU1046	6450	Big Sage	Location	—	Unknown	Flakes
26EU1047	6410	P-J	Location	270	Unknown	Core/chopper, biface, flakes
26EU1052	6420	Big Sage	Location	—	Unknown	Biface, flakes
Alternative 4-B						
26EU828	5851	Big Sage	Location	Isolate	Unknown	Chert biface/point midsection
Alternative 4-C						
26EU783	6440	Sagebrush	Location	Isolates	—	Biface, chert flake
26EU803	6540	P-J/Sage	Location	21	—	Chert flakes
26EU919	6500	P-J	Location	Isolate	Unknown	Point fragment
26EU920	6450	J-Sage	Location	Isolate	Unknown	2 secondary flakes
26EU933	6540	P-J	Location	Isolate	Unknown	White chert flake
26EU1024	6530	Big Sage	Location	—	Middle Archaic	Elko point, biface, flake tools, flakes
26EU1025	6470	Big Sage	Location	12960	Middle Archaic	Elko point, point midsection, flakes
26EU1033	6520	Big Sage	Location	270	Unknown	Flakes

1/ P-J Pinyon Juniper
2/ Site contains historic component

Source: Intermountain Research, Inc. (1983)

Table 3-13 Summary of Historic Sites Recorded in the Mine Area

Site No.	Elev. (ft)	Vegetation Zone	Site Type	Area (sq ft)	Cultural Group	Cultural Remains
Mt. Hope Site						
26EU787 1/	6330	Sagebrush	Railroad Siding/Camp	8100	—	Summit Station - Cans, bottles, stoneware, other debris
26EU790	6200	Sagebrush	Railroad Camp	37800	Chinese	Chinese ceramics, buttons, cans, wood
26EU791	6280	Sagebrush	Debris	Isolate	—	Bottle fragment, boot leather
26EU794	6390	Sagebrush	Trail Debris	—	—	Cans, wagon part(?), milled lumber
26EU809 1/2/	6920	P-J	Habitation, Charcoal Making	9720	Italian(?)	Charcoal kiln, rock cairn, cans, buttons, bottles, other debris
26EU811	6770	P-J	Charcoal Making	2160	Italian(?)	Charcoal lens, bitters bottle, wood pile
26EU819	7140	P-J	Charcoal Making	—	Italian(?)	Charcoal lens
26EU823	6570	P-J	Charcoal	1134	Italian(?)	Charcoal lens
26EU827	6460	P-J	Charcoal Making	518	Italian(?)	Charcoal lens
26EU831	6300	P-J/Sage	Woodcutting	2160	—	Axe cut wood pile
26EU875	7260	P-J	Charcoal Making	Isolate	Italian(?)	Charcoal platform
26EU877	7080	J-Sage	Debris	Isolate	Unknown	Enameled cook pot and coffeepot
26EU878	7100	J-Sage	Charcoal Making	Isolate	Italian(?)	Charcoal platform
26EU883	7080	J-Sage	Charcoal Making	1080	Italian(?)	Charcoal platform
26EU884	7040	J-Sage	Charcoal Making	Isolate	Italian(?)	Charcoal platform
26EU887	6930	P-J	Debris	Isolate	Unknown	Lard can with handle
26EU889	6770	P-J	Charcoal Making	2430	Italian(?)	Charcoal platform; debris fragments
26EU890	6900	P-J	Debris	Isolate	Unknown	Tobacco tin; glass sherds
26EU894	6950	J-Sage	Charcoal Making	691	Italian(?)	Charcoal platform
26EU895	6810	P-J	Debris Making	Isolate	Unknown	Large hole-in-top can
26EU921	6800	Big Sage	Debris	Isolate	Unknown	Hole-in-top can
26EU923	6550	J-Sage	Charcoal Making	540	Italian(?)	Charcoal platform
26EU924	6590	J-Sage	Charcoal Making	270	Italian(?)	Charcoal platform
26EU925	6480	J-Sage	Debris	Isolate	Unknown	Four hole-in-top cans
26EU926	6490	J-Sage	Debris	Isolate	Unknown	Wash tub
26EU927	6590	J-Sage	Debris	540	Italian(?)	Charcoal platform
26EU928	6535	P-J	Debris	Isolate	Unknown	Broken white ceramic cup
26EU931	6560	J-Sage	Charcoal Making	1080	Italian(?)	Charcoal platform
26EU935	6470	J-Sage	Charcoal Making	540	Italian(?)	Charcoal platform
26EU939	6360	J-Sage	Charcoal Making	691	Italian(?)	& Son...White Rose" Charcoal platform

Table 3-13 Summary of Sites Recorded in the Mine Area (Continued)

Site No.	Elev. (ft)	Vegetation Zone	Site Type	Area (sq ft)	Cultural Group	Cultural Remains
26EU940	6310	P-J	Debris	Isolate	Unknown	Hole-in-top can
26EU943	6160	Big Sage	Debris	Isolate	Unknown	Champagne bottle
26EU944	6170	Big Sage	Debris	Isolate	Unknown	Hole-in-top can
26EU945	6180	Big Sage	Debris	Isolate	Unknown	Hole-in-top can
26EU947	6100	Big Sage	Debris	Isolate	Unknown	Square base bottle frags.
26EU952	6430	Big Sage	Debris	Isolate	Unknown	Enameled metal bowl
26EU953	6440	J-Sage	Charcoal Making	4860	Italian(?)	Charcoal platform; metal pail
26EU954	6350	J-Sage	Debris	Isolate	Unknown	Cut-down 55 gal. drum with handles
26EU957	6270	P-J	Debris	Isolate	Unknown	Ceramic pasteware plate fragment
26EU962	5990	Big Sage	Debris	Isolate	Unknown	Well/cistern cover, Patent May 10 04
26EU963	6430	Big Sage	Charcoal	Isolate	Italian(?)	Charcoal platform
26EU968	6800	J-Sage	Debris	Isolate	Unknown	Can lid
26EU969	6720	J-Sage	Debris	Isolate	Unknown	Hole-in-top can lid
26EU978	7440	B-S	Charcoal Making	6750	Italian(?)	Charcoal platform; one hole-in-top can
26EU981	6360	P-J	Charcoal Making	3888	Italian(?)	3 charcoal platforms
26EU986	6330	Big Sage	Isolate	—	Unknown	Olive glass kickup base; green glass fgs.
26EU987	6580	Big Sage	Charcoal Making	1080	Italian(?)	1 charcoal platform; 2 solder seam cans
26EU988	6600	Big Sage	Charcoal Making	27000	Italian(?)	3-4 charcoal platforms at camp; glass, metal fgs.; heat-altered rock (kiln?)
26EU990	6740	P-J	Unknown	270	Unknown	Pit and rock ring
26EU991	6700	P-J	Charcoal Making	2808	Italian(?)	Charcoal platform; axe head & hole-in-top can
26EU992	6590	P-J	Debris	270	Unknown	Hole-in-top can scatter
26EU993	6560	P-J	Charcoal Making	1620	Italian(?)	Charcoal platform; glass fgs;
26EU994	6480	Big Sage	Charcoal Making	324	Italian(?)	Charcoal platform; hole-in-top can; homemade sieve
26EU997	6320	Big Sage	Debris	10	Unknown	3 crockery fragments
26EU998	6340	P-J	Debris	—	Unknown	Glass, metal, hole-in-top cans; opium tin
26EU999	6320	Big Sage	Debris	—	Unknown	2 hole-in-top cans; 1 crimped seam can
26EU1002	6670	Big Sage	Charcoal Making	1080	Italian(?)	Charcoal platform; baking powder lid
26EU1005	6850	P-J	Debris Making	—	Unknown	1 glass fragment milled wood
26EU1010	6930	P-J	Charcoal Making	—	Italian(?)	Charcoal platform; 85+ hole-in-top cans
26EU1011	7400	P-J	Debris	972000	Unknown	Pipe frag.; part of large prehistoric site
26EU1028	6900	Big Sage	Debris	25920	Unknown	Hole-in-top cans, glass, crockery, metal fgs.
26EU1029	6860	P-J	Debris	1080	Unknown	Hole-in-top cans; tobacco tins
26EU1045	6420	P-J	Debris	5400	Unknown	Glass; shovel; bucket; hole-in-top cans; bowl
26EU1048	6380	P-J	Debris	—	Unknown	Solder seam, crimp seam, evap. milk cans

*Site also has prehistoric component

Table 3-13 Summary of Historic Sites Recorded in the Mine Area (Continued)

Alternative 4C

26EU784	6600	P-J/Sage	Fence Corral	432000	—	Juniper pole fence; brush corral; axe cut stumps
26EU804	6540	P-J	Campsite	—	—	Stove pipe, cans, baling wire, button, bucket

1/ Possibly fit criteria for eligibility for listing on the National Register of Historic Places.
2/ Site contains prehistoric component

Source: Intermountain Research, Inc. (1983)

thirty miscellaneous debris, one trail associated and two unknown sites.

Two historic sites along the railroad are particularly interesting. Site 26EU787, feature II, is a railroad siding with an associated habitation area, located about a mile east of the Mt. Hope Mine on the dismantled Eureka and Palisade Railroad. Cultural materials consist of a dense scatter of cans, bottle fragments, porcelain and other debris. Most of the trash appears to date from the turn of the century to the 1930's. That the site is a railroad siding is indicated by two parallel sets of railroad ties that are still in situ. The site may be the Summit Station referred to in historic literature. Site 26EU787, feature B, is a Chinese habitation site.

Another railroad-related site (26EU790) is situated on a sagebrush covered ridge overlooking Tyrone Creek. The presence of Chinese ceramics suggests that the historic occupation of the site represents a Chinese railroad workcamp dating from the 1875 construction of the Eureka and Palisade Railroad.

Alternative 4 - Tailings Pond Site 4-C.

The two historic sites found are a fence and bush corral (26EU784) and a small campsite (26EU804).

3.9.2.3 Eligibility for National Register of Historic Places Listing

Fifteen sites located within the mine area and potentially affected by the project were identified as being eligible for National Register listing. These are 26EU787, features B and II, 788, 790, 800, 923, 924, 931, 982, 983, 987, 988, 991, 993, 994 and 1011.

3.9.3 Pony Express Trail

As discussed in Section 3.9.1, the pony express service was known to utilize lands in the vicinity of Mt. Hope. Land use is believed to have involved trail route establishment through the proposed land acquisition area. Public scoping meetings relative to the project brought forward the fact that each year a commemorative Pony Express Trail ride is conducted and includes traversing the lands within the land acquisition boundaries. Figure 3-10 (Land Use) illustrates the commemorative routing of the Pony Express Trail as delineated by Mr. William Arant, President, National Pony Express Association.

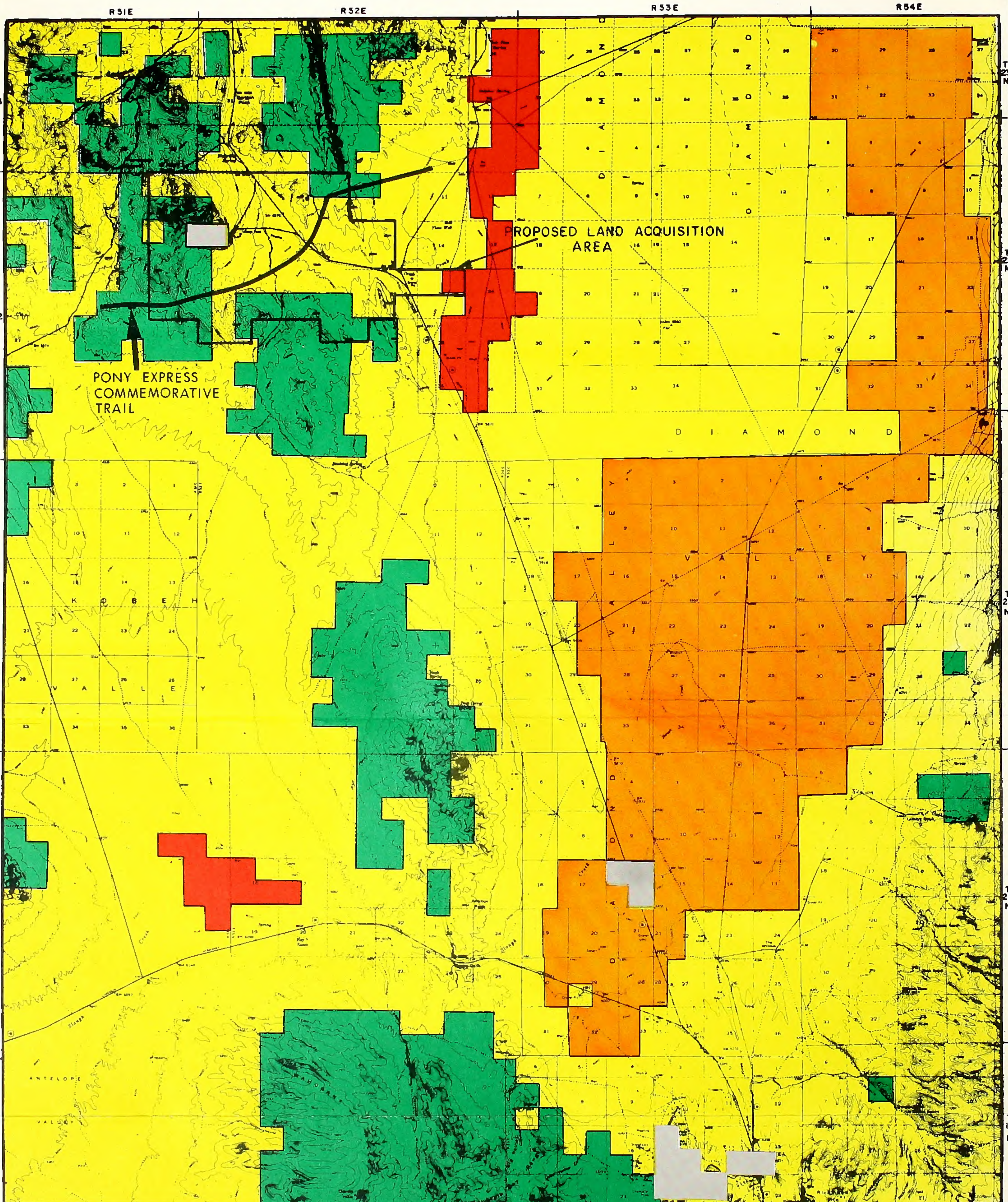
3.10 Land Use, Transportation and Noise

Detailed reviews of regional land use, transportation and noise characteristics are presented in Technical Report No.8.

3.10.1 Land Use

3.10.1.1 Land Ownership

Present land use patterns in Eureka County are principally influenced by ownership of lands and area environmental characteristics. Historical land use, especially in the Town of Eureka and Mt. Hope areas has involved mineral resource exploitation since the late 1800's. Ranching utilization in Diamond Valley subsequently developed and expanded to include agricultural use in the limited valley areas proximal to naturally available water. Early irrigation well system developments (1949) allowed expanded agricultural use of the Diamond and Kobeh valley floors. Present land uses within the county include farming, ranching, mining, residential, oil and gas exploration and recreation. A general land use map is presented as Figure 3-10.



PROPOSED LAND ACQUISITION AREA BOUNDARY

MOUNTAIN FOREST AND BRUSHLANDS

DESERT BRUSH AND SHRUBLANDS

SCRUBLANDS

AGRICULTURAL LANDS

PRESENT HUMAN USE / OCCUPIED LANDS (e.g. EUREKA TOWN)

BASE: USGS TOPO QUADRANGLES, GARDEN VALLEY, WHISTLER MTN, DIAMOND SPRINGS & EUREKA, NEVADA.

0 1 2 3 4 5 Miles

0 1 2 3 4 5 6 7 8 Km.

Nevada MAP AREA

N

MT. HOPE MOLYBDENUM PROJECT

EXISTING LAND USE PATTERNS

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-10

Approximately 69 percent (48.8 million acres) of the land in Nevada is administered by the BLM due to federal ownership. Eureka County encompasses approximately 2.676 million acres of total land, 75 percent of which is administered by the BLM (approximately 2.022 million acres). Comprehensive planning by the BLM is presently underway for lands administered and includes all types of uses from recreation, fauna management, watershed management, mining, livestock grazing and timber production on the more heavily forested portions of the land.

Additional public ownership in Eureka County includes lands administered by the U.S. Forest Service (165,000 acres; 7 percent), county-owned lands totalling 2,080 acres and 70 acres of recreation/public purpose lands (less than 1/10th of one percent). Private land ownership (commercial, residential, agricultural, railroad) equals 486,194 acres or 18 percent of total county land area (Ithurralde, J. County Tax Assessors Office, personal communication, 1983). Lands presently involving Native Americans are potentially included in Eureka County and are discussed in the following subsection.

The majority of land use controls in Eureka County are those established by the BLM in its administration of public lands. Primary land use goals and proposed controls are based on specific criteria developed as part of the Final Shoshone-Eureka Resource Management Plan. Land use controls established by local government are currently limited to an adopted land division ordinance. The county has not established a zoning ordinance or building codes. A County General Plan prepared under contract with the Nevada Urban Planning Division and the Eureka County Commissioners in 1974 and amended in 1982, serves as a primary land use guide.

The environmental factors of soils, topography, hydrology etc. characteristic of Eureka County and the Mt. Hope area significantly affect most categories of land resource utilization potential. Relative to regional (five county area) and state agricultural/ranching values, Diamond and Kobeh valleys represent areas of comparatively high utilization benefit. Limited water availability, climatic and topographic conditions, however, limit total land commitment to agriculture. Population distribution (e.g. residential, commercial) is primarily a reflection of economic influences (e.g. agriculture/ranching and local dependency on mine siting).

The following presents brief summaries of Mt. Hope area land use patterns with respect to Native Americans, agricultural, grazing, recreation and visual resources.

3.10.1.2 Native Americans

The American Indian Religious Freedom Act provides for the preservation and protection of sacred places, animals, plants and artifacts. It also ensures freedom of access to these by Native Americans. The Historic Preservation Act calls upon government agencies to pursue actively the preservation of significant historic sites, archaeological sites and culturally important locations. The Advisory Council on Historic Preservation encourages the participation of relevant, federally recognized tribes during the evaluation of cultural resource significance and the development of impact management alternatives.

No reservation lands are near the project area; however, the region in which Mt. Hope is located was once occupied by the Western Shoshone. In order to ensure an opportunity for the early identification of potential Native American concerns with regard to the Mt. Hope project, Intermountain

Research initiated contact with various Indian groups in Nevada in February and March, 1983. Letters introducing the proposed Mt. Hope project were sent to the Inter-Tribal Council of Nevada, the Paiute Shoshone Tribe of Fallon, the Duckwater Shoshone Tribe, the Yomba Shoshone Tribe and the Battle Mountain Colony (Te-Moak Bands of Western Shoshone). Comments and suggestions with regard to contemporary Indian land use and concerns were solicited.

One response was received; the Duckwater Shoshone Tribe wrote to present the information that the Western Shoshone and the United States are presently in litigation with regard to the disposition of the land in the project area (as well as other lands). Copies of correspondence relating to Native American consultations appear in Technical Report No.8.

3.10.1.3 Agricultural Lands

Agricultural areas in the Mt. Hope region are restricted to Diamond and Kobeh Valleys. Although proposed power line and pipeline routing will cross in part such lands, the primary mine/process plant site area does not include cropland areas. The main crop produced is alfalfa (88 percent of Diamond Valley production acreage); the secondary crop is small grain.

Acreage in production for Diamond Valley in 1981 totalled approximately 35,000 acres (30,740 in alfalfa, 4,000 in grain and 260 in pasture). The majority of cropland acreage required irrigation, as indicated in Section 3.5, Hydrology (in excess of 70,300 acre-feet per year in Diamond Valley; 3,240 acre-feet in Kobeh Valley). Average yields per acre in Diamond Valley for alfalfa and grain equalled 4.0 and 1.5 tons per acre, respectively in 1981. It is projected that in year 2000, Diamond Valley and Kobeh Valley irrigated croplands will total 37,000 and 1,800 acres, respectively, (Desert Research Institute, 1980).

3.10.1.4 Grazing Lands

Rangeland is extensive throughout the Mt. Hope region. The Battle Mountain District is responsible for administering the lands in the Mt. Hope region and characterized management levels by planning units and individual allotments containing animal unit months (AUM - the amount of forage required by an animal-unit for one month). Numerical establishment of AUMs available in each allotment were based on an occular range survey in 1964. The actual number of AUMs available will flucuate on a yearly basis due to weather variations.

The Mt. Hope region includes portions of two separate planning units: the Devils Gate Planning Unit which includes the Romano allotment and the Pony Express Planning Unit which includes the Roberts Mountain allotment.

The Romano allotment, includes a total of 3,034-3,708 AUMs in an area of 67,450 acres. The Roberts Mountain allotment includes a total of 18,444-22,542 AUMs in an area of 227,000 acres. The Roberts Mountain allotment includes three crested wheatgrass seedings in the north end of Kobeh valley. Allotment boundaries within the Mt. Hope region are illustrated on Figure 3-8. The AUMs available for grazing within the Mt. Hope site are 358-438. Approximately 87 percent (311-381) exist within the Romano allotment, and 13 percent (47-57) exist within the Roberts Mountain allotment.

The range user in the Romano allotment is licensed to run cattle from April to December and the range user in the Roberts Mountain allotment is licensed to run cattle and sheep from March to December. Both range users are currently using their allotments within the Mt. Hope site. The range user in the Romano allotment has a grazing permit from March 1, 1980 to February 28, 1990 and the range user in the Roberts Mountain allotment has a grazing permit from March 1, 1979 to February 28, 1989.

3.10.1.5 Recreation

Lands involving a recreational use commitment are limited in Eureka County and the Mt. Hope area. BLM lands provide the major areas of dispersed recreation activity involving hunting, fishing, hiking, rock-hounding, etc. No major federal or state lands have been established for centralized recreational purposes (e.g., improved campgrounds) in Eureka County. The nearest such site to the Mt. Hope/Eureka Town area is the BLM administered Hickison Petroglyph Site in Lander County (approximately 45 miles east of Eureka, 200 visitor days). The majority of land areas for centralized recreational use (picnic and rodeo grounds, museums, etc.) are located in close proximity to community population centers.

Future development of recreational use areas on public lands is planned to a limited extent. Increased utilization of the Toiyabe National Forest, partially extending into southwest corner of Eureka County, may warrant improved recreational site development in the future although the U.S. Forest Service does not anticipate any major recreational developments between 1983 and 1990 (HDR, 1980c). BLM's proposed management plans regarding the Roberts Wilderness Study Area and surrounding environs do not encompass recreational facility/area developments.

Hunting of big and upland game is an important form of recreation in Eureka County. The primary hunting harvest in Eureka County consists of sage grouse and mule deer. An area which runs beyond the western boundary of the proposed Mt. Hope site and extends southwest to northwest (from the southern portion of the Roberts Mountains southward into upper northeast Kobeh Valley) is commonly utilized by mule deer and sage grouse hunters.

The legal harvest of mule deer for Management Area 14, of which approximately 70 percent of Eureka County falls within has ranged from 788-1,183 animals for the years 1978-1983 (D. Elliot, Nevada Department of Wildlife, personal communication, 1983). Estimates indicate that approximately 200 mule deer move through the proposed site area as compared to a population estimate of 4,000 to 4,500 deer for Eureka County (D. Elliot, 1983).

The sage grouse season is presently only seven days with a bag limit of two per day or four total for the season. In Eureka County, the number of hunters recorded (D. Elliot, 1983) ranged from 203 to 574 per year during the 1976-1980 period and total birds harvested ranged from 830 to 1,865.

3.10.1.6 Timber Products and Pine Nut Gathering

There are nearly 600,000 acres of pinyon-juniper woodland classified as forest available for woodland products management in the Shoshone-Eureka Resource Area. Of this, less than 20 percent or 120,000 acres is currently accessible for woodland harvest. Demand for woodland products has been steadily increasing over the last decade. Current annual demand is for approximately 1,000 cords of firewood, 5,000 Christmas trees, 4,000 juniper posts, and 52,500 pounds of pine nuts (U.S.D.I., 1983f).

The Mt. Hope site study area represents a prime commercial Christmas tree site which currently produces a sustained yield of 300 to 500 trees annually. Fair to good crops of pine nuts are additionally reported in the site study area (U.S.D.I., 1983f).

3.10.2 Visual Resources

Visual Resource Management Classes set limits on the amount of contrast which will be allowed in an area between a management activity (road, power line, fence, etc.) and the existing landscape. All areas in the Shoshone Eureka Resource Area fall into Class IV, III, or II. The Mt. Hope area encompasses lands characterized as Class III and Class IV.

Class IV, the least restrictive of the three classes, predominates in the Mt. Hope area. A management activity in this class could draw attention as a dominant feature in the landscape, but it should be planned so as to minimize the contrast by repeating the form, line, color, and texture of the characteristic landscape. Most of the resource area has been designated as Class IV.

A Class III area in the vicinity of Mt. Hope generally encircles the portion of State Route 278 entering the project area through the erosional gap of Sulphur Spring and then extending to the north. In a Class III area, a management activity is expected to be evident, but does not draw attention to itself as a dominant feature in the landscape.

In a Class II area, a management activity may be visible, but must not attract attention as a contrast to the landscape. The Roberts Wilderness Study Area has been designated as Class II.

3.10.3 Transportation

In an area such as Eureka County, the availability and quality of a transportation network adequate to accommodate the necessarily long travel distances caused by remote locations and low population density is extremely important. The presently existing transportation system of Eureka County includes well-maintained ground, rail and air routes of adequate volume.

Ground Transportation

The public road system in Eureka County comprises a network of federal, state and county highways. As of 1980, total road and street mileage in Eureka County equalled 1904.4 miles. County rural roads accounted for 90.4 percent or 1721.6 miles of the total mileage. Remaining road mileage is distributed as interstate system 25.7 miles, federal aid primary system 47.4 miles, federal aid secondary system 103.1 miles, and a state aid route system entailing 6.6 miles of roadway.

The primary roadway pattern is city-oriented. State Route 278 (also mapped as State Route 51) extends north-south toward Carlin-Elko and Eureka. U.S. Route 50 extends east-west (generally bisecting the Town of Eureka area) to Austin and Ely (west and east of Eureka, respectively). As the county seat, the Town of Eureka represents the focus of the county ground transportation network. The total number of licensed vehicles in the county equalled 1,376 as of 1980. Type-distribution of vehicles tended toward trucks (650, 47.2 percent). Passenger cars and trailers accounted for a combined 713 units or 51.8 percent of the total (472 cars, 241 trailers). Intercounty transport does, however, add significantly to total road transport volumes. Annual averages of daily traffic volume (1981) indicate high utilization of U.S. 50 through Eureka with 1,535 to 1,680 vehicles per day. Travel on U.S. 50 immediately outside of Eureka averaged 680 vehicles per day (northwest portion toward Austin). State Route 278 traffic volume is substantially less, with approximately 205 vehicles per day travelling the two-lane north-south roadway near the Mt. Hope project site (Ward, T., Nevada Department of Transportation, personal communication, 1983).

System capacity is adequate and service level designations vary throughout the system due to variable lengths of road with free flow capability (open, 50 mph speed limit under good weather conditions) as well as significant mountain pass road lengths.

In addition to the primary highway system, numerous gravel and graded roads allow access to most county areas. State Highway 46, a graded gravel road originating in Eureka, extends along the eastern side of Diamond Valley and by way of Huntington Valley connects with U.S. Highway 40 at Elko. Graded roads have also been constructed along most section lines in developed Diamond Valley areas. Development of roads in Kobeh Valley has been very limited, indicative of the associated low use patterns of the valley itself.

Rail and Air Transportation

Eureka County is serviced by two railroad lines. Rail transport of freight only is available at a joint company station in Beowawe (Figurski, G., Union Pacific Railroad, personal communication, 1983). The nearest railway connections for passenger service are located at Ely (76 miles east of the Town of Eureka) and Carlin (about 100 miles north of the Town of Eureka). Both Southern Pacific and Western Pacific operate and maintain the railway system.

Two general aviation facilities exist in Eureka County, only one of which is located proximal to the Mt. Hope site in Diamond Valley. Maintained by the county, the Diamond Valley landing strip is limited to light private and commercial aircraft use.

3.10.4 Noise

Detailed discussion of baseline acoustic characteristics, limited to literature-based data and extrapolation, thereof, is presented in Technical Report No.8. Discussion herein is limited to establishment of baseline conditions.

Current man-made sources of noise within the Mt. Hope area are limited to: residential contributions (one source at Mt. Hope); EXXON activities on site; vehicular travel as occasioned by hunting, visitation, employment-seeking and site investigation activity; and, military overflights of variable frequency. As such it can be expected that noise levels would range from 20 dBA to 45 dBA (dB - decibels, A - scale weighted).

With respect to the nearest project-sensitive human receptor of noise and, therefore, important baseline noise characterization, the Town of Eureka represents an area of particular interest. Lacking major industrial activity, the Eureka baseline noise levels may be expected to predominantly reflect vehicular traffic of automobile and truck use (excepting infrequent excursion of fire siren, church bells, rodeo exhibition, etc). Traffic noise sources are excluded somewhat from the center of Eureka because the major regional interchange (US50 - SR278) is located 3.5 miles northwest of central downtown. Based on estimated traffic loads of 1980, maximum baseline noise levels are expected to range from 70 dBA (33 feet from road centerline) to 45 dBA (1,500 feet from road centerline). For comparison, a dBA of 70 is generally equivalent to the sound of a lawnmower and a dBA of 40 is equivalent to a suburban neighborhood with distant traffic noise background. A quiet rural area with no traffic commonly experiences noise at a 20 dBA level.

3.11 Socioeconomics

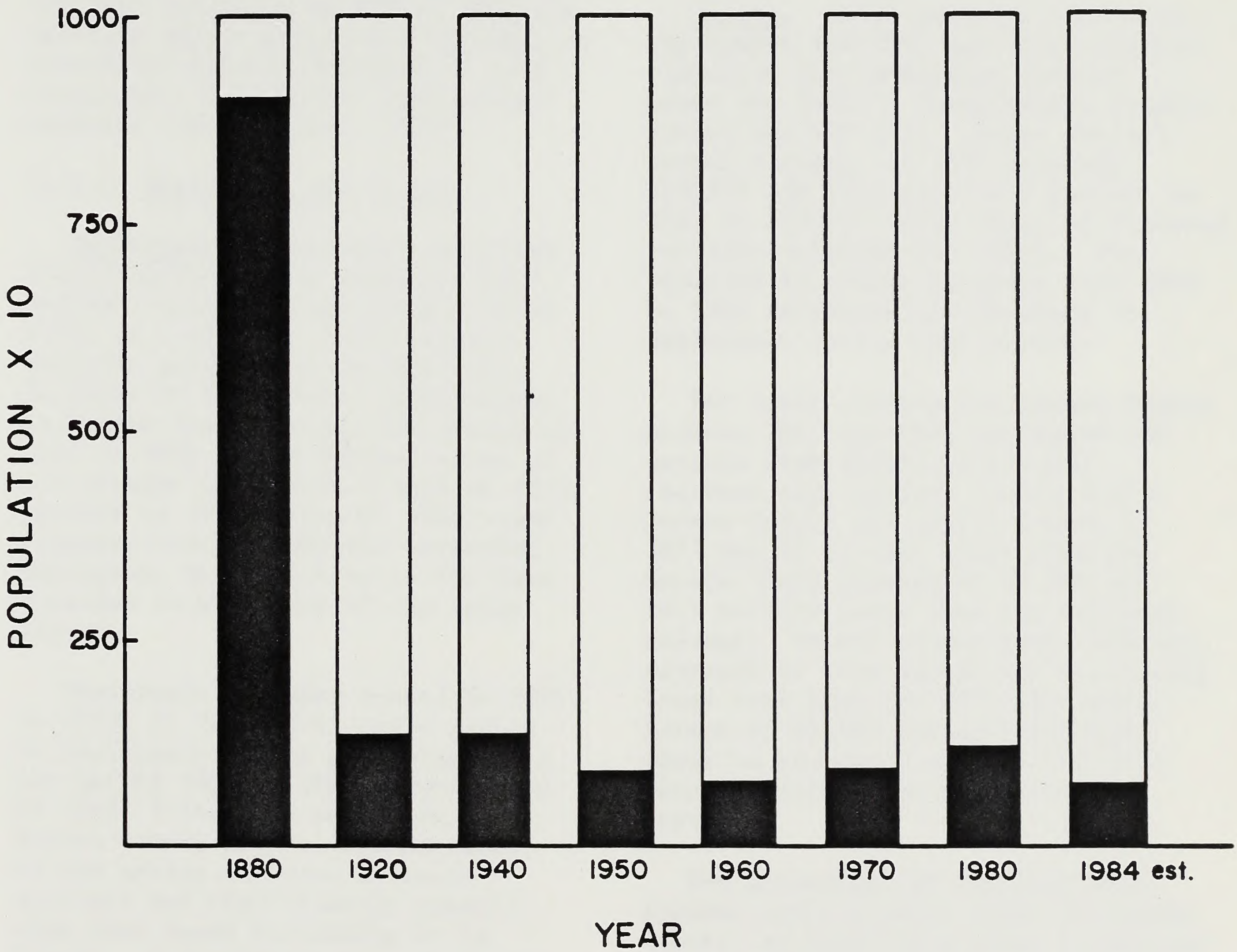
Socioeconomic data broadly characterizes the human utilization of a particular environment. The factors of population, income, employment, production, community development, housing, etc., describe a dynamic framework of land use and industrial and human interaction. The socioeconomic profile presented in this section describes the primary and secondary areas of potential project influence, specifically Eureka County (Sections 3.11.1 through 3.11.6) and the outlying affected area which includes the City of Elko and the community of Carlin (Section 3.11.7).

3.11.1 Population

Eureka County is located in the sparsely populated region of north central Nevada. Population density equals less than one person per three and one-half square miles (1980), the second lowest county average in the state. Historically, the population of the county has fluctuated significantly. Peak population exceeded 9,000 during the intense mineral mining activity of the 1880's. By the 1920's, diminished mining activity resulted in a decline of county population to approximately 1,350. Further population declines were recorded from 1940 to 1950 (pop. 896) and from 1950 to 1960 (pop. 767). Since 1960, however, the county population has steadily increased to a 1970 census of 948 and a 1980 census population of 1,198 (Figure 3-11). In 1980, more than half the county population resided in the unincorporated town and county seat of Eureka. The balance of the population resided primarily in the unincorporated towns of Crescent Valley and Beowawe at the north end of the county.

The recent trends in population for Eureka County show an increase of 26.5 percent between 1970 and 1980 and 23.6 percent between 1960 and 1970. These trends reflect increased mining and construction activity as well as the stabilization of local merchant, farming and ranching employment bases. Sporadic mining developments have had similar effects on population trends in the Town of Eureka. Overall population trends can be evaluated further by reviewing each component. During the period 1960 to 1970, net migration equalled 26.1 percent of base population while the natural increase was a negative 2.5 percent. Net migration during the next decade (1970-1980) decreased to approximately 18.9 percent of base population but the natural increase during that period was a positive 7.5 percent of baseline.

Predicting net population trends in an area with a dynamic population history such as Eureka County is very difficult. Literature-based projections of county and town populations are widely variant due to the diverse economic and industrial assumptions applied to the period between 1980 to 2000. Recent projections of Eureka County population by the Bureau of Business and Economic Research, University of Nevada at Reno suggest a population growth of 79 percent for the period between 1980 and the year 2000 (from population 1,198 to 2,145). Assumptions by the UNR Bureau of Business and Economic Research regarding the population growth include increased mining activity, energy development and outdoor recreation activities. Nearly any industrial scale development would create major changes due to the low population base and its sensitivity to flucuations. Within Eureka County, the Town of Eureka population is projected to increase to approximately 1,330 by the year 2000. While these projections represent an overall growth trend it is necessary to note that



MT. HOPE MOLYBDENUM PROJECT

HISTORICAL POPULATION OF EUREKA COUNTY, NEVADA

U.S. Department of the Interior
Bureau of Land Management

FIGURE 3-1

individual projects will cause short-term surges of population in both the county and the town. These surges are generally temporary, and for most projects, will be of short duration.

Indeed, the 1981-1983 national recession has apparently produced a significant downward trend in Eureka population as employment opportunities decreased. Mid-1983 town population has been estimated at 450 to 500, the decrease being largely attributable to area mine closures and lack of jobs (Pastorino, D., County Commissioner personal communication, 1983).

3.11.2 Employment and Income

Employment. Employment in Eureka County varied from a negative 2.63 percent annual average growth (1976-1978) to a dramatic 25.66 percent positive growth rate in 1980-1981. As shown on Table 3-14, unemployment in Eureka County during the period of 1976 to 1982 ranged between a low of 1.8 percent in 1978 to a high of 13.3 percent in 1982. (March, 1983 unemployment figures indicate worsening employment opportunities as the rate equalled 14.6 percent of the labor force).

Employment by major sector in 1981 is shown in Table 3-15 and a review of employment sector percentages for the period 1967 to 1981 is presented in Table 3-16. The extent to which Eureka County relies, economically, on the mining industry is quite apparent and significantly greater than that found nationally or in Nevada. Agricultural and government employment is also above state and federal averages. In total, the three employment sectors of mining, agriculture and government utilize 75 to 85 percent workforce.

Whereas the percentage of mining employment (55%) had been on the increase, the 1980-1983 recession has particularly affected the mining industry as a whole and thereby the Eureka County economy. Other economic sectors such as construction and manufacturing have grown progressively in Eureka County although the percentage of service industry employment remains substantially at a lower level than that found statewide or nationally.

Income. Total personal income in the county for 1981 was \$11.5 million (reported for industries covered under the State's Unemployment Compensation Law NRS 612). Gross average annual earnings in 1980 equalled \$15,369 and increased 21.2 percent in 1981 to \$18,620 (U.S. Dept. of Commerce revision expected for 1981). The increase in annual earnings from 1980 to 1981 reflected the increase in employment during that period.

Per capita income for Eureka County between 1977 and 1981 increased 109 percent from \$5,275 to \$11,042 (current year dollar) (Table 3-17). Eureka County per capita income in 1977 was 32 percent lower than the Nevada State average of \$7,808 and 24.5 percent lower than the national average. Recent events have, however, reversed to some extent the historical trend such that the 1979 per capita income of \$9,897 was approximately equal to the state average and 14.3 percent higher than the national average.

The percentage of families with incomes under poverty level in Eureka County, as based on a range of poverty income cut-offs adjusted by factors such as family size, gender of family head, number of children under 18 years, and farm/nonfarm residents equalled 10.4 percent in 1970. Census data for 1980 indicated that 27 percent of the Eureka County population (325 individuals) had annual incomes below designated poverty levels and that 61 of 302 families in the county (20.2

Table 3-14 Percent Unemployment for Selected Years

	1976	1977	1978	1980	1981	1982
Eureka County	5.0	3.8	1.8	5.0	5.1	13.3
Nevada	9.0	7.0	4.5	6.2	7.1	10.1
United States	7.7	7.0	6.0	7.1	7.6	9.7

Sources: Nevada Employment Security Department, Nevada and County Labor Force Summaries, (1976, 1977, 1978, and 1979) and Wright, D., U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Personal Communication, 1983 (for years 1980, 1981, 1982).

Table 3-15 1981 Employment by Major Economic Sector Eureka County 1/

Sector	1981 Employment	Employment Percent (705 Total)	Payroll $000	Number of Firms
Mining	388	55.0	8,662	11
Government 2/	102	14.5	1,206	7
Agriculture	NA	NA	NA	NA
Services	50	7.1	424	10
Trade	41	5.8	NA	15
Construction	30	4.3	NA	5
T.P.U.C. 3/	<10	<1	20	<3
F.I.R.E. 4/	<10	<1	70	<3
	+ 611	+ 86.7	+ 10,382	+ 50

1/ Covered employment by industry and payroll refers to those industries whose employees are covered under the State's Unemployment Compensation Law NRS 612.
2/ Number of Departments, Agencies - Federal, State, local.
3/ T.P.U.C. Transportation, Communication, Utility Industries
4/ F.I.R.E. Finance, Insurance, Real Estate Industries

Source: State of Nevada Office of Community Services, Eureka County Nevada Profile, 1982.

Table 3-16 Employment Sector and Percent Share - Annual Review, Eureka County

Employment Sector	1967 %	1977 %	1981 %
Mining	36.2	43.7	55.0
Government	16.9	21.8	14.5
Agriculture	22.3	20.2	12.3
Services	D	D	7.1
Manufacturing	0.0	D	5.8
Construction	D	<1.6	4.3
	-	-	99%

D - Data not disclosed

Source: Nevada State Employment Security Department, Nevada County Labor Force Summaries, Nevada Statistical Abstract, 1981.

Table 3-17 Estimated Per Capita Personal Income

	1977	1978	1979	1980	1981	1982
Eureka County	$5,275	$8,298	$9,897	$11,042	$11,299	$ 9,662
Nevada	7,808	8,878	9,789	10,758	11,778	12,022
United States	6,984	7,776	8,657	9,503	10,582	11,000

Source: Kennedy, G., U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Information System, Personal Communication, 1984.

percent) had family incomes of less than $5,000.

In the absence of the Mt. Hope project, the Eureka County economy is expected to continue as it has with sporadic fluctuations in the economic sectors of mining and government. Most future growth is anticipated to follow historical trends in response to mining and oil/gas developments. Although the renovation of the Town of Eureka and effective game management programs are expected to enhance the tourist and hunting service industries, significant population and industry growth will only be recognized as county and area mining/energy projects develop. The uncertainty in the economy since 1980 resulted in negative development throughout the region and has affected the Eureka County economy in a significant manner. The 1982-1990 period is projected, however, to potentially involve multiple industrial project developments, including the initiation and/or reopening of several mining operations.

The development of almost any project within the county or proximate region would affect the county economy. Substantial project development in adjacent counties which exceeds that within Eureka County might be expected to result in a net out-migration of population due to difficult commuter conditions (e.g., mountain passes and 90 mile distance to Ely-White Pine Power). Most proposed regional projects (e.g., White Pine Power Plant) are expected to require significant in-migration to support labor force requirements. Therefore, multiple project development in the region could be expected to significantly affect current demographic patterns and the economic conditions. Project developments within Eureka County may also affect demographics. A majority of the potential projects identified to date propose locations near the county borders which could result in an intracounty migration from the Town of Eureka to other locations.

In general, regional economic developments are expected to create higher employment, increased personal and per capita income and the need for more support services and facilities. However, Eureka County will likely continue to experience variable economic conditions as development proceeds, subject to the particular schedules and siting of future industrial and mining activities.

3.11.3 Housing

Eureka County contained 605 total housing units in 1980, approximately 43 percent of which were located in or proximal to the Town of Eureka. The remaining housing unit balance was mostly dispersed in the unincorporated towns of Crescent Valley and Beowawe. Of 605 total units, 56 were designed as seasonal or second homes and 549 units existed as available primary residences. A total of 446 primary dwelling units (81.2%) were occupied; 306 by owner, 140 by renter. Vacant units accounted for 103 of available primary housing units (18.8%). Single-family units accounted for 218 or 39.7% of the 549 primary residence units. Mobile home units were second in numerical rank order at 193 units or 35.2% of primary residence units, nearly three times the state average of 12.1 percent. Multiple family housing totalled 138 units; the number of persons per unit averaged 2.66 in 1980.

Median value of Eureka County single-family and mobile home units in 1980 equalled $22,700. Median cash rental for the same period equalled $128 per month. Government assisted financing for home construction and/or purchase (e.g. FHA, FMHA Loans) was available but not utilized in the county. No units received government assisted financing for rental construction, operation and/ or rental payment supplements.

Comparative review of 1970 and 1980 housing type data (Table 3-18) indicates that 100 percent of housing addition activity in Eureka County has been multi-family and mobile homes (negating single-family housing, 47.2% and 52.8% respectively). Between 1970 and 1980, an average of only 17 housing units were added to the housing stock per year. The total number of units was 44.9% higher than in 1970, excluding seasonal/second houses.

The number of multiple family units rose at a dramatic rate of 151% during the period of 1970 to 1980. The total number and rate of increase (93%) of mobile home units demonstrates substantially increased reliance upon that mode of housing, apparently indicating a trend toward centralizing population centers by work place.

The 10.4 percent increase of vacancy rate/housing availability (1970-1980) may not represent an entirely valid picture of the overall housing trend. The large increase of multiple family units would correspondingly allow a greater increase in vacancy ratios due to the nature of tenant use; specifically apartment dweller versus home owner stability. Although more units as a whole may be available, housing size, age or purpose may be the determining factor. Excess capacity in singlefamily housing may be nil, whereas apartment or boarding house occupancy may equal 75 to 85 percent, an acceptable industry minimum. In discussion held over the period 1981-1983, Eureka County officials emphasized that the significant lack of housing availability was primarily due to age and general condition of the existing units.

3.11.4 Local Government and Public Finance

Eureka County was established in 1873 by the Nevada State legislature in response to mining induced population growth. The unincorporated Town of Eureka was designated the county seat, at which time it represented the largest population center in central Nevada. Presently, the town and the county are governed by three elected commissioners, each representing a different district of the county. In addition to commissioners, the following officials are elected: assessor (Beowawe), constable, clerk/ treasurer, district attorney, justice of the peace (2), recorder/auditor and sheriff (Eureka). Officials of the Planning Board and T.V. Board are appointed. The number of county employees, including part-time and hourly (temporary), totalled 49 in 1981 and 47 in 1982.

Table 3-19 lists selected administrative services and special districts and programs operating as a function of local government. These districts and programs are created by the local government for special issues and the resolution of particular problems. County support of services and facilities includes an eight-person sheriff's department, volunteer fire department (partial), county road department, water and sewage, county pool and library, T.V. power relay, ambulance maintenance and a health clinic with full-time doctor in residence.

The tentative 1983-1984 Eureka County budget of $1,734,030 represents a negative 34 percent change from the 1981-1982 budget of $2,626,060. This is a marked change from the increasing budget trends of prior years (1980-81 equalling $2,104,454 and 1979-80 equalling $1,587,761). The decline represents the effects of both a recessionary economy and tax restruc-

Table 3-18 Housing Type - Historical Review Eureka County 1/

Housing Type	1970	1980	% Change	# Unit Change/Yr.
Total Housing Units	379	549	44.9	17.0
Occupied Units	347	446	28.5	9.9
Vacant Units	32	103	221.9	7.1
Single-Family	224	218	-3.0	-0.6
Multiple Family	55	138	150.9	8.3
Mobile Home	100	193	93.0	9.3
Persons/Unit	2.73	2.66	-2.6	NA

1/ Does not include seasonal and second homes.

Source: State of Nevada Office of Community Services, Eureka County Nevada Profile, 1982 and U.S. Bureau of the Census, 1980.

Table 3-19 Selected Administrative Services, Special Districts and Programs Eureka County

Selected Administrative Services	
Civil Defense	Public Health Doctor
Cooperative Extension	Library
Drafting	Police
Diagnostic and Treatment Center	Public Works
Fire Protection	Roads
Justice Department	Rodent/Weed Control
Juvenile Probation	Recreation
Special Programs	
Diamond Valley Rodent Control	- (Town of Beowawe)
Diamond Valley Weed Control	- (Town of Eureka)
Special Districts	
Eureka County T.V. District	
Eureka County School District	

Source: State of Nevada Office of Community Services, Eureka County Profile, 1982.

turing. The county has substantially reduced special project budgets and overall expenditures in order to accommodate the fiscal constraints. Eureka County budgeting does not include the budget of the Eureka County School District which retains political independence.

On a regional basis, Eureka County has a moderately broad revenue base from which services are supported. During 1981, legislation greatly reduced the local jurisdiction's state reliance on assessed valuation taxes and substituted shared revenue from a statewide 5.75% sales and use tax (NRS Chapter 374). Increased state support, as guaranteed by current statute, is planned to offset revenue losses. The effect of the 1981 legislation is apparent in view of revenue/expenditure data and annual variations thereof. For example, approximately 51% of revenues were derived from the ad valorem taxes (0.7964 - 0.7464 per $100 assessed value) in 1980-1981; but only 13% was derived from the Ad Valorem tax in 1981-82.

Excluding debt service and major capital expenditures, the Eureka County revenues and operating expenses tend to be population and property value sensitive. The county property tax base (total assessed valuation) for 1982-1983 equalled $68.7 million, a five percent decrease from 1981-82 ($72,410,576). Comparing historical property tax revenue growth with total revenue growth, the county's increasing reliance on the property tax to support local public services is readily apparent. The percentage of property tax valuation attributable to net mining proceeds (1982-1983, $49.95 million of $68.72 million) indicates the significant value of the mining industry to the Eureka County economy.

The Eureka Town budget and associated allocations for 1980-81 and 1982-83 are presented on Table 3-20. The town supplements county services with health service facility support, fire department, streets and sewer support. In fiscal years 1979-80 to 1980-81 there was a 173 percent gain in the town budget (from $223,358 to $637,685). However, a decline began as a result of the recession and tax restructuring to the most recent budget of $195,752 in 1982-1983 and a tentative 1983-1984 budget of $139,709.

The tentative 1983-84 school district budget has been set as $1,440,620 which is a decrease of seven percent from the 1982-83 budget of $1,554,448. The 1983-84 budget represents a return to the budget amounts of previous years ($1,418,664 in 1980-1981 and $1,441,208 in 1979-1980).

Table 3-21 lists revenues and expenditures of the local jurisdictions for recent year periods on the basis of per capita.

Substantial economic interaction exists between Eureka County and the Eureka County School District. County developments such as the pool and sports complex were arranged to be constructed on other party property (i.e., pool on county property, sports complex on school property). As of May, 1983 the school district had an approximate debt capacity of $10.3 million (Wilcox, L., Nevada Department of Taxation, personal communication, 1983).

The future of Eureka County in terms of its public finance capabilities without the Mt. Hope project will largely be dependent upon five determining factors: 1) mining industry proceeds; 2) population growth; 3) property tax base; 4) availability of government and private financing; and 5) the impacts of 1981 legislation (or amendment thereof in 1983) limiting property tax rates and government spending.

Table 3-20 Town of Eureka Budget Fiscal Year 1980-81 and 1982-83

REVENUES	1980-1981 $	1982-1983 $
Ad Valorem Taxes	1,091	433
Supplemental County Relief	0	884
Licenses/Fees	870	1,500
Intergovernmental Revenue		
Payments in Lieu of Tax	44,768	40,000
Motor Vehicle Tax	2,579	4,137
State Gaming License Fee	46,663	52,000
Grants (APA Sewer-Federal)	249,252	-
Charges for Services		
Sewer	4,856	-
Bail Forfeit	20	-
Misc. Sales/Rentals	2,353	-
Opening Balance	6,811	96,798
EXPENDITURES		
Fire Department		
Salaries and Wages	720	1,000
Benefits	-	800
Services/Supplies	2,508	4,000
Capital Outlays	1,505	2,700
Streets/Highways		
Services/Supplies	810	40,000
Lights	3,078	8,000
Sewer		
Salaries and Wages	56	-
Services/Supplies	1,783	-
Capital Outlay	348,223	-
Water Fund Transfer	-	123,500
Contingency	-	1,600
End Fund Balance	580	14,152

Table 3-21 Revenues and Expenditures of Local Jurisdictions 1/
(Normal Annual Recurrent)

	Budget 1982/1983 2/			Budget 1981/1982 2/			
	Eureka Town	Eureka County	Eureka School District	Elko Town	Carlin Town	Elko County	Elko School District
Revenues	98,994	637,694	1,043,441	2,322,200	250,419	1,779,441	9,148,218
Expenditures	67,600	982,300	1,279,650	2,492,80	357,906	2,993,817	9,373,926
Population							
Total	585	1,184	1,184	9,668	1,269	18,938	18,938
School	213	225	225	2,812	318	4,218	4,218
Per Capita/(Student)							
Revenue	169.15	543.24	877.47	240.20	93.97	483.06	193.37
Expenditures	115.56	795.86	1,080.78	257.77	158.13	494.98	282.04
(Student)			(5,687.33)				(2,222.36)

1/ Omits capital outlays, opening and closing balances.

2/ For comparison purposes, budget years of 1982-1983 for Eureka jurisdictions and 1981-1982 for Elko jurisdictions provide best basis of similarity.

3.11.5 Attitudes and Lifestyles

Community field studies (e.g., comprehensive questionnaire, surveys, etc.) have not been initiated in the Town of Eureka due to the early phase of project activity. However, this section which discusses community attitudes and lifestyles has been prepared to reflect available data. The discussion is based largely on the results and comments expressed during the scoping meetings, in public response, letters and verbal communications to the BLM, as well as the professional experience of the preparers.

To determine the fiscal and socioeconomic baseline presented in the previous section, the WRC EIS team interviewed numerous individuals (both private citizens and public officials) in the Town of Eureka and Eureka County. While this section largely represents an overview of the literature-based information available concerning the Eureka County peoples and their lifestyle, certain qualitative views presented reflect both the results of WRC interviews and interpretations of the letters received and BLM forwarding of verbal comments from civic leaders in Eureka. In truth, the simple announcement of the EXXON Mt. Hope project has led to an exchange of ideas about present and potential lifestyles, thereby directly affecting the nature of the "baseline" attitudes and lifestyles. As dynamic in fluctuation of attitudes may be, the point of beginning for a "baseline" characterization must necessarily be current with EIS development regardless of the changes perhaps already underway. Lifestyles can be fairly well characterized as baseline, however, as the project factors most significantly capable of effecting change (e.g. population influx, economic surge, etc.) would not occur or be in place until following implementation of the proposed action or alternatives.

Thus, the following discussion attempts to relate the current (post announcement, pre DEIS publication) characteristics of Eureka County and Town lifestyles and attitudes. Historical characterizations, derived from literature, are presented as deemed relevant. The establishment of baseline conditions for impact analysis (Chapter 4.0) relative to lifestyles and attitudes has additionally involved the identification of community services and support facilities (e.g. schools, health care, recreation) of which availability and use factors provide important indicators of attitude. Chapter 4.0 relates discussion concerning the anticipated impacts of attitude/lifestyle relative to project effects upon community services and facilities and quality of life, thereof. Baseline conditions are presented elsewhere in this section.

The attitudes and lifestyles of the people of Eureka County and particularly the Town of Eureka, can historically be attributed to the predominant influence of mining and the area's general physiography. As exhibited by the historical background of its "boom and bust" economy resulting from fluctuating mining activities, and its western rural character, a strong degree of individualism and self-reliance exists among the population as a whole. Fiscal reliance upon entreprenurial enterprises (e.g. country stores, ranching, farming, etc.) as the sustaining mechanism of County/Town residency has played a major role in attitude development.

The traditional social structures and value systems associated with remote rural areas of the western U.S. appear to be characteristic of the Eureka County population, subject to the continuing influence of mining activity and fluctuations thereof. But, an increasingly important influence upon the county lifestyle is the trend toward immigration of urban people who are attracted by the relaxed, unhurried, rural atmosphere. An associated "anti-growth" attitude appears to have correspondingly developed to a limited extent and has to some degree contradicted the established attitude which has sought industry development.

Stabilizing factors to community lifestyle and attitude include the town's continuing role as county seat and primary population center, satisfactory transportation routes allowing acceptable mobility, and utilization of proximal lands for recreation, agriculture and ranching. The resident population of the town has increased the cohesiveness of its community through efforts to expand and renovate the town's historic character and promotion of tourism.

Interviews additionally indicated a strong community regard for the school facilities and activities offered, the establishment of the health clinic and social activities such as the week of rodeo competition and parade.

A Coordinated Resource Management and Planning group (CRMP) and the Eureka County Planning Commission are effectively operating within Eureka County and the Town of Eureka. Following the announcement of EXXON's proposed project plans, considerable interest was and continues to be expressed by the members of the Eureka County Planning Commission to immediately begin planning efforts in coordination with EXXON that will emphasize transitional mitigation of any anticipated social and economics impacts upon the town or county. While the early stage of project initiation has somewhat limited extensive planning design (but for which this EIS is a major initiating component and mechanism), the effect of the member interests has been to significantly indicate the strong personal and community desires that industry development not be prohibited but thoroughly integrated into the existing community in as beneficial a manner as possible.

Generally, the overall attitude of the affected population toward mining and industrial development appears to be similar to that common to rural communities when confronted with potential rapid growth, major changes in services provision (short term, long term) and associated lifestyle changes as described by the Institute for Social Science Research (1974). The degree of resistance to change in Eureka County is anticipated to be somewhat different, however. The increased emphasis on development of the towns "charm from by-gone days" and an increased number of in-migration residents fleeing urban environments has to some extent apparently created a wide divergence in perspectives toward local development of non-tourist industries. However, the Town's cultural and historical mining and dramatic population background may be expected to reflect a community more adaptable to social changes anticipated by project implementation.

Divergent attitudes of the community population have to some extent been magnified by the economy of the 1980's. While the community as a whole appears to share a positive attitude toward developmental prescriptions and associated changes in lifestyle (e.g., land use, population increase, transportation efficiency, services capability, etc.), the level of acceptability and tolerance for change varies significantly. Although local business people are anxious for the benefits of economic growth, newcomer groups "fleeing" urban environments together with some ranchers regard industry and mining developments as a potential source of highly negative impact. The perceived negatives may include over-population, shifts in status-quo politics and economic stature, and the potential for varying mores and lifestyles which industrial in-migrating populations are normally anticipated by some to represent.

3.11.6 Community Facilities and Services

Schools

School services in Eureka County are planned and administered by the Eureka County School District. Although the district's boundaries are the same as the county's; it is politically independent of the county. As of 1983, the district operated three schools; one elementary (K-6), one middle school (K-8) and one junior/senior high-school (7-12). No colleges are located in the county. The elementary and junior/senior schools are located in the Town of Eureka; the middle school is located in Beowawe. The 1981 combined capacity of these schools was 419 students, 319 in the Town of Eureka schools. Because of the distance from Beowawe to Eureka (117 miles), 26 students (1983) from Pine Valley and Crescent Valley attend school in Carlin under an agreement with the Elko County School District.

Enrollment in 1980-1981 totalled 213 pupils: 107 in grades K-6, 86 in grades 7-12, and 20 pupils were provided special education service. The 1980-1981 enrollment represented a 7.6 percent increase from 1979-1980. Recent reduction in enrollments (170 pupils, 1983) has been attributed to recessionary migration out of the county (Molke, S., Eureka County School District, personal communication, 1983). In 1983, the Eureka junior/senior high school had an enrollment of approximately 80 students. Enrollment in grades K-6 in 1983 included approximately 80 students in Eureka and 17 in Beowawe. Ten additional students are anticipated at Beowawe in 1984 due to the Cortez Mine operations (Molke, 1983).

Total district expenditures for the period 1979-1980 equalled $982,365, a per pupil basic support cost of $4,961. The 1982-1983 basic support cost has been set at $2,866 per student which translates to an actual per pupil cost of approximately $7,000 (Eureka) and $9,000 (Beowawe; small enrollment, under capacity enrollment) (Molke, 1983). Total teaching personnel equalled 15 in 1979-1980 and 18 in 1982-1983 (average teacher/student ratio of 1:14.2 and 1:9.4, respectively). Two nonteaching personnel were employed during the 1980-1981 and 1982-1983 school years. In addition to payroll, district expenditures include housing support (11 mobile homes, 5 houses, 1983), library (approximately 6,400 volumes, 1981) and ongoing development of a sports complex. Salary payrolls have decreased from ranking first in the State to position nine as a result of budget cut backs.

Interscholastic sports and music at the high school are emphasized, with major transportation provided by a large converted commercial bus. The community population is highly supportive of scholastic sports and 4-H Club affairs (Molke, 1983). The high school is active host to collegiate students (usually geology majors) during the summer when area surveys/field camps are conducted. Adult education night classes utilize high school facilities, particularly the ceramics equipment classroom. Vocational training is available utilizing well-equipped machine tooling facilities.

Due to dispersed student populations, bus transportation costs represent a major budgetary and planning element. The school district owns sixteen transportation vehicles, nine of which are dedicated to bussing (9 to 55 passenger capacities). Bus routes commonly require one hour or more of transportation time.

The school district owns limited acreage adjacent to both Eureka Town schools.

Health

Health care in Eureka County is provided by a number of governmental agencies (federal, state and local) and volunteer groups. Major medical facilities are not available in the county. Residents requiring hospital services normally obtain such care in the City of Elko, approximately 115 miles north. The Town of Eureka has an equipped health clinic and the state has secured a full-time resident doctor. In times of resident doctor absence, the state provides an assigned replacement. This state health care assistance is provided via the Nevada Rural Health Consortium. The county also maintains ambulances and a volunteer organization supplies licensed EMT ambulance attendants. Table 3-22 depicts typical health and medical expenses incurred by the county in fiscal year 1981-1983.

Law Enforcement

Law enforcement in Eureka County is provided primarily by the county sheriff's department and the county court system. The county sheriff's department in 1983 employed nine staff members; five sworn personnel and four civilian employees. Department operations are conducted from the County Courthouse located in the Town of Eureka. If land adjacent (behind) the Courthouse were required for expansion, it would have to be purchased from private ownership. The county has a Nevada State Highway Patrolman in residence.

Ratio of officers to population equals 4.2/1,000, a significantly low ratio but representative of the large county acreage and the distance between population centers at north and south ends of the county. Although the sheriff's department estimates a requirement of two additional duty officers, which would increase the officer-population ratio, present budget constraints apparently will limit this expansion (Carlson, B., County Sheriff, personal communication, 1983).

The department's transportation and communication capabilities are generally adequate for the limited staffing (four vehicles). Staffing levels appear fixed although personnel turnover was high in 1983 (85 percent). The high turnover rate is assumed to be infrequent in nature primarily being associated with change in administrations.

Eureka County has two justices of the peace with jurisdiction in Beowawe and the Town of Eureka. The Seventh Judicial District, with three courts, includes Eureka, Lincoln and White Pine counties.

Fire Protection

Fire protection in Eureka County is provided by four volunteer fire departments and federal/state agencies. Federal agency involvement is dictated by respective jurisdiction over public lands, particularly the BLM, U.S. Forest Service, and of Nevada Department of State Forestry which provide varying degrees of support at each fire department. Response to fire situations is generally reciprocal between the county and forest services and, if requested, may include out-of-county activity (e.g., Lander County) (Todd, J., Eureka Volunteer Fire Department, personal communication, 1983).

Table 3-22 Eureka County Health and Medical Expenses Fiscal Year 1981-1982

Expense Category	Expense $
Rural Health Nurse	2,500
Home Health Care	1,700
Clinic	49,006
Ambulance 1/	35,366
Indigent Medical	4,737
County Employee Insurance	49,778

1/ Includes purchase of new ambulance

Source: Eureka County Budget 1981-1982.

The largest volunteer department is the Eureka V.F.D. which registered 21 volunteers in 1983. Administratively based in the County Courthouse, the Eureka V.F.D. services one fire station with major equipment (state provided) including a 4-wheel drive 2,000-gallon tanker/pumper, 2.5 and 1.5 inch live lines, 750-gallon per minute (gpm) pack capability truck and one additional truck provided by the Nevada Department of Forestry. The Eureka V.F.D. is financed in large by city limit taxes. The fire insurance class rating, a commercial measure of system adequacy, is reported to be 7 or 8 (Todd, 1983).

Located near the Town of Eureka (approximately 15 miles north), the Diamond Valley V.F.D. registers four to eight volunteers and services a fire station with major equipment entailing a 6x6 500-gallon pumper (D. Conway, Diamond Valley Volunteer Fire Department, personal communication, 1983). Staffing availability is dependent on agricultural commitments. Located within the McNary Fire District of the U.S. Forest Service, the Diamond Valley V.F.D. is financed by state, federal and county monies. The Forest Service has provided the single truck and performs most maintenance. Communication is via one-way Plectron radio.

Other county volunteer departments include Beowawe V.F.D. and Crescent V.F.D., neither of which service fire stations. The Beowawe V.F.D. registers four volunteers, Crescent V.F.D. registers one volunteer.

Public Utilities and Communications

Electrical services are provided by the Mt. Wheeler Power Company (Southern Eureka County) and the Sierra Pacific Power Company (Northern Eureka County). Telephone service in Eureka County is provided by Nevada Bell (Nevada Telephone and Telegraph Company). Natural gas, propane and heating oil services are available to county residents from multiple companies based in Ely, White Pine County.

In the project area, Mt. Wheeler Power Company presently operates the Machacek Substation near the Town of Eureka. The Sierra Pacific Power Company owns a 230-kilovolt power line transecting the county east-west. In 1971, Mt. Wheeler and Sierra Pacific entered into contract providing Mt. Wheeler Power capacity rights of 40,000 kilowatts (KW) during the summer season (April through September) and 22,000 KW during the winter season (October through March). Subsequent power provision capacity was obtained through Mt. Wheeler's membership with the Intermountain Consumer Power Association (ICPA) whereby the Mt. Wheeler Power Colorado River Storage Project proceeded and resulted in an allocation of 22,000 KW (summer season) and 12,800 KW during the winter season. Additional power supply planning, both in association with ICPA and independently, has included Mt. Wheeler Power Company participation in the Desert Generation and Power Cooperative which has purchased 100 megawatts (MW) in Utah Power and Light Company's Unit No. 2, Hunter Generating Station, Intermountain Power Project which will provide a 230-kv power capacity to Mt. Wheeler when constructed (proposed 1985-1986), and the White Pine Power Project which additionally involves another 230-kv power capacity from the 1,500-MW plant proposed for operation in mid-1989.

Telephone service in Eureka County is anticipated to generally remain as of present although limited expansion and upgrading continues as an ongoing yearly activity.

Television service is provided by the Eureka T.V. District which is funded through a county tax. A relay transmitter located on Prospect Peak operating at full capacity relays major networks from Salt Lake City and Nevada (via Ely and Elko-Reno, respectively). Two radio stations (FM) are additionally relayed via the T.V. District. One newspaper, The Eureka Sentinel, is distributed weekly in the Town of Eureka and is the main source of local and regional printed news with an estimated weekly circulation of 600. Several major daily newspapers routed from Ely and Elko are also available in the Town of Eureka.

Water and Wastewater

Dependent on location, Eureka County residents are reliant upon county-provided water and wastewater services or on independent means. The county supplies water and sewer services to Town of Eureka residents. Some town residents retain independent well-water supply systems. Major water services in the county are provided by the Crescent Valley Water System (Crescent Valley service area - 1980 population served, 90) and the Eureka Water Assistance System (Eureka County service area - 1980 population served, 450). Major wastewater services are limited to that provided by the Eureka Wastewater Treatment Facility (1980 population served, 475). Residential and commercial water use in 1982 equalled approximately one million gallons per month (Fiorenzi, L. Eureka Town Public Works Department, personal communication, 1983).

Due to a shortage of water supply capacity, a moratorium on new water connections existed during the period 1980-1982. System improvements during the period 1982-1983 have resulted in a cessation of the moratorium and include the addition of two additional wells and a 300,000 gallon storage tank. The distribution system is additionally undergoing partial improvement. Some undersized mains in the downtown area result in difficult fire flow capacity maintenance.

The Town of Eureka sanitary sewage collection system was constructed in 1981; the associated sewage treatment lagoons were designed for a 50-year life, base population level of 450 with four percent annual increase. Evaporation and percolation lagoons represent the principal wastewater treatment system components.

Solid Waste

Organized solid waste disposal in Eureka County is primarily limited to use of authorized landfill areas on BLM lands. The county operates and maintains a 40-acre landfill 2.5 miles north of the Town of Eureka. Additional landfills exist in Diamond Valley (county road department maintains), Crescent Valley and Beowawe. Collection service in the Town of Eureka is provided primarily by the county.

Community Facilities

The recent interest in developing a cohesive community and encouraging renovation of the town has prompted multiple projects directed toward attracting resident participation and increasing the level of personal satisfaction with life in the area. As in the past, the County Courthouse remains the focal point of town gatherings dealing with community planning and community affairs. The community facilities existing within Eureka County are predominantly located in the Town of Eureka. These include in part a county swimming pool (constructed 1977), the Eureka Sentinel Museum, Eureka County Branch Library (1982), Senior Citizens Center offering transportation to Ely and Elko, community park and rodeo arena and U.S. Post Office. The school district is presently constructing a sports complex which is expected to provide public use opportunity.

Five churches are located in the area of the Town of Eureka: Catholic, Church of Latter Day Saints, Episcopal, Presbyterian and Baptist. More than a dozen community service and special interest organizations function in Eureka Town, as well as several federal and state agency offices.

3.11.7 Regional Area Socioeconomics

The demographic assumptions accompanying the Decentralized Workforce Alternative (Alternative 5-B) entail a "natural" distribution of the workforce within the existing communities of Eureka, Elko and Carlin, and require the analysis of baseline conditions for each of the potentially affected areas. Eureka County and Eureka Town socioeconomics, as well as overall environment descriptions, have been detailed in preceding sections.

Description of Affected Regional Areas

Elko County, adjacent to the northern part of Eureka County, encompasses 17,181 square miles and is the second largest county in Nevada. As Figure 1-1 illustrates, the communities of Elko and Carlin are in close proximity to Eureka County and are the primary trade and residential centers nearest the junction of State Route 278 (north-south to Eureka) and I-80 (major travel route to Reno-Salt Lake City). Elko County was established in 1869 and has experienced relatively consistent patterns of population and industrial growth. The City of Elko is the county seat and lies on the Humboldt River. Its location along I-80 between Salt Lake City and Reno has contributed substantially to its socioeconomic environment. The City of Carlin is located 23 miles southwest of Elko; directly at the junction of State Route 278 from Eureka and I-80. The predominant socioeconomic influences in the City of Carlin include two major railroad operations and proximity to Elko.

Elko County Socioeconomics

Several population centers and associated industries contribute to the general Elko County socioeconomic environment. In 1980, Elko County population totalled 17,269 individuals; Elko City and Carlin populations totalled 9,990 or 57.8 percent of the county population. Bureau of Business and Economic Research projections for county population growth indicate a year 2000 population of 28,962, representing an increase of 67.7 percent. Population density is just less than one person per square mile. Contrary to Eureka County distribution, approximately half the Elko County population resides in an urban area (Eureka County 100 percent rural). The percentage change from 1970-1980 indicates that the growth of rural areas (34.3%) is significantly higher than urban area growth (14.9%). Median family income in Elko County during the period 1970-1980 increased 164 percent ($9,900-1970; $26,100-1980). Per capita income in 1980 equalled $10,640, a 29% increase from 1978 ($8,247). Unemployment rates from 1980 (4.6 percent) and 1981 (4.9 percent) to 1982 (12.4 percent) indicate the effects of the national recession.

Total county employment (as measured by State Unemployment Compensation Law NRS 612 coverage) in 1981 equalled 649 business firms and governmental agencies. The industries of finance, insurance, real estate and services employed 4,927 persons (55% of total employment) and were distributed among 370 firms. Total federal, state and local government employment equalled 1,769 in 34 agencies. Total county payroll in 1981 (NRS 612) equalled $123,801,107. A substantial area of mining activity, Elko County net proceeds of mines assessed valuation totalled $11,199,440 in fiscal year 1981-1982. This represented a 86.6 percent change from fiscal year 1980-1981 of $6,000,608. Although numerous mine reopenings occurred in late 1982-1983, net proceeds for 1982-1983 are expected to reflect the recessionary downturn in mining. Gaming activity produced gross taxable revenues in 1981 of $45,335,138, a 20.5 percent change from fiscal year 1980 ($37,636,416).

Elko County is governed by a county manager and three elected county commissioners. In addition, an appointed seven member planning commission is active. Although somewhat seasonal in number, total county government employment is approximately 228. Administrative services of the county are extensive and include ambulance, health, road maintenance, recreation, welfare, sheriff and the courts system. As in Eureka County, special districts are created for singular issues and include T.V. service, fire protection and water provision. Detailed county government finance information is presented in Technical Report No.9.

Housing characteristics in Elko County describe a total of 7,667 units in 1980, 6,350 of which were occupied as primary residences. Distribution of housing by type included 3,906 single family units, 1,823 mobile home units and 1,470 multiple family units. Average persons per unit was 2.67 in 1980. Median value for single-family and mobile home units was estimated at $49,900. Median cash rent was $157 per month.

Eighteen schools exist in Elko County and include a two-year college and one vocational school. Facilities and services within the county include more than 2,800 campsites, 105 service organizations, 59 fraternal organizations, 26 churchs and major hospital care units.

Elko and Carlin Community Socioeconomics

Demographic distribution under the Decentralized Workforce Alternative (Alternative 5-B) is expected to affect both cities to some extent. Carlin lies approximately 90 miles north of the Town of Eureka. Elko lies 23 miles to the northeast of Carlin.

Elko Community Socioeconomics.

Elko was incorporated as a city in 1917 and is governed by an elected manager, mayor and three council members. Appointed officials include an attorney, clerk, municipal judge, vice mayor and a seven member Planning Advisory Committee. Population in 1981 totalled 9,693 and represented a 2.47 percent average annual growth rate from 1970 (population 7,621). Population projections anticipate a total of 11,030 people in Elko City in 1990. Employment in Elko City is largely representative of its regional trade center basis. Located approximately midway between Reno and Salt Lake City on recently completed I-80, the city hosts the only county hospital facility, commercial airport (undergoing expansion), multiple motel/hotel facilities with a combined capacity of 1,600 plus, convention center and community college. The City of Elko also serves as a tourist and sportsmen base for the nearby Ruby Mountains Scenic Area.

City budgeting of revenues for fiscal year 1982-1983 totalled $5,530,543, a 20.8 percent change from the fiscal year 1981-1982 amount of $4,578,313. Budgeted expenditures for 1982-1983 ($7,679,448) represent a 12.2 percent change from the fiscal year 1981-1982 amount of $6,844,981. Major expenditure increases occurred in categories of culture/recreation and capital outlay.

Elko City government employed approximately 111 full-time employees in 1982. Administrative services of the city include building inspection, cemetery, engineer, fire protection, recreation, police, water and wastewater, and street/landfill operations. Police protection is provided by 33 full-time officers. Fire protection is provided from three stations by a 15 person paid force supplemented with volunteers. Water and sanitary sewer systems are reported at capacity; solid waste management is reportedly adequate and includes private and county services. Health services are readily available at the expanding Elko general hospital of 58 beds, admissions in 1980 equalled 2,701.

Three elementary schools (K-6) and a junior/senior high school (7-12) are located in Elko City. School operation is retained by the Elko County School District which is politically independent of the county. Total Elko City enrollment in 1982-1983 approximated 2,730 students, more than 60 percent of the district's total. Advanced education is available at Northeastern Nevada Community College in Elko City which offers AA degrees as well as vocational and technical programs. Housing in Elko City is reportedly at capacity although land lots remain available. The Elko Chamber of Commerce found new unit median prices of $85,000 and $75,000 for 30-year-old units in 1980. Median rent for two bedroom apartments equalled $335 per month.

Carlin Community Socioeconomics.

Carlin was incorporated as a city in 1925 and is governed by mayor-council form. Elected officials include three council members, justice of the peace, mayor and vice mayor. Appointed officials include an attorney and clerk. The city employs a total of 15 full-time personnel (1984). Selected administrative services include ambulance, volunteer fire protection, waste and water systems, engineer and police. City population in 1980 equalled 1,232; a negative 6.2 percent change from the 1970 population of 1,313. School facilities in Carlin (K-12) were below capacity in 1982 by approximately 40 percent (230 students).

City budgeting of expenditures for fiscal year 1982-1983 ($394,142) increased by 4.79 percent from fiscal year 1981-1982 ($376,100). Revenues for the same period increased 6.08 percent from $324,341 to $344,076.

The predominant employment base of Carlin is the railroad industry with both Southern Pacific and Western Pacific companies maintaining yards in the city. Nearby gold mines provide employment. No major retail or commercial base exists in the city. Carlin's water system reportedly has sufficient capacity to support a population of 3,000 to 4,000, although storage is currently near capacity.

The city's current sanitary sewage system has capacity to serve a population of between 1,770 and 1,800. The city has four full-time police officers, two fire trucks and two ambulances with volunteer fire fighting and emergency personnel. City improvements have recently included street repair, street lighting and baseball park construction.

CHAPTER 4.0
ENVIRONMENTAL CONSEQUENCES

4.1 Introduction

The purpose of Chapter 4.0 is to present discussions of the environmental consequences which would predictively result from implementation of the proposed action and alternatives. The content of this chapter is intended to be responsive to the directives in Section 1502.16 of the National Environmental Policy Act (NEPA) regulations pertaining to presentation of the scientific and analytical basis for the comparison of alternatives described in Chapter 2.0. Additionally, the discussions of evironmental consequences detail impacts which have been determined to be significant. As discussed in Chapter 2.0, some uncertainty regarding environmental loadings characterizes EXXON's Mt. Hope project and as appropriate, worst-case analyses have been employed pursuant to Section 1502.22 of NEPA regulations.

The text in this chapter presents the results of impact assessment and has been summarized from specific Technical Reports prepared as background documentation for this EIS. The data, assumptions, assessment methodologies and the resulting impact determinations are detailed in each Technical Report.

Beyond impact assessments commonly defined as necessary to providing appropriate NEPA analysis, the issues of concern specific to the proposed action and alternatives have been identified in accordance with NEPA requirements and professional judgement. Questions raised during the scoping process and EIS preparation concerning a potentially significant impact have been incorporated into the analytical efforts and, as appropriate within the guidelines of NEPA, have been directly responded to within this chapter regardless of impact significance.

The analysis of environmental consequences required that certain assumptions be made regarding project and environmental components. The following assumptions apply to the analytical work conducted and briefly presented in this chapter.

1. It is assumed the proposed actions and alternatives would be implemented as described in Chapter 2.0. This assumption encompasses all project components; including general facility siting design specifications, water use, etc. As necessary, the implementation of standard operating procedures common to the particular activity has been assumed (e.g., monitoring of BACT performance, blastrock control, noise abatement equipment, etc.). Presented mitigation plans (Section 2.5) are assumed as to eventual implementation, including successful establishment of a reclamation ground cover, fugitive dust control methods, archaeological/cultural resource Class III inventories, etc.

2. It was assumed that permanent area losses at the Mt. Hope site study area would include the mine/non-mineralized material storage areas (3,100 acres). All other areas within the land acquisition area would be subjected to the reclamation efforts described.

3. When regulatory programs require specific pollutant limitations be complied with (e.g. quality restrictions), it has been

assumed that the established standards would, by definition, also limit the significance of adverse impacts. For example, although operation of the proposed process plant will result in significant atmospheric emissions, because those emissions will be controlled well below the limits established by law, no significant adverse impacts to human health, vegetation, etc. would occur, since the limits establish the lowest threshold at which such impact would occur.

4. The characterization of short-term and long-term impacts has been defined as follows: (1) short-term period encompasses 60 years based on an assumed mine life of 50 years and a reclamation success period of 10 years; (2) long-term period entails the indefinite time frame following the short-term period. Impacts which might be predicted to extend beyond the 60-year time frame or would not occur until after that period would be considered long-term. The 10-year reclamation period assumes that no substantial or maintained irrigation efforts are implemented. A worst-case reclamation scenario, i.e., revegetation and soil stabilization efforts would fail, has not been assumed.

5. Analyses pertinent to the action components which are linear in nature (e.g., power line) have incorporated activities to date involving avoidance routing. Avoidance routing has involved substantial interaction among concerned and knowledgeable parties of varying environmental specialties. It has been assumed that such efforts would be maintained through final design, construction and operation period (e.g., avoidance routing of water pipeline away from significant sage grouse strutting or nesting grounds).

6. The term "impact" has been defined so as to characterize changes in current or projected conditions resulting from implementation of the proposed action and/or alternatives. Impacts may be beneficial, inconsequential or adverse. In keeping with the CEQ regulations, where possible, direct and indirect impacts have been distinguished. The balance of this chapter discusses the impacts identified to date with implementation of the proposed action, alternatives or the no action alternative. Discussion is presented by the environmental resource affected. The ramifications of land acquisition by FLPMA sale or alternative methods are presented in Section 4.10, Land Use.

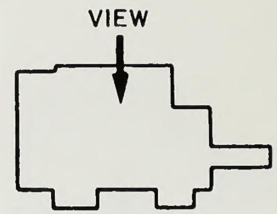
4.2 Topography

Area topography as anticipated at end-of-mine is dipicted via computer simulated perspectives on Figures 4-1A, 4-1B and 4-2A, 4-2B. A complete description of local and regional topography effects resulting from the proposed action or alternative is presented in Technical Report No.2.

4.2.1 Proposed Action

Intrinsic to the proposed action is a direct, significant impact involving the long-term alteration of the existing Mt. Hope site topography. As depicted by Figures 4-1A through 4-2B, the proposed action plan would result in a permanent and substantial variation of existing land forms. (Existing topography is illustrated on Figures 3-2A and 3-2B). Final pit configura-

View from the north looking south (EXISTING)



TOPO WITH TAILINGS POND View from the north looking south. (PROPOSED)

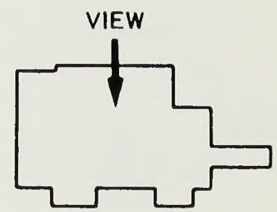
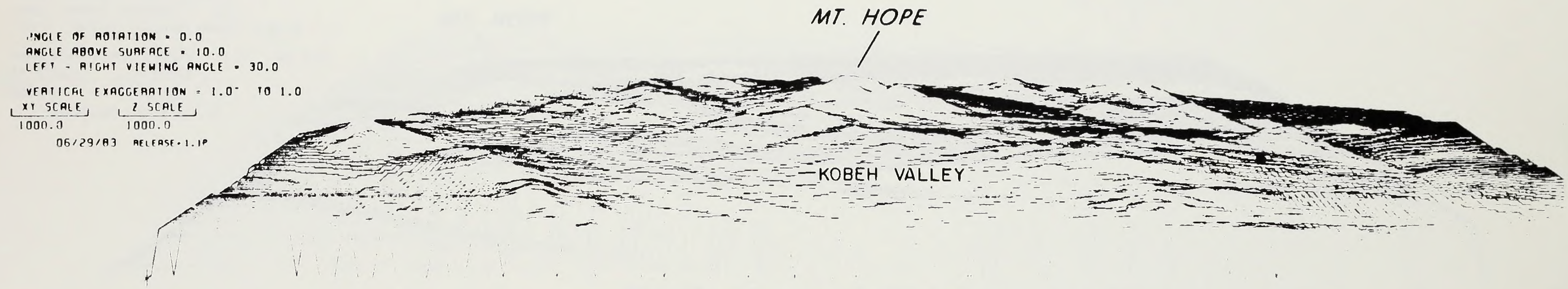
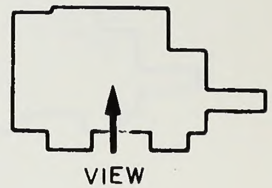
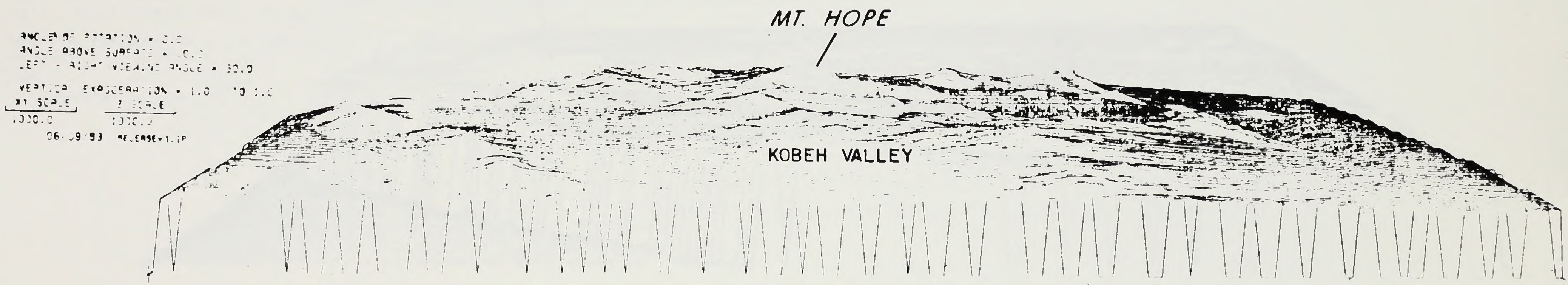


FIG. 4-1A
PERSPECTIVE OF MT. HOPE EXISTING TOPOGRAPHY
VS. PROPOSED ACTION TOPOGRAPHY
(Includes Mine Pit, Tailings Pond, Non-Mineralized Storage Areas)



View from the south looking north (EXISTING)





View from the south looking north (PROPOSED)

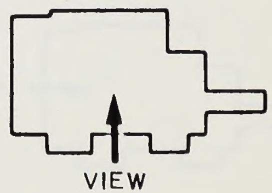
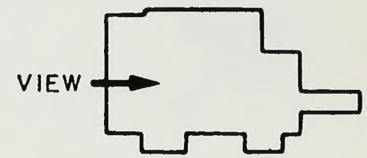


FIG. 4-1B

PERSPECTIVE OF MT. HOPE EXISTING TOPOGRAPHY
VS. PROPOSED ACTION TOPOGRAPHY
(Includes Mine Pit, Tailings Pond, Non-Mineralized Storage Areas)

View from the west looking east (EXISTING)



TOPO WITH TAILINGS POND

View from the west looking east (PROPOSED)

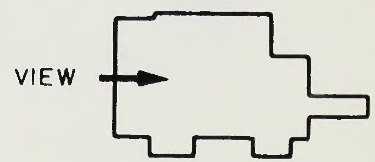


FIG. 4-2A

PERSPECTIVE OF MT. HOPE EXISTING TOPOGRAPHY
VS. PROPOSED ACTION TOPOGRAPHY
(Includes Mine Pit, Tailings Pond, Non-Mineralized Storage Areas)

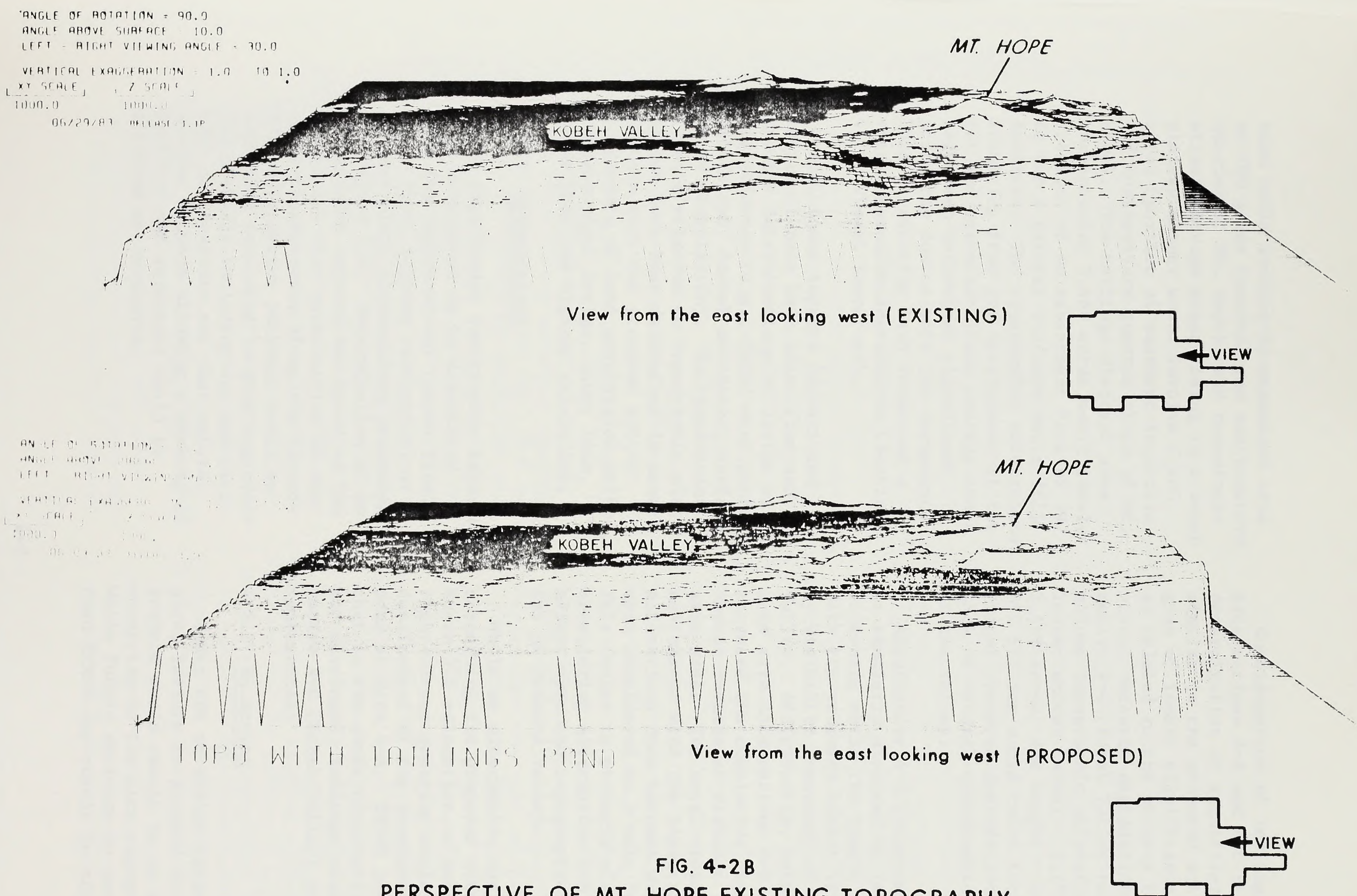


FIG. 4-2B

PERSPECTIVE OF MT. HOPE EXISTING TOPOGRAPHY VS. PROPOSED ACTION TOPOGRAPHY

(Includes Mine Pit, Tailings Pond, Non-Mineralized Storage Areas)

tion would involve an excavated area of 700 acres (central and southeastern quarter of Mt. Hope), and non-mineralized storage areas rising in a bench plateau manner would involve 2,400 acres (portion of southern foothills and northeastern quarter slope of Mt. Hope). The tailings disposal area encompassing 3,460 acres would involve creation of an embankment face of 397 ft and a partial drainage basin fill landform. The topographic alterations resulting from the development of the pit and non-mineralized storage areas have been determined significant primarily due to both the permanent loss of existing land forms and a visual resource degradation (Section 4.10, Visual Resources).

Additional impacts (direct and indirect) have been identified and involve determinations of little or no significance (e.g., local wind pattern alteration, faunal avoidance, surface water percolation). No significant impacts relative to topographic alterations have been determined in association with the proposed action components of land acquisition method, process plant design, water line, power line and highway relocation.

4.2.2 Alternatives

No significant topographic impacts were determined to be associated with the rights-of-way (power line, water line, highway relocation) or process plant alternatives presented in Chapter 2.0. Determination of no significant impacts was based on the assumption that construction of the project components along the identified alternative pathways would be conducted according to good engineering practice including cut and fill only as necessary and that natural contour factors allowing a masking of facility and structure would be utilized as available.

Consideration of tailings pond site Alternatives 4-B and 4-C results in a determination of significant impact similar to the proposed action. Degree of impact significance increases as related to the primary factor of visual resource degradation. Alternative 4-C (Kobeh Valley pond site) allows topographic alteration of lesser extent (areal - 2,173 vs. 3,460 acres, dam height - 249 vs. 397 ft) but would cause increased visual resource degradation due to a lack of natural topographic screening in the valley.

Alternative 4-B (Diamond Valley) is similarly disposed to lack of screening while the impact associated with its proposed locale is compounded by visibility frequency of Diamond Valley. Additionally, both tailings pond site Alternatives 4-B and 4-C increase the cumulative region of impact because of distance from the mine area. The total visual impact associated with the topographic alterations then becomes much greater when considered as a unit feature. This factor is strongly affected when considering Alternative 4-B and its effect upon the topographical character of Diamond Valley.

While no alternative was presented concerning the proposed action State Route 278 relocation, a denial of the right-of-way granting would prohibit development of the proposed tailings pond at Site 4-A. EXXON has stated that in the event Alternative 4-A were not developed, tailings pond Alternative 4-C (Kobeh Valley) would be implemented.

4.2.3 No Action

Under the no action implementation plan, failure to proceed with the project would result in no impact occurring to the site topography. While future activity by parties other than EXXON may result in mineral extraction and probable topographic alterations, no such intent is known at this time.

4.3 Geology

4.3.1 Proposed Action

As discussed in Chapter 2.0, daily ore and non-mineralized material production rates of approximately 30,000 and 90,000 tons, respectively, are expected during the 50-year life-of-mine action. Removal of this material would eliminate the geologic record in the mine pit but would not directly affect the geology of adjacent lands. The indirect impacts associated with the processing and relocation of the material removed are discussed in numerous sections of this chapter (e.g., Section 4.10.1, visual resources discussion).

During preliminary project engineering, earthquake hazard analyses were conducted to evaluate seismic risk potentials associated with mine/ non-mineralized storage areas and tailings pond features. Analysis of seismic risk relative to tailings pond siting involved design considerations necessary to reduce or eliminate impacts resulting from tailings embankment damage in the event of a major earthquake. The results of these analyses including seismic effects upon the proposed tailings pond are presented in Technical Report No.2.

Initial analyses indicated that earthquake shaking at the site would probably occur as a result of distant seismic events but that bedrock motion in excess of 9 percent of "g" (acceleration due to gravity) should not occur (Call and Nicholas, Inc., 1982). A 0.09 g would be similar to that experienced at Mt. Hope during the 1915 Pleasant Valley earthquake having a magnitude (M) of 7.6. Seismic events are commonly considered "major" if their magnitude exceeds 7.0. Figure 4-3 illustrates the probability of earthquake occurrence of specified magnitudes in the Mt. Hope area. The probability of an earthquake with magnitude of 7 or greater and bedrock motion was determined to be less than 0.015 in 50 years and 0.03 in 100 years (1.5 and 3.0 percent, respectively).

The probability of bedrock motion exceeding 0.09 g in a 50 year period equals less than 0.025 (2.5 percent chance) (Call and Nicholas, Inc., 1982). Events of twice that magnitude, 0.15 to 0.20 g, were assessed as necessary before substantial damage to pit walls would be experienced.

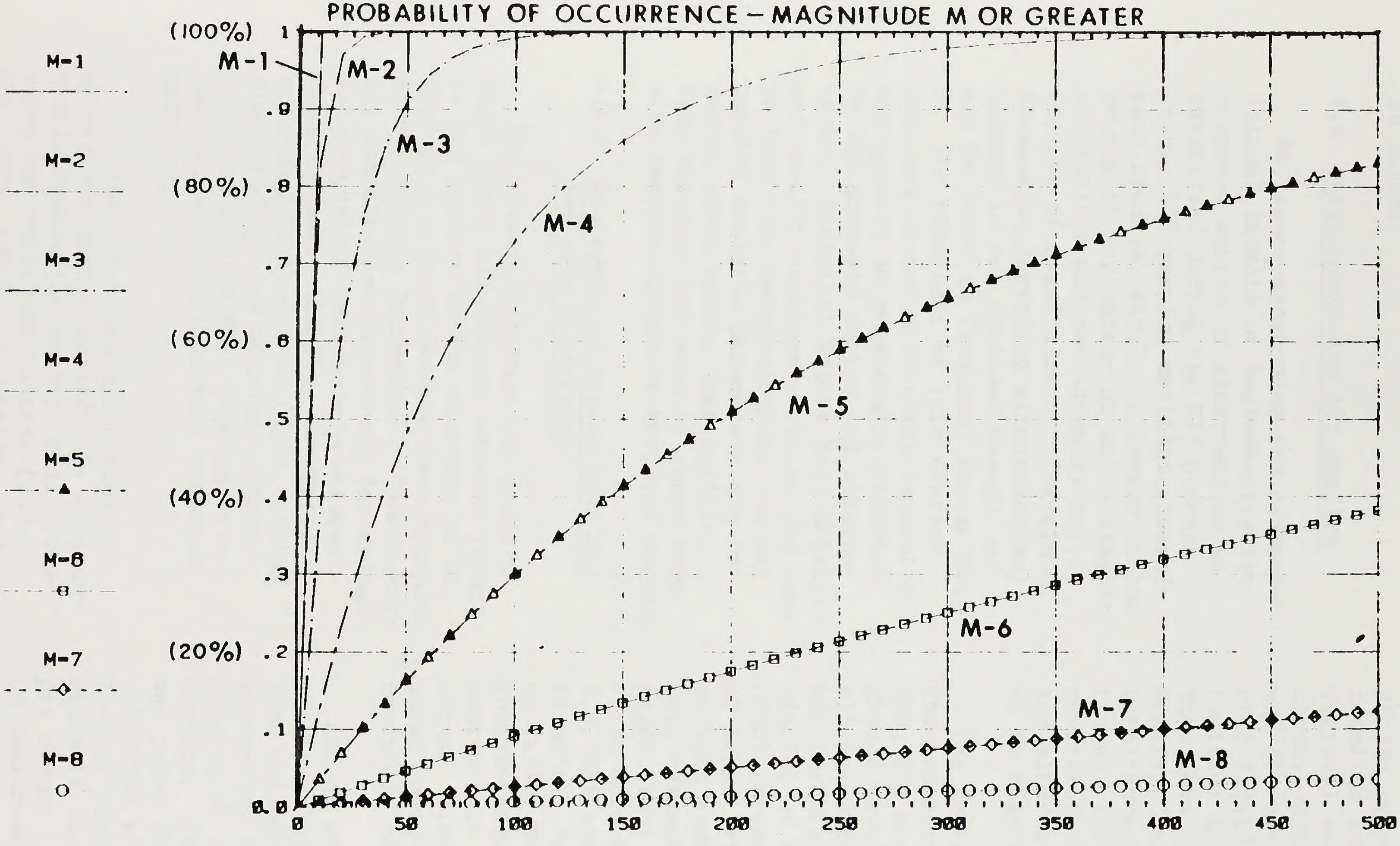
Based on the findings of Call and Nicholas, Inc. (1982) and the assumption that because the proposed action would be implemented per the design specifications stipulated, no significant impacts were identified with the seismic risk potential. As such, worst-case analyses were not applicable to seismic evaluations.

4.3.2 Alternatives

Excepting the alternatives of tailings pond site selection (4-B and 4-C), all identified alternatives were determined to result, upon implementation, in impact potential for geologic resources and hazard identical to that described for the proposed action. Sites 4-B and 4-C are considered to be of similar seismic potential (Wahler Associates, 1983) with no apparent real difference in seismicity for the sites compared. Based on the analyses conducted, no significant impacts regarding seismic risk were identified for Alternative 4, tailings pond sites 4-B and 4-C.

4.3.3 No Action

Under the no action alternative, the geologic record would remain in place. Strategic mineral reserves,



SOURCE: EXXON MINERALS COMPANY

M – RICHTER MAGNITUDE (THE MAXIMUM AMOUNT OF GROUND MOVEMENT MEASURED AT A FIXED DISTANCE FROM AN EARTHQUAKE'S POINT OF ORIGIN; THE RICHTER SCALE RANGES FROM 1 TO 10).

MT. HOPE MOLYBDENUM PROJECT

MT. HOPE EARTHQUAKE HAZARD DATA BASE WITHIN 95 MILE RADIUS OF SITE

U.S. Department of the Interior
Bureau of Land Management

FIGURE 4-3

of which molybdenum is considered an important element, would remain in record.

4.4 Meteorology and Air Quality

No issues concerning the climatological impacts of implementing the proposed action or alternatives were identified during the EIS process (e.g., EIS scoping meetings, consultant studies, etc.). A review of the potential for macro- or microclimatic alterations did not identify any impacts of significance. Therefore, discussion regarding climatological impacts is not included herein but may be found in Technical Report No. 3. The remainder of this section presents impact discussion regarding air quality as potentially affected by the proposed action and alternatives. Technical Report No.3 details air quality analyses. Unlike the rest of this EIS, meteorological and air quality analysis parameters are in metric units rather than English. This was done for ease of comparison with federal standards that are metric.

4.4.1 Statement of Assumptions and Analysis Guidelines

The possibility that the project might cause significant adverse impact to air quality in the vicinity of Mt. Hope is a primary concern (see Appendix A, EIS Scoping Documents). Consequently, quantitative potentials for change in air quality have been predicted using computer modeling for total suspended particulates (TSP), sulfur dioxide (SO_2) and nitrogen oxides (NO_x). Fugitive dust impacts were also evaluated but without computer modeling.

Fugitive dust was calculated in accordance with standard U.S. Environmental Protection Agency (EPA) procedures and emissions factors (U.S. EPA, 1979, 1982). Utilizing established emission factors and no mitigation measures such as road dust suppression, fugitive dust contributions of the proposed action/alternatives totalled less than ten percent of the regional annual existing concentrations. Applying mitigation measures and discounting tailings pond areas with liquid surface area exposure, fugitive dust emissions would contribute less than five percent to Air Quality Control Region (AQCR) 147 total annual existing concentrations. Thus, fugitive dust source contributions of the proposed action and alternatives were not considered to be significant.

The criteria of significance for the industrial source emissions of TSP, SO_2 and NO_x involve anticipated ground-level concentrations and compliance with both the National Ambient Air Quality standards (NAAQS) and Prevention of Significant Deterioration (PSD) increments. Analytical criteria of impact significance were selected as both annual geometric mean and 24-hour maximum concentrations. Computer predictions of ground-level concentrations were made by utilization of the U.S. EPA and Nevada Division of Environmental Protection (NDEP) recommended Valley Model. The Valley Model incorporates factors of analysis appropriate for rough terrain evaluations. Simulations were conducted under worst-case conditions for 56 receptors of input analysis.

Annual simulations were based on the annually averaged meteorologic data collected at Elko, Nevada and summarized by the computerized STAR program of the National Weather Service. The average mixing height was taken from inversion statistics collected at Ely, Nevada. For the 24-hour simulation, the worst-case analysis was based on a 2.5 meters per second (m/s) wind and F stability (a measurement of worst-case atmospheric mixing conditions). This combination of meteorological parameters happens to be the default option (worst-case) for the Valley Model.

4.4.2 Proposed Action

Impact modeling was conducted utilizing estimated emission rates (pollution control equipment installed) from the process plant complex during full scale operation. Emission rates totalled 8.14 grams per second (gm/s) for SO_2, 2.05 gm/s for TSP and 0.07 gm/s for NO_x. Isopleths of TSP and SO_2 concentrations that would result from process plant operation (direct impacts), after taking into account prevailing winds, are shown in Figures 4-4 and 4-5 respectively.

A worst-case, peak annual TSP concentration of 11.9 micrograms per cubic meter (ugm/m^3) can be expected (Figure 4-4) just beyond the process plant boundary. This concentration would decrease to 1.0 ugm/m^3 within 3.1 miles of the process plant (within the project area). A 24-hour TSP peak concentration of 38.4 ugm/m^3 can be expected under worst-case conditions to occur just outside the process plant facility. Within approximately 1.8 miles there would be a six fold dilution as the concentration decreased to 5 ugm/m^3.

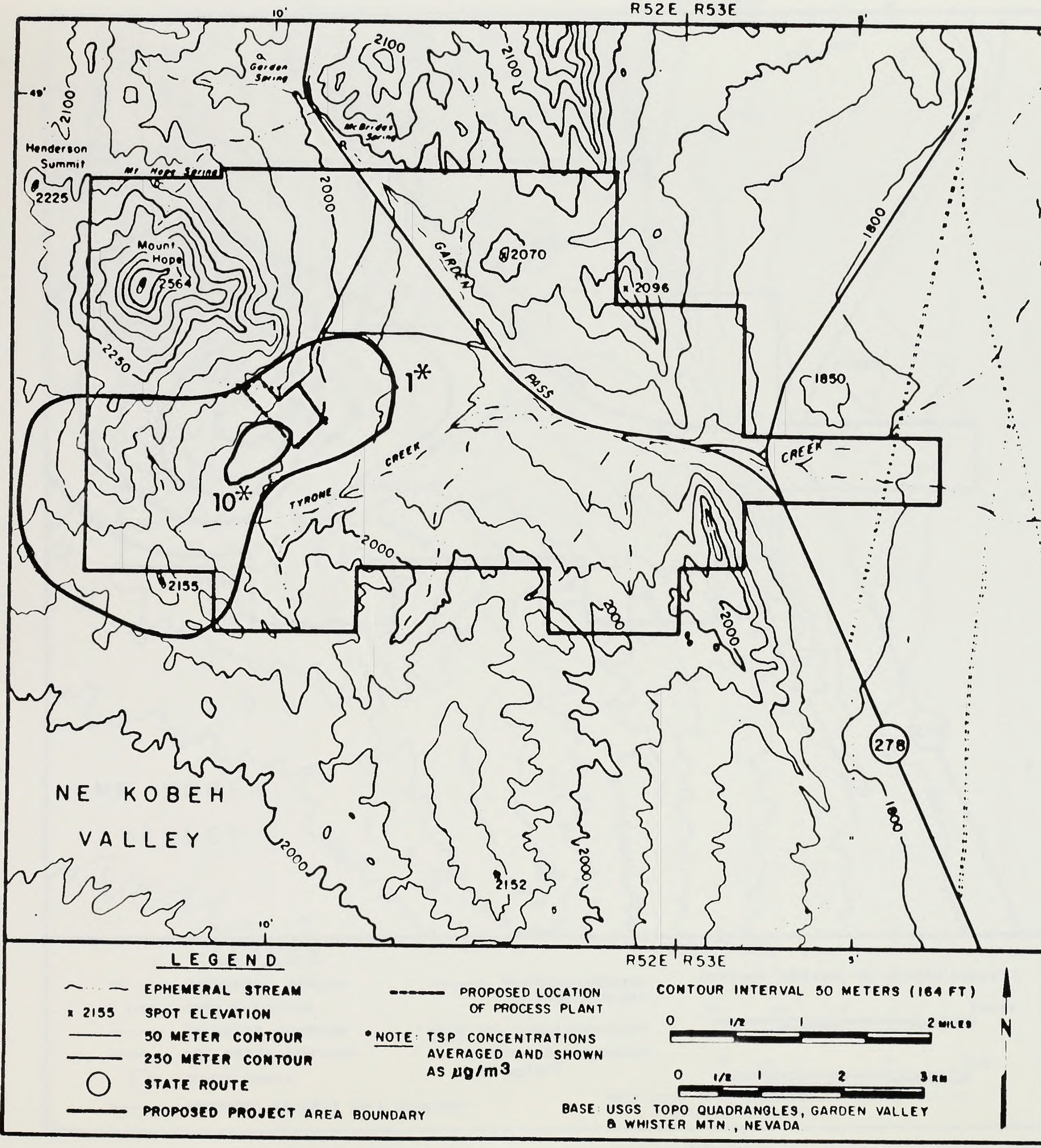
A worst-case, peak annual SO_2 concentration of 48.9 ugm/m^3 would occur within one-half mile of the process plant but would decrease to 1.0 ugm/m^3 within 3.1 miles (Figure 4-5). A worst-case, maximum 24-hour SO_2 concentration of 163.5 ugm/m^3 would occur within a mile (0.6 mi) of the process plant but would decrease to 10 ugm/m^3 within 3.1 miles. Emissions of NO_2 at the process plant would be quite small and would contribute insignificantly to ground-level concentrations.

A comparison of federal and state standards, PSD increments and model predictions is shown in Table 4-1. Even with background concentrations the model predictions for TSP and SO_2 are within federal and state standards for the Mt. Hope Class II air quality area. The proposed action would also result in emissions within PSD incremental allowances.

Indirect impact assessments were also done on visibility, soils and vegetation in addition to air quality. The purpose of the visibility impairment analysis was to determine the potential impact resulting from mobile and stationary source emissions on visibility to surrounding areas, including Roberts Wilderness Study Area.

Potential visibility impairment was investigated using the methodology described in the EPA's Workbook for Estimating Visibility Impairment (1980). The procedure, normally used to evaluate impact potential relative to a Class I air quality area, is based on a series of increasingly complex and conservative screening tests using simple algorithms and nomograms provided in the workbook. Inputs to the analysis include pollutant emissions rates, atmospheric stability and distance from source. The emissions rate of concern in the analysis involved nitrogen dioxide (NO_2), a reddish-brown gas formed during the conversion of NO_x emissions. In estimating the worst-case visual impacts for the emissions source and observer location, the worst-case meteorological conditions for plume transport were identified. Such worst-case conditions occur during light wind and limited vertical mixing. The Pasquill-Gifford stability class, F, corresponds to the meteorological situation described above. The F stability class as presented by Turner (1969) was used to determine the plume dispersion coefficient ($\overline{\sigma_z}$) as a function of downwind distance from the source.

A further assumption regarding

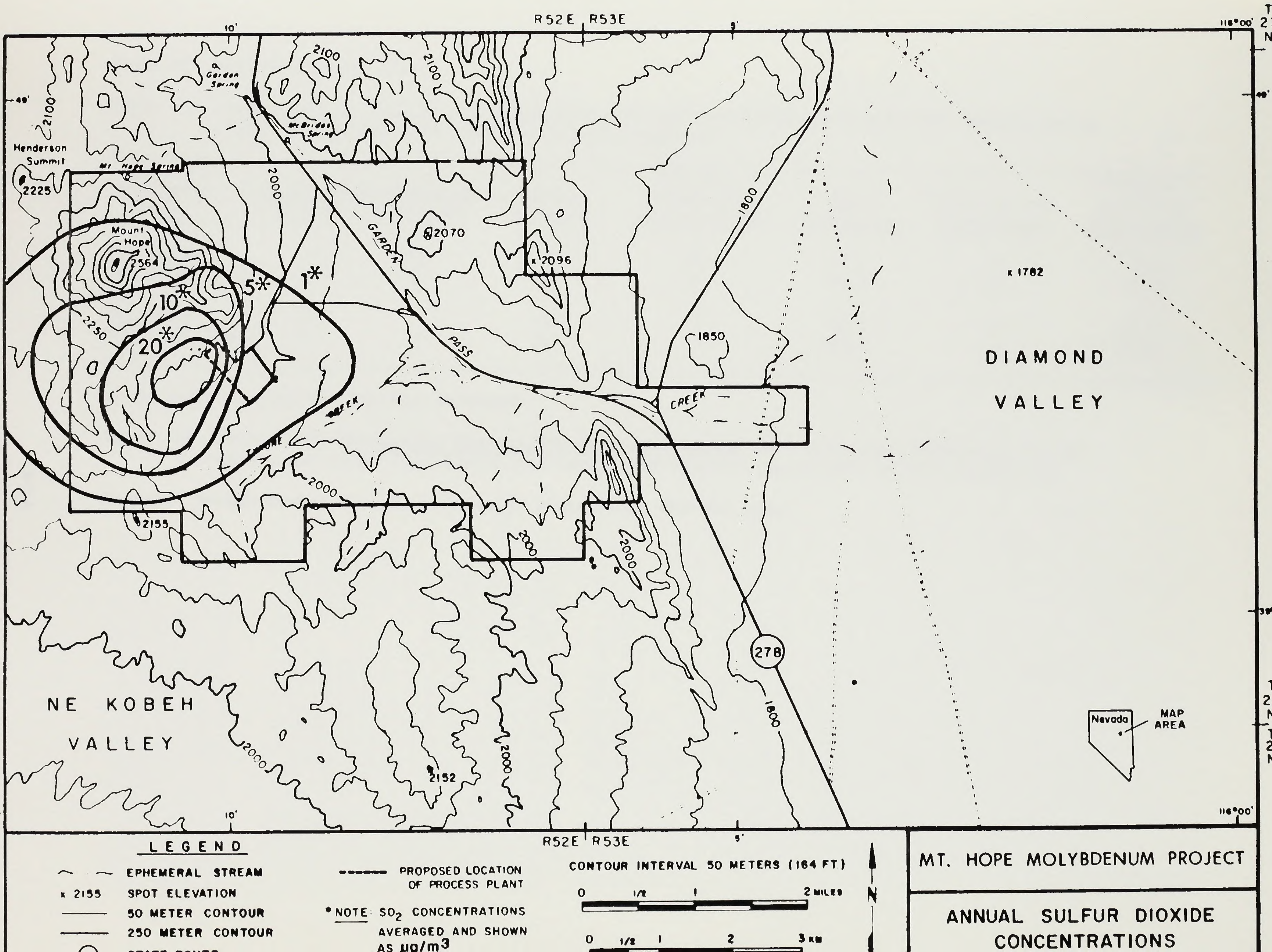


MT. HOPE MOLYBDENUM PROJECT

ANNUAL TOTAL SUSPENDED PARTICULATES CONCENTRATIONS

U.S. DEPARTMENT of the INTERIOR
BUREAU of LAND MANAGEMENT

FIGURE 4-4



MT. HOPE MOLYBDENUM PROJECT

ANNUAL SULFUR DIOXIDE CONCENTRATIONS

Table 4-1 Comparison of Federal and State Standards and Prevention of Significant Deterioration (PSD) Increments With Model Predictions (ugm/m^3)

Pollutant Averaging Time	Federal NAAQS Standards 1/		State Standards	Assumed Background Concentration	Model Prediction	Class II PSD Increments	Project Increment Consumption
	Primary	Secondary					
TSP Annual	75	60	75	25	11.9	19	2.95
TSP 24-hr (avg)	260	150	150	25	38.4	37	4.18
SO_2 Annual	80	-	80	5	48.9	20	11.3
SO_2 24-hr (max)	365	-	365	5	163.5	91	17.9

1/ National Ambient Air Quality Standards

Note: See Appendix C, Mitigating Measures/Monitoring Programs for a detailed discussion of PSD increments and other legislative and regulatory controls applicable to air permitting.

Source: Nevada Division of Environmental Protection, WRC EIS Team level-1 screening for visual impact involved the complete conversion of NO_x emissions to NO_2 in the atmosphere. This rather conservative assumption was used to effect a worst-case visual impact as a result of nitrogen dioxide gas.

Finally, throughout all level-1 screening estimates, the background visual range, r_{vo}, was assumed to be 170 km (105 miles) for the Mt. Hope region as based on the study by Trigonis and Shapland (1979). The distance from source of 10 km (approximately 6.25 miles) was used to assure appropriate inclusion of peripheral lands, particularly the Roberts Wilderness Study Area.

The results of the visibility impairments analysis are shown in Table 4-2. From the optical contrast parameters it can be concluded that visibility degradation with respect to sky observation would be minimal and insignificant. Horizontal visibility degradation (i.e., observation from elevated terrain, etc.) would also be insignificant.

Air pollution impact on soil is important because the latter is a receptor and pathway for airborne pollutants such as SO_2, NO_2 and TSP. Such pollutants are transferred to the soil from the atmosphere by physical and chemical mechanisms producing, in many cases, acidic compounds which may affect soil pH. This can cause long term leaching of important minerals such as calcium, magnesium and potassium. Of special concern are plants and crops that are of commercial and recreational value to the region.

Based on the air quality modeling results, the predicted air contaminants would be below the Secondary NAAQS established by EPA to protect soils and vegetation from air pollution damage. Therefore, damage to soils and vegetation is expected to be insignificant from airborne emissions. Also, the Mt. Hope site does not include cropland areas and, as such, no species of significant commercial or recreational worth are likely to be affected.

The components of the proposed action involving power line, water line and highway relocation do not pose any air quality impacts of significance. Fugitive dust emissions that would be generated in connection with these components cumulatively represent less than one percent of the regional AQCR annual concentrations. Significant sources of TSP, SO_2 and NO_x emissions are not anticipated to be associated with these activities. Direct impacts associated with the construction of the proposed action are expected on the basis of worst-case review to be of low magnitude, short in duration, dispersed in areal extent and are considered insignificant (Technical Report No.3).

4.4.3 Alternatives

Air quality impacts associated with implementation of the proposed action are similar for all stated alternative cases.

4.4.4 No Action

The no action alternative involves a no project decision which would negate air quality impacts of any type as related to project activity. Lacking project activity, the regional and site area air quality would remain at baseline conditions.

4.5 Hydrology

4.5.1 Proposed Action

4.5.1.1 Surface Water

There are no perennial streams in the site study area and existing

Table 4-2 Level 1 Visibility Impairment Screening Analysis 1/

Emission Rates (metric tons/days)	Plume Optical Thickness	Optical Contrast Parameter 2/
$Q_{Part.}$ = 0.178	Part. = 0.089	C_1 = 0.0004
Q_{NO_2} = 0.006	NO_2 = 0.0005	C_2 = 0.078
Q_{SO_2} = 0.703	aerosol = 0.00197 (SO_2 emissions)	C_3 = 0.0007

1/ U.S. Environmental Protection Agency, 1980. Analysis based on equations specified in Workbook for Estimating Visibility Impairment.

2/ C_1 is the contrast of the plume against the sky. C_2 is the plume contrast against terrain. C_3 is the change in sky-to-terrain contrast caused by primary and secondary aerosol. If the contrast parameters have absolute values each less than 0.10, the EPA guidelines allow an assumption that visbility degradation would be minimal.

Calculation Factors:

Minimum distance from the Mt. Hope Project to sensitivity area (within Roberts Wilderness Study Area) - 10 kilometers, 6.25 miles (conservative value).

Pasquill-Gifford $\overline{\sigma_z}$ under F stability at 7.2 km - 40m (131 ft)

Regional Background Visual Range = 170 km (106 mi)

Plume Dispersion Parameter = 6.944 x 10^5

Source: WRC EIS Team

ephemeral streams carry water only after intense rainfall events or from spring snowmelt runoff. Intense rainfall events occur infrequently and often are localized in a portion of the drainage basin. These baseline conditions, combined with the fact that the Mt. Hope Project would be designed to achieve no discharge, leads to the conclusion that there would be insignificant impacts to the surface water resource in and around the site study area.

Because the proposed mine and non-mineralized material storage areas are in stream headwaters on relatively steep hillsides, there would be a minor impact on surface water runoff. Snowmelt and rainfall runoff in the small headwater drainages would be reduced by the non-mineralized material storage areas. No surface water runoff would occur from the open pit mine area.

Linear facilities, including pipelines, power lines and the relocated highway, would have little surface water impact. Standard construction techniques would result in minor land disturbance but the reclamation and erosion control practices described in Appendix C would make surface water impacts negligible (Technical Report No.4).

4.5.1.2 Groundwater

Potential impacts to groundwater are of two kinds: 1) possible changes in groundwater quality as a result of seepage from the tailings pond, and 2) possible drawdown of groundwater in the vicinity of the proposed water supply well field in Kobeh Valley. Approximately 44 acre-feet/day (10,123 gpm) of water would be discharged daily from the mineral processing plant to the tailings pond. Most of this water would be returned to the mill for reuse; some would be evaporated and a small portion of the pond water would percolate downward into the subsurface and enter the groundwater system beneath and peripheral to the tailings pond. Some of the percolating groundwater would be retained in small pore spaces in the unsaturated alluvium beneath the pond and the remainder would continue downward to the water table. The long-term influence of seepage water from the tailings pond that reaches and enters the groundwater system is of particular concern in assessing potential impacts to groundwater quality. The rate of pond seepage would be a function of: 1) permeability of the stored tailings and of natural soils beneath the pond; 2) depth and area of pond water; and, 3) groundwater conditions in alluvium beneath the pond. Pond seepage has been estimated to range from 500 to 1,000 gpm (Technical Report No.4). The latter, larger flow has been chosen to characterize impacts on a worst-case basis.

The quality of tailings pond seepage would depend on the quality of the process plant effluent and physical chemical changes to the aqueous fraction of the tailings such as absorption, ion exchange, precipitation, dissolution of minerals, dilution and dispersion. Sampling tests conducted in accordance with and compared to EPA toxicity standards show that the tailings would not be considered hazardous (Appendix D). On the basis of worst-case analysis, parameter concentrations in Table 2-10 are the maximum that could eventually be expected to infiltrate into groundwater beneath or adjacent to any of the ponds.

After the seepage water joins the existing groundwater system it would slowly move downgradient eastward into Diamond Valley where it would mix with natural groundwater. As dilution occurs, the influence of pond seepage water on groundwater quality would decrease. Rates of groundwater movement range from an estimated 100 to 1,000 feet per year. This slow movement would restrict the areal extent of seepage water migration. There is limited groundwater usage near the potential tailings ponds sites.

Based on the above stated estimates and a general knowledge of existing geological and hydrological conditions, a worst-case analysis has been performed to assess the potential impacts to groundwater quality in Diamond Valley. This analysis is detailed in Technical Report No.4 and the results are summarized in Table 4-3. The analysis was performed only for those constituents that may leave the pond at or above drinking water standards, i.e., copper, iron, manganese, sulfate and arsenic. As an aid in interpreting the results, Table 4-4 shows background conditions and federal drinking water standards.

Overall groundwater quality in Diamond Valley would be altered. For those parameters that could potentially exceed drinking water standards (Cu, Fe, Mn, SO_4, As, and TDS) at the time of exit, copper and arsenic would have fallen below drinking water standards by year 5, when the seepage front exits the property. Total dissolved solids and sulfate would have fallen below drinking water standards by the conclusion of reclamation. Only iron and manganese, both naturally high, would persist beyond reclamation activities. It is estimated that iron would drop below the drinking water standard in year 100. Manganese concentrations are currently in excess of the drinking water standard and a reduction to levels below those standards is not anticipated.

Implementation of the monitoring program described in Section 2.5.2 as well as the more detailed study of seepage rate and quality that would occur during later stages of project engineering, will foster a more accurate understanding of the potential effects to groundwater. This information will be used in working with the Nevada Division of Environmental Protection to acquire necessary permits and identify the most appropriate control technology.

Groundwater Drawdown. Kobeh Valley is a structural, fault bounded basin containing a substantial thickness of alluvial valley fill. An appraisal of the overall effect of annually withdrawing 7,630 ac-ft per year (4,730 gpm) from Kobeh Valley can be made on the basis of perennial yield. The perennial yield for Kobeh Valley, as defined by Rush and Everett (1964), is the maximum amount of water which can be withdrawn from the groundwater reservoir and used economically each year for an indefinite period of time. The perennial yield of Kobeh Valley has been estimated to be 16,000 ac-ft/yr (Hydro-Search, Inc., 1982). The project requirement of 7,630 ac-ft/yr, together with an agricultural demand of 3,240 ac-ft/yr, would amount to an annual withdrawal of 10,870 ac-ft/yr which is well within Kobeh Valley's perennial yield. This yield would not result in a regional impact on the valley groundwater system over the project life. The remaining annual yield available in Kobeh Valley during project operation (approximately 6,200 acre feet) would conceivably allow a tripling of agricultural water use in acre-ft/yr.

The proposed well field would be located in Kobeh Valley in alluvium south of Mt. Hope and about 9 miles southwest of the proposed mine site. The project would have a local effect on water table elevations in the vicinity of the well field. Existing wells that may be affected by pumping over the project lifetime have been determined (Table 4-5).

Table 4-3 Estimated Groundwater Constituent Concentrations in Diamond Valley Resulting From Tailings Pond 4-A Seepage (mg/l)

Year	Cu	Fe	Mn	SO_4	As	TDS	Area Affected sq. mi.	% Diamond Valley Area Affected
1	0.94 4/	0.95	4.7	470	<0.059	961	0.036	0.005
2	0.88	0.91	4.4	445	<0.055	927	0.143	0.02
3	0.83	0.87	4.1	422	<0.052	898	0.323	0.05
4	0.78	0.83	3.9	402	<0.049 4/	870	0.574	0.08
1/ 5	0.75	0.80	3.7	386	<0.047	849	0.897	0.13
10	0.60	0.69	3.0	317	<0.037	757	3.59	0.51
15	0.50	0.61	2.5	274	<0.031	699	8.07	1.2
20	0.43	0.56	2.1	241 4/	<0.026	657	14.3	2.0
25	0.38	0.51	1.9	217	<0.023	623	22.4	3.2
30	0.34	0.48	1.7	199	<0.020	600	32.3	4.6
40	0.28	0.44	1.4	173	<0.017	566	57.4	8.2
2/ 50	0.24	0.41	1.2	155	<0.014	541	89.7	12.8
60	0.19	0.38	0.96	135	<0.011	516	129	14.5
70	0.16	0.35	0.80	121	<0.009	497 4/	176	19.7
3/ 72.5	0.16	0.35	0.81	121	<0.009	498	189	21.2
80	0.13	0.33	0.66	108	<0.007	479	230	25.8
90	0.11	0.31	0.55	98	<0.006	466	291	32.6
100	0.10	0.30 4/	0.47	88	<0.005	456	359	40.2

1/ Estimated time for seepage front to exit project boundary area.

2/ End of operation, closure begins.

3/ Estimate time when remaining volume from tailings pond after closure would have seeped from pond.

4/ Year at which national drinking water standards are met. Because background manganese concentrations are already greater than drinking standards, these standards cannot be achieved.

Note: A detailed explanation of the derivation of this estimate may be found in Technical Report No.4. Basic worst-case assumptions are as follows: 1) Maximum seepage rate of 1,000 gpm begins immediately and is maintained until closure begins; 2) All seepage is directed through Tyrone Gap; 3) There is no attenuation of seepage; 4) There is no dilution of seepage before reaching Diamond Valley; 5) The seepage front moves at the rate of 1,000 ft/year; 6) Groundwater is uniformly distributed throughout Diamond Valley; 7) There is uniform mixing across the seepage front and affected portions of Diamond Valley.

Source: EXXON Minerals Company, WRC EIS Team

Table 4-4 Reference Constituent Concentrations (mg/l)

Parameter	Diamond Valley Baseline Concentrations for Constituents of Interest	Primary & Secondary Drinking Water Standards for Constituents of Interest
Cu	0.02 1/	1.0
Fe	0.24	0.3
Mn	0.09	0.05
SO_4	56	250
TDS	411	500
As	0 2/	0.05

1/ No data on this parameter available for Diamond Valley, Kobeh Valley data transferred.

2/ No data on this parameter available, assumed to be zero.

Source: EXXON Minerals Company, WRC EIS Team

Table 4-5 Summary of Existing Wells That May Be Impacted By Groundwater Drawdown

Well No.	Depth of Well (feet)	Source of Water	Elevation at Well (feet)	Water Level Below Land Surface Datum (feet)	Elevation of Water Level (feet)	Date of Measurement	Use of Water
1 (20/52-20ab) A. C. Florio	120	Alluvium	6012	16	5996	5/51	Irrigation
2 (20/52-18ab) Hay Ranch	25	Alluvium	6014	6.3	6008	11/53	Stock Watering
3 (20/52-18CA) Lucky C Cattle Co.	85	Alluvium	6005	5	6000	9/66	Irrigation
4 (20/52-17bd) Hay Ranch	90	Alluvium	6020	17.8	6002	11/53	Irrigation
5 (20/52-17CA) Lucky C Cattle Co.	85	Alluvium	6005	5	6000	9/66	Irrigation
6 (20/51-13AC) Lucky C Cattle Co.	95	Alluvium	6008	5	6003	12/65	Irrigation

Source: Hydro-Search, Inc. (1983)

Based on an assumed aquifer transmissivity coefficient of 250,000 gpd/ft and a storativity of 0.01 (Hydro-Search, Inc., 1982), drawdown adjacent to the well field probably would not exceed 35 ft during the project life, and at six miles, drawdown probably would be less than 15 to 18 feet. One of the wells listed in Table 4-5 (20/52-18ab) may be affected by the drawdown and may then have to be deepened if it were to remain productive.

Principal springs in Kobeh Valley generally occur in the vicinity of Bean Flat (T19 and 20N., R49E), the Bartime Ranch (T19N., R50E) and the Hay Ranch (T20N., R52E) (Rush and Everett, 1964). The proposed well field is located approximately 15 miles from the Bean Flat and Bartime Ranch area and about 6 miles from the Hay Ranch. Spring flows at the Hay Ranch occur on the south side of the slough and playa. As such, well pumping at the well field would have no effect on the springs.

The impacts of drawdown, limited to a production decrease at a single well and no adverse effects to springs in the area, have been determined insignificant.

In summary, the impacts to hydrology have been determined to be significant in the short-term for groundwater quality standards and to be insignificant relative to the very limited effects of groundwater drawdown. Long term groundwater quality degradation would be considered significant in regulatory terms of water quality standards for iron and manganese.

4.5.2 Alternatives

4.5.2.1 Surface Water

Potential impacts to surface water from the alternatives would be of the same magnitude as those described for the proposed action.

4.5.2.2 Groundwater

Impacts from tailings pond seepage from Alternative 4-B would be of the same order of magnitude as that associated with the proposed action. However, because there is no natural barrier to seepage flow (i.e., Sulphur Range), the worst-case analysis would include equidimensional flow in a northeastward direction in Diamond Valley. Impacts associated with Alternative site 4-C are also similar except that site 4-C is located within Kobeh Valley and the seepage front would move south or southwestward toward the valley center.

4.5.3 No Action

The no action alternative would preclude surface water or groundwater impacts as implementation of the project activity would not occur. Neither the beneficial water use proposed by EXXON or the reduction in evapotranspiration losses (resultant from drawdown in Kobeh Valley) would occur. Regulatory standards for manganese concentrations in groundwater would, however, continue to be exceeded.

4.6 Soils

Soil erosion losses, water and aeolian (wind), were calculated to assess soil resource impacts associated with implementation of the proposed action and alternatives. Certain assumptions concerning construction, operation and reclamation phases of the proposed action and alternatives were required and primarily concerned soil handling and treatment procedures. Assumptions applicable to the impact assessments conducted are outlined in the following discussion.

4.6.1 Proposed Action

Soil losses and disturbance would occur primarily during construction phases (disturbance along rights-of-way, in the vicinity of facility structures and at collection and storage areas of topsoil at the Mt. Hope site) and at the earliest stages of final reclamation between the time that stockpiled topsoil is spread and vegetation is re-established. Soil losses resulting from construction disturbances would be limited and of a very minor, localized nature. Results of analyzing the extent of this loss may be found in Technical Report No.5 but are not included herein.

Project impacts to soils would primarily involve displacement, mixing, exposure during salvage and soils handling and placement during reclamation. The impact assessment required calculations of soil losses pertinent to reclamation of each tailings pond site. Soil losses along both the dam face (water erosion) and tailings pond surface (aeolian erosion) were individually analyzed by period (e.g., baseline-undisturbed soils, exposed-mixed soils immediately following soil redistribution, mulched-redistributed soil with two tons per acre mulch applied, revegetation at approximately half baseline conditions and revegetation at approximately baseline conditions). Soil losses within the mine/non-mineralized material storage areas were evaluated as insignificant due to the exposed, rock surface characteristics and the fact that these areas would not be subject to soil replacement during reclamation. By evaluating probable erosional losses prior to, during and after establishment of vegetation and topography, actual reclamation potential of the soils can be estimated.

Potential soil losses due to water erosion along the tailings pond dam face were estimated based on a weighted average of each soil type disturbed within the pond area. The Universal Soil Loss equation developed by the Soil Conservation Service (SCS) was used for calculation purposes. This equation is an empirically derived relationship, the application of which involves making certain assumptions and allows only estimates of approximate erosional losses. Estimated erosion losses were calculated for each of the above mentioned periods. The results and equation factors are presented on Table 4-6.

Results indicate that under all cases investigated water erosion losses at the dam face would be above baseline conditions (Table 4-6) but within commonly accepted best engineering standards (approximately 5.0 tons/acre/year). Sheet and rill erosion would be considered insignificant.

Potential annual wind erosion losses were calculated on a per acre basis for mixed soils to be disturbed during the tailings pond construction (Table 4-7). These calculations were based on the wind erosion equation developed by Woodruff and Siddoway (1965) and allow a review of soil losses from flat or slightly sloping surfaces such as the tailings pond. The soil erodibility factor (I) for each soil was based on the SCS classification of these soils into wind erosion groups. A weighted average of the soil erodibility factor values for the disturbed soils was used in the calculations. The soil roughness factor (K) was assumed to be one (1), essentially equivalent to a plowed soil. The climate factor was an empirical factor assumed to be 40, based on SCS data. Unsheltered distance was assumed as 10,000 feet for all calculations involving reclamation and 100 feet for baseline conditions. The wind erosion equation was developed using flat small grain residue as the reference standard, thus necessitating the conversion of range

Table 4-6 Estimated Water Erosion Soil Losses at the Tailings Pond Dam Face (in tons/acre/year)

Condition	Tailings Pond 4-A	Tailings Pond 4-B	Tailings Pond 4-C
Baseline (undisturbed soils)	4.1	0.10	1.25
Exposed	49.7	48	56.2
Mulched	8.4	8.2	9.5
Reveg-1	9.9	9.6	11.2
Reveg-2	5.0	4.8	5.6

Source Equation: USDA Agriculture Handbook No. 537; Soil Conservation Service (Reno). Equation factors:

- Baseline cover estimates for pinyon-juniper vegetation type are 25% canopy cover and 30% ground cover; for big sagebrush vegetation type, 50% canopy cover and 30% ground cover; and for the winterfat-sagebrush type, 50% canopy cover 30% ground cover.

- Revegetation cover estimates (reveg-1 and reveg-2) were 0% canopy and 20% ground cover for reveg-1 and 0% canopy and 40% ground cover to reveg-2.

- Dam face slope was assumed to be 3:1 in accordance with Chapter 2. Slope lengths were assumed to be 165 feet between terraces.

- Exposure was assumed to include a full year climatic cycle.

- Rainfall factor was assigned a value of 24 at sites 4-A and 4-C and 19 at site 4-B as per SCS (Reno, Nevada office) R factor maps.

Table 4-7 Estimated Wind Erosion Soil Losses on Surface of Tailings Pond (tons per acre per year)

Conditions	Tailings Pond 4-A	Tailings Pond 4-B	Tailings Pond 4-C
Baseline	<0.4	1.6	<0.5
Exposed	15.2	36.4	22.4
Mulched	<0.9	<0.5	<0.6
Reveg-1	8.7	21.7	13.4
Reveg-2	2.6	8.2	4.5

Source Equation: Woodruff, N. P. and F. H. Siddoway, 1965. A Wind Erosion Equation. Soil Sci. Soc. Amer. Proc. 29:602-608

- Baseline cover estimates for pinyon-juniper vegetation type are 25% canopy cover and 30% ground cover; for big sagebrush vegetation type, 50% canopy cover and 30% ground cover; and for the winterfat-sagebrush type, 50% canopy cover 30% ground cover.

- Revegetation cover estimates (reveg-1 and reveg-2) were 0% canopy and 20% ground cover for reveg-1 and 0% canopy and 40% ground cover to reveg-2.

- Exposure was assumed to include a full year climatic cycle.

- Rainfall factor was assigned a value of 24 at sites 4-A and 4-C and 19 at site 4-B as per SCS (Reno, Nevada office) R factor maps.

conditions to "equivalent" flat small grain residue. A "V" factor of 1,000 was used for baseline and reveg-2 calculations and a "V" of 500 was used in calculating reveg-1 figures.

Results indicate that final reclamation will result in an aeolian loss calculated at 2.6 tons/acre/year at the proposed tailings pond Alternative 4-A. Based on a standard of 5.0 tons/acre/year value, the anticipated impact would be considered insignificant.

4.6.2 Alternatives

Potential soil losses due to erosion at each alternative pond site (4-B and 4-C) were calculated similarily to that discussed in the preceeding subsection. Water and wind erosion calculations applicable to sites 4-B and 4-C are also shown on Tables 4-6 and 4-7, respectively. As Table 4-6 indicates, soil loss potential due to water erosion of site 4-B were estimated to be very low at baseline conditions (0.10 tons/acre/year) while maximum erosion (48 tons/acre/year) would occur immediately following soil replacement and prior to vegetation establishment or mulching. Water erosion at site 4-B would result in slightly less soil loss per acre than that predicted at the proposed action site 4-A. This difference is due primarily to the lower amounts of precipitation received in the valley location of site 4-B. Site 4-C would erode approximately 10 percent more than site 4-A, primarily due to the more erosive nature of the soils disturbed at site 4-C.

Wind erosion rates calculated for alternative site 4-C were intermediate to sites 4-A and 4-B. The wind erosion rates applicable to all periods at site 4-C were at least double the soil loss quantities estimated for site 4-A and 50 percent more than at site 4-B. This difference is largely due to soil texture variables.

As discussed in Section 4.6.1, the soil disturbances caused by the construction and operation along the water line, power line and highway relocation rights-of-ways were considered to pose no impacts of significance.

4.6.3 No Action

No impacts would occur to the soils resource base of the site area. Natural erosional forces would continue unabated and unaffected by project activity.

4.7 Biota

Implementation of the proposed action and alternatives would result in certain long-term and short-term alterations to the existing biologic environment. Categorized in the following discussion by vegetation and fauna, analyses of impact were applied to criteria emphasizing dependent relationships within the study area (e.g., critical habitat area, water source - animal use, etc.). Impact analyses were also related to degree of concern that federal and state agencies or other interested parties have established regarding species value, and the effects of herbage loss and replacement in terms of fauna and livestock use patterns.

4.7.1 Proposed Action

4.7.1.1 Vegetation

Vegetational resources, primarily pinyon-juniper and big sagebrush communities, would be affected from the construction and preoperational stripping of proposed action component areas. Construction and operation of the mine/non-mineralized material storage areas would result in the permanent vegetation loss within 3,100 acres (700 and 2,400 acres, respectively). The vegetation affected within these areas equals approximately 2,439 acres of pinyon-juniper and 1,001 acres of big sagebrush community types.

Construction and operation of the process plant and tailings pond would involve the short-term loss of 3,558 acres of vegetation including pinyon-juniper (709 acres), big sagebrush (2,200 acres) and black sagebrush (649 acres) community types.

Construction and maintenance of the highway by-pass, water and power lines would result in the disturbance of 276 acres. Permanent disturbance of vegetation would total approximately 145 acres (power line, 40 acres; state route, 63 acres; water line, 42 acres).

The above described changes to the vegetational resource base were generally determined not to pose significant adverse impacts. Direct impacts relative to partial loss of area vegetation productivity (the equivalent of 358 to 438 AUMs in the short term, 110 to 115 AUMs in the long term) were determined not to be significant due to the substantial quantity of similarly vegetated areas within the region as well as the significantly small area of disturbance on a regional basis. However, a significant impact would occur in terms of local vegetation and land use. The Mt. Hope site currently represents a prime commercial Christmas tree cutting site, producing a sustained yield of 300 to 500 Christmas trees annually. The permanent disturbance of the area would represent a loss of more than 10 percent of the annual harvest for the Shoshone-Eureka Resource area (USDI, 1983e). (See also rangeland impact discussion, Section 4.10).

Vegetational areas of critical habitat value were not identified as being affected by or proximal to the proposed action. As such, impacts associated with habitat loss via vegetation removal were not considered significant. Additionally, no federally listed threatened or endangered plant species occur in Eureka County. The occurrence in Eureka County of one candidate threatened and endangered plant species was determined not to present a potentially significant impact if the proposed action was implemented. The determination of no impact was based primarily on the fact that the species is not known to exist within the site area.

Analysis of other potential impacts deemed insignificant are presented in Technical Report No.6. Briefly, some impact evaluations additionally conducted include significance of productivity losses in the region due to fugitive dust, reduction in percent cover, increases in halogeton intrusion and potential loss of riparian/spring vegetation.

4.7.1.2 Fauna

Analysis of impacts to fauna emphasized a number of species expressed as being of interest to governmental and public entities and individuals. Beyond including consideration of federally or state listed threatened or endangered faunal species, it was deemed appropriate to investigate the potential for impact upon a number of species, including; sage grouse (strutting grounds breeding criteria), mule deer (migratory path criteria), and wild horses (area use patterns criteria).

Early in the EIS process, the faunal populations of the regional study area were reviewed by agency specialists and project planners in order to consider avoidance measures as necessary to limit or eliminate potential adverse impacts. This factor of analysis and mitigation planning was assumed in the impact assessment to be on-going and effective. As such, it has been assumed that no fauna habitats of particular value or uniqueness would be significantly impacted by the implementation of rights-of-way activity as proposed (e.g., avoidance routing would be exercised). An example of the mitigation planning to date includes avoidance routing of the proposed water line 3-A away from sage grouse strutting grounds.

Additional factors affecting this analysis of impacts include 1) consideration that essentially all of the Mt. Hope site area would be disturbed during the life of the project (disturbance is defined for analytical purposes as "effective area of disturbance" and does not necessarily connote physical disturbance), 2) that all power line facilities and line structures would be designed and operated so as not to pose danger to fauna (e.g., raptor electrocution), and 3) that special efforts would continue to be exerted to protect the immediate vicinity of McBrides Spring during highway relocation. Additionally, the impact analyses assumed that the tailings pond liquid would not significantly affect bird or mammal populations. This consideration was based on the process plans which envision a very limited area of actual liquid surface at any one time and the fact that the effluent testing to date has not produced toxicity ratings as determined by comparison with EPA standards.

Mule Deer

Operations within the Mt. Hope site were additionally assessed as to potential for interference with three known important migration routes of mule deer across the project site (Nevada Dept. of Wildlife, 1983). It is likely that these routes would become inaccessible if inappropriate fencing was established. The Nevada Department of Wildlife has suggested that a fence corridor be established allowing a migration route detour to the east of the proposed tailings pond and west of Tyrone Gap. The mitigation plan discussed in Appendix C and involving EXXON coordination with the Nevada State Department of Wildlife and BLM relative to fencing location, has been assumed to reduce (upon implementation of planning recommendations) the potential for impact associated with migration route blocking. A reduction in anticipated road kill numbers has, in effect, been achieved by the alteration from original fencing plans offered by EXXON to date. It would however, be expected that the need for migration routing near State Route 278 would still lead to an increase in road kill frequency. The estimated maximum number of mule deer road kills is 140.

Sage Grouse

Evaluation of impacts indicates the potential for a significant adverse impact relative to the proposed power line 2-A siting, the edge of water line corrider 3-A, and the location of the southern non-mineralized material storage area. Based on data available, power line route 2-A is within approximately 0.5 miles of a small, isolated sage grouse strutting ground. Although no direct surface disturbance is planned in the area, increased habitat avoidance could result due to construction activity and predatory utilization of the power poles. The proposed water line corridor (western edge) borders the sage grouse strutting grounds indicated in Sections 10, 11, and 15 of Township 21 North, Range 51 East (Figure 3-9A). The eastern edge of the corridor, however, is approximately 2.5 miles distance from the nearest border of the sage grouse strutting grounds. Additionally, the northwestern border of the southernly located non-mineralized material storage area 8-A is within 0.75 mile of a sage grouse strutting ground (due west) (Figures 3-9A, 3-9B).

The singular area of sagegrouse strutting grounds located northeast of project perimeter (Township 22 North, Range 52 East) could be potentially impacted during the period of state route relocation construction which would occur at its closest point at approximately 1.5 miles distant.

Human associated activity within two miles of sage grouse strutting grounds has been reported to potentially result in behavioral avoidance of habitat. In a December, 1970 memorandum of understanding between the Nevada Department of Fish and Game and the BLM, discussion was formalized concerning appropriate determination of habitat and use areas significant to sage grouse populations. The BLM currently recognizes an area of two-mile radius of interest around sage grouse strutting grounds. Research has shown that the majority of nesting occurs within two miles of the strutting ground (Western States Sage Grouse Committee, 1974). The circle (two-mile radius) of interest factor has been incorporated into impact assessments determining the area of project impacts.

BLM wildlife specialists additionally plan a detailed review of any specific sage grouse habitats of concern which will aid in determining the significance of the site location and power line impacts. However, until such time that detailed information can be obtained, a worst-case analysis is warranted. Under this analysis, the conclusion was that sage grouse breeding and nesting success would be significantly adversely affected.

Relative to other species of interest in the area, no significant adverse impacts were determined. Although there would be a loss of living space and productivity of all species presently on the Mt. Hope site area, this was not considered to be significant because of the large amount of similar area that is available.

Raptors

Significantly adverse impacts to the raptor populations of the region were not identified in the assessment of proposed action implementation. The absence of bald eagle and peregine falcon nesting in the region has been assumed sufficient to preclude impacts. Reconnaissance surveys of the Mt. Hope peak area by WRC biologists and vegetation personnel also did not record the presence of nesting or use at the time.

The use of Diamond Valley by golden eagles was determined to present the potential for adverse impacts. While power line structure design is planned by Mt. Wheeler Power to include anti-roosting features, accidental electrocutions would still be expected to occur, although at a much lesser frequency than if no special features were installed. Road kills are expected to increase.

Wild Horses

The potential exists for increased movements between the Herd Use Areas (HUA's) if EXXON removes the existing allotment boundary fence without appropriate relocation. Increased movements may also occur when gates in the existing fence are left open to accommodate vehicular traffic across the boundary. Therefore, a potential does exist for significant increase in numbers of wild horses in the Romano Allotment. Upon implementation of the proposed project area a significant impact may result from wild horses being located on private land. Section 4 of the Public Law 92-195 (PL 92-195) states:

"Section 4. If wild free-roaming horses or burros stray from public lands onto privately owned land, the owners of such land may inform the nearest Federal marshall or agent of the Secretary, who shall arrange to have the animals removed. In no event shall such wild free-roaming horses and burros be destroyed except by the agents of the Secretary. Nothing in this section shall be construed to prohibit a private landowner from maintaining wild free-roaming horses or burros on his private lands, or lands leased from the Government, if he does so in a manner that protects them from harassment, and if the animals were not willfully removed or enticed from the public lands. Any individuals who maintain such wild free-roaming horses or burros on their private lands or lands leased from the Government shall notify the appropriate agent of the Secretary and supply him with a reasonable approximation of the number of animals so maintained."

As such, Section 4 provisions would be followed to mitigate wild horses and private land ownership conflicts.

Non-Species Specific Impacts

A secondary impact of importance was, however, determined relative to regional fauna populations and the human population influx expected as a result of mine development. Substantial camping, poaching and harrassment/disturbance of fauna in the surrounding area is expected. Wildlife management efforts, particularly those related to game populations and hunting, will be adversely affected.

In terms of carrying capacity, a potential 358 to 438 AUMs would be lost in the short term on the Mt. Hope site area. The impact of this AUM loss in forage value terms (permanent loss equalling 100 to 115 AUMs in the mine pit and non-mineralized material storage areas) was considered insignificant. The permanent forage value loss in AUM terms differs from the short-term total in that forage areas previously undisturbed but under EXXON control would be made available in the long-term.

4.7.1.3 Protected Species and Unique Habitats

Impacts were not identified for rare endangered or threatened species. Based on a review of habitat characteristics, lack of visual observation during on-site reconnaissances (May, June 1983) and discussions with BLM wildlife biologists, no significant potential was identified for the presence of threatened or endangered species. No such floral or faunal species are known to exist in the areas affected by project implementation (see Section 3.7.3). A vegetation reconnaissance survey of the lands within the Mt. Hope site study area in 1983 did not result in the observance of particularly unique species. Records of plant observations in Eureka County were reviewed to assure consideration of known locations with the result being that the plant listed as candidate threatened or endangered was not recorded as being in the vicinity of the Mt. Hope site study area.

No protected unique habitats exist in the Mt. Hope site study area. Several areas of locally important habitats do exist, however, and would be adversely affected. The Special Habitat Features (SHFs) located in the mine/non-mineralized material storage areas and tailings pond site 4-A would be eliminated by project activity. SHFs occurring as ridges and outcrops along the erosional Sulphur Springs cut would not be directly impacted although faunal use may be affected through avoidance. In combination, the habitat disturbance effects of project implementation would be significant on a site specific basis only; area and regional impacts were determined to be insignificant due to total area habitat availability (particularly north, west and south) and the species of fauna affected by disturbance.

As discussed previously, the proposed location/routings of the southern non-mineralized material storage area, power line 2-A, water line 3-A and the proposed state route relocation are in part within the two-mile circle of interest considered paramount to sage grouse nesting success. As such, the impacts associated with such location/routings has been determined significantly adverse on a worst-case basis (prior to intense inventory activity).

4.7.2 Alternatives

4.7.2.1 Vegetation

No significant adverse impacts have been identified. For total habitat acreage there is only about a 5 to 10 percent variance (15-30 acres) between alternative power line routes. Vegetation type consistently predominates as big sagebrush. Tailings pond alternative 4-B encompasses 5,650 acres, 63 percent greater than the proposed action and more than 260 percent larger than tailings pond alternative 4-C. Although vegetation cover is big sagebrush it is common and extensive throughout the region. An indirect impact would result from the loss of vegetation productivity equal to approximately 63 to 77 AUMs. Alternative site 4-C encompasses the least amount of vegetational acreage but exhibits a high degree of diversity as big sagebrush-juniper woodlands exist at higher elevations and big sagebrush at lower elevations. Because of the relatively high diversity and an associated vegetation productivity equal to an approximate AUM value of (76-94) to fauna and livestock, alternative site 4-C represents the least preferred alternative relative to vegetation impacts. The implementation of site 4-C would additionally result in a conflict with existing livestock seeding.

4.7.2.2 Fauna

Mule Deer

The implementation of either tailings pond Alternatives 4-B or 4-C would result in insignificant and significant impacts, respectively to mule deer migratory routes. Alternative 4-B, located in Diamond Valley, would present no impact to mule deer populations or migration. Alternative 4-C, appropriately fenced (e.g. chain link enclosure) would present an obstacle of low significance to migration. No significance relative to mule deer populations and migration were determined relative to the alternatives of power line or water line.

Sage Grouse

Alternative power line route 2-B traverses two sage grouse strutting grounds in Diamond Valley. As such, implementation of the alternative would be considered a significant adverse impact unless confirmation of negligent site value can be obtained. Alternative power line 2-C also traverses two sage grouse strutting grounds in Diamond Valley. Direct ground disturbance (power line construction) would result in loss of nesting habitat. Thus, the impact of implementing either alternative 2-B or 2-C was determined as significantly adverse.

Alternative water line 3-B would pose identical impacts to that defined for the proposed action. Alternative water line 3-C would pose significant adverse impacts to the regionally important sage grouse strutting grounds and nesting areas located proximate to the well field.

No significant impacts were associated with alternative tailings pond site 4-B. Loss of AUMs would occur but is deemed insignificant relative to the regional basis of comparison. The northwest border of alternative tailings pond site 4-C is approximately 0.75 miles south of a sage grouse strutting ground. As such, determination of a significant adverse impact on a worst-case basis is warranted.

Raptors

Impacts to raptor population were deemed insignificant but in scale of extent exceeded that of the proposed action. Specifically, both tailings pond alternatives 4-B and 4-C would pose attractive similarities to water bodies removed from central mine operations. While avoidances of the proposed tailings pond would be expected due to the close proximity of the ongoing mine operations, such avoidance would probably not occur at Alternatives 4-B or 4-C due to distance and topographic barrier from the mine site. While the tailings effluent has been characterized as non-toxic (EPA toxicity test criteria), commonly accepted criteria deem it undesireable that fauna be attracted to operational components as artificial habitat or use areas.

Wild Horses

Impacts to the HUA's would be similar to that described for the proposed action. A decrease in the likelihood that wild horses would utilize private lands would be expected in the case of alternatives 4-B or 4-C selection in that the area of Mt. Hope restricted area would be decreased, allowing some use of the original site 4-A lands.

4.7.2.3 Protected Species and Unique Habitats

As for the proposed action, impacts were not identified for rare, endangered or threatened species. Based on a review of habitat characteristics and discussions with BLM wildlife biologists, no significant potential was identified for the presence of threatened or endangered species. No such floral or faunal species are known to exist in the areas affected by project implementation (see Section 3.7.3). A vegetation reconnaissance survey specific to the lands within Alternative 4-C in 1983 did not result in the observance of particularly unique species (e.g. clokey pincushion). Records of plant observations in Eureka County were reviewed to assure consideration of known locations with the result being that the plant listed as candidate threatened or endangered was not recorded as being in the vicinity of the Mt. Hope site study area.

No protected unique habitats exist in the Mt. Hope study area. Several areas of locally important habitats do exist, however, and would be adversely affected. The Special Habitat Features (SHFs) located in the mine/non-mineralized material storage areas would be eliminated by project activity. Sites within the tailings pond 4-A area and SHFs occurring as ridges and outcrops along the erosional Sulphur Springs cut would not be directly impacted although faunal use may be affected through avoidance. In combination, the habitat disturbance effects of project implementation would be significant on a site specific basis only; area and regional impacts were determined to be insignificant due to total area habitat availability (particularly north, west and south) and the species of fauna affected by disturbance.

As discussed previously, the

proposed location/routings of the southern non-mineralized material storage area, power lines 2-B, 2-C, and water lines 3-B and 3-C and the proposed state route relocation are in part within the two-mile circle of interest considered paramount to sage grouse nesting success. As such, the impacts associated with such location/routings has been determined significantly adverse on a worst-case basis (prior to intense inventory activity).

4.7.3 No Action

No significant adverse impacts to vegetation and fauna were determined if the no action alternative was implemented. Failure to develop rights-of-way would preclude consideration of sage grouse strutting grounds interference. The absence of the southern non-mineralized material storage area would correspondingly result in a determination of no impact to sage grouse.

4.8 Wilderness and Significant Natural Areas

4.8.1 Proposed Action

The impacts of wilderness designation on potential industrial activity within the Roberts Wilderness Study Area (WSA) was completed by the Bureau of Land Management (Shoshone-Eureka Resource Area) in January of 1984 and is included in the Final Shoshone-Eureka Resource Management Plan and Environmental Impact Statement (1984). In accordance with the CEQ concept of tiering, the analysis is incorporated by reference.

The analyses of wilderness designation potential in the RMP/EIS were generally limited to existing resource uses within the WSA boundary. Environmental resource impacts to the Roberts WSA as a result of proposed action implementation (all components) would be minor in extent and quantity, primarily limited to visual resource impact external to the WSA. Specifically, visual resources within the WSA would not be affected as the proposed action does not include any form or type of physical activity within the WSA. The scenic and unique visual characteristics of the WSA (and significant area of surrounding non-WSA land) would not be affected.

As discussed in the following section (4.10 Land Use, Transportation and Noise), visual observation of some Mt. Hope project activity (e.g. lights, downstream portion of tailings dam surface (site 4-A), Kobeh Valley water supply power line) may be possible from within certain WSA land points with the use of an aided eye device. Such observation may be considered negative to some WSA visitors while others might consider it a reflection of the uniqueness of the WSA characteristics. The limited extent of identifiable visual resource conflicts resulted in a determination of insignificant impact. Additional analyses of visual resource degradation, involving the Level-1 screening impairment analyses discussed in Section 4.4, indicate that atmospheric emissions associated with the proposed action would not significantly impact the Roberts WSA or Mt. Hope region.

Other potential impacts considered but deemed insignificant included increased visitor use, wild horse population impact (apparent non-use of Mt. Hope area by Roberts HUA herd), transportation (no effect), and noise (topographic buffering).

4.8.2 Alternatives

Implementation of Alternatives 1 (land acquisition), 2 (power line), and 5 (housing) were determined to represent impacts generally similar to the proposed action, i.e., no significant impact.

Water supply pipe line routing 3-C represents an increased potential for visual observation of the supply power line from the Roberts WSA. The impacts associated with both alternatives (3-B, 3-C) were determined insignificant, however, due to the natural masking effects of pipeline vegetation growth allowance and topographic/vegetation screening from both within the Roberts WSA and from the site areas undergoing activity. Tailings pond alternative 4-C additionally represents a potential for increased areal extent of visual contrast.

4.8.3 No Action

Implementation of the no action alternative would result in a general status quo of WSA resource quality. Certain aspects of the regional topography indicative of human activity, such as valley and mountain road developments, would remain potentially visible with an aided eye device. Use demand would be expected to remain as projected in the Shoshone-Eureka RMP/EIS.

4.9 Cultural Resources

The following briefly discusses the results of cultural resource impact mitigation identified to date in compliance with 36 CFR 800 and in consideration of NEPA guidelines. The results reported herein have been derived from the mitigation planning conducted to date by EXXON, BLM and other federal/state entities.

4.9.1 Proposed Action

A cultural resources mitigation plan has been written covering the fifteen (15) National Register eligible sites in the mine area. BLM, the Nevada State Historic Preservation Office and the Advisory Council for Historic Preservation have agreed that implementation of this plan will constitute no adverse effect to these properties.

Additionally, the proposed action will require the interruption, by impoundment of tailings material, of a commemorative route traversed annually by the National Pony Express Trail Riders Association. As discussed previously, a route deviation will be developed in coordination with EXXON and the National Pony Express Trail Riders Association to mitigate the proposed action and/or alternatives impact. Impacts to the cultural resources of the Town of Eureka are discussed in Section 4.11. Impacts from either the proposed action or alternatives to the culturally significant Historic District of Eureka Town are discussed in Section 4.11 relative to potential for change in ambiance and/or population/housing impacts. In summary, significant potential for adverse impacts were not identified.

4.9.2 Alternatives

Mitigation planning relative to alternatives has been conducted to the extent exercised for the proposed action in the case of linear alternative components (i.e. avoidance routing design, preconstruction surveys). As such, it has been assumed that the mitigation of encountered sites (e.g., via avoidance) would negate adverse effects.

Selection of tailings pond alternatives 4-B or 4-C has been assumed, however, to result in the potential for significant adverse impact. This determination is based on the consideration that EXXON would develop such lands via the General Mining Law of 1872 (see Section 2.3.6, Details of Alternative 4 - Tailings Pond Siting) and that a Plan of Operations may be approved for such activity without mitigation being accomplished.

4.9.3 No Action

Adverse impacts to cultural resources were not identified under the no action alternative. Should the cultural resources mitigation plan activity proceed as scheduled at present (designed for the proposed action), the cultural resource base would be affected (e.g. data collection) regardless of alternative selection. Should the cultural resources mitigation plan activity not proceed as scheduled, the significant amounts of new information to the scientific community regarding cultural resources in the Great Basin would not be provided at this time. Assuming the informational record remained intact, e.g., vandalism, unauthorized collection did not occur, the failure to collect the inplace information at this time would not be expected to be significantly adverse.

4.10 Land Use, Transportation and Noise

The following discusses significant impacts associated with land use and implementing the proposed and alternative actions. A complete review of land use (grazing, transportation, noise, etc.) and project effects is presented in Technical Report No.8.

4.10.1 Proposed Action

The proposed action, involving a FLPMA land sale and claim development through the mining laws for the purposes of private industry (EXXON) mineral extraction and processing, and the granting of several rights-of-way has been analyzed as to land use character as described in the following.

4.10.1.1 Land Ownership

The proposed action would directly impact the manner in which the affected lands have been historically managed and used. If implemented, the proposed action would result in the transition of present day management practices of predominantly open grazing lands to that of mineral resource extraction. Of the approximately 8,900 acres that would ultimately be controlled by EXXON, virtually all of the area would be actively used for the mine/process plant operation or environmental and safety maintenance buffers. For impact assessment purposes, a total of 8,900 acres has been assumed to be under the control of EXXON regardless of acquisition method.

An additional direct impact to area land use patterns would involve the development of the proposed action housing subdivision. The conversion of approximately 150 acres of land may be considered on a worst-case basis to involve the total transposition of land use goals or present patterns. The provision near Eureka of a 50-acre recreational vehicle park to support construction housing needs may be considered a direct impact, on a worst-case basis, due to the potential that the site location may also require transposition of land use goals.

Impact assessment regarding land use alterations, on a worst-case basis, primarily assumes that development of the subdivision and temporary housing totalling approximately 200 acres requires the acquisition of county-owned lands. This worst-case scenario is based on the fact that county-owned lands represent the smallest entity ownership position (less than 0.1 percent of total acreage in the county). Implementation of the proposed action, resulting in a 10 percent reduction in county-owned lands, would be considered a significant change with potential for benefits and detriments.

Based on land ownership reviews and availability of lands, it is not expected that singular acquisition of county lands for housing would be required. The major criterion of assessment would then involve the availability of lands throughout the study region. Land use change would, therefore, be considered in terms of net type lands remaining available for agriculture, recreation, etc. In such terms, the proposed action would be considered insignificant.

Implementation of the proposed action does not conflict with any presently existing county land use controls.

4.10.1.2 Native Americans

In accordance with the National Historic Preservation Act, as applicable to consideration of Native Americans in project evaluation, contact with various Indian groups in Nevada was initiated to assure appropriate impact analysis. The proposed action would not entail use of Indian reservation lands nor would the proposed action occur within proximity of such lands. However, the Duckwater Shoshone Tribe in its response to project requests for information of interest has stated that the Western Shoshone and United States are presently in litigation with regard to the disposition of lands including the project area lands.

4.10.1.3 Agricultural Lands

Agricultural areas in the Mt. Hope region are restricted to Diamond and Kobeh valleys. Although proposed power and pipeline routings will cross in part such lands, the primary mine/process plant site does not include cropland areas. Agricultural use patterns (e.g., circular irrigation systems) may affect power line routing, which presently includes 3.8 miles traversing agricultural land. As such, no significant impacts were identified relative to agricultural land use. Analyses have included effects of atmospheric emissions (Section 4.4); groundwater impacts associated with ore processing (Section 4.5) and soil erosion impacts (Section 4.6).

4.10.1.4 Grazing Lands

Short and long-term losses of rangeland would be the same for the proposed action. The loss of government controlled rangeland would involve 358-438 AUMs since the Mt. Hope site would go to private ownership. (Loss of AUMs along rights-of-way is negligible.) This loss of AUMs would directly affect the permittees in the Romano and Roberts Mountain Allotments whose livestock presently utilize the Mt. Hope site. The Romano Allotment would lose 311-381 AUMs and the Roberts Mountain Allotment would lose 47-57 AUMs. This was determined not to be significant on a regional basis.

4.10.1.5 Recreation

The impacts upon recreational resources of the affected area would be both adverse and beneficial. While county, school and private recreational facilities appear adequate to accommodate increased use and might benefit from such increased use, overcrowding and excess demand would be expected. Until the establishment of subdivision recreation facilities, the adverse effects upon recreational facility capabilities and use would be significant. Significance of impact would, however, decrease substantially thereafter assuming both that the recreational facilities planned are implemented and that economic/social influx would proceed normally to include population sensitive growth (churches, social clubs, etc.). Non-facility recreation (e.g., hunting, fishing, sightseeing) would be significantly, adversely impacted. Excess demand for hunting and fishing privileges would result in participant and non-participant displeasure due to overcrowding and probable prohibition of activity for some. Increased sightseeing, including associated off-road vehicle use and campground use would also result in perceptions of recreational pleasure being decreased. Physical disturbance of available lands would be expected to increase as a result of increased use, some of which would require increased management activity if the status quo were to remain intact (e.g. increased grounds maintenance, Toiyabe National Forest).

4.10.1.6 Timber Products and Pine Nut Gatherings

The proposed action of removing up to 8,900 acres from public access would significantly affect the availability of such lands for timbering and pine nut gathering on a local criteria basis. The annual estimated harvest of 300 to 500 Christmas trees (6 to 10% of region harvest) would be removed and/or made inaccessible to the public. The associated impact would be adverse, limited to local significance.

4.10.1.7 Visual Resources

The impact on the visual resources within the study area would result from the following proposed developments; mining pit, process facility, power line, water pump facilities and support power line, relocation of State Route 278, tailings and evaporation ponds, overburden storage area and access and service roads. It is estimated that the visual contrasts associated with the tailings pond retention dam and the two non-mineralized material storage areas would be significant but limited in extent.

Of the many factors influencing the quality of the environment impacted by a project such as the Mt. Hope Project, the item most likely to be significantly impacted is the visual quality. Visual resource evaluation was initiated by analyzing the existing soil, vegetation and geological features for background color, texture and percent of cover. The existing landscape and land forms were analyzed for ability to visually absorb the project's physical features.

The visibility of the proposed action, day and night, from surrounding land forms was analyzed using computer generated XYZ cross-sections and standard topographic maps of various scales. Technical information utilized for methodology and reference included the BLM Visual Resource Management Program (#024-011-00116-6) and Visual Simulation Techniques (#024-011-00116-6). The following summarizes the results of the visual impact (aesthetic) assessment.

Within an 11-mile "Visual Influence Zone" (which incorporates a nearer "Primary Influence Zone"), the project would be seen frequently by residents or travelers. Each major landscape type (valleys, foothills, mountains) was rated for scenic quality. Land forms, vegetation composition and cover percentages, and intrusion (man-made and natural changes) were combined to determine landscape background ratings.

When the proposed development was analyzed some generalization and local variations were noted. Mt. Hope west of the project and the Sulfur Spring Range to the north, effectively block the project from being viewed from the Roberts Mountains area. A small portion may be visible (i.e., tops of non-mineralized material storage piles and the eastern portion of the tailings pond) with an aided eye device. The residents of any small developments or travellers in Garden Valley, to the north, and Diamond Valley, to the east and north, would be screened from directly viewing the project by the Sulfur Spring Range and Henderson Summit and associated high land forms. People living or traveling through Kobeh Valley would be most aware of the project.

The visual impact of construction and operation of the proposed project would be concentrated around the immediate project area. Residents and regional travellers may experience single or occasional effects on their sensitivities. The construction of power lines, access and service roads and other support facilities would result in short-term adverse effects on visual resources.

Within the project boundary area the visual resource quality would be degraded by the presence of machinery, lights, and contrast of color and texture between the developed areas and the natural landscape. The proposed process plant facilities, in general, would create a strong visual contrast both day and night. The reclamation process, after completion of mining would soften the contrast between developed and natural areas. The reclaimed areas would be lower in scenic quality and have a moderate visual contrast compared to present conditions.

In general, the Class III site area will decline to a Class IV area. Visual resources immediately within the project boundary area would be degraded to Class V during operations (project dominates) but could be expected to return to Class IV (project may dominate, but appears normal) following cessation of mining and reclamation (Section 2.5.1).

4.10.1.8 Transportation

Implementation of the proposed action would significantly increase the amount of vehicular traffic within the regional study area. Impact is anticipated to occur primarily on U.S. Highway 50 in the commercial business district (CBD) extending through the town of Eureka. Three worstcase scenarios were categorized to allow estimation of impact: 1) 4th quarter peak - 1,340 personnel, 2) 7th quarter peak - 1,410 EXXON employees, and 3) 50-year operations constant - 640 EXXON employees. Indirect vehicular traffic, defined in the assessment as those trips associated with persons who move into the area (Section 4.11), as a result of project-based economic opportunities, was incorporated into the analyses as appropriate per population projections.

The criteria selected to determine significance of impact emphasized the estimation of future volume/capacity ratios for each route substantially affected under the worst-case analysis of peak construction/operational use. The worst-case analysis allowed further assessment of mitigation efforts, including such trip reduction mechanisms as car pooling. Capacity was defined for a "C" level of service, i.e., providing open, 50 mph speed limit under good weather conditions. Trip generation was calculated by project component activity and location, thereof. Specifically:

1) Mine/Process Plant site - State Route 278 access.
2) Highway Relocation - State Route 278 access north and south of mine/process plant site.
3) Water Line Route - U.S. 50 access west of Eureka.
4) Power Line Route - State Route 278 primary access.

Origin of access under the proposed action involved the assumptions outlined below.

1) Point of origin for EXXON employees assumed to be near Town of Eureka. This assumption allows worst-case assessment as a location near the Mt. Hope study site would not dramatically affect other-activity traffic on a regional basis.

2) Point of origin for contractors was assumed to be work-camps in proximity to Eureka along State Route 278 or access roads (trailer parks). While construction housing might be located at job site, the assumption of a near-town location additionally allowed a worst-case scenario.

3) Under worst-case analysis, no allowances were made for car pooling or any other trip reducing factors.

The estimated volumes and capacities of each traffic route are shown in Table 4-8. Assuming that a volume/capacity ratio of greater than 1.0 indicates system deterioration, the proposed action would lead to a significant rate of deterioration in travel adequacy in the area of Eureka Town during the initial project peak period of two years but not throughout the project term (e.g., road congestion, service/repair frequency increases). Impact would involve peak hour periods primarily, although second and third shift travel would pose a contrast to the area's existing use pattern. Travel at non-peak hours would remain at a "C" level of service. (See Technical Report No.8 for a detailed review of traffic analyses).

Other impacts related to the increased traffic would include an increased frequency of accidents in the area, increased downtown Eureka traffic congestion (particularly during weekend, summer or special activity periods), decreased availability of parking space, and a loss of status quo appreciation of traffic by current residents.

Relative to railroad and air transportation, no significant impacts were identified. Rail transportation would not be directly affected although frequency of Diamond Valley aviation facilities use could be expected to increase in response to project-related business travellers.

4.10.1.9 Noise

The impact of the proposed action on noise levels in the Mt. Hope site study area relate to construction of the project support components (e.g., power line, water line, road relocation) and activities in the mine/process plant area. Construction activity would require machinery of major noise source types (e.g., bulldozers, backhoes, air compressors, etc.). Sources of significant noise generation during construction and operation within the mine/process plant area include drilling, blasting, surface clearing, ore and rock hauling/transport/unloading, crushing and operation of the process plant.

The purpose of the noise analysis was to establish a general level of the impacts associated with these noise sources. As discussed in Section 3.10, existing noise levels in the mine/process plant area are estimated to be very low, in the range of 20 to 45 decibels (dBA) which is comparable to a rural environment without transportation noise backgrounds. In Chapter 3.0, it was additionally noted that the nearest center of population was in excess of 25 miles distant and that the mine/process plant was located in an area

Table 4-8 Transportation Impact Assessment

ANNUAL AVERAGE DAILY VEHICLE VOLUME	U.S. 50 Northwest of Route 278 Junction	Route 278 North of U.S. 50 Junction	Eureka U.S. 50 1/	U.S. 50 North of Eureka 1/
Baseline	680	200	1,680	1,455
Projected Baseline Growth (1987)	741	218	1,831	1,586
Proposed Action (Alternate 5-A) Construction and Operation Peak	741	1,174	2,032	2,441
Alternate 5-B Construction and Operation Peak	741	1,089	3,181	2,226
ESTIMATED HOURLY VEHICL				
Baseline Capacity	1,500	1,500	1,800	1,800
VOLUME/CAPACITY RATIOS				
Baseline 1987 Projection	0.49	0.15	1.02	0.81
Proposed Action	0.49	0.78	1.13	1.36
Alternative 5-B	0.49	0.73	1.21	1.24

1/ Commercial Business District (CBD) areas.

Source: WRC EIS Team

surrounded by higher ground. These factors were incorporated into the impact assessment methodology to evaluate noise alteration and peak levels beyond the site area.

Construction of the water line, power line and highway relocation would involve machinery typically capable of producing noise levels in the 72 to 98 dBA range at 50 feet. This range is based on U.S. EPA data sources (EPA, 1971) which indicate principal construction equipment noise levels as follows (partial listing only, see Technical Report No.8): dump truck during ground clearing - 83 to 94 dBA; jack hammer - 81 to 98 dBA; backhoe excavation - 72 to 93 dBA; bulldozer - 80 dBA; and front end loader - 72 to 84 dBA.

Analyses conducted for impact assessment involved using these noise sources and assumption of approximate point source wave spreading and 10 dB, per km (0.6 mile) excess alteration (atmospheric absorption and ground alteration). Results indicate that sound levels of approximately 60 and 35 dBA would be experienced at one quarter and one mile distances, respectively. These levels would be well below the upper limits of acceptable highway traffic noise levels within areas where serenity and quiet are of significance (Federal Highway Administration Guidelines, HDR, 1980d). Additionally, with baseline noise levels of 25 to 40 dBA and the construction activity noise combined, exposure would be inaudible at a range of 1.25 miles (Technical Report No.8). Thus, noise safety level associated with the project support components, were deemed to represent an insignificant impact to most receptors because of the generally low values, short duration of activity and remoteness of locale. (Section 4.7 discusses impacts of human activity, including noise, upon sage grouse populations).

Operations within the mine/process plant complex would involve two primary noise source types of significance: blasting and haul trucking/grading. Blast activity was analyzed as to the methods of Siskind and Summers (1974). Blast noise was calculated at 40,000 lb loads (one per day, 40 holes each blast). Noise associated with blasting would equate, on a worst-case basis, to 128 dBA at 1,500 feet. Although elevated in noise levels, the temporary duration of blasting and natural screening of the project area would result in significant diminution of the blasting sounds to below 60 dBA at the project boundary and State Route 278.

Ore hauling, unloading of non-mineralized material and other mine/process plant activities were determined to represent noise sources ranging in the 75-99 dBA level (at 50 feet) as per EPA (1971) and Bolt et.al. (1981). Similar in extent to the noise generation of the project support facilities, mine/process plant area activity noise would be additionally attenuated due to the surrounding topography to the extent that the mine/process plant area activity would be inaudible at State Route 278.

In summary, neither blasting or mining activity were determined to represent a significant impact with respect to noise.

4.10.2 Alternatives

Land use impacts associated with implementation of rights-of-way and tailings ponds alternatives were assessed similarily to the proposed action implementation. Discussion of alternatives regarding their influence upon land use patterns, agricultural value, grazing practices, visual resources, transportation and noise is presented in the following.

4.10.2.1 Land Ownership

Implementation of Alternative 1-B would, upon final patenting under the provisions of the General Mining Law of 1872, result in private ownership similar to that described for the proposed action. Until such time that the affected lands were patented, ownership would be retained by the public and would require management obligations. In as much as a land tenure adjustment has been determined to be beneficial to public goals, both on a preliminary basis both in the Shoshone-Eureka RMP/EIS and on a site-specific basis in this EIS, implementation of Alternative 1-B has been determined to represent a loss of benefit.

Alternative 2 (power line routings 2-B and 2-C) or Alternative 3 (water lines routes 3-B and 3-C) components were determined not to present significant impacts if implemented as lands would remain in public ownership and is not proposed otherwise.

Implementation of tailings pond Alternative 4-B would result in the EXXON utilization of 9,395 acres (100 acres purchased by FLPMA sale) and the permanent loss of 5,650 acres of grazing lands (an increase in tailings area of 2,190 acres, 63 percent) from the proposed action and an increase in land use impact area as project facilities would span a greater area. The increased transposition of lands and area of influence was considered a direct impact.

Implementation of tailings pond Alternative 4-C would result in an impact similar to Alternative 4-B, i.e., the increase of influence zone described for Alternative 4-B. Alternative 4-C however does not involve the significant increase in transposition of land ownership as described for Alternative 4-B. Table 2-2, Section 2.3.2, details the land acreage of each alternative and the proposed action.

Quantitative evaluation of Alternative 5-B, Decentralized Worforce, in terms of land ownership cannot be definitively conducted at this time due to the unknown eventual location of housing. Assuming random and disassociated housing (no subdivision) would require acreage in excess of that needed for centralized area utilization, the demand upon available private lands could be expected to be greater than that estimated for the proposed action. The decentralized housing alternative is not compatible with the goals of the Eureka Council Planning Commission (J. Eyre, Eureka County Planning Commission, personal communication, 1983).

4.10.2.2 Native Americans

The impacts upon Native Americans of alternative implementation (all alternatives) would be identical to that described for the proposed action (i.e. no impacts identified to date).

4.10.2.3 Agricultural Lands

Implementation of Alternative 1-B would result in no direct impact to agricultural lands.

Alternative power line rights-of-way 2-B and 2-C cross agricultural lands (approximately 4.0 and 6.2 miles, respectively). Water line Alternatives 2-B and 2-C would present no significant impacts in terms of agricultural land use. Power line routing may be changed to avoid circular irrigation practices. Tailings pond Alternatives 4-B and 4-C do not presently include agricultural uses. While potential for such use exists, particularly at tailings pond Alternative 4-B in Diamond Valley, a determination of no significant impact was warranted based on present-day conditions.

Alternative 5-B would, upon implementation, present circumstances that would be expected to result in an increased demand for land use pattern change within private lands (e.g. agricultural to residential). Due to the agricultural importance of Diamond Valley managed lands, a worst-case assessment of lands taken out of production by the implementation of Alternative 5-B would warrant a determination of adverse impact, significant on a local and regional basis.

4.10.2.4 Grazing Lands

Under Alternative 1-B, land development under the provision of the General Mining Law of 1872, the short- and long-term losses of government controlled AUMs would be the same as the proposed action: 311-381 AUMs in the Romano Allotment and 47-57 in the Roberts Mountain Allotment. This was determined to be insignificant on a regional basis.

The short- and long-term losses for power line Alternatives 2-B and 2-C would be the same. The short term loss would be the minor disturbance during installation of the power lines and road. The long term loss would be the vegetation lost on the road. Both Alternatives, 2-B and 2-C, have an insignificant effect on grazing. Alternative 2-C would, however, conflict with an existing livestock seeding.

The short- and long-term losses for the water line Alternatives 3-B and 3-C would be the same. The short-term loss would be the minor disturbance during installation of the water line and road. The long-term loss would be the vegetation lost on the road. Alternative 3-B would have an insignificant effect on grazing, however, Alternative 3-C would interfere with the livestock operation on Roberts Creek seedings (Nos. 1 and 2) and Nichols seeding.

The short- and long-term losses for tailings pond Alternatives 4-B and 4-C would be the same. The loss of 63-77 AUMs for the Romano Allotment and 76-94 AUMs for the Roberts Mountain Allotment would be permanent.

The short- and long-term losses associated with Alternative 5-B, Decentralized Workforce, cannot be readily quantified due to the unknown locations eventually selected for residency. Due to the unlikelihood of residing on BLM land, it may be assumed that most, if not all, residency will be established on private lands without government controlled AUM allotments.

4.10.2.5 Recreation

Implementation of Alternatives 1-B, 2-B and 2-C, 3-B and 4-B would result in impacts to recreational resources similar to that identified for the proposed action. Alternative water line 3-C would significantly impact a regionally important sage grouse strutting area. Alternative 4-C would adversely affect recreational hunting in the area.

Alternative 5-B, Decentralized Workforce, would represent the greatest relative potential for recreational resource impacts. Provision of recreational facilities or park acreage is not planned in Alternative 5-B. Significantly adverse impacts to area resources would be expected. Mitigation of impact would be limited primarily to public entity response (e.g. county, school, U.S.F.S. facility expansions or additions). Overcrowding and system degradation would be expected to be severe with a five to ten year gap between demand and private enterprize developments. Nonfacility recreational impacts would be lessened by implementation of Alternative 5-B with demand being distributed between Elko and Eureka counties.

4.10.2.6 Timber Products and Pine Nut Gathering

Excepting Alternative 4-C, impacts to timber product resources and pine nut gathering would be similar for the identified alternatives as described for proposed action. Alternative 4-C would result in the additional loss of land (up to 1,620 acres) presently available for such use. The losses have been determined to be insignificant.

4.10.2.7 Visual Resources

Alternative 1-B would result in the same visual resources impact described for the proposed action.

Power line routing Alternatives 2-B and 2-C were determined not to be significantly different, in terms of visual resource effects, than the proposed action. Qualitative review of visual resource effects indicates increased adversity of impact from that described for proposed action in that routings 2-B and 2-C are aligned farther into Diamond Valley than the alignment of the proposed action and thus further away from contrast-diminishing topographic features. The supply power line associated with water line routings 3-B and 3-C would result in qualitative visual resource degradation similar to the proposed action. As in the proposed action, Alternative 3-B (lower Kobeh Valley) would result in power line establishment within an area generally lacking contrast masking features (e.g., valley terrain low and gently sloping, vegetation of grasses and low sagebrush). While Alternative 3-C represents a routing of greater topographic/vegetation diversity, visual impact potential would be of greater extent due to a worst-case assumption of potential Roberts WSA sensitivity sightings.

Based on the landscape element criteria of absorption/contrast and relative development visibility, implementation of the tailings pond Alternative 4-B would result in a significant adverse effect upon area visibility. The Diamond Valley location of site 4-B would present a high contrast outline with no absorption characters available. Development visibility would be at a maximum and view frequency would be high.

Alternative tailings pond site 4-C presents a potential visibility impairment intermediate in extent to either site 4-A or site 4-B. While not screened from observation to the extent that site 4-B (nearly 95 percent) is, area location would provide a certain degree of contrast reduction and absorption. Viewer frequency rating would be substantially less assuming the low receptor values presently occurring were to remain unchanged. The adverse impact associated with implementing the tailings pond Alternative 4-C was, therefore, determined of low significance as applicable to overall viewer satisfaction.

Under a worst-case scenario, Alternative 5-B development could be assumed to present localized visual resource degradation of significance as housing sites would be expected to include numerous sites within and adjacent to the Town of Eureka, a designated National Historic District.

4.10.2.8 Transportation

Implementation of Alternative 5-B, Decentralized Workforce, would be the primary alternative of impact variance from the proposed action. Traffic loading within Eureka Town and along the portion of State Route 278 between Eureka and the Mt. Hope site would be reduced during the operational period of activity. Traffic loading on that portion of State Route 278 between Carlin/Elko and the project site would increase correspondingly. Neither the alternatives or proposed action were determined to significantly impact area transportation in a significantly adverse manner in the long-term.

4.10.2.9 Noise

Excepting impacts to sage grouse strutting grounds (Section 4.7), noise levels associated with the construction/operation of the tailings pond and power line alternatives were determined to pose insignificant impacts of a temporary period (construction period). While construction of tailings pond Alternatives 4-B and 4-C would extend outward the decibel contours approximately two-fold, the impact of such extension was not determined significant due to the low levels of noise generated and the distance of the area from population centers. Similarily, construction of power line Alternatives 2-B and 2-C would result in closer proximity of source noise to receptors (along State Route 278) but would only pose increased, short-term discomfort exposures experienced by traffic receptors.

Implementation of Alternatives 1, 3, or 5 was not determined to present impact potential differently than the proposed action.

4.10.3 No Action

The effects upon land use of implementing the no action alternative would be as outlined in the following.

4.10.3.1 Land Ownership

Land ownership would be retained by public entity. Management obligations would remain as at present. In as much as land tenure adjustments have been determined to be in the public interests, both on preliminary basis in the Shoshone-Eureka RMP/EIS and on a site-specific basis in this EIS, failure to proceed in a manner representing those public interests would represent a loss of benefit.

4.10.3.2 Native Americans

Implementation of the no action alternative would result in impacts similar to the proposed action or component alternatives. Land ownership litigation would remain unaffected by implementation or non-implementation of the Mt. Hope project.

4.10.3.3 Agricultural Lands

Implementation of the no action alternative would be similar to that described for the proposed action, i.e. no significant impacts would occur to agricultural lands.

4.10.3.4 Grazing Lands

Implementation of the no action alternative would result in no numerical or ownership effects upon government controlled AUM allotments as the no action alternative assumes no implementation of the project.

4.10.3.5 Recreation

Both adverse and beneficial impacts to area recreational resources would not be realized under the no action alternative. Whereas adverse impacts under the proposed action case were determined short-term in duration and extent with long-term benefits being realized thereafter, implementation of the no action alternative would preclude the Mt. Hope specific impetus to further develop recreational resources. The preclusion of such development was determined insignificant, however, in that the status quo appears adequate for population satisfaction.

Non-facility recreational resource impacts would be beneficially precluded under the no action alternative as the cause of impact, increased population with associated use demands, would would not occur on a project specific basis.

4.10.3.6 Timber Products and Pine Nut Gathering

Implementation of the no action alternative would result in no net impact upon timber product resources and pine nut gathering potential.

4.10.3.7 Visual Resources

Implementation of the no action alternative would result in a visual resource quality similar to the status quo. Specific to the Mt. Hope site, it has been assumed that exploration activity would cease, reclamation of disturbed land would be completed and the area would remain as classified at present (Classes IV and III).

4.10.3.8 Transportation

Implementation of the no action alternative would result in a transportation system similar to present conditions. State Route 278 relocation would not be conducted.

4.10.3.9 Noise

The temporary effects of project construction and operation noise would be eliminated upon implementation of the no action alternative. Baseline levels ranging from 20 to 45 dBA would be characteristic.

4.11 Socioeconomics

This section presents specific detail concerning anticipated effects upon housing, population, public finance, etc. Although project timing remains uncertain, a decision was made to base the analysis on a third quarter, 1984 project start-up date in order to limit the degree of extrapolation from current year data which would be required. Excessive extrapolation from the data base year would diminish accuracy of projections. It must be stated that the 1984 basis of project start-up is only an arbitrary establishment of date and that EXXON has expressed no specific date for start-up operations. All costs are expressed in 1982 dollars.

Many of the identified impacts are dependent upon which of the two housing scenarios may eventually be selected (i.e., subdivision - proposed action or decentralized workforce alternative).

Each case has been analyzed to determine the measurable effects upon existing normal populations of the towns of Elko, Eureka and Carlin during the forecast period. Resultant demands upon new housing, utilities and services have been traced to their final budgetary and demand impacts upon each jurisdiction.

Section 4.11.1 presents detailed impact description relative to the effects of implementing the proposed action (Alternative 5-A), a developed subdivision. Sections 4.11.2 and 4.11.3 present the impact discussions relative to Alternate 5-B, decentralized housing, and the no action alternative. Tabular data is presented in a manner facilitating comparison among alternatives. Effects upon the regional environment (e.g. Elko and Carlin) are included under each topical discussion with the local area impact discussion.

4.11.1 Proposed Action

The proposed action is to provide a developed subdivision. The various aspects of socioeconomic impacts resulting from this alternative are discussed below.

4.11.1.1 Population

The influence of these new employment levels and populations would be experienced by Eureka and Elko Counties, mainly in the towns of Elko, Carlin and Eureka. Present population levels in these jurisdictions and projections of baseline growth made by the Bureau of Business and Economic Research/UNR have been extrapolated to illustrate anticipated effects (Figure 4-6).

During the start-up phase of construction, the additional populations associated with construction crews would be concentrated in the Eureka area alone. These would be housed in a work-camp provided to single and single status workers, and a mobile home, trailer and RV camp would be provided for those with dependents. (See Chapter 2.0).

Distributions of Project Populations

Non-local operations employees will number 525 out of the total 640 scheduled for hire. Preferences in housing and location have been assumed, based on employment status, pay-scale and the relative attractiveness of alternative housing facilities. The expected distribution of these employees at full complement is compared for Alternative 5-A (proposed subdivision) and Alternative 5-B in Table 4-9.

In Alternative 5-A, the attraction of a wholly new subdivision in proximity to employment at Mt. Hope would tend to concentrate about 90 percent of non-local operations employees. The Eureka community and the subdivision together would attract fully 98 percent of the total (514). Only 11 professional employees are expected to make Elko their residence.

As new numbers of construction and operations workers arrive at Eureka, Elko and Carlin for employment at the Mt. Hope Project, their family members and additional new arrivals of secondarily employed people would also add to the total new populations in each community. It is estimated that the population in the area will stabilize at a project-related average of 1,775 persons. Distribution of this subject population is depicted in Table 4-9.

Due to the peak population increases illustrated in Figure 4-6 and the manner of distribution in either Alternative 5-A or 5-B a significant impact would result to Eureka Town. In the peak period (7th quarter), the project populations would be approximately 4.9 times (3,029 versus 615) the expected population of Eureka Town in that period (this includes the subdivision). In Alternative 5-A, the towns of Elko and Carlin would experience population increases of only minor proportion by comparison. In addition, their peak new additions would occur in later periods, as operations employees and generated employment stabilize. This factor results from the higher multiplier for secondary employment assumed for operations employees over construction workers, and the continuing rise of operations employee numbers through the period.

4.11.1.2 Employment and Income

The following discussion identifies anticipated employment and income effects. Section 4.11.1.1 evaluates the employment influence upon population levels.

Employment

Construction on the mine/mill complex at Mt. Hope would require 11 quarters (Figure 2-8). At peak employment, construction workers would total 940, of whom it is estimated, for the purpose of impact analysis, 845 would be non-local (90 percent).

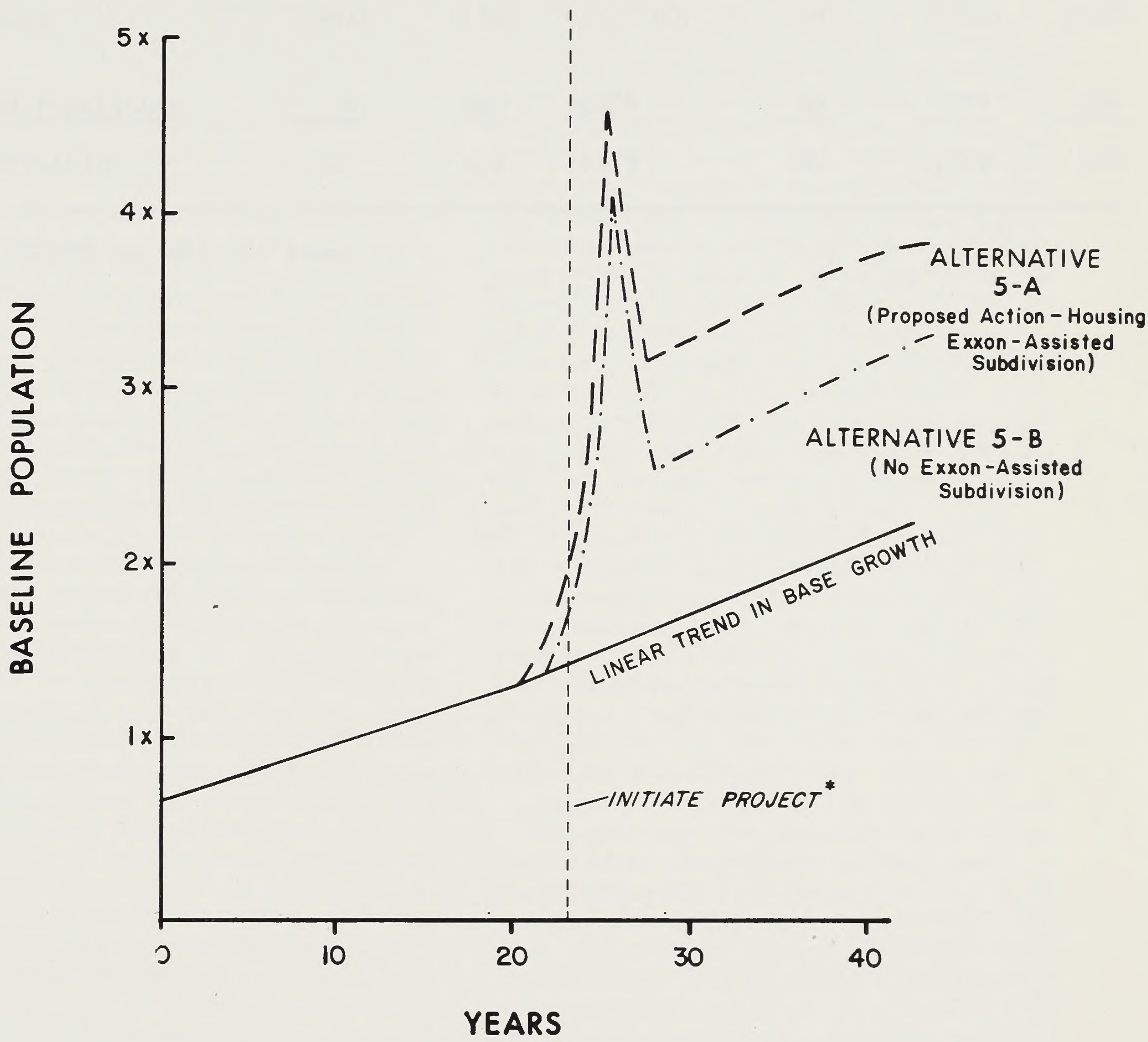


FIG. 4-6
HISTORIC AND PROJECTED POPULATION GROWTH
IN EUREKA COUNTY

*Initiate project line arbitrorily set at midscale to demonstrote effect.

Table 4-9 Stable Annual Populations

Employment	Proposed Action (5-A) Subdivision			Alternative (5-B) Decentralized Work Force		
	Subdiv.	Eureka	Elko/Carlin	Carlin	Eureka	Elko
Household Populations	1,087	122	27/0	99	834	303
(Employees)	(461)	(53)	(11)/(00)	(41)	(355)	(129)
Generated Population	0	362	168/9	31	274	234
TOTAL POPULATION	1,087	484	195/9	130	1,108	537

Source: EXXON and WRC EIS Teams

Non-local has been defined as any employees who are expected to require housing because of a commute distance exceeding 90 miles. Total additional household populations, including dependents of the incoming non-local workers, would be 1,732 persons. This peak level would be sustained during four quarters of the mid-period of construction.

Operation of the Mt. Hope Project will require the sustained employment of 640 persons (Figure 2-8), of whom it is estimated, for the purpose of impact analysis 525 or 82 percent of the total would be non-local. Operational employment would rise more slowly to the full-complement level which is expected to be achieved in the tenth quarter of the 12-quarter start-up phase. Household populations of direct-hire employees of non-local origin would be 1,236 persons. This peak would rise as construction was nearing completion (12th quarter) and would stabilize thereafter.

The highest level of non-local construction and operations workers and their dependents would occur in the seventh quarter of the start-up period. Employment would reach the level of 1,410, with a total peak population of 2,642 persons.

Secondary employment would be generated from the additional local spending by construction and direct-hire operations workforces, including that of local employees recruited to construction and operations staffing. This secondary employment and the associated dependents are expected to be of non-local origin, representing net new employment and immigrant populations. Total generated employment was calculated from a set of factors rather than from a single multiplier (Technical Report No.9). Analyses indicate that total secondary employment generated by both the construction and operations phases combined would be 387. The peak employments of each are non-coincident, and because generated employment would be lagged one quarter, a highest quarterly level of 299 would be expected to occur (seventh quarter).

Combined peak employment levels of construction, operations and secondary employment would be expected to occur in the seventh quarter and total 1,709 new workers (1,410 primary workers plus 299 secondary workers). Combined peak population influx arising in the same quarter would total 3,247 persons in the affected area (2,642 primary workers and dependents plus 605 secondary workers and dependents).

The employment potential of the proposed action, and the effects thereafter, represents perhaps the most singularly significant factor in the social impacts anticipated within Eureka County. The sheer magnitude of change represents a causative force of change, both highly beneficial and adverse in character.

Evident is the burden to which the employment requirements of the project could place upon the existing available labor force. In the short-term period, significant in-migration of qualified labor is anticipated, as is the complete absorption of available in-place qualified/semi-qualified workforce.

The absorption of the available workforce would result in certain aggravation of local businesses requiring either 1) the availability of that workforce at peak or special period (e.g., part-time labor replacement of full-time vacation time, tourist peaks, rodeo time, etc.) and 2) the availability of that workforce to indirectly allow maintenance of the company's on-board personnel (i.e., less turnover as available labor force is largely acquired first by new employers).

The experience of the preparers indicates that perhaps the most significant factor in community unease with a new large employer is the loss of in-place employees to the competitively more resourceful new employer (or in the case of agricultural/ranching interest, the distraction that higher payroll offers younger family members to transfer their career interests away from farming/ranching).

The inability to consistently compete in terms of wage levels, benefits, etc. can significantly affect the eventual longevity/success of a small, in-place business. In some cases, the economic benefits derived from the incoming population can be effectively managed to allow/justify direct marketplace competition for available workforce. In other cases, employee loyalty may be the only decisive factor in retaining qualified and experienced personnel. During the short-term period of project activity, extensive immigration of immediately qualified personnel would reduce the extent to which the in-place but unqualified county workforce would be "extracted" from existing businesses and family endeavors.

The long-term nature of the project would, however, tend toward such extraction as, in years 5-10, the in-place workforce would strive to become qualified and employed. In this regard, the proposed action represents an ironic dilemma in benefits/detriments normally associated with the mining industry. Specifically, while providing beneficial long-term opportunities of employment, financial independence and a future of career development, the 50 plus year period of activity negates the indirect effect that short-life mining ventures (5-10 year ore development) provide by allowing "temporary" employment and then an eventual return to originating industries such as agriculture and small business.

Income

Relative to direct monetary and living standard conditions, the implementation of the proposed action would be considered a significantly beneficial action. While worldwide economics will always affect the continuity of industrial activity, mining or any other industry, the potential for maintenance of economic continuity will also be defined in large part by the potential for opportunity - i.e., the magnitude, in this case, to which a resource exists and which it can sustain activity. As indicated by the anticipated 50-plus year activity period, the Mt. Hope activity varies significantly from short-term mining venture activities of a lesser magnitude. As presented in Section 4.11.1.4, the Mt. Hope project would contribute in excess of 1.2 million dollars annually of net tax revenue gain alone. These monies would represent a significant source of "income" to the local jurisdictions and of which their expenditures would be supported. As further presented in Technical Report No.9, the impacts of economic influx would be dramatic on an individual/commercial basis, significantly increasing the potential for per capita gains and also lowering of unemployment.

The analysis of socioeconomic impacts has predominantly been based on the quantifiable distribution of tax revenues generated as a result, in part, of personal and corporate income. This income, and the associated manner of expenditure thereof, would directly affect the non-project related resident population. Local commerce would be directly affected in that the source of income would be available for "capture" through the sale of goods, provision of services, etc. While the direct quantification of tax revenue and analysis of distribution thereof is presented in Section 4.11.4, the following summarizes the anticipated spending of personal income within the communities affected.

Personal Spending

The spending of EXXON's mine/process plant employees on normal personal and household items has been categorized on Table 4-10. For the purposes of impact analyses, estimated average annual gross incomes have been used to arrive at net disposable income after federal taxes, and the disposition of this income among 15 normal expenditure items has been estimated, including an allocation to personal savings. (The estimated income figures are within industry pay scale standards.) The calculations produced an array of taxable and non-taxable items, and a level of sales taxes annually paid according to sales tax rates in effect at the present time in the State of Nevada.

In summary, total annual income of operating personnel at the Mt. Hope project would exceed 11 million dollars. EXXON employees and families (approximately 1,236 people) would personally spend in excess of approximately 7.6 million dollars (after 20 percent tax reduction) annually in the total of 15 expenditure categories.

As indicated by Table 4-10, the Nevada Sales Tax levies apply to six of the normal 15 expenditure items by households, and exclude food, utilities and other significant expenditure items in an average personal budget. For the operations population of 1,236 on site from the third quarter of year four, a total expenditure level of $7,577,100 annually would generate $82,746 in sales tax revenues.

The personal sales tax calculated represents a $66.95 per capita annual expenditure for the 1,236 mine/process plant operations population. This same rate has been extended to the 539 population of generated secondarily employed, thereby covering 1,775 persons annually through the forecast period. Quarterly rates amounting to one-fourth the above rates have been applied to the populations of construction workers and operations and generated populations during the start-up period. Local hires have been excluded from these calculations, as their former employments are uncertain and may not contribute to the incremental tax revenues of the proposed action.

For the total population of 1,775 persons, an annual sales tax revenue volume of approximately $118,830 would be generated through the forecast period ($82,746 attributable to direct hires). By county, the annual sum of sales tax revenues generated would be as follows under the proposed action Alternative 5-A: Eureka - $105,170; Elko - $13,660.

4.11.1.3 Housing

A premise underlying the estimated population distributions of operations employees is that of multiple options in diversity and location of housing. Evaluation of housing requirements for the construction workforce has incorporated the Chapter 2.0 specifics regarding an RV/work-camp facilities establishment. Table 4-11 details the total new housing demand anticipated during peak and stabilized project periods. The housing type preference for the project influx of operations-related population was estimated at 24 percent for single family units, 32 percent multi-unit types (e.g., apartments, townhomes) and 44 percent mobile home units (Table 4-12). Housing value was established as follows for fiscal impact purposes: single family units - $75,000; multi-unit and mobile home $35,000 each.

Table 4-10 Mine/Process Plant Personal Spending and Tax Consequences (Estimated)

	Gross	After Fed. Tax	
Total Annual Assumed Incomes:			
Professional	$3,393,000	(70 percent)	2,375,100
Other	6,120,000	(85 percent)	5,202,000
Total	9,513,000	(80 percent)	7,577,100

	Percent	Annual Expenditures	Sales Taxes Amount $	Kind	Percent
Spending Levels					
Housing	30	2,273,130	0		
Electr.	4	303,084	0		
Water	3	227,313	0		
Heat	6	454,626	0		
Food	30	2,273,130	0		
Gasoline	7	530,397	42,840	$1.30/gal (407,988 gals.)	51.77
Clothing	5	378,855	14,207	3.75 percent net 1/	17.17
Liquor	1	75,771	2,589	$60.00/gal (1,263 gals.)	
Beer	2	151,542	2,273	$ 4.00/gal (37,885 gals.)	5.88
Savings	2	151,542	0		
Household	4	303,084	11,366	3.75 percent net 1/ =	13.73
Medical	3	227,313	0		
Recreation	1	75,771	0		
Cigarettes	1	75,771	9,471	$0.80/pack (94,714 packs)	11.45
Insurance, etc.	1	75,771	0		
Total:		$7,577,100	$82,746		100.00

Per Capita Sales Tax (1,236)	$ 66.95

1/ Net of 2 percent to State Fund

Source: WRC EIS Team

Table 4-11 Estimated Total Housing Units Needed for Peak and Stabilized Project Influence Periods 1/

	Year 1	Year 2	Year 3	Year 4-50
Construction Workforce				
Work-camp	180	423	23	0
RV Park	164	385	20	0
(Subtotal)	(344)	(808)	(43)	(0)
Operation Workforce 2/				
Proposed Action (Alternative 5-A)				
Subdivision	44	259	376	376
Eureka Other	27	175	163	168
Elko	11	75	65	67
Carlin	0	4	3	3
(Subtotal)	(82)	(513)	(607)	(614)
Decentralized Workforce (Alternative 5-B)				
Eureka	50	305	380	368
Elko	26	168	184	187
Carlin	5	34	44	45
(Subtotal)	(81)	(507)	(608)	(600)

1/ Year end totals are not additive, i.e., maximum housing numbers associated with construction workforce equals 808 units, not the additive total of years 1 through 4.

2/ Includes generated secondary employment population housing demand.

Source: EXXON and WRC EIS Teams

Table 4-12 Estimated Housing Type Preference of Population Influx

	Year 1	Year 2	Year 3	Year 4-50
Construction Workforce				
Work-Camp	180	423	23	0
RV Park	164	385	20	0
Operation Workforce				
Proposed Action Alternative 5-A				
Subdivision				
- Single family	11	62	90	90
- Multi-unit	14	83	120	120
- Mobile Home	19	114	166	166
Eureka Other				
- Single family	6	42	39	40
- Multi-unit	9	56	52	54
- Mobile Home	12	77	72	74
Elko/Carlin				
- Single family	3	19	16	16
- Multi-unit	4	25	22	22
- Mobile Home	4	35	31	32
Decentralized Workforce Alternative 5-B				
Eureka				
- Single family	12	73	91	88
- Multi-unit	16	98	122	118
- Mobile Home	22	134	167	162
Elko				
- Single family	7	40	44	46
- Multi-unit	8	54	59	60
- Mobile Home	11	74	81	81
Carlin				
- Single family	1	8	11	11
- Multi-unit	2	11	14	14
- Mobile Home	2	15	19	20

Source: EXXON and WRC EIS Teams

As illustrated by Table 4-11, peak housing demand would occur during the second year of project start-up for Alternative 5-A, the proposed action. This would require substantial reliance upon rental properties (e.g., houses, apartments, hotels, etc.) until such time that adequate housing becomes available. This anticipated reliance upon rental property has been determined on the basis that a housing shortage does exist in Eureka (Chapter 3.0) and a further assumption that preproject development would not occur.

Shortfalls in housing are expected to result in an increased reliance upon mobile homes, perhaps much in excess of the 44 percent forecasted for the stabilized condition. While the Alternative 5-A, subdivision scenario results in a housing shortfall, some mitigation may be expected in that construction requirements would be centralized and thusly focus industry response. An increase in the number and stability of Eureka-based homebuilder and mobile home dealerships could be anticipated.

The total housing demand would equal 614 units (Table 4-11). Under the Alternative 5-A scenario, 238 of the 614 units would be added to the Eureka and Elko/Carlin housing stocks. The addition to Eureka housing stock of 168 units would equal a 30.6 percent change from the 1980 housing stock of 549 units. Percent distribution of housing types within Eureka (Table 4-12) is estimated to be changed as follows: single family units - 39.7 to 31.8 percent; multiple family units 25.1 to 28.6 percent; and, mobile home units 35.2 to 39.6 percent. Percent change of type distribution in Elko County would be miniscule.

Baseline housing requirements for Eureka County were estimated to equal 136 units through the four year period of peak load (2.66 persons/unit). Thus, implementation of Alternative 5-A would result in a Eureka housing demand external to the subdivision development of 304 units (136 + 168). The additional requirement of 376 subdivision units would result in a total Eureka housing demand of 680.

The effects associated with the housing demand of Alternative 5-A are significant. As discussed in Chapter 3.0, availability of housing in Eureka is presently very limited even though 103 units (1980) are reported as vacant. Discussions with county government personnel (1983) indicate that this is due to substandard housing unit conditions and second home or seasonal ownership of units. Thus, a shortfall of available housing up to 304 units over the four year period was assumed as a worst-case scenario although actual numbers should be expected to be less.

Due to the limited number of homebuilders and mobile home dealers in Eureka, the response to the housing demands of Alternative 5-A is anticipated to require temporary but significant reliance upon self-provided housing (trailers, campers, mobile homes) by the in-migrating population. All available multiple family, mobile home, or single family rentals are expected to be absorbed by the population influx. Overcrowding of available or self-provided housing units may be expected. The length of time required to ameliorate this situation has been estimated at one to one and one-half years.

Indirect effects of the anticipated housing shortfalls, although expected to be of short term, may be significant in terms of the communities' satisfaction with employment opportunities, community relationships and environmental quality. Mitigation of the housing shortfalls would largely reduce the significance of direct and indirect effects.

4.11.1.4 Local Government and Public Finance

Implementation of the proposed action would significantly affect public financing in the region, having both positive and negative effects. Seven jurisdictions are involved: Eureka and Elko counties, Eureka and Elko county school districts, the towns of Eureka and Carlin, and the City of Elko. Each jurisdiction would be affected differently under either the proposed action Alternative 5-A, Alternative 5-B, or no action circumstances.

The financial effects of project and alternatives implementation upon each jurisdiction were analyzed extensively utilizing conservative methodologies. The detailed analytical results are presented in Technical Report No.9. The following subsections summarize methodologies of analysis and the results pertinent to the analysis conducted.

Methodologies of Analysis

An analysis of fiscal impacts fundamentally requires the investigation of revenues versus expenditures. Upon implementation, the proposed action (or alternative) would cause certain revenues to be generated while simultaneously causing area jurisdictions to incur certain expenditures. The fiscal balance, or imbalance, thus created between generated revenues/incurred expenditures significantly affects the eventual magnitude and adversity of social impacts resultant from the action underway.

To determine the fiscal impact of the proposed action, and thus to characterize socioeconomic impact as to beneficial/adverse conditions, conservative and realistic measures were incorporated into the analyses. First, the calculation of project generated revenues was conducted on a directly traceable dollar basis (i.e., tax monies generated by the project and project personnel were directly calculated and traced from origin through distribution). The use of directly traceable revenues allows an unbiased and accurate quantitative establishment of definitive monies that are specific to the project but results in an understated revenue value. Understated revenues result due to the fact that some generated tax monies, particularly those within the General State Fund (see latter discussion), cannot be distributed in a manner allowing analytical inclusion to this EIS. Additionally, local economies often receive external financing beyond direct tax money return which involves per capita basis requirements (e.g. grants). The use of directly traceable dollars to project revenues, therefore, results in the presentation of generated revenues which do not include General State Fund Monies or per capita special external finance monies commonly utilized by the affected jurisdictions.

The alternative method of revenue establishment would have involved use of a per-capita ($/person population) estimation procedure which assumes certain set revenue/expenditure values per person and disregards money source. The per-capita method would require use of data not developed specific to the project. Use of a per-capita revenue estimation procedure was considered to be less suitable than the direct dollar trace method and was, therefore, not utilized for final impact assessment procedures.

The second factor in the fiscal analysis involved the measure of revenues distribution to assess expenditure balance or imbalance. The distribution of project generated revenues to each jurisdiction was also calculated on the basis of direct traceability. Due to Nevada state tax laws, this method of calculation resulted in an underestimate of distributed revenues to the jurisdictions because a large proportion of tax revenues (35% of state sales tax) are obtained and distributed by the State under the State General Fund program in a manner not allowing definitive assumptions regarding final destination (Appendix E). Consequently, the calculations of fiscal impacts shown herein are conservative since redistribution of these funds to affected jurisdictions is not included in the analysis to evaluate the offset of impacts. Later discussion documents the quantity of such monies but does not account for distribution.

The third factor in the fiscal analysis (a per-capita determination of jurisdiction expenditures) resulted in response to the socioeconomic framework of the Eureka area which due to the low population density of the affected Eureka jurisdictions (county, town, school) are highly sensitive to population alterations of even minor extent. Superimposing the tripling of population anticipated upon the jurisdictional frameworks without consideration of economies of scales and without deemphasizing special external financing would result in a significant overstatement of eventual realized expenditures.

Thus expenditures were calculated for both direct and secondary (non-EXXON) generated populations using a project specific per-capita rate (1980-1983 budget basis). The fiscal expenditures calculated represent the most-probable case, reflecting the population and direct cost modified per capita rate anticipated through project implementations. The anticipated expenditures of the affected jurisdictions as calculated are discussed in the latter part of this subsection.

<u>Generated Tax Revenues</u>

The initial 50 years of project activity will result in about 123 million dollars (approximate round number) being generated in tax monies. Of the total being generated, approximately 102 million dollars would be directly distributed to the affected jurisdictions. The remaining balance of approximately 21 million dollars represents monies retained and indirectly distributed through the State General Fund (2.0 of 5.75 percent State Sales Tax). Although monies can be distributed to particular cost accounts of the jurisdictions of origin, state law does not require it.

As detailed previously, State General Fund monies (totaling 21.6 million dollars) have not been included in the budget balance analyses or projected jurisdictional revenues which follow. While it may be assumed that significant General Fund monies would eventually be distributed to the originating jurisdiction, the quantification of those monies distributed is a decision undertaken by legislative action as influenced by local, regional and state needs. As briefly outlined in later discussion, distribution of General Fund monies to school jurisdictions in Eureka and Elko Counties has historically exceeded the amounts paid in. Appendix E details certain aspects of past General Fund monies distribution and in summary, notes that the distribution of General Fund monies occurs via sector title (i.e., public safety, highways) rather than according to the local jurisdiction receiving state aid. The manner in which distributions occur involves variable equations which may change annually to reflect current perceptions of need. The determination of need is subject to legislative and political entity review.

The most notable return to local jurisdictions is in the form of the Distributive School Fund, which is separate from the 1.5% school support tax, and which originates out of the General Fund, accompanied by funds derived from four other sources. This second co-mingling of funds, and other, specific, aids to school programs (school lunch, vocational education, etc.) not a part of the Distributive School Fund but also originating from the General Fund, supplies an aid to public schools greater in amount than the original 2% sales tax paid in by all local jurisdictions. In FY 1982 and 1983, such aid was 131.8% and 166.1%, respectively, of the 2% paid in to the General Fund; of the original 2% sales tax paid in, 91% and 117%, respectively, was returned to public schools in the form of the Distributive School Fund.

The forecasts of Eureka and Elko School District revenues analyzed in this EIS do not include the return of the 2% State Sales Tax in the Distributive School Fund, nor of the specific aids separate from this fund named above. In FY 1982, the Distributive School Fund paid to Eureka 4.2 times, and to Elko 1.9 times, the amounts recorded as paid in by these counties in the form of the 2% sales tax. However, these returns to elementary and secondary public schools are by complex computerized formulas, which have the characteristic of changing externally-given parameters as well as internal relationships on an annual basis. The significance of this distribution, while not forecasted herein, would be expected to be major in terms of additional monies being received by the affected jurisdiction.

Project generated taxes which would be dispersed to the seven jurisdictions are detailed in Table 4-13 for the proposed action Alternative 5-A Subdivision. Generated taxes do vary based on the locale of population residency, thus the Alternative 5-B will result in differing fiscal impacts. The Alternative 5-B impacts are discussed in Section 4.11.2.

As indicated by Table 4-13, maximum receipt of direct distribution project tax revenue under Alternative 5-A for the seven districts combined would occur after 2.5 years of project initiation and would total $2,383,300. Tax revenues would stabilize in year 12 and would total $2,399,600. (Rounding of numbers not conducted to allow cross referencing with Technical Report No.9.)

The revenues shown on Table 4-13 include residential property taxes, personal sales tax, mine/process plant property taxes and net proceeds tax derived from the project. A detailed review of tax calculation methodologies and results is presented in Technical Report No.9.

Expenditures of Affected Jurisdictions

The annual budgets in the most recent period for each of the seven jurisdictions were examined to define recurrent operating revenues and expenditures by type. Capital outlays, opening balances and closing balance carryovers were eliminated. The purpose of the budget analysis was to define the source and the amount of revenue, and the departmental expenditures by type which are normal to ordinary operations. The existing population and the facilities and services to serve that population, were presumed to give rise to these "normal" levels of revenues and expenditures. This presumes that all facilities and services which the normal population requires are in place and that future

Table 4-13 Annual Tax Revenues Generated by the Project and Distributed to Jurisdictions (1982$) 1/
Subdivision Alternative 5-A

Year	Eureka County	Eureka Schools	Eureka Town	Elko County	Elko Schools	Elko City	Carlin Town	(TOTAL)
1 (2 Qts)	189,900	120,900	0	100	100	200	0	(311,200)
2	845,000	546,600	500	2400	2,200	4,400	900	(1,402,100)
3	1,341,000	1,016,300	900	6400	9,000	7,300	1,500	(2,383,300)
4	909,000	877,000	1300	7500	11,200	7,500	1,500	(1,815,000)
5	1,009,000	1,138,000	1400	7100	10,300	7,300	1,500	(2,174,600)
6	1,020,000	1,138,000	1400	7100	10,300	7,300	1,500	(2,185,600)
7	1,020,000	1,160,000	1400	7100	10,300	7,300	1,500	(2,207,600)
8	1,020,000	1,160,000	1400	7100	10,300	7,300	1,500	(2,207,600)
9	1,020,000	1,160,000	1400	7100	10,300	7,300	1,500	(2,207,600)
10	1,020,000	1,160,000	1400	7100	10,300	7,300	1,500	(2,207,600)
11	1,118,000	1,254,000	1400	7100	10,300	7,300	1,500	(2,207,600)
12	1,118,000	1,254,000	1500	7100	10,300	7,300	1,500	(2,399,600)
13	1,118,000	1,254,000	1500	7100	10,300	7,300	1,500	(2,399,600)
14	1,118,000	1,254,000	1500	7100	10,300	7,300	1,500	(2,399,600)
15	1,118,000	1,254,000	1500	7100	10,300	7,300	1,500	(2,399,600)
16-50 2/	-	-	-	-	-	-	-	-

1/ Does not include revenues retained by State for County-City Relief Tax (CCRT), Supplemental County-City Relief Tax (SCCRT); Ad Valorem Property Taxes lag one year from year incurred.
2/ Years 16-50 no significant variation. Complete data presentation in Technical Report No.9.

Source: WRC EIS Team

changes in revenue or expenditure would be in direct response to changes in population only. In this way, incremental population changes of the proposed action are measurable in their effects upon future revenues and expenditures.

The per capita expenditures of the jurisdictions for both normal and new populations provided a basis for estimating the expected increase in normal operating budgets. Existing budget details and associated per capita rates (status quo, 1980-83) are summarized by jurisdiction in Tables 3-20 and 3-21 (for detail, see Section 3.11.4 and Technical Report No.9).

Projected expenditures for each of the seven affected jurisdictions are presented in Table 4-14. The estimation of future expenditures was calculated for final analysis at the population/direct cost modified per capita rate, the results shown on Table 4-14.

As indicated in Section 3.11.4 discussion, considerable variation exists between the status quo per capita (1980-83) and per student costs rates of Elko and Eureka County school districts: $1,080.78 per capita and $5,687.33 per student for Eureka; $282.04 per capita and $2,222.36 per student for Elko. The analytical review of status quo per capita expenditure calculations clearly indicated the inevitable overstatement of real costs if a linear function not responsive to economics of scale was assumed. Table 4-15 illustrates the effect of population upon average cost per student based on the analysis of the Nevada's 17 school districts (see Technical Report No.9).

In combination with the dependency of the jurisdiction budgets upon special revenue supplements from external sources (Section 3.11.4), the necessity of establishing a population basis for forecasting future expenditures was further analyzed.

A linear regression analysis was made of the relationship between Eureka County populations and expenditure levels and those of Mineral, Humboldt, Lyon and Elko Counties for the period ending June 30, 1982. These populations were, respectively, 1,395, 6,286, 11,816, 15,235 and 19,875, thus permitting step-wise comparisons of five expenditure items common to each county, and the total of these items, as costs per capita. The analysis furnished a predictive model of declining per capita costs as population rises. An identical analysis was made of the Eureka School District with five low-enrollment school districts, using available data of 1979 and 1980. Enrollments of 114, 173, 190, 700, 907 and 911, provided the step-wise increases needed to supply a predictive model of per student costs at different levels of enrollment. The resulting forecast for Eureka School District expenditures indicated an annually declining cost per student based on the anticipated population influx of the proposed action.

Town of Eureka per capita budgeting was not subjected to regression analysis effects due to the diversity and statistical unreliability that its base population and county financing in comparison with other similar entities presented.

An Elko model was not formulated, because of insufficient numbers of counties or districts larger in size to provide reasonable measures of cost relationships with larger populations. This was because only one larger county of 34,000 population supplied a single reference point. Further stepwise progression was made unreliable by the extreme increase in the remaining two counties' populations of 208,000

Table 4-14 Net Project-Related Mid-Term Budgetary Shortfalls in Individual Accounts 1/
Proposed Action ($000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Subdivision Case 5-B															
Eureka County															
Expenditures	628	1,692	1,026	1,020	1,015	1,004	1,000	995	982	886	980	976	972	966	963
Revenues	190	845	1,341	909	1,009	1,020	1,020	1,020	1,020	1,020	1,118	1,118	1,118	1,118	1,118
Balance	-438	- 847	315	- 111	- 6	16	20	252	25	134	138	142	146	152	155
Eureka Schools															
Expenditures	286	809	736	710	686	663	640	626	612	600	585	572	558	543	529
Revenues	121	547	1,016	877	1,138	1,138	1,160	1,160	1,160	1,160	1,254	1,254	1,254	1,254	1,254
Balance	-165	- 262	280	167	452	475	520	534	534	560	669	682	696	711	725
Eureka Town															
Expenditures	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56
Revenues	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Balance	- 56	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55	- 55
Elko County															
Expenditures	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Revenues	0	2	6	7	7	7	7	7	7	7	7	7	7	7	7
Balance	- 32	- 30	- 26	- 25	- 25	- 25	- 25	- 25	- 25	- 25	- 25	- 25	- 25	- 25	- 25
Elko Schools															
Expenditures	101	101	101	101	101	101	101	101	101	101	101	101	101	101	101
Revenues	0	2	9	11	10	10	10	10	10	10	10	10	10	10	10
Balance	-101	- 92	- 92	- 90	- 91	- 91	- 91	- 91	- 91	- 91	- 91	- 91	- 91	- 91	- 91
Elko															
Expenditures	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Revenues	0	4	7	7	7	7	7	7	7	7	7	7	7	7	7
Balance	- 50	- 46	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43	- 43
Carlin															
Expenditures	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Revenues	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Balance	- 3	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2	- 2
TOTAL															
Expenditures	1,156	2,743	2,004	1,972	1,943	1,909	1,882	1,863	1,836	1,728	1,807	1,790	1,772	1,751	1,734
Revenues	311	1,402	2,381	1,813	2,173	2,184	2,206	2,206	2,206	2,206	2,398	2,398	2,398	2,398	2,398
Balance	- 845	-1,341	377	- 159	230	275	324	343	370	478	591	608	626	647	664
General State Fund 2/	156	609	973	539	504	504	504	504	504	504	574	574	574	574	574

1/ These figures do not include total revenues and expenditures of the related local jurisdictional budgets.

2/ General State Fund - monies generated from project and paid in to General State Fund. Such monies, available for redistribution throughout the State, have not been input to offset or enhance budgetary shortfalls or surpluses, respectively.

Source: WRC EIS Team

Table 4-15 Expenditures Per Student For Five Most Directly Applicable Teaching Costs

Budget (1980)	Eureka	Elko	State Average
	(Dollar costs per student)		
Administration Instruction	1994	1243	1131
Transportation	645	101	79
Operation Maintenance	602	184	189
Employees' Retirement Insurance	413	236	205
Equipment for Administration Instruction	53	5	11
Total Direct Teaching Costs	3707	1769	1615
Excluded Outlays	758	138	126

Source: WRC EIS Team

and 515,000 compared to the relatively small increases in Elko County populations which are forecasted. The same problem disallowed further extended analysis of the Elko School District. Expenditure projects for Elko County jurisdictions were therefore calculated by extrapolation of status quo per capita rates, as exhibited by 1980-83 budgets.

The regression analysis indicated that without project influence (continued baseline growth trends), normal Eureka County school expenditures (as direct teaching costs, 81.5% of total in 1979-1980) are expected to decline as per student expenditures from $4,702 to $4,092 during the period of 1984-2000. In the case of higher local school enrollments under the proposed action, the per student costs would further decline from $4,437 to $3,119 (first year, 34 percent student enrollment increase). The resultant forecast of these per student costs in terms of annual total expenditures is shown on Table 4-14.

The regression analysis and expenditure/revenue determinations indicate that the aggregate jurisdiction budgets would initially expend 1.156 million dollars with revenues of 311,000 dollars (Year 1, Table 4-14). The resultant budget deficit of $845,000 would be offset thereafter by budget surpluses of $230,000 (Year 5) to $664,000 (stabilized, Year 15).

Table 4-14 further indicates, however, that the aggregate budget surpluses are heavily influenced by the major budget balances of Eureka County and Eureka School District having a total budget balance surplus of $880,000. Eureka Town and Elko jurisdictions would each incur budget deficits, in the aggregate totalling a negative $216,000. The significance of this disparity is discussed in the following.

Eureka County School District revenues would exceed expenditures by year 2.5 of proposed action start-up and would remain in surplus for the forecast period. The modified per capita rate expenditures calculated indicate that upon annual stabilization an annual budget balance surplus of $725,000 (without State General Fund monies) would be anticipated. In addition to the budget results indicated substantial monies would be expected as distributed revenue per the State General Fund (not included as forecasted revenue in the analysis).

As with school enrollment economies of scale, county population dependency was noted in the comparison of Eureka and four other counties. When expressed as expenditures per capita, Table 4-15, the levels of comparative cost show a tendency to decline rapidly as population rises. Utilizing the detailed expenditure data of the counties examined (Technical Report No.9), the county expenditure regression analysis was prepared with output representing the population/direct cost modified per capita rate.

Per the regression analysis, county costs per capita were shown to decrease from $773 to $733 under "normal" (no project influence) conditions for the period 1984 to year 2000. Under the conditions of the proposed action, initial per capita costs would equate to 734 (assuming first year influence 1984), with subsequent reductions to a $679 per capita cost. The budgetary forecast for Eureka County shows a surplus of revenues over expenditures as early as year 2.5. Deficits reappear however, for the following two years with surpluses thereafter through the forecast. A main cause of this early surplus, and subsequent fluctuation, is a peak sales tax revenue earned from mine/mill expenditures for equipment and supplies in the year of opening, 45 percent greater than the year following.

As Table 4-14 further indicates, the Town of Eureka would incur an excess of project related expenses compared to revenues. The net annual project related deficits would total approximately $55,000. Excepting certain years (1, 2, 4 and 5), the Eureka County budget surpluses would be sufficient to ameliorate the Town budget deficits. In total, however, the first 10-year period of project implementation indicates an aggregate County-Town deficit of 1.4 million dollars. As discussed in Chapter 3.0, the Town of Eureka is financed primarily by county funding. Assuming that no changes were to occur in county funding, the anticipated Town budget deficits would represent a significant adverse impact with or without county financial support. Alternate means of financing (external source) or reduced project related expenditures would be required to offset the anticipated budget deficits. As stated previously, the projected revenue/expenditure budgets do not include State General Fund monies, a major source of available funds. These funds total $5.3 million in the first 10-year period and, hence, represent a viable, project specific source of monies generated to offset budgetary impacts. The outlay of these monies has not been assumed but it would be expected that substantial justification for such distribution could be presented to the legislature.

While Elko jurisdiction budget deficits do occur, they quantitatively represent low percentage contributions to total budget allocations. For example, the $91,000 Elko School District deficit represents less than one percent of total annual budget dollars. Without inclusion of State General Fund monies however, no manner of direct mitigation was identified to offset the anticipated deficits (as opposed to county financing of town in Eureka). As in the case of Eureka Town/County deficit mitigation potential, it would be expected that substantial justification for state fund distributed monies could be presented by Elko entities to the legislature.

Fiscal Impact Summary

The fiscal analyses conducted to assess the impacts upon public finance of implementing the proposed action indicate the following, based on the plans to date and as documented in this EIS. In summary, the monies generated by the EXXON Mt. Hope Project would be sufficient to offset the incurred expenditures of the affected jurisdictions. Relative to this revenue generation, the project was determined not to present a significant adverse impact. Due to the method of tax revenue retention/distribution as determined by State law, the jurisdictions within Elko County would experience budget deficits in an amount determined to be significantly adverse.

- If implemented, the proposed action would result in the generation of tax dollars totaling 123.3 million dollars over a 50 year period.

- Of the tax monies generated, 21.6 million dollars or 17.5% of the total would be distributed within the auspices of the State General Fund program. The manner and amount of distribution has not been predicted in the analyses presented in this EIS. Jurisdictional revenues are therefore underestimated if past experience holds true. Specifically, the affected jurisdictions most frequently receive (directly or indirectly) General State Fund monies far in excess of that originating in the jurisdiction. As documented in Appendix E, it is probable that at least the retained monies (21.6 million dollars) would be distributed to the seven affected jurisdictions.

- The stabilized annual total jurisdictional budgets would approximate 2.4 million dollars of revenues and 1.7 million dollars in expenditures for an aggregate budget balance surplus of $660,000. The jurisdictions of Eureka County and Eureka School District would, upon stabilization, incur budget surpluses of $155,000 and $725,000, respectively. The Town of Eureka would, however, incur a deficit budget balance of $55,000 annually. Historically, the Town of Eureka has relied upon external fund sources to offset incurred budget deficits. The Eureka County budget surpluses could, as in the past, provide one source of the required deficit financing.

- Elko jurisdictions would be expected to experience excess project expenditures relative to project generated revenues. This can be anticipated in light of the manner in which tax revenues (excepting State General Fund monies) are directly distributed in return to the originating jurisdiction. The expected distribution of the project generated revenues would be weighted heavily in favor of Eureka-based jurisdictions.

  The jurisdictions of Elko County, Elko School District, Elko City and the Town of Carlin would experience budget balance deficits totaling in the aggregate approximately $161,000 on an annual basis. Excepting the distribution of State General Fund monies, no consistently mitigating source of funds was identified to ameliorate the $161,000 annual budget deficits.

- In total, project generated tax monies would exceed annual jurisdictional expenditures except in years 1, 2 and 4. As Table 4-14 indicates, normal recurrent budget surpluses (in total) from year 5 would approximate $730,000 to $1.2 million annually in year 15.

  Forecasting by use of status-quo per capita rates, while allowing use of quantitative data unaffected by assumptions or historical conditions, is considered unrealistic due to the sensitivity of the Eureka socioeconomic frameworks in terms of population influence. Such forecasting disregards historical and financial management trends that clearly illustrate valid reduction in per capita costs as a result of economies-of-scale.

  Incorporating factors involving economies-of-scale, based on Nevada State data bases, indicates the most probable case of annual revenues exceeding expenditures, thus resulting in Eureka jurisdictional budget surpluses as an aggregate total.

4.11.1.5 Attitudes and Lifestyles

The potential for impacts upon the general attitudes and lifestyles of the Eureka County population as result of Alternative 5-A implementation was evaluated on the basis of two criteria: (1) rural lifestyle; and (2) attitudes as to "ambiance" of Eureka County, particularly the Town of Eureka, resulting from the cultural history (Chapter 3.0) of the area.

The population influx of the Alternative 5-A subdivision scenario would directly affect the rural lifestyles of the existing Eureka County resident populations. Effects within Elko County were determined insignificant as a result of its rural/urban composition and larger population base which would effectively mask most, if not all effects.

The rural lifestyle presently associated with the Eureka area would be affected primarily as a result of the expected population doubling, mostly with mining and mineral processing professionals and industrial labor (versus ranchers, small businessmen, farmers). The different lifestyles of the in-migration population would be expected for the most part to present direct conflicts with the status quo. Although this conflict would diminish as project term proceeded, a short-term effect throughout project duration would be expected.

The effects of the lifestyle conflicts upon the resident population would be both direct and indirect as well as beneficial and adverse. Direct impacts would affect the rural way of life through concentration of the population, increased traffic and congestion, increased service industries of a specific nature versus the rural county general store, etc. The extent of this rural "urbanization" would, however, be limited. The limited amount of land affected, the lack of significant impacts to agriculture or ranching, and the remoteness of the regional area would continue to strongly support a rural setting.

The primary impacts to local lifestyles are expected (Technical Report No.9) to be indirect impacts on resident attitudes and perceptions as project implementation proceeds. Extremely difficult to quantify is the perception that some residents will regard the implementation of Alternative 5-A as a permanent, negative change of status quo. Correspondingly, some residents would consider Alternative 5-A implementation highly favorable in terms of lifestyle change due to their perceptions that the area status quo is not complete and/or satisfactory in terms of health care, employment opportunities, etc.

Overall, the lifestyle changes incurred as a result of Alternative 5-A implementation would be perceived on an individual basis in highly variable degrees.

The potential for impacts upon the ambiance of Eureka County, especially the Town of Eureka, was primarily related to the historic and cultural value of the town itself. The effects of Alternative 5-A were evaluated as to the potential for impacting the town's Historic District designation (Section 3.9). The sources of direct influence upon the historic district criteria would be limited to physical obstruction or disturbance in the immediate locale of downtown Eureka. The Alternative 5-A scenario was not determined to present definitive potential for such impact. The Alternative 5-A housing plans stipulate development of subdivision property in a single unit area that would be infeasible in the downtown area. Housing requirements not fulfilled within the subdivision alone under the Alternative 5-A scenario were assumed to be addressed by dispersed housing located throughout the Diamond Valley, Kobeh Valley and Eureka Town perimeter areas. The construction of such housing would not be expected to create direct impacts upon the Historic District area. Indeed, the potential exists that, as in the past, the Eureka townspeople will view the economic influx of the increased population as an opportunity to maximize Historic

District preservation and local cultural values.

4.11.1.6 Community Services and Facilities

Schools

Population projections for Alternative 5-A, proposed action subdivision, indicate that an additional 326 students would require schooling at the point of project impact stabilization (3.75 years for school population). Distribution of the students has been estimated as shown in Table 4-16. The number of classrooms anticipated to accommodate the additional student body is also shown on Table 4-16. Classroom requirements were determined on a worst-case basis, i.e., it was assumed that no capacity was available in the existing schools. Although this is not presently the case (Chapter 3.0), the assumption was deemed appropriate for full review of potential impact in the event that at the time of project implementation such a full capacity situation had occurred.

Implementation of the proposed action (Alternative 5-A, subdivision) would result in a doubling of the present Eureka Town classroom facility requirements and more than a doubling of present school enrollment.

Beneficial impacts would result as the school base enrollment achieved a level adequate to facilitate teacher recruitment (presently a major problem) and enhance extracurricular programs. Primary impacts determined to be detrimental would involve a significant and adverse lack of classroom space. The classroom numbers associated with the student influx are based on a 22 pupil-per-classroom ratio. While student/classroom ratios could be increased and probably would be in the short term, additional facilities would be required to alleviate classroom shortage. Student distribution would be anticipated to be equally divided between the two schools of Eureka (K-6 and junior/senior high school) which would lessen impact level but would require facility expansion at both locations.

As discussed in Chapter 3.0, the financial capabilities of the Eureka School District (as measured by bonding capacity) appear adequate to accommodate the necessary facility expansion costs. Expansion costs for the Alternative 5-A scenario have been estimated on a preliminary basis (Technical Report No.9) to approximate $2.4 million or 23 percent of the 1983 district bonding capacity of approximately $10.3 million.

Expenditure levels of the school district, assuming status quo of the per capita student costs, would be adversely affected (Section 4.11.1.4) due to increased staffing requirements, facility maintenance, etc. Based on a teacher/student ratio of 1:14, approximately 23 teachers would be required to accommodate the gross total student influx of Alternative 5-A. Present staffing levels are, however, equal to a teacher/student ratio of 1:9.4, and if elevated to 1:14 would result in a required teaching staff addition of 17. While housing provisions for such a staffing increase would not presently be available, the homebuilder/mobile home dealer industry response anticipated to occur (Section 4.11.1.3) would be expected to mitigate the problem in the long term (+4 year period). Short-term housing would probably be addressed in a manner similar to that presently occurring (e.g., mobile home supply maintained by school district).

As indicated in Table 4-16, Elko County schools would be insignificantly affected as only an additional

Table 4-16 Number of Project-Related School Age Children and Classrooms Year End Totals 1/

	Year 1	Year 2	Year 3	Year 4
Subdivision Alternative 5-A				
Eureka Town	78	321	289	287
Elko	5	39	34	35
Carlin	0	2	2	1
Classrooms				
Eureka Co.	4	15	13	13
Elko Co.	0	2	2	2
Decentralized Workforce Alternative 5-B				
Eureka Town	64	256	206	204
Elko	15	87	96	99
Carlin	3	18	23	23
Classroom				
Eureka Co.	3	12	10	10
Elko Co.	1	4	5	5

1/ Year-end totals are not cumulative to prior year.

Source: WRC EIS Team

36 students would be expected, equalling a two percent enrollment increase.

The fiscal impact of the enrollment increase is discussed in Section 4.11.1.4.

Health

Health care services within the Eureka Town area would be directly affected by implementation of the proposed action Alternative 5-A. The impacts associated with the provision of health care services (federal, state, county and volunteer) are expected to progress from being generally negative during the early period of construction (1 to 2 years) to being beneficial during the period of late construction through operation.

The primary influence of implementing the Alternative 5-A subdivision scenario upon health care services would entail centralization of a population large enough to require well developed health care services. As noted in Chapter 3.0, health care service in Eureka County is limited by low population characteristics. Medical and dental professionals are heavily reliant upon external funding and community demographics do not provide a self-supportive establishment of health care services beyond non-hospital medical and emergency requirements.

The population projections associated with implementation of the Alternative 5-A scenario would theoretically provide a self-sustaining basis of support for approximately three to four doctors (1.5 doctors/1,000 population), 12 to 14 nurses (4.5 nurses/1,000 population), one or two dentists and one mental health specialist (HDR, 1980e). The expanded capability would be a significant beneficial impact to the Eureka County population that presently must go to Elko for most non-basic medical and nearly all dental services. It is expected that the existing health clinic facility would require expansion although this impact would be partly, if not entirely, offset by the location.

Negative impacts associated with the Alternative 5-A scenario, primarily incurred during the first two years of implementation of the proposed action, may be found in a shortage of health care professionals and in the overall quality of services provided. Additional staffing would probably require supplemental hiring or personnel reassignments by the Nevada Rural Health Consortium until such time that the private professional sector responded to the generated demand. Patient access and service priorities would be altered to accommodate demand. While potentially significant in the short term, the negative health care impacts are considered insignificant.

Elko County health care services are not expected to experience impact of significance (Technical Report No.9).

Law Enforcement

Both the county sheriff's department and county court system of Eureka would be directly affected by the increased populations described in Alternative 5-A. Elko County law enforcement agencies would be affected only to a minor extent. Associated impacts are primarily of an indirect nature (e.g., increased number of patrol vehicles required) versus direct impacts associated with long-term crime levels.

In Eureka County, the Alternative 5-A population increase would require the addition of an estimated six officers, six administrative/support personnel and three patrol cars. The rapid population growth associated with the construction period would require a rapid fulfillment of the estimated requirements. Although not quantified in detail, it is expected that jail facilities which are presently located in the County Court House would require either expansion or the establishment of a separate facility. Due to the historic value of the County Court House, it is doubtful that physical alterations to the building would be desirable and it is assumed that a new facility would be constructed.

Indirect impacts of project population influx include a probable need to rapidly train new-hire law enforcement personnel, a management system restructure to allow facilitated response and a potential need to expand the present judicial process capacity.

Additional workload upon the existing law enforcement system may be anticipated to rise generally in proportion to the population increase. The short-term construction period may be accompanied by a higher frequency of misdemeanor occurrences, e.g., public alcohol consumption, public disturbance, etc. This impact is not expected to pose a direct significant effect.

No long term Elko County law enforcement requirements were determined on the basis of Alternative 5-A impacts.

Fire Protection

No significant impacts to fire protection services were identified as a result of Alternative 5-A implementation. The Alternative 5-A subdivision plans call for provision of a fire truck vehicle and housing/support facility. The plans additionally assume that, if not in emergency response, the equipment and support personnel would be available for use outside the subdivision community. Some upgrading and/or addition to the presently available fire protection equipment (e.g., intermediate sized support service truck) would probably be desirable but was not deemed significant.

The impact analysis has assumed that fire prevention and control at the mine operation would be EXXON provided or negotiated with EXXON and contracted party.

Public Utilities and Communications

No direct impacts of adverse significance were identified relative to project and population demands upon electrical, gas, telephone or general communication systems. Firms presently or potentially responsible for providing such system services indicated that existing or planned (directly or indirectly induced) capacities would be adequate to accommodate the projected demand. Upgrading and/or expansion would be expected as the need developed. Direct and indirect effects of the additional demand on existing capacity are difficult to accurately quantify but have been analyzed as possible within the fiscal impact analysis (Technical Report No.9).

The existing and proposed power supply system available to Mt. Wheeler Power Company has been planned independently and without consideration of the proposed action. Mt. Wheeler Power, in its environmental impact report has stated that the estimated capacity of the Mt. Hope action will not exceed planned power supply (Appendix B). (Appendix B of this EIS presents details of the Environmental Impact Report prepared by Mt. Wheeler Power Company concerning provision of electrical services).

Water and Wastewater

Presently, the water supply and

distribution system within the Town of Eureka is variable in capacity and quality. Present capacity is considered excellent as a result of recent well-developments (Section 3.11.6). The water distribution system, presently undergoing partial improvement, is generally adequate although peak load capabilities are limited in some instances.

Under Alternative 5-A circumstances, no significant adverse impacts were identified. New subdivision plans call for the development and provision of major water and wastewater supply/distribution facilities (e.g., wells and pump station, storage, distribution). Impacts associated with the requirements of generated populations and Mt. Hope employees not living in the subdivision were evaluated in terms of fiscal budget expenditure. The data and results are incorporated into the analysis of Section 4.11.1.4 and are presented in detail in Technical Report No.9. In summary, no impacts of significance were identified for either the water or wastewater systems. Wastewater treatment capacity within Eureka's lagoon system was determined adequate for the probable portion of residents requiring such services (assumed to be all of the project-related population influx on a worst-case basis).

Solid Waste

No impacts of significance were identified relative to availability or adequacy of the solid waste management system and implementation of Alternative 5-A. Complete review of fiscal impact, minor in extent, is presented in Technical Report No.9.

Community Facilities

Most, if not all, of the available community facilities in the vicinity of Eureka Town would experience increased visitation and/or use if the proposed action subdivision was implemented. Additional social organizations (e.g., churches, social clubs, etc.) may be expected to develop in response to demand although the existing activities/ facilities may well be adequate for and actually benefit from increased patronage.

No community facilities were considered to be significantly impacted in a direct manner although indirect effects (e.g., displeasure with crowding of county pool) were identified in variable degrees. Technical Report No.9 presents a complete description of the analyses conducted.

4.11.2 Alternatives

Alternative 5-B, Decentralized Workforce assumes that the Mt. Hope operational workforce would be decentralized, i.e. no subdivision would be developed as a planned project component of EXXON. The alternative also assumes that personnel distribution by county would be variable from that anticipated by the proposed action, with a larger percentage of people locating in Elko County.

As detailed in the following sections, the variable distribution of personnel would directly impact the socioeconomic conditions of housing, employment, and fiscal management in a different manner than that described under the proposed action.

4.11.2.1 Population

Under Alternative 5-B, it is anticipated that a higher percentage of population residency would occur in the Elko City and Carlin areas. In Alternative 5-B, 67 percent (355) of the non-local operations employees are expected to select Eureka as residence; 33 percent (versus two percent in Alternative 5-A) would choose Elko or Carlin (170). This analysis is based on commuting distance. Table 4-10 depicts the expected distribution of these employees.

The distribution of population is, as under the conditions of Alternative 5-A, expected to significantly impact the Town of Eureka. Additionally, the population increases in the Elko jurisdictions significantly vary the financial impacts to each jurisdiction (Section 4.11.2.4).

Under Alternative 5-B, the peak project population period (7th quarter) would result in an increase from approximately 615 to 2,650 persons in the Eureka Town area. Operational population increases would total 1,108 versus 1,572 (Proposed Action) in Eureka and 537 versus 195 (Proposed Action) in Elko (Table 4-9). Carlin would undergo a population increase of 130 from its 1980 population of 1,232, a change of 10.5 percent. The population change in Carlin would reverse the negative trend from 1970 to 1980 of minus 6.2 percent growth. Population increases within the Elko City area would generally be insignificant in terms of total population (an addition of 537 persons to the 1981 population of 9,693).

4.11.2.2 Employment and Income

Employment impact under the Alternative 5-B would be identical to that described for the proposed action, Section 4.11.1.2. Peak construction employment would total 940 workers; operational employment would total 640 persons. Combined peak employment (non-local) would reach 1,410 with a total peak population increase of 2,642. The peak of construction and operational workforce overlap would occur during the seventh quarter of the start-up period. Secondary employment would total 605 personnel.

4.11.2.3 Housing

Table 4-11 details the total new housing demand anticipated for Alternative 5-B and the proposed action. Assumed housing characteristics are outlined in Section 4.11.1.3.

As in Alternative 5-A, peak housing demand would occur during the second year of project start-up (first full year, year one being two quarters only). Total housing demand would equal 614 units. Under the Alternative 5-B scenario, a total of 368 housing units would be added to the Eureka County stock. Percent distribution of type would be affected as follows: single family units - 39.7 to 33.4 percent; multiple family units - 25.1 to 27.9 percent; and, mobile home units - 35.2 to 38.7 percent. Percent change of type distribution in Elko County should be miniscule. Total addition to the Elko County housing stock would equal less than 3.3 percent of the 1980 7,667 unit stock. Evaluating the urban housing stock only (3,649 of 7,667 units), the additional housing demands represented by the decentralized workforce case would equal an increase of less than 7.0 percent.

Baseline housing requirements for Eureka County were estimated to equal 136 units through the four-year period of peak load (2.66 persons/unit). As such, total Eureka County housing demand would be reached in the fourth year of project activity to a total of 504 housing units versus 680 in the proposed action (376 subdivision units, 304 non-subdivision units).

As indicated for the proposed action, the effects associated with the housing demands of either the proposed action or Alternative 5-B would be significant. The low availability of housing and limited number of homebuilders/mobile home dealers in Eureka would create a significant housing shortfall, requiring the temporary reliance upon self-provided housing (trailers, campers, mobile homes). All available rental housing would be expected to be absorbed by the population influx. The term of adverse impact caused by implementation of the Alternative 5-B is expected to be considerably longer than that experienced under the condition of the proposed action. Two and one-half years or more (versus 1 to 1.5 years in the proposed action) may be required before the housing shortfall might be ameliorated.

Whereas the planned development of a housing subdivision (proposed action) mitigates a portion of the anticipated housing shortfall caused by project implementation, no such mitigation action has been assumed under the Alternative 5-B, Decentralized Workforce scenario. The absence of such action was considered significant, directly affecting the level of adverse impact anticipated.

4.11.2.4 Local Government and Public Finance

As presented in Section 4.11.1.4, implementation of the Alternative 5-B or the proposed action would significantly affect public financing in the region, both beneficially and adversely.

The methods of fiscal analysis utilized between case assessments were identical. Thus, the directly traceable project dollar revenues and per capita expenditure calculations were conducted simultaneously for the proposed action and Alternative 5-B. Section 4.11.1.4 presents a summary review of the methodologies utilized; Technical Report No.9 presents the analytical results in detail. Summary discussion and tabular data concerning the fiscal impacts of the Alternative 5-B are presented in the following.

Generated Tax Revenues

A total of approximately 114 million dollars would be generated in the first 50 years of project activity with approximately 93 million dollars being directly distributed to the jurisdictions of origin. State General Fund monies equalling approximately 21 million dollars would be generated and available for distribution (18.5 percent of total).

Project generated taxes which would be dispersed to the seven jurisdictions are detailed in Table 4-17. Maximum revenues (without State General Fund monies) from the project tax contribution would equal $2,386,400 at year 2.5 with the consistent revenue level of $2,408,600 being achieved during the eleventh full year of project initiation.

Comparison with revenue distributions in the proposed action case indicates that a shift of monies from Eureka jurisdictions to Elko jurisdictions occurs under the Alternative 5-B. The revenue shift would reduce total Eureka project revenue monies by 3% (Eureka County), 1.8% (Eureka School District), and 13% (Eureka Town). The shift in revenues distribution, while not particularly significant in Eureka jurisdiction totals, substantially increases Elko jurisdictional receipts which are much lower in base amount than Eureka jurisdictions (Table 4-17). Elko County revenues increase from $7,100 to $22,600 (318 percent change), Elko School District from $10,300 to $32,800 (318 percent change), Elko City from $7,300 to $24,000 (328 percent change) and Carlin from $1,500 to $4,900 (326 percent change).

Table 4-17 Annual Tax Revenues Generated by the Project and Distributed to Jurisdictions (1982$) 1/ Decentralized Workers (Alternative 5-B)

Year	Eureka County	Eureka Schools	Eureka Town	Elko County	Elko Schools	Elko City	Carlin Town	(TOTAL)
1 (2 Qts)	189,050	121,000	0	300	300	600	100	(311,350)
2	831,600	543,000	500	6,500	6,100	11,800	2,700	(1,402,200)
3	1,315,000	1,004,000	800	17,500	23,400	21,200	4,500	(2,386,400)
4	880,000	860,000	1,000	22,200	32,800	23,900	4,900	(1,824,800)
5	978,000	1,119,000	1,200	22,600	32,800	24,000	4,900	(2,182,500)
6	978,000	1,119,000	1,200	22,600	32,800	24,000	4,900	(2,182,500)
7	989,000	1,141,000	1,300	22,600	32,800	24,000	4,900	(2,215,600)
8	989,000	1,141,000	1,300	22,600	32,800	24,000	4,900	(2,215,600)
9	989,000	1,141,000	1,300	22,600	32,800	24,000	4,900	(2,215,600)
10	989,000	1,141,000	1,300	22,600	32,800	24,000	4,900	(2,215,600)
11	1,088,000	1,235,000	1,300	22,600	32,800	24,000	4,900	(2,408,600)
12	1,088,000	1,235,000	1,300	22,600	32,800	24,000	4,900	(2,408,600)
13	1,088,000	1,235,000	1,300	22,600	32,800	24,000	4,900	(2,408,600)
14	1,088,000	1,235,000	1,300	22,600	32,800	24,000	4,900	(2,408,600)
15	1,088,000	1,235,000	1,300	22,600	32,800	24,000	4,900	2,408,600)
16-50 2/	-	-	-	-	-	-	-	-

1/ Does not include revenues retained by State for CCRT, SCCRT; Ad Valorm Property Taxes lag one year from year incurred.

2/ Years 16-50 no significant variation. Complete data presentation in Technical Report No.9.

Source: WRC EIS Team

The revenue shift corresponds directly to locale of residency, which under the Decentralized Workforce scenario is more equally distributed between Eureka and Elko Counties, and the jurisdiction in which levying of personal sales and residential property taxes occurs.

Expenditures of Affected Jurisdictions

Table 4-18 presents the forecasted project-related expenditures for each of the affected jurisdictions under the conditions of Alternative 5-B. The analysis of expenditures was conducted similarly to that for the proposed action. Specifically, modified population/direct cost per capita rates were utilized in the final analysis to determine probable expenditures.

Stabilized project-related expenditures among the seven jurisdictions would total approximately $1,896,000 with resulting budget balances being a positive $513,000 (total revenues equalling $2,409,000). However, by individual jurisdiction, substantial variation in budget balances would be expected as a result of distribution techniques. The Eureka jurisdictions (county, school, town) would experience a positive $1,105,000 budget surplus although by item the Town of Eureka budget would be in deficit by $119,000.

As with the proposed action, approximately $500,000 would be generated annually by the project which have not been included in the budgetary balance calculations. Similarly, substantial justification for the distribution of such monies from the General State Fund would appear feasible and appropriate for legislature introduction.

In sharp contrast to the Eureka jurisdiction budget surplus, the Elko jurisdictions (Elko County, school, city and Carlin) would experience total budget deficits approximating $592,000. In comparison, the projected Elko deficits under the proposed action scenario would approximate $161,000 annually. The budget differentials are derived from the large expenditure variations caused by the increased population without project tax base support: under the proposed action total expenditures approximate $186,000 versus $677,000 in the Alternative 5-B; with revenues escalating from $25,000 (proposed action) to only $85,000 under the Alternative 5-B.

As Table 4-18 further indicates, the jurisdiction of Eureka School District would be expected to experience significant budget surpluses throughout project life. While the more equal distribution of population results in reduced expenditures, total revenues received vary little from that of the proposed action due to the originating source location (Eureka County) of these generated monies (the mine/process plant itself). The more consistent and extensive budgetary surpluses are contrary to the fiscal impacts expected for the proposed action in which the initial Eureka County budgets progress from deficits to low amount surpluses and the Eureka School District budget shows an initial budget deficit of $165,000 (Table 4-14) versus a budget deficit of $123,000 in the Alternative 5-A scenario.

As described for the proposed action, the Town of Eureka will incur expenditures in excess of revenue without direct county support. In the case of Alternative 5-B, the negative balance totals approximately $119,000 versus the proposed action balance of a negative $55,000. Contrary to the proposed action, however, the early balance surpluses of Eureka County ($167,000 and

Table 4-18 Net Project-Related Mid-Term Budgetary Shortfalls in Individual Accounts 1/
Alternative 5-B ($000)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15
Decentralized Workforce Case 5-B															
Eureka County															
Expenditures	595	1,516	761	713	709	701	695	694	688	684	682	676	676	671	666
Revenues	189	832	1,315	880	978	978	989	989	989	989	1,088	1,088	1,088	1,088	1,088
Balance	-406	-684	554	167	269	277	294	295	301	305	406	412	412	417	422
Eureka Schools															
Expenditures	244	702	583	560	543	526	511	501	491	482	472	463	453	442	433
Revenues	121	543	1,004	860	1,119	1,119	1,141	1,141	1,141	1,141	1,235	1,235	1,235	1,235	1,235
Balance	-123	-159	421	300	576	593	630	640	650	659	763	772	782	793	802
Eureka Town															
Expenditures	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Revenues	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Balance	-120	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119	-119
Elko County															
Expenditures	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117
Revenues	0	7	18	22	23	23	23	23	23	23	23	23	23	23	23
Balance	-117	-110	- 99	- 95	- 94	- 94	- 94	- 94	- 94	- 94	- 94	- 94	- 94	- 94	- 94
Elko Schools															
Expenditures	366	366	366	366	366	366	366	366	366	366	366	366	366	366	366
Revenues	0	6	23	33	33	33	33	33	33	33	33	33	33	33	33
Balance	-366	-360	-343	-333	-333	-333	-333	-333	-333	-333	-333	-333	-333	-333	-333
Elko															
Expenditures	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157
Revenues	1	12	21	24	24	24	24	24	24	24	24	24	24	24	24
Balance	-156	-145	-136	-133	-133	-133	-133	-133	-133	-133	-133	-133	-133	-133	-133
Carlin															
Expenditures	37	37	37	37	37	37	37	37	37	37	37	37	37	37	37
Revenues	0	3	5	5	5	5	5	5	5	5	5	5	5	5	5
Balance	- 37	- 39	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32	- 32
TOTAL															
Expenditures	2,495	3,015	2,141	2,070	2,049	2,024	2,003	1,992	1,976	1,963	1,951	1,936	1,926	1,910	1,896
Revenues	311	1,404	2,387	1,825	2,183	2,183	2,216	2,216	2,216	2,216	2,409	2,409	2,409	2,409	2,409
Balance	- 2,184	-1,611	246	-245	134	159	213	224	240	253	458	473	483	499	513
General State Fund 2/	154	600	960	531	497	497	497	497	497	497	566	566	566	566	566

1/ These figures do not include total revenues and expenditures of the related local jurisdictional budgets.

2/ General State Fund - monies generated from project and paid in to General State Fund. Such monies, available for redistribution throughout the State, have not been input to offset or enhance budgetary shortfalls or surpluses, respectively.

Source: WRC EIS Team

$269,000 in years 4 and 5, respectively) under the Alternative 5-B scenario could accommodate the supplemental assistance to mitigate the Eureka Town budget deficit. The first ten years of project impact would result in a net County/Town budget surplus of approximately $183,000 in the Alternative 5-B (versus a budget deficit of 1.4 million dollars). Correspondingly, however, the jurisdictions in Elko County would experience a 10 year total budget deficit of approximately 6.1 million dollars versus that of 1.6 million dollars in the proposed action scenario.

Fiscal Impact Summary

The fiscal analyses conducted to assess the impacts of implementing Alternative 5-B, Decentralized Workforce, indicate the following, based on the plans to date and as documented in this EIS. In summary, the monies generated by the EXXON Mt. Hope Project would be sufficient to offset the incurred expenditures of the affected jurisdictions. Relative to this revenue generation, the project was determined not to present a significant adverse impact. However, due to the method of tax revenue retention/distribution as determined by State law, the jurisdictions within Elko County would experience budget deficits in an amount determined to be significantly adverse.

- If implemented, the Alternative 5-B scenario would result in the generation of tax dollars totalling approximately 114.5 million dollars over a 50 year period.

- Of the tax monies generated, 21.2 million dollars or 18.5% of the total would be distributed within the auspices of the State General Fund program. As described for the proposed action, the jurisdictional revenues are understated by the WRC fiscal impact analysis discussed in this EIS in order that a traceable and conservative dollar estimates can be evaluated. As documented in Appendix E, it is probable that at least the 18.5% retained monies (21.2 million dollars) would be distributed to the seven affected jurisdictions.

- The stabilized annual total jurisdictional budgets would approximate 2.4 million dollars of revenues and 1.9 million dollars in expenditures for an aggregate budget balance surplus of $500,000. The jurisdictions of Eureka County and Eureka School District would, upon stabilization, incur budget surpluses of $442,000 and $802,000, respectively. The Town of Eureka would, however, incur a deficit budget balance of $119,000 annually. Historically, the Town of Eureka has relied upon external fund sources to offset incurred budget deficits. The Eureka County budget surpluses could, as in the past, provide one source of the required deficit financing.

- The jurisdictions of Elko County, Elko School District, Elko City and the Town of Carlin would experience budget balance deficits totalling in the aggregate approximately $592,000 on an annual basis. This amount of budget deficit represents a 367% increase from the budget shortfalls anticipated in the proposed action ($161,000). Excepting the distribution of State General Fund monies, no consistently mitigating source of funds was identified to ameliorate the $592,000 annual budget deficits.

- The total project generated tax monies, including those retained by the General State Fund, would exceed jurisdictional expenditures by approximately 1.1 million dollars annually (versus 1.2 million dollars in the proposed action).

4.11.2.5 Attitudes and Lifestyles

As in the analysis of the proposed action, the potential for impacts upon the general attitudes and lifestyles of the Eureka County population as result of Alternative 5-B implementation was evaluated on the basis of two criteria: (1) rural lifestyle; and (2) historical "ambiance" within Eureka Town.

The population influx of Alternative 5-B scenarios would directely affect the rural lifestyles of the existing Eureka County resident populations. As in Alternative 5-A, however, the effects within Elko County upon implementation of Alternative 5-B were determined insignificant as a result of its rural/urban composition and larger population base.

The dispersed population characteristics of Alternative 5-B would largely be the determining factor in local population attitudes toward the project. Contrary to the proposed action, Alternative 5-B personnel would be required to fulfill housing and recreational needs without the benefit of a centralized, available complex. Significant competition for scarce housing would be expected to result in conflicts between local residents wishing to upgrade or purchase new homes simultaneous to in-migration of the workforce. Location siting of housing could be an irritant to locally established land use patterns; a concern that has been emphasized to date. The potential that a dispersed population may be implemented would be expected to undergo immediate local scrutiny with probable zoning ordinance debates being undertaken and initiating conflicts.

Overall, Alternative 5-B increases the likelihood of resident negative perceptions due to its intrinsic random approach to integration within the community. With regard to Historic District effects, under the Alternative 5-B scenario circumstances, no significant potential for impact was identified. The increased housing requirements would be expected to exert some pressure upon property located within and in proximity of the town. Extensive use of such properties to accommodate the natural desire to group housing units near service facilities would present a potential for impacts on the Historic District. A quantified probability of such an impact could not be assessed. Based, however, on the currently high and increasing resident and local government desires to maintain and improve the quality of the Historic District, it was determined that impact potential was low. The determination was based on the assumption that restrictive land controls such as zoning ordinances and architectural specifications would be established and enforced.

4.11.2.6 Community Services and Facilities

Schools

Population projections for Alternative 5-B indicate that an additional total of 326 students (same as proposed action) would require schooling at the point of project impact stabilization (3.75 years for school population). Distribution of the students and number of classrooms required have been estimated as shown in Table 4-16.

As in the analysis of the proposed action, classroom requirements were determined on a worst-case basis with the assumption that full capacity use had been achieved at the affected schools.

Under the Alternative 5-B scenario, the dispersed population of personnel would result in a 30 percent decrease in required Eureka classroom space from that of the proposed action: 10 versus 13. The additional requirements would still represent an impact of significance to the district school system. In terms of expansion, Alternative 5-B costs to Eureka have been estimated to equal approximately $1.4 million or 13.6 percent of district bonding capacity.

Teacher requirements under the Alternative 5-B scenario would equal approximately 14 and 8 for the 1:14 and 1:19.4 (upgraded) ratios, respectively. The reduction of teacher staffing requirements (39 and 53 percent, respectively) in comparison to the Alternative 5-A requirements would result in licensed housing provision difficulties as well as lower district budget expenditures.

The variations in district expansion requirements relative to Alternative 5-A and Alternative 5-B directly reflect an associated increase of expenditure requirements by the Elko County School District under Alternative 5-B circumstances. While the dispersal of costs associated with staffing, facility expansion, etc. would be beneficial to the Eureka County School District, a substantial inequity of costs would be accrued to the Elko County school system. Under Alternative 5-B circumstances, the impact budget deficits significantly increases for Elko County (see previous section 4.11.2.4).

Health

As in the proposed action, health care services within the Town of Eureka area would be directly affected by implementation of Alternative 5-B. The impacts associated with the provision of health care services (federal, state, county and volunteer) are expected to progress from being generally negative during the early period of construction (1 to 2 years) to being beneficial in nature during the period of late construction through operation.

Alternative 5-B implementation would, however, result in a diminished potential for beneficial impacts and would probably extend the period of negative impacts related to staffing and facility shortages. It is expected that the private professional health care sector would respond to population demand as in the proposed action Alternative 5-A but that response time might be extended and less specific in terms of area of need (e.g., Town of Eureka). The increased distribution of population to Elko is expected to result in a probable expansion of existing hospital facilities (i.e., building wing addition of 10 to 20 rooms).

Law Enforcement

Both the county sheriff's department and county court system of Eureka would be directly affected by the increased populations induced by Alternative 5-B. Elko County law enforcement agencies would be affected only to a minor extent under the alternative. As in Alternative 5-A, the associated impacts are primarily of an indirect nature (e.g., increased number of vehicles) versus direct impacts associated with long-term crime levels.

Under Alternative 5-B circumstances, the dispersed location of the project population would require the additional employment of three duty officers, three administrative/support personnel and one or two patrol vehicles. Additional facilities within the county would also probably be required.

Elko County law enforcement requirements resulting from Alternative 5-B implementation are expected to be limited to the necessary staffing addition of one or two duty officers.

As in the proposed action, additional workload upon the existing law enforcement system may be anticipated to rise generally in proportion to the population increase. The short-term construction period may be accompanied by higher frequencies of misdemeanor occurrences but, is not expected to pose a direct significant effect.

Fire Protection

No significant impacts to fire protection services were identified for the Alternative 5-B. The dispersed location of the additional population of Alternative 5-B would generally limit the need for major improvement requirements such as an additional fire department station. An additional fire truck and support equipment would be required to provide for adequate service capabilities. The volunteer personnel system would also probably require supplement with a paid fire protection workforce of two to five employees.

Public Utilities and Communications

As in the analysis of the proposed action, no direct impacts of significance were identified relative to project and population demands upon electrical, gas, telephone or general communication systems. The dispersed population may tend to facilitate any system expansion requirements simply due to magnitude of expansion required.

Water and Wastewater

Impacts upon the water and wastewater systems of Elko and Eureka following implementation of Alternative 5-B were analyzed in terms of local county budget expenditures. As in the Alternative 5-A analyses, cost of system developments and annual maintenance were incorporated in the budget expenditure/revenue impact assessment. Capital expenditures, difficult to accurately assess because of unknown residential location, were assumed to be limited because counties are not likely to authorize a high cost mainline extension to widely dispersed residences. (A complete detailing of assumed county expenditures relative to water/wastewater system services is presented in Technical Report No.9).

Solid Waste

No impacts of significance were identified relative to availability or adequacy of the solid waste management system upon implementation of the Alternative 5-B. Complete review of fiscal impact is presented in Technical Report No.9.

Community Facilities

As described for Alternative 5-A impacts, most, if not all, of the available community facilities in the vicinity of Eureka Town would experience increased visitation and/or use if Alternative 5-B was implemented. To perhaps a lesser extent than in the proposed action, additional social organization (e.g., churches, social clubs, etc.) may be expected to develop in response to demand.

Under Alternative 5-B, indirect effects (e.g., displeasure with crowding of county pool) were identified to be significant. The lack of a subdivision recreational area would be significantly adverse in light of the increased population use demand. Technical Report No.9 presents a complete description of the analyses conducted.

4.11.3 No Action

Due to project location, Eureka County and its immediate environs including the county seat, Eureka would reap the major share of the benefits and liabilities resulting from implementation of the proposed action at Mt. Hope. These geographic and governmental entities will also be the objects of consequence in the event no project is initiated at Mt. Hope. It is the intent of this section to explore the consequences of the no action alternative, which assumes that project development would not occur.

4.11.3.1 Population

The population of Eureka County is basically split between the Town of Eureka and the rural county population. These populations, subject to extreme periodic fluctuations, have been slowly degrading for the past 60 years for lack of a stable industrial base. The total population of Eureka County now stands at approximately 2,000 with 1,200 inhabitants located in rural areas and the remainder in Eureka. It is anticipated that the population of Eureka County under the no action alternative would stabilize at approximately 1,800 inhabitants with a mix of 600 in the Town of Eureka and the rest in the rural areas. These projections exclude the addition of any new industrial or governmental projects within, or in close proximity, to Eureka County. The impact of no project on the Elko County area will be slight with fairly steady growth occurring as projected.

4.11.3.2 Employment and Income

In the absence of the Mt. Hope project, the employment and economic base of Eureka County would become more dependent on the agricultural sector located in Diamond Valley relative to a decline in opportunities and tax revenues in other employment sectors. At the present time, this base is not sufficient to sustain the County and the latter relies, somewhat heavily, on outside funds to support its economy. In the absence of the project, the economy would remain in its present condition and subject to variations in agricultural markets. With respect to the latter, the agricultural sector in Diamond Valley is vulnerable to several uncontrollable factors, including the availability of water and extreme weather conditions. Therefore, the economic base will also be subject to severe fluctuations.

The economic base of Elko County and Elko City would largely be unaffected by implementation of the no action alternative because of its broad base of support. Its economic base would therefore continue as projected.

Under the no action alternative, employment and income in Eureka County would largely follow the que of the economy discussed above and would, as a result, remain slightly depressed during the good cycles and moderately depressed in poor cycles. The reason for these dampened cycles is because the singular agricultural base would not allow income and employment to accelerate during good economic times nor would it cease under poor economic conditions. This, of course, describes a condition of stagnation which could be comfortable for some financially established inhabitants but discouraging for many others.

4.11.3.3 Housing

As discussed previously, the populations of Eureka County and Town have been slowly diminishing. It is anticipated that the levels will continue to diminish in the future without the mine project or similar undertakings being started. Therefore, the present housing along with a very limited amount of new housing would be sufficient to meet the basic needs of Eureka County and its environs in the immediate future. However, there would be little incentive for newcomers to make an investment in long-term private housing (mortgages of 10 years or more) if the economic conditions of Eureka County were stagnant. It is expected that newcomers would, for long periods of time, rely upon temporary or mobile habitations which would exaggerate the stagnant image to the point that it would undermine, even further, the tendency for long-term investment in the County. The existing housing conditions of Eureka County would additionally tend to impact resident use in that, without economic stimilus, presently available but poor quality housing would undergo no significant impetus for improvement or abandonment. The impact of the no action alternative on Elko County and the town of Elko would be minimal for reasons stated previously.

4.11.3.4 Local Government and Public Finance

The no action alternative presents a more limited financial horizon to Eureka County and its inhabitants than does the proposed action. The total monetary resources generated by the project over a 50 year period would exceed 100 million dollars. This would not necessarily mean the County would receive an economic windfall because of the large expenses involved in providing the necessary public services for a growing population. In the absence of the project, however, the County would continue to require an infusion of revenue from outside sources and would continue to lack the financial leverage necessary to support large scale or more developed public service projects without state or federal backing. Elko County, with its much larger population and broad tax base would not be adversely affected to any great degree, and would in fact not experience the project related deficits expected under the proposed action or alternatives.

4.11.3.5 Lifestyles and Attitudes

In the absence of the project, the lifestyles and attitudes of the residents will remain essentially as they are at present. This is, of course, beneficial for those who are comfortable (large landowners, etc.) or who desire sparse population to achieve a degree of solitude. On the other hand, a status quo situation would also create a feeling of despair or discouragement in some, especially in the young, which would undoubtedly encourage out-migration of those who are able to go, causing further stagnation.

4.11.3.6 Community Services and Facilities

Schools

Because of slowly diminishing populations, the present school system within Eureka County would be sufficient to satisfy demand. However, there will be very few funds available for large improvements or additional supplies without outside help. It is anticipated that there will also be a lack of incentive for new teachers to locate in the system if the economic sector achieved the degree of stagnation discussed previously. The Elko school system would be insulated from these problems because of its larger size and because most of the project impact would occur in Eureka County.

Health

In the absence of the project, health care facilities in Eureka County would remain virtually unchanged or may even deteriorate slightly. Without new resources, there would be no incentive or funds for the construction of new facilities. Without new facilities, medical professionals may not wish to locate or relocate in the county. This would force Eureka County to become more dependent on the medical resources of Elko County. There would also be less likihood of new facilities for the aged and infirm in the Eureka County area causing a hardship on those that require nursing home care and the families that may be forced to travel long distances to find adequate care.

Law Enforcement

In the absence of the Mt. Hope project it is anticipated that little change would occur with respect to law enforcement activity in Eureka County and its local subdivisions. With a stable or declining population and a relatively flat economy, law enforcement activity could remain at its present level for an indefinite period of time. There would be requirements, from time to time, for new equipment and/or personnel as a result of a normal turnover of personnel and hardware. Larger purchases would most likely be financed using outside grant money from state or federal sources. Elko County and Elko City would not be affected by the no action alternative in any appreciable way in terms of its law enforcement activities.

Fire Protection

As with law enforcement, it is anticipated that there would be little change in the manner or degree of fire protection in Eureka County in the absence of the Mt. Hope project. Fire equipment and personnel would remain largely at the present level with few changes in personnel quantity or hardware. Elko City and Elko County would continue to grow slowly but steadily as projected and would not be influenced greatly by the absence of the project.

Public Utilities and Communication

It is anticipated that few changes would occur in Eureka County and Town in public utilities and communications without the project. New innovations in communications technology do not come swiftly to areas of little or no growth. The present system of utilities are adequate for the present population and will remain adequate for a considerable period of time in view of the projected growth for Eureka County without the project or any other activity of an equivalent size. The Eureka County population will be somewhat reliant on Elko County and City for access to the most up-to-date advancements in communications since Elko is located on important transportation corridors and would most likely be the recipient of new technology at a much faster rate. With the possible exception of inter-communication between Elko County and Eureka County, the absence of the project would have no appreciable impact on the public utilities or communications systems of Elko County and City.

Water and Wastewater

In the absence of the project, the facilities and system of water supply would continue to be developed along present lines and would be adequate to meet rising demands as long as sufficient controls govern their usage. The Town of Eureka would also have sufficient supplies to support its activities at its present and projected population. The water supplies of Elko County and its political subdivisions would be unaffected in the absence of the project.

The wastewater facilities of Eureka County and Eureka town would be sufficient to meet the demands of both the rural and town populations in the absence of the project because of the limited growth projections. The facilities would most likely be maintained rural and town populations in the absence of the project because of the limited growth projections. The facilities would most likely be maintained County, community facilities would continue to grow modestly in response to the steady increase in the population base projected for the area. The no action alternative would not have a significant impact on the community facilities of Elko County or city. facilities of Elko County or Elko City.

Solid Waste

Since there would be little growth anticipated for Eureka County in the absence of the project, the present solid waste disposal system would be sufficient to handle the demand in the foreseeable future. The no action alternative would have no impact on solid waste disposal planning in Elko County.

Community Facilities

It is anticipated that, in the absence of the project, the population of Eureka County would continue to have only limited access to common social services. Social service programs are usually most accessible in areas of dense population or where populations are growing rapidly and thereby causing a demand for the services. Since practically no growth is projected for Eureka without the project it is unlikely that new social service programs will become established in the County. Elko County, which already has considerably more to offer in the way of public and private social service programs, would not be affected by the no action alternative. In some cases, the social service programs in Elko County may partially serve the needs of some residents of Eureka County and it is likely that this relationship would continue in the future.

As in the case of social services, community facility resources are more prevalent in densely populated areas. Therefore, because little growth is projected for Eureka County, community facilities would remain basically as they are at the present time in the absence of the project. In Elko County, community facilities would continue to grow modestly in response to the steady increase in the population base projected for the area. The tion base projected for the area. The no action alternative would not have a significant impact on the community facilities of Elko County or city.

4.12 Unavoidable Adverse Impacts

4.12.1 Introduction

The following summarizes the identified unavoidable adverse impacts associated with implementation of the proposed action and alternatives. Discussion is limited to impacts determined. Complete presentation of potential impacts considered has been delegated to individual Technical Reports.

4.12.2 Topography

If the proposed action is implemented, the impact associated with significant topographic alterations (mine/non-mineralized storage areas and tailings pond) are unavoidable due to the intrinsic definition of the action. This determination is equally applicable to tailings pond alternative sites 4-B and 4-C.

4.12.3 Geology

No significant unavoidable adverse impacts on geologic resources would occur due to the proposed action or alternatives.

4.12.4 Air Quality

Worst-case analyses of air quality impacts resulting from implementation of the proposed action indicate that atmospheric pollutants would be well below the PSD increment and NAAQS criteria at any point beyond the Mt. Hope site study area. Based on the accepted PSD and NAAQS criteria, the proposed action would not significantly affect air quality. Similar scope of impact is associated with all identified alternatives, except the no action alternative. Under the no action alternative, unavoidable adverse impacts would be precluded by failure to implement project activity.

4.12.5 Hydrology

No long-term significant unavoidable adverse impacts on water resources would occur due to the proposed action or alternatives. Short-term unavoidable adverse impacts include groundwater quality degradation for the constituents of copper, iron, manganese sulphate, aresenic and total dissolved solids.

4.12.6 Soils

Unavoidable impacts would occur to the soils resource base as a result of water erosion losses. The impact was determined to occur during the early stages of reclamation. The unavoidable impacts of soil erosion loss would be limited to the tailings pond dam face(s). Additionally, implementation of the proposed actions and alternatives would result in the permanent relocation of the soils resource base presently within the mine/non-mineralized material storage areas.

Unavoidable impacts would not occur under the no action alternative.

4.12.7 Biota

The permanent disturbance of vegetation resulting from implementation of the proposed action and alternatives would be an unavoidable impact of very limited, localized significance. However, one land use/vegetation factor was determined to experience unavoidable adverse impact. In terms of local productivity, more than 10 percent of the Resource Area's Christmas tree cutting annual sustained yield would be permanently lost from harvest.

An unavoidable adverse effect has been identified relative to faunal road kills (e.g., golden eagles, mule deer) and location of the project site. The extent of adverse impact has been determined not to be significant based on regional species population.

The proposed action would, upon implementation, pose a significant unavoidable adverse impact to sage grouse populations as a result of proximal strutting ground activity. Implementation of power line alternative routings 2-B and 2-C, water line Alternative 3-C, tailings pond Alternative 4-C and the proposed State Route relocation would result in significant unavoidable adverse impacts to sage grouse populations due to direct land disturbance of strutting grounds (power line Alternatives 2-B and 2-C, water line Alternative 3-C) and proximal effects of noise/human activity (tailings pond Alternative 4-C and State Route relocation).

Impacts were not identified under the no action alternative.

4.12.8 Wilderness and Significant Natural Areas

Neither the proposed action or alternatives, including the no action alternative, were identified to pose unavoidable adverse impacts upon wilderness and significant natural areas.

4.12.9 Cultural Resources

Those sites which cannot be avoided during the construction phase would be unavoidably impacted. However, these impacts would not occur until the mitigating measures agreed to by SHPO, Advisory Council, EXXON and BLM had been implemented.

4.12.10 Land Use

Land Ownership. An unavoidable impact would occur as a result of converting range and/or agricultural lands to industrial/residential lands. The impact would occur upon implementation of either proposed action or project component alternatives. Some individuals and entities who oppose any change from the presently rural agrarian character of the regional area would consider this an adverse impact.

The no action alternative, upon implementation, would preclude unavoidable impact.

Native Americans. Neither the porposed action or alternatives, including the no action alternative, were determined to present potential for unavoidable adverse impact upon native Indians or tribal resources.

Agricultural Lands. No significant unavoidable adverse impacts upon agricultural values would occur due to the proposed action or alternatives, including the no action alternative. Mitigative routing alignments are assumed to be implemented as necessary.

Grazing Lands. An unavoidable impact for the proposed action would be the permanent loss of 358-438 government controlled AUMs. The Romano Allotment would lose 311 to 381 AUMs and the Robert's Mountain Allotment would lose 47-57 AUMs.

Alternatives 1-B, 2, 3-B, and 5-B would represent activity accruing no unavoidable adverse impacts. Implementation of water line Alternative 3-C could adversely impact present livestock seedings (Roberts Creek Seedings 1 and 2, Nichols Seedings).

Implementation of alternative tailings pond site 4-B would result in the unavoidable permanent loss of 63 to 77 AUMs (worst-case). Implementation of alternative tailings pond site 4-C would result in the unavoidable impact of permanent losses totalling 76 to 94 AUMs (worst-case). These impacts would not be significant in terms of total AUM availability in the Roberts Mountain and Romano allotments.

Recreation. Implementation of the proposed action and project component alternatives would result in unavoidable adverse impacts to recreational resources, primarily those of a non-facility nature (e.g., hunting, fishing, sightseeing). Participant satisfaction would be reduced as a result of increased use and associated disturbance/resource diminishment. Restricted use would adversely affect individuals desiring participatory activity.

Implementation of the no action alternative would preclude the occurrence of unavoidable adverse inpacts. Correspondingly, however, the no action alternative upon implementation would also preclude the beneficial impacts anticipated under the proposed action for facility recreation expansion and beneficial use patterns.

Timber Products and Pine Nut Gathering. Unavoidable adverse impacts would accrue upon implementation of the proposed action and project component alternatives. Annual Resource Area harvesting would be affected at a level of 6 to 10 percent, assuming demand would not be fulfilled from other Resource Area lands.

The no action alternative would preclude resource elimination.

Visual Resources. The visual effects of the proposed action and alternatives would be unavoidable. Impact associated with implementation of the proposed action would not be significantly adverse as Class IV visual criteria would be maintained in the long-term.

Implementation of the tailings pond site 4-B would result in an unavoidable adverse impact of significance. Diamond Valley, Class IV visual resource criteria may not be maintained as development of tailings pond site 4-B would draw visual attention as an unnatural, dominant feature in the terrain.

The no action alternative would preclude visual resource impacts.

Transportation. Implementation of the proposed action or alternatives would result in unavoidable impacts to the vehicular transportation system of the regional study area. Traffic congestion, increased incidents of vehicular accidents and shortened longevity and increased maintenance of road system would constitute adverse impacts. Impact significance was determined to be low, however, due to the high capacity to use ratio and general quality of roads. No unavoidable adverse impacts were determined relative to air and rail transportation networks.

The no action alternative would preclude adverse impacts.

Noise. Implementation of the proposed action or alternatives would result in an increase to existing noise levels which would not be significantly adverse in terms of human receptor criteria. Section 4.12.7 discusses impact significance upon fauna receptors (i.e., sage grouse).

Implementation of the no action alternative would preclude adverse impacts.

4.12.11 Socioeconomics

Proposed Action Subdivision Alternative 5-A

Unavoidable impacts due to implementation of the Alternative 5-A scenario would include significant population increase, significant increase in employment opportunities, a shortfall and subsequent increase in total housing, significant public financial requirements, and an increased demand for community facilities and services, particularly schools.

Significant adverse impacts would be confined to the effects upon public financial resources. This impact would be directly attributable via budgetary line items to increased population. Degrees of significance would vary through time and by individual budget account items.

Alternative 5-B - Decentralized Workforce

Unavoidable impacts which would occur upon implementation of the Alternative 5-B scenario are identical to those described for Alternative 5-A but the degree of significance would vary due to the dispersed location of new population. As in Alternative 5-A, the primary adverse impact can be presented by public financial impacts. Levels of significance would vary through time and by individual account items within public budget capacities. Significance would be increased, however, in the event that revenue sources required to offset budget deficits would not be available to Elko County as a result of the origination of tax revenues in Eureka County.

4.13 The Relationship Between Local Short-term Uses of Man's Environment and The Maintenance and Enhancement of Long-term Productivity

4.13.1 Introduction

Implementation of the proposed action and alternatives would involve the short-term commitment of a variety of resources for the development of the project. In compliance with CEQ guidelines the commitment of these resources on a short-term basis has been related to the potential long-term uses of the resources in the future. As outlined in the introduction to this chapter, short-term has been defined as equal to the life span of the project plus a ten year reclamation success period (total 60 years). Long term has been defined as entailing an indefinite time frame during which project effects may extend beyond the short-term period or not occur until after the short-term is concluded.

4.13.2 Topography

The short-term use of the site study area for operation of the mine/ process plant complex would permanently alter the topography.

4.13.3 Geology

The proposed action and alternatives will involve the short-term removal of local geologic resources in the 700-acre pit area to a depth of approximately 3,600 feet. The short-term removal of ore and host rock material would be permanent. Under most circumstances, removal of this material would preclude future use of the resource. Future circumstances, both economic and technologic, may allow additional mineral resource extraction to occur (e.g., in-situ leach processing).

4.13.4 Air Quality

The proposed action and alternatives would involve short-term increases in the atmospheric concentractions of total suspended particulate (TSP), nitrous oxides (NO_x) and sulphur dioxide (SO_2). The short-term effect will be of limited areal extent. Project emissions would not be allowed to exceed state or federal air quality standards. There would be no long-term effect on air quality as these emissions would cease at point of operations closure.

4.13.5 Hydrology

The project would use about 7,630 acre-feet of groundwater annually from Kobeh Valley. This would be about 48 percent of the valley's perennial yield. Depending on the well field location and aquifer yield, groundwater withdrawal could lower the water table in a few existing wells near the well field. Withdrawal of groundwater, however, may enhance groundwater recharge and reduce withdrawal impacts. The long-term effect of groundwater withdrawal will not be significant as the valley groundwater system will eventually become recharged and water levels will return to normal.

Seepage of approximately 1,613 acre-feet of water from the tailings pond would occur and would influence groundwater quality near the tailings pond. As distance from the pond increases the impact on water quantity and quality would decrease. Local water users would not be adversely impacted by the pond seepage.

4.13.6 Soils

During the short-term period, the project would directly affect the soils resource base of essentially all the land encompassed by the proposed action and alternatives. Long-term effects would be negligible, however, as reclamation plans call for use of the retained soils for growth media. The erosional losses experienced during the short-term period of initial reclamation would be mitigated as a result of reclamation success.

4.13.7 Biota

Construction and operation of the mine/process plant complex would result in variable short-term impacts to vegetation and fauna. The short term disturbance of vegetation would involve an insignificant percentage of similar type lands on a regional basis and a minor amount of range vegetation related to host allotment totals. Vegetation within the mine pit and non-mineralized material storage areas would be removed permanently, which would result in a long-term effect of forage loss. The significance of the long-term forage loss is minor as related to regional capabilities.

The impacts of the proposed action and alternatives on fauna would involve short and long-term loss of fauna habitat areas. Long-term viability of the regional faunal resource base would not be affected. No rare, endangered or threatened species would be affected in the short or long-term periods.

4.13.8 Wilderness and Significant Natural Areas

The proposed action and alternatives would neither affect short-term or long-term use capabilities or resource value of the Roberts Wilderness Study Area. No designated Significant Natural Areas would be affected by the proposed action or alternatives.

4.13.9 Cultural Resources

The short-term use requires the completion of a mitigation plan to negate impacts. This short-term resource effect will provide long-term use of the acquired data base. The acquisition of the data would result in loss of the sites from the data pool.

4.13.10 Land Use

Land Ownership. Short-term effects of the proposed action and alternatives include conversion of Mt. Hope site lands (including power line corridor, water line, etc.) from grazing use to industrial use patterns and the conversion of 200 acres (more in the event of decentralized workforce) from agricultural/rangeland use to residential use patterns. Long-term effects would be limited to the permanently disturbed lands of residential development and the mine/non-mineralized material storage area. Under worst-case analyses, it has been assumed that Eureka County would permanently lose right-of-ownership for the 200-acre land plot.

Native Americans. No short-term or long-term effects have been identified as a result of proposed action or alternatives implementation.

Agricultural Lands. No short-term or long-term effects of significance have been identified with implementation of the proposed action or alternatives.

Grazing Lands. Implementation of the proposed action would result in a permanent long-term loss of 358 to 438 government controlled AUMs (worst-case). Vegetational productivity losses would equal less than half that equivalent. Implementation of alternative tailings pond sites 4-B and 4-C would result in the long-term loss of 63-77 and 76-94 AUMs (worst-case), respectively.

Recreation. The short-term period of proposed action or alternatives implementation would result in short-term losses in recreational resources utilization in terms of participant frequency. Long-term losses were not identified.

Timber Products and Pine Nut Gathering. A long-term loss of Resource Area utilization equalling 6 to 10 percent of total used lands would be incurred as a result of proposed action or alternatives implementation.

Visual Resources. The short-term period activity of project development would result in long-term visual resource effects. The long-term visual effects of the proposed action and alternatives (excepting tailings pond site 4-B) would not be significantly adverse due to maintenance of BLM visual resource management criteria. The long-term effects of implementing the tailings pond site 4-B alternative would be significant in that the BLM management criteria for Class IV visual resource areas might not be possible in the short- or long-term time frames.

Transportation. The short-term effects upon transportation would not translate into significant long-term effects. The proposed action and alternatives impact to the existing transportation system would be expected to be primarily, if not entirely, of a short-term nature. The long-term effects may include, however, an expansion of the secondary transportation network to address residential traffic requirements.

Noise. The short-term effect of increased noise associated with the proposed action and alternatives would not be translated into long-term impacts. Following cessation of operation, the primary sources of noise would no longer exist.

4.13.11 Socioeconomics

In terms of socioeconomic impact, the short-term period of implementation of the proposed action or alternatives would exhibit brief, significant adverse effects as a result of the substantial population influx. The majority of these temporary adverse effects would be expected to diminish within a two to six year period as public and private sectors respond to fulfill the associated requirements of housing demand, educational needs and community services. The infrastructure would be expected to stabilize and reduce the extent of any long-term effects. The sociological changes brought about by implementation of the proposed action would be considered significantly adverse, beneficial, or indifferent. Perception of impact would be an independent and variable factor in the community.

Analysis of worst-case estimates of fiscal impact indicate the potential for a 10-year budget deficit period for Eureka County/Town as a result of short-term activity. The projection of long-term effects would be unrealistic if economies-of-scale and the availability of state tax funds were not to be taken into consideration. Once taken into consideration, local and county budgets are expected to be adequate to meet anticipated needs. The establishment of a local infrastructure with substantially greater capability to provide the necessary services to the population would be considered a beneficial long-term effect.

4.14 Irreversible and Irretrievable Commitments of Resources

4.14.1 Introduction

As discussed in preceeding sections, the development of the mine/process plant complex would require that certain commitments be made regarding resource base utilization. The quality and quantity of available resources within an area is often a determinant of project development success. Correspondingly, the development of a project often results in the permanent commitment of certain resources, in whole or in part, that might preclude future resource utilization potentials. Thus, impact evaluations have included the consideration of resource commitments relative to the proposed action and alternatives which may result in irreversible (e.g., once implemented the effects of a commitment cannot be reversed) and/or irretrievable (e.g., cannot be replaced as originally occurring prior to use) commitments.

The CEQ guidelines dictate that the concept of irreversible and irretrievable commitments analysis be incorporated into project impact assessments in order that the implications of decision making be fully appreciated. The following briefly presents discussion concerning the irreversible and irretrievable commitments of resource base that would occur upon decision to implement the proposed action and alternatives.

4.14.2 Topography

The topographic alterations resulting from implementation of the proposed action and alternatives would be considered an irreversible commitment. Although restoration of original topography might eventually be technically possible, such an effort would not be economically feasible.

4.14.3 Geology

The geologic features characteristic of the immediate mine pit area would be irreversibly committed to permanent alteration upon proposed action or alternative implementation. The commitment would be considered intrinsic to the action type defined herein. The processing of ore would represent an irretrievable commitment of resource base.

4.14.4 Air Quality

The short-term effects of proposed action and alternatives implementation would result in a temporary irreversible commitment of atmospheric resources on a qualitative basis (e.g., emissions loading). This commitment would be short-term and limited in areal extent.

4.14.5 Hydrology

Mining, milling and associated activities would irretrievably consume approximately 7,630 acre-feet of water annually or approximately 380,000 acre-feet of water during the 50-year project life.

4.14.6 Soils

Topsoil coverage totalling 3,440 acres would be irretrievably lost in the mine/non-mineralized material storage areas. The topsoil resource base of these areas would, however, not be irreversibly lost as a result of plans to conduct salvage, storage and reclamation operations.

4.14.7 Biota

The existing vegetational and wildlife habitat resources within the mine/non-mineralized material storage areas would be irreversibly lost. The extent of irreversible vegetation losses would be equal to the acreage of mine/non-mineralized material storage lands (i.e., 3,440 acres) and the permanently disturbed lands of alternative actions (ranging from 196 to 133 acres (no action)).

4.14.8 Wilderness and Significant Natural Areas

Excepting potential external visual degradation, no irreversible, irretrievable losses were identified as a result of proposed action or alternatives implementation. To the extent that visual observation by aided eye device would impact human receptor sensitivities within the Roberts WSA, an irretrievable and irreversible impact would be incurred.

4.14.9 Cultural Resources

An irreversible and irretrievable commitment has been made of the site itself, even though data collection will have taken place. Thus, an irreversible and irretrievable commitment of the cultural resource base has been identified. However, implementation of the proposed mitigation plan will provide significant amounts of new information to the scientific community regarding cultural resources in the Great Basin.

4.14.10 Land Use

Approximately 3,110 acres of land would be irreversibly committed to the production of ore. An additional 200 acres of land would, under the worst-case, also be irreversibly committed to housing development use.

The visual resource commitments derived from topographic alterations would be irreversible due to the economic infeasibility of returning lands to original form.

4.14.11 Socioeconomics

The socioeconomic components (human resources, materials, etc.) required to implement the proposed action and alternatives are considered to be irretrievable. The population growth and resulting changes in social and economic values would constitute an irreversible and irretrievable commitment of resources.

CHAPTER 5.0
LIST OF REVIEWERS AND PREPARERS

5.1 Introduction

The Environmental Impact Statement (EIS) for the EXXON Mt. Hope Molybdenum Project was prepared by Wyatt Research and Consulting, Inc. (WRC) under contract to EXXON Minerals Company (EXXON) and under a Memorandum of Understanding with the Bureau of Land Management (BLM), EXXON and WRC. WRC had responsibility for completion of the environmental impact analyses and the EIS according to the specifications of the BLM. BLM was responsible for review of all materials, assurance of quality control, and eventual acceptance of the EIS.

5.2 Reviewers: U.S. Department of the Interior, Bureau of Land Management

BERTON E. BRESCH, Nevada State Office Sociologist

B.A. Sociology, California State University, Sonoma
M.A. Counseling California State University, Sonoma

Experience includes nine years experience with Bureau of Land Management; socioeconomic review.

MARY R. CRAGGETT, District Realty Specialist

B.S. Biology, Washington College, MD;
M.A. Botany, University of Colorado, Boulder

Experience includes eight years experience with Bureau of Land Management; lands review.

MARK H. DAVIS, Area Wildlife Biologist

B.S. Biology, General Science, University of Wisconsin
M.S. Wildlife Management, University of Wisconsin, Stevens Point

Certified Wildlife Biologist. Experience includes five years with Bureau of Land Management; wildlife review and technical coordination.

DEAN HUIBREGTSE, Area Range Conservationist

B.S. Range and Wildlife Habitat, Washington State University, Pullman

Experience includes four years with Bureau of Land Management; grazing review.

JON JOSEPH, Area Outdoor Recreation Planner

B.A. Recreation Administration, California State University, Chico

Experience includes seven years with Bureau of Land Management; wilderness review.

ROBERTA McGONAGLE, District Archaeologist

B.A. Anthropology, University of California, Davis
M.A. Anthropology, University of California, Davis
PhD. Archaeology, University of Missouri

Experience includes eight years with Bureau of Land Management; archaeology review.

CALVIN McKINLAY, District Soil Scientist

B.S. Agronomy, Utah State University, Logan

Experience includes five years with Bureau of Land Management; erosion review.

TERESA McPARLAND, Area Geologist

B.A. Geology, Stephens College, MO.

Experience includes four years experience with Bureau of Land Management; coordinator, writer-editor; geology review.

JACK T. MATUSKA, District Forester

B.S. Forestry, Syracuse University

Experience includes four and one-half years with Bureau of Land Management; visual resource management and woodland products review.

PAUL E. MYERS, Nevada State Regional Economist

B.S. Economics, University of Nevada, Reno

Experience includes eleven years in the field of economics, three of which have been with the Bureau of Land Management; economics review.

MARK O'BRIEN, District Watershed Specialist

B.S. Range and Wildlife Management, Humboldt State University, CA

Five years experience with Bureau of Land Management; Air quality and water rights review.

JEFF RAWSON, District Wild Horse Specialist.

B.S. Range Management, Utah State University, Logan.

Experience includes five and one-half years with Bureau of Land Management; wild horse review.

NEIL D. TALBOT, Area Manager.

B.S. Range Management, Utah State University, Logan.
Experience includes twenty years with Bureau of Land Management; team leader.

ED TILSEY, Nevada State Environmental Specialist.

B.S. Wildlife, University of Montana.

Experience includes nine years in environmental protection with Bureau of Land Management; overall document review.

CRAIG L. WESTENBURG, District Hydrologist.

B.S. Watershed Management, University of Arizona, Tucson.

Experience includes three and one-half years experience with Bureau of Land Management; groundwater resources review.

5.3 Preparers

ROBERT C. WYATT, Project Manager

B.S. in Biology, University of Miami
Post Graduate Study, Biology, University of Miami

Mt. Hope Project: Responsible for coordination of environmental discipline impact analyses (except cultural resources) and direction of the third party EIS scientific team; technical and regulatory (NEPA) oversight and management of EIS documentation; and liaison and coordination with the Bureau of Land Management (BLM) and EXXON.

Experience includes management and technical analyses of environmental impact studies involving surface and underground mines, nuclear and coal-fire electrical generating plants, petrochemical and mineral process facilities, and hazardous waste/nuclear disposal site regulatory analysis. Professional experience involving activity in 23 states, Mexico and Puerto Rico has included the technical critique and environmental discipline analysis of hydrology, air quality, chemical and mine engineering, terrestrial and aquatic biology, socioeconomics, land use, pollutant toxicity and regulatory compliance.

MAXWELL K. BOTZ, Senior Hydrologist

B.S. in Geological Engineering, University of Nevada
M.S. in Geological Engineering, University of California, Berkeley
Ph.D in Hydrology, University of Arizona (dissertation not completed)
Professional Engineer, States of Colorado, Wyoming, Utah

Mt. Hope Project: Responsible as senior scientist for design and supervision of geohydrologic analysis, impact assessments and technical report preparation pertinent to EIS documentation.

Professional experience in excess of twenty years includes project direction for major mining, reclamation and water resources investigations. Emphasizing hard rock and coal mining, experience has included engineering design and construction of a hazardous waste site, development of water surplus, mineral processing treatment research, and groundwater pollution investigations. Employment history has included responsibility as Head of Technical Investigation Section, Water Quality Bureau, Montana Department of Health and Environmental Sciences.

CHUCK DALBY, Geologist/Hydrologist

B.A. in Geology, University of Montana
M.S. in Geology, University of Montana

Mt. Hope Project: Responsible for data compilation and analytical assistance relative to hydraulic assessment of tailings pond effluent migration and area hydrology.

Professional experience emphasizes the design and performance of hydrologic and geologic studies to determine impacts of energy facility siting. Employment has included experience with the Montana Department of Natural Resources and Conservation as a geologist/hydrologist responsible for coordination of inter-agency research efforts and preparation of environmental study plans.

ROBERT C. ERICKSON, Wildlife Biologist

B.S. in Zoology, San Jose State College
M.S. in Ecology, University of Washington
Ph.D in Biology, University of Washington

Mt. Hope Project: Assisted in review and analysis of project impacts upon wildlife populations. Prepared wildlife technical reports, conducted site reconnaissance, assisted in liaison with government agencies.

Experience includes impact assessment and mitigation planning of faunal populations with regard to strip mining, water diversion, nuclear power, oil gassification and reservoir development projects. Has managed and prepared several large ecological environmental assessments for industrial and governmental entities. Professional career includes project activity within 23 states.

RICHARD TRENHOLME, Soil Scientist

B.S. in Agronomy, Texas A & M University
Post Graduate Studies - soils, Texas A & M Unviersity

Mt. Hope Project: Responsible for review and analysis of project impacts upon soils resources. Conducted analytical determinations of soil, wind and water losses. Assisted in the preparation and review of technical reports and soils mapping.

Experience includes: mapping, classification, and impact analysis of soils for surface and underground mining projects; conducting soil fertility studies; design, implementation and assessment of reclamation activities pursuant to federal and state regulations. Professional experience includes Soil Conservation Service and U.S. Forest Service employment in the western United States.

LESTER ALLEN KISH, Range Ecologist

B.S. in Fish & Wildlife Management, Montana State University
M.S. in Range Science, Montana State University

Mt. Hope Project: Technical analysis and field survey of project land vegetation, threatened and endangered species, and range conditions. Assisted in primary preparation and review of vegetational technical report including aerial photo interpretation (infra-red).

Experience includes professional activity as principal investigator/project leader on baseline and annual vegetation monitoring studies, range resource inventories, mapping and conflicts analysis of livestock grazing allotments. Professional experience has primarily involved analysis and assessment of mine operations in the western United States.

JEFFREY T. RYAN, Ecologist, Photo-interpreter

B.S. (associate) in Natural Sciences, University of Wisconsin Center System Marathon
B.S. in Environmental Sciences, University of Wisconsin

Mt. Hope Project: Responsible for infrared aerial photo interpretation of project land vegetation.

Experience includes eight years of aerial photo interpretation involving more than five million acres of land in the western and central United States. Project activity has emphasized environmental impact analyses for mining operations, including the determination of erosion condition classification via BLM soils surface factor criteria.

WILLIAM M. O'BRIEN, JR., Visual Analyst

B.S. in Landscape Architecture, Pennsylvania State University
Post-Graduate Studies in Civil Mine Engineering, West Virginia University

Mt. Hope Project: Responsible for visual response evaluation and impact assessment. Prepared technical report and impact section discussion for EIS documentation.

Professional experience includes review and evaluation of mining and reclamation plans, development of mitigative programs, project engineering and plans design. Has assisted in management and preparation of numerous environmental impact statements and EISs; analysis of overall environmental impacts, recreational, planning, esthetics and inventory of natural systems. Experience has emphasized energy development projects, particularly mine operations, throughout the United States.

WARREN K. GILBERT, Economist

B.A. in Economics, University of Washington
M.A. in Economics, University of Washington
Post-Graduate Diploma, New York Institute of Finance

Mt. Hope Project: Responsible for analysis and technical report preparation involving socioeconomic baseline characteristics and project impacts.

Professional experience in excess of 26 years includes national and international finance analyses; industry and agribusiness preinvestment studies, forecasts and market analysis; regional and urban economic base studies, economic activity, resource utilization and growth analyses. Projects include U.S. Department of State (Agency for International Development) and Export-Import Bank of the United States representation.

ALAN EASTMAN, Planner, Impact Analyst

B.A. in Geography, Mankato State University
M.A. in Urban and Regional Planning, University of Iowa

Mt. Hope Project: Assisted in the characterization and analyses of socioeconomic conditions.

Professional experience includes cost and feasibility analysis of state agency plans and projects; impact and managerial analysis of human resource service delivery entities in the areas of education, criminal justice, aged and developmentally disabled; location and economic feasibility analysis for private industry and government; and impact analysis of regional investment decisions. As a planner for more than twelve years, project activity has involved watershed assessments, urban field development (economic and social impact), recreation demand studies and transportation planning. Employment has included responsiblities as Social Services Coordinator for the Nebraska State Planning Office.

C. MICHAEL COWAN, Land Use Analyst

B.S. in Geology, University of Nebraska
M.S. in Ecology-Zoology, University of Nebraska
Ph.D in Ecology-Zoology, University of Nebraska

Mt. Hope Project: Responsible for baseline determinations and impact analyses concerning land use patterns and project plans. Assisted in technical analysis and report preparation of socioeconomic impacts.

Professional experience in excess of thirteen years has emphasized the performance and interpretation of social, economic and habitat studies relative to land use modification plans (watershed reservoir developments, mine operations, transportation systems and mineral processing facilities siting). Researched and developed the Vertically Integrated Geographic Information System (VIGIS) for the management and planning of natural and urban resources.

LAL BABOOLAL, Air Quality Scientist

B.S. in Physics, University of California at Los Angeles
M.S. in Physics, University of Washington
Ph.D in Atmospheric Science, University of California at Los Angeles

Mt. Hope Project: Responsible for direction and performance assistance of the air quality impact analyses utilizing computer models. Reviewed and prepared technical reports and section discussion of EIS (climatology, air quality).

Professional experience in excess of fifteen years includes program directorship for both international and domestic projects. Technical activity has involved air quality and meteorologic baseline characterizations; development and simulations of air dispersion models in coordination with regulatory and public agencies; design and management of air quality monitoring networks; and the analytical treatment of data pertinent to direct and indirect environmental air quality impacts.

VICTOR M. YAMADA, Air Quality Scientist

B.S. in Civil Engineering, University of Washington
M.S. in Environmental Engineering, University of Washington
M.B.A., Pepperdine University

Mt. Hope Project: Assisted in determinations of air quality impact and process plant environmental loadings.

Professional experience involves over fourteen years of consulting and government employment. Project specialties include fugitive dust emissions inventory and control measures design, impact analysis of alternative new source review policies and economic analysis relative to air pollution control technology. Employment history has included responsibilities as Section Chief, Air Program Development, EPA Region V.

TED R. TURK, Air Quality Analyst

B.A. in Biology, Williams College
Ph.D in Ecology, University of California, Riverside and San Diego State University

Mt. Hope Project: Responsible for evaluating air quality impacts upon vegetation and soils.

Professional experience includes design of environmental field studies, the application of advanced statistical analyses techniques, studies of botanical and zoological resources in desert and semi-arid areas and hazardous waste impact determinations relative to vegetation, wildlife and water resources.

LAWRENCE J. WATSON, Air Quality - Quality Assurance

B.S. in Geography, Chicago State University
Ph.D in Geography, University of Oklahoma

Mt. Hope Project: Responsible for quality assurance program affecting air quality modeling exercises and data interpretations.

Professional experience includes studies management and development in geology, geography, atmospheric sciences, hydrology, remote sensing and noise.

MARK STEPHENS, Air Quality Technician

B.A. in Environmental Studies, California State University, Northridge

Mt. Hope Project: Responsible for meteorologic/air quality data gathering and assisting in data analysis exercises.

Professional experience includes air quality monitoring network establishment, data acquisition equipment maintenance and operation, and primary data review and reduction.

KEVIN P. MULLEN, Regulatory/Environmental Analyst

B.S. in Pre-Med/Biology, Stonehill College, North Easton, Massachusetts
M.S. in Biology, Northeastern University, Boston, Massachusetts

Mt. Hope Project: Responsible for quality assurance in documentation of EIS technical reports.

Professional experience includes marine and tropical ecology/impact assessment and transfer of technology. His managerial/administrative experience includes environmental and planning studies for the petroleum, chemical, mining/metals and utilities industries. He has contributed to baseline and impact assessments related to nuclear and fossil-fuel power plants, offshore energy, coastal oil fields, port development, and agri-business. He has eight years international experience in coastal resources planning and development, higher education and formulation of environmental regulations.

KENNETH W. MACKENZIE, JR., Senior Air Quality Scientist

B.S. in Pre-Med, Wayne State University, Detroit, Michigan
M.S. in Engineering, University of Washington, Seattle, Washington

Mt. Hope Project: Responsible for assisting in impact analysis related to air quality fugitive dust emissions, noise and transportation.

Mr. MacKenzie has over twenty years experience in environmental management with both the private and public sector. He is an expert in all aspects of regulatory compliance at U.S.E.P.A. and state levels. He has served as chairman of the Southwest Section of the Air Pollution Control Association (APCA) and as President of the Association of Local Air Pollution Control Officials (ALAPCO). He was for a number of years the Air Quality Manager for a large environmental consulting firm, and his project experience includes management of several large environmental projects. He has held the posts of chief environmental officer for the cities of Houston, Texas, and Fairbanks, Alaska. He is currently active in Houston on the Chamber of Commerce Environmental Committee and the Mayor's Environmental Task Force consulting on regulatory and air quality matters.

JOHN J. KNEISS, Environmental Analyst

B.S. in Biology, Wilkes College

Mt. Hope Project: Responsible for assisting baseline data acquisition programs, review of process plant environmental loadings and analysis of soils loss characteristics.

Professional experience includes environmental analysis in the technical disciplines of soil science, wildlife ecology, vegetation and hazardous wastes disposal. Site development and impact assessment work has entailed underground mining, deep well injection, chemical process lagoon and sewage treatment facilities planning.

RANDALL K. BUSH, Geologist/Data Analyst

B.S. in Geology, University of Houston

Mt. Hope Project: Assisted in the preparation and data abstraction required for EIS technical reporting. Coordinated EIS documentation relevant to mapping and quality assurance.

Professional experience includes technical writing and regulatory compliance documentation for numerous coal and mineral mines; technical critique of topographic and geologic data and support documentation; and land use analysis (physical environmental factors relevant to engineering planning).

LAURIE A. PEARCE, Documentation Coordinator

B.A. in Business Management, University of Houston (in progress)

Mt. Hope Project: Responsible for overall supervision and quality assurance of data reproduction, impact documentation quality and oversight review archiving.

Professional experience includes document supervision and quality assurance program maintenance/design for several mining related environmental assessment reports and Office of Surface Mining permit applications.

DIANE YARBERRY, Data Coordinator

B.A. in Education, Texas Christian University

Mt. Hope Project: Responsible for baseline data acquisition, preliminary assimilation, and performance of literature search activities.

Professional experience includes the management supervision of several environmental, engineering and legal compliance documentation efforts involving major surface and underground coal mines; the performance of literature based data search and acquisition projects emphasizing the disciplines of hydrology, biology, soil and pollution control systems; and the analysis/communication of project-specific regulatory procedures.

ROBERT G. ELSTON, Archaeologist/Director of Research

B.A. in Anthropology, San Francisco State University
M.A. in Anthropology, Washington State University
Ph.D. (ABD) in Anthropology, Washington State University

Mt. Hope Project: Served as Principal Investigator for the Mt. Hope Project Class II and Class III Archaeological Survey. Additionally responsible for overall project direction and coordination of both cultural resource studies, related impact analyses, and technical report preparation. Also participated in the field work and co-authored the Class II report.

Robert Elston is an archaeologist with seventeen years experience in the prehistory of the Great Basin and desert west. He is presently Anthropologist to the College of Agriculture, University of Nevada/Reno, a quarter-time appointment. Until January 1980 when he began consulting privately through IMR, Elston was Director of the Archaeological Survey, Anthropology Department, University of Nevada/Reno. At the same time he was an associated member of the Anthropology Department faculty, curator of the Department Museum. Elston served as series editor of the Nevada Archaeological Survey Reporter. He is a SOPA member with certification in field research, collections research, archival research, and archaeological administration. Although his degrees are in anthropology and archaeology, Elston brings to his work an inter-disciplinary approach to Great Basin archaeology encompassing geomorphology, geochronology, and paleoecology. For the past ten years, Elston has developed and tested a Washoe land use model based upon the ethnographic record and is a specialist in lithic production and use-wear analysis. He has served as Principal Investigator on a variety of archaeological projects of various sizes and degrees of complexity both in Nevada and eastern California. Elston has published a number of papers, monographs, and reports on Great Basin prehistory.

CASHION CALLAWAY, Administrative Coordinator

Mt. Hope Project: Served as Project Manager and production editor for the Class II Archaeological Survey in addition to providing project and administrative management for the Class III Archaeological Survey.

Cashion Callaway has eight years archaeological experience in the history and prehistory of the Great Basin and desert west. During this time, Callaway has served on the technical staffs of Archaeological Services, Nevada State Museum; the Archaeological Survey, University of Nevada/Reno; the California Department of Parks and Recreation, Division of Archaeology; and Henningson, Durham and Richardson, Ecosciences Division. While she possesses a variety of technical skills appropriate to the field and laboratory, Callaway brings to her work a special interest in cultural resources contract management. On a day-to-day basis, Callaway functions as IMR's projects manager and contract administrator. Callaway, together with Robert Elston, organized the firm of IMR in 1979.

STEVEN R. JAMES, Staff Archaeologist

B.A. in Anthropology, University of California, Berkeley
M.A. in Anthropology, University of Utah

Mt. Hope Project: Served as Project Supervisor, providing day to day project supervision, for the Class II Archaeological Survey which he also co-authored. He also assisted in the Class III survey.

Steven James is an archaeologist with seven years experience in the history and prehistory of the Great Basin, Colorado Plateau, and California, as well as field work in Texas, Wyoming, and Hawaii. He has served as a staff archaeologist for the Bureau of Land Management Ely and Winnemucca Districts, and as a research assistant at the Desert Research Institutes, University of Nevada/Reno; the Center for Archaeological Research, University of Texas/San Antonio; and the Archaeological Center, University of Utah. James has authored numerous reports and publications including cultural resource overviews of the Ely, Elko and Salt Lake Bureau of Land Management Districts. Since joining IMR, he has directed field crews on surveys and test excavations in Nevada and California. James brings to his work a special interest in Quaternary paleoenvironmental research and faunal analysis, and aside from his other work is currently reanalyzing the Danger Cave faunal remains with Donald K. Grayson, University of Washington, through a National Science Foundation Grant.

CHARLES D. ZEIER, Staff Archaeologist

B.S. in Sociology/Anthropology, Montana State University
M.A. in Anthropology, University of Nebraska

Mt. Hope Project: Project Archaeologist and senior author of the Class III Archaeological Survey, in which he also shared the design and direction of. This involved the supervision of the cultural resources field activities and assistance in data abstraction, impact analyses and technical report preparation. He also synthesized site data for the Class II survey and assisted with various aspects of report preparation.

Charles Zeier is an archaeologist with four years experience in the Great Basin. Prior to his arrival in Nevada, Zeier worked on a variety of archaeological projects in the northern Plains while attending school at Montana State University and the University of Nebraska. In 1977, Zeier became staff archaeologist for the Nevada Division of Historic Preservation and Archaeology (SHPO) and served as alternate State Historic Preservation Officer for the State of Nevada. In 1981, Zeier joined Intermountain Research as Project Archaeologist for the White Pine Power Plant Siting Study for which he supervised the gathering of archival data, and developed evaluation criteria for plant site ranking as well as predictive model of site type and distribution.

JOHN V.A. SHARP, Project Manager (Hydro-Search)

Ph.D in Geology, University of Colorado
A.M. in Geology, Columbia University
A.B. in Geology, Haverford College

Mt. Hope Project: Responsible for project coordination and overall quality assurance. Principal water rights advisor.

Experience includes 30 years of professional and supervisory experience in planning and performance of consulting projects in the areas of ground and surface water hydrology, groundwater resources developmand and water rights, operational mining hydrology, chemical quality of water, waste water disposal and monitoring, seepage, artificial recharge, geothermal development, geophysical exploration and environmental impacts.

RICHARD J. BERGER, Senior Hydrogeologist (Hydro-Search)

M.S. in Geology, Michigan Technological University
B.S. in Geology, University of Wisconsin, Oshkosh

Mt. Hope Project: Responsible for project management and coordination of field engineering, analysis well drilling and reporting. Water rights advisor.

Experience includes 13 years in the planning and performance of projects in the areas of groundwater supply exploration and development, waste water disposal and monitoring and environmental assessments associated with mining operations, solid waste disposal and energy development.

FORREST L. FOX, Hydrogeologist (Hydro-Search)

M.S. in Hydrology, University of Nevada, Reno
B.S. in Geology, University of Nevada, Reno

Mt. Hope Project: Plan and conduct field and office investigations in well design, construction and completion. Water quality sampling and analysis.

Experience includes 8 years in the design and construction of groundwater test and observation wells, performance and analysis of aquifer pumping tests, water chemistry/quality studies.

RODNEY A. FRICKE, Hydrogeologist (Hydro-Search)

M.S. in Geology, University of Nevada, Reno
B.S. in Geology, Southern Illinois University

Mt. Hope Project: Performance of pumping tests and analysis, water quality monitoring.

Experience includes seven years in the conducting of groundwater investigations including drilling and well construction programs, water quality and geochemical analyses and groundwater resource evaluation.

CHAPTER 6.0
GLOSSARY

Acid soil. A soil with a preponderance of hydrogen and aluminum ions in proportion to hydroxyl ions. Specifically, soil with a pH value <7.0.

Algorithm. A procedure for solving a mathematical problem in a step-by-step iteration that frequently involves repetition of an operation.

Alkaline soil. A soil with a high degree of alkalinity or with a high exchangeable sodium content, or both. Specifically, any soil that has a pH value >7.0.

Alluvial apron. The area of intermediate slope at the base of mountain ranges and composed of coalescing alluvial fans.

Alluvial fan. A fan-shaped deposit of sand, gravel and fine material dropped by a stream where its gradient lessens abruptly. Usually found at the base of highland terrain in arid regions.

Alluvium. A general term for all detrital material deposited or in transit by streams, including gravel, sand, silt, clay and all variations and mixtures of these.

Alteration. Change in the minerological composition of a rock, typically brought about by the action of hydrothermal solutions. Sometimes classed as a phase of metamorphism but usually distinguished from it because of a milder and more localized nature.

Animal unit month = AUM. The quantity of forage required by one mature cow (1,000 lb.) or its equivalent for one month.

Anthropogenic. Being of the origin of man, e.g. man made or caused.

Aplitic. A fine-grained granitic texture characteristic of certain igneous rocks.

Aquifer. A formation, group of formations, or part of a formation that is water bearing.

Argillite. A rock derived either from siltstone, claystone, or shale, that has undergone a somewhat higher degree of induration than is present in those rocks. (Twenhofel, W.H., Rept. Comm. Sed., pp. 95-96 1936-1937)

Ash flow. A volcanic deposit resulting from an avalanche of volcanic ash and other debris; generally a highly heated mixture of volcanic gases and ash, traveling down the flanks of a volcano or along the surface of the ground and produced by the explosive emission of gas-charged ash from a fissure or group of fissures or by the explosive disintegration of viscous lava in a volcanic crater.

Batholith. A stock-shaped or shield-shaped mass of igneous rock intruded as the fusion of older formations and of considerable size. (Suess, 1895)

Block faulting. See Fault block.

Breccia. A fragmental rock whose components are coarse angular fragments and therefore, as distinguished from conglomerates, are not waterworn. There are sedimentary breccias, friction or fault breccias, talus breccias and eruptive breccias. (Kemp)

Calc-silicate = skarn. Metamorphosed rock containing calcium carbonate ($CaCO_3$), mainly calcite and calcium bearing silicates.

Caldera. A large basin-shaped volcanic depression, more or less circular in form, the diameter of which is many times greater than that of the included volcanic vent or vents. (After Williams, H., Univ. Calif. Dept. Geol. Sci. Bull., vol. 25, pp. 242-246, 1941)

Candidate species. Those species recommended for and awaiting inclusion to the list of threatened and endangered species, but for which sufficient information is not presently available to biologically support a proposed rule or for which sufficient information does exist but the necessity of gathering data concerning the environmental and economic impact of listing and designations or critical habitats, development and publication of final rules will require several years.

Carbonate. A salt or ester of carbonic acid; a rock containing the radical CO_3, such as limestone or dolomite.

Centerline method. A method of dam construction involving the cycloning procedure whereby the centerline of the embankment crest remains essentially in the same horizontal position as the dam is raised.

Class II cultural resource survey. A cultural resource survey conducted by sample reconnaissance of part or a percentage of the total area of investigation.

Class III cultural resource survey. A cultural resource survey involving intensive reconnaissance and identification of all cultural sites within all of the areas to be impacted.

Contact metamorphism. Metamorphism genetically related to the intrusion or extrusion of magmas and taking place in rocks at or near their contact with a body of igneous rock.

Country rock. A general term applied to the rocks invaded by and surrounding an igneous intrusion. (After Holmes, A., 1920)

Cycloned tailings embankment. An embankment (such as for a dam) constructed from fine-grained tailings material. This material is derived by a process of gravitational separation (cycloning) along the dam crest.

Cycloning. A process of gravitational separation whereby solid mill waste is separated into underflow tailings sands that will constitute the tailings embankment and overflow tailings slimes will be deposited into the pond behind the dam.

Dacite. The extrusive equivalent of quartz diorite; the principal minerals are plagioclase, quartz, pyroxene and/or hornblende with minor amounts of biotite and sanidine.

Drawdown. The lowering of the water table or piezometric surface caused by pumping or artesian flow. (After Theis, Econ. Geol., vol. 33, no. 8, p. 891, 1938).

Environmental impact. Effect of environmental loading on existing physical, biological and socioeconomic environment (e.g., change in air quality, groundwater quality or soil loss). These changes to the current or projected conditions may be beneficial, inconsequential or adverse.

Environmental loading. Emission from proposed action or alternatives that has potential to change existing environment (e.g., air emissions, effluent quality, areal disturbance, etc.).

Epicenter. The point on the earth's surface directly above the focus of an earthquake.

Eugeosyncline. A long, narrow geosyncline in which volcanic rocks are abundant. (Kay, 1951)

Evaporite. One of the sediments which are deposited from aqueous solution as a result of extensive or total evaporation of the solvent. (Rankama and Sahama, p. 199; used first by Berkey, C.B., Bull. N.Y. Mus., vol. 251, p. 105, 1924)

Evapotranspiration. A term embracing the portion of the precipitation returned to the air through direct evaporation or by transpiration of vegetation, no attempt being made to distinguish between the two. (Langbein, W.B., Trans. Amer. Geophys. Un., vol. 23, pt. 2, p. 610, 1942).

Extrusive. A term applied to those igneous rocks derived from magmas or magmatic materials poured out or ejected at the earth's surface. Synonymous with effusive rocks, volcanic rocks.

Fault. A fracture in rock where movement of one side with respect to the other has occurred (Reid, 1913). The movement or displacement may be a few inches to several miles.

Fault block. A mass bounded on at least two opposite sides by faults; it may be elevated or depressed relatively to the adjoining region, or it may be elevated relatively to the region on one side and depressed relatively to that on the other. (Reid, H.F., et al, GSA Bull., vol. 24, pp. 163-186, 1913)

Fire insurance class rating. A system devised for fire insurance purposes which enables a town or community to be classified or rated, dependent upon factors such as water supply, type of fire department and number of personnel, number of fire stations, adequacy of fire station equipment, etc.

Focus. The true center of an earthquake beneath the earth's surface where the strain energy is first converted to elastic wave energy. (Leet and Judson, Physical Geology, p. 409, 1954)

Formation. "In geology, any assemblage of rocks which have some character in common, whether of origin, age, or composition." (Lyell, Manual of Geol. 6th Ed., p. 2, 1858)

Geosyncline. A large elongate basin within which great thicknesses of sedimentary and volcanic rocks are accumulating due to a regional extent of subsidence over a long time. Geosynclines are prevalently linear, but non-linear depressions can have properties that are essentially geosynclinal. (After Kay, p. 4, 1951; first used by J.D. Dana in 1873)

Humidity. The condition of the atmosphere in respect to water vapor; usually referring to relative humidity which is the ratio of the actual amount of water vapor present in the portion of the atmosphere under consideration to the quantity which would be there if it were saturated.

Intrusive. Magma or plastic solid which penetrates in or between older rock and solidifies before reaching the surface.

Lacustrine. Produced by or belonging to a lake environment. (Emmons, Ebeneyer, Man. of Geol., 1860)

Magma. Naturally occurring mobile rock material, generated within the earth and capable of extrusion and intrusion, from which igneous rocks are considered to have been derived by cooling and solidification.

Metamorphosed. Rock having undergone any change in texture or chemical composition after its induration or solidification, produced by exterior agencies, especially by deformation (pressure), heat and moisture. (La Forge)

Miogeosyncline. A long, narrow geosyncline in which volcanic rocks are rare or absent. (Kay, 1951)

Nomogram. A graphic representation that consists of several lines marked off to scale and arranged in such a way that by using a straightedge to connect known values on two lines an unknown value can be read at the point of intersection with another line.

Non-mineralized material storage. That portion of the excavated material which cannot be economically processed.

Orogeny. The process of formation of mountain ranges by folding, faulting and thrusting. (After Upham, W., four. Geol. 2, p. 383, 1894)

Permeability. The capacity of rock for transmitting a fluid. Also, the ease with which gases, liquids or plant roots penetrate or pass through a bulk mass of soil or a soil layer.

Phreatophyte. A plant that habitually obtains its required water supply from the zone of saturation, either directly or through the capillary fringe. (Meinzer, USGS WSP 494, p. 55, 1923)

Piezometric surface. 1. An imaginary surface that everywhere coincides with the static level of the water in the aquifer. 2. The surface to which the water from a given aquifer will rise under its full head. (After Meinzer, USGS WSP 494, p. 38, 1923)

Playa. The shallow central basin of a desert plain or valley in which water gathers after a rain and is evaporated. (U.S. Geol. Surv., Bull. 613, p. 184)

Porphyry. Generally referring to all rocks containing conspicuous crystals in a fine-grained groundmass. (After Holmes, A., 1920)

Pyroclastic. Fragmental or detrital material which has been expelled aerially from a volcanic vent.

Raptor. A bird of prey (e.g. hawk, eagle, falcon).

Retrograde alteration. A term used to describe previously altered rocks which have been shifted into a new geologic environment, resulting in subsequent alteration and reducing them from a high rank alteration rock to a low rank alteration rock.

Rhyolite. The extrusive equivalent of a granite. The principal minerals being one or more of the silica minerals (e.g., quartz, alkali feldspar.

Short-term impact. Impacts encompassing a 60-year period and based on an assumed mine life of 50 years and a reclamation success period of 10 years.

Special habitat feature. An anomaly or area within or adjacent to a larger habitat site which influences faunal population, movements or distribution and are classified as man-made or naturally occurring.

Stock. A body of igneous rock that covers less than 40 square miles, has steep contacts (generally dipping outward) and generally being discordant. (Billings, 1954)

Syncline. A fold in rocks in which the strata dip inward from both sides toward the axis. (La Forge)

Threatened or endangered species. As defined by the Endangered Species Act of 1973, federally listed endangered species are those in danger of extinction throughout all or a significant portion of their world range; federally listed threatened species are those likely to become endangered in the foreseeable future.

Thrust fault. A fault characterized by a low angle of inclination with reference to a horizontal plane and the dominant movement of the rocks above the fault surface being up the dip of the fault. The rocks above the fault appear to have been pushed or thrust over those below.

Tiering. A concept addressed by a number of sections in the CEQ regulations, the purpose of which is "to eliminate repetitive discussions of the same issues and to focus on the actual issues ripe for discussion at each level of environmental review." EIS's that address site-specific actions that are part of a larger federal program or policy for which a programmatic EIS has been prepared should incorporate by reference the issues that have previously been addressed in the programmatic EIS and are common to both actions. Consequently, a latter EIS will be tiered to the former EIS, and discussions in the former EIS which are pertinent to the latter EIS are incorporated by reference.

Tuff. A rock formed of compacted volcanic fragments, generally smaller than 4mm in diameter. (After Holmes, 1928)

CHAPTER 7.0
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APPENDIX A
SCOPING DOCUMENT AND ISSUES INTRODUCTION

The following pages present duplicate copies of (1) the EXXON Mt. Hope Molybdenum Project EIS Scoping Document presented to the public January 11-13, 1983; and (2) the Issues Identification Letter issued by the BLM Battle Mountain District Office following a review of public comments received.

Scoping Meeting Document for Mt. Hope Project
Land Acquisition Application
Environmental Impact Statement

I. Introduction

In 1969, the U.S. Congress enacted the national Environmental Policy Act (NEPA) that requires that all federal agencies prepare an environmental impact statement (EIS) for each of their major actions. This EIS must be prepared early enough to be part of the decision-making process. On December 6, 1982, the Bureau of Land Management (BLM) received application from EXXON Corporation (EXXON) to purchase public lands in the vicinity of Mt. Hope, in the County of Eureka, Nevada, for the purpose of developing a molybdenum mine/process plant complex. The transfer of public lands to the private sector constitutes a major federal action and, consequently, an EIS must be prepared.

II. Authority for EIS Development

Broad guidelines for EIS preparation, applicable to all federal agencies, have been published by the Council on Environmental Quality (CEQ) (Federal Register, Vol. 43, No. 230, Wednesday, November 29, 1978). The applicant will prepare an environmental impact report (EIR) similar in form and substance to an EIS; this preparation will be overseen by an environmental contractor to ensure adequacy of the analyses of environmental effects. Upon submittal of the EIR to the BLM, this oversight contractor will, under the direction of the BLM, prepare an EIS.

III. Purpose of the Scoping Process

The purpose of the scoping process is to determine the scope of the issues to be addressed and identify significant issues related to the proposed action. Scope consists of the range of actions, alternatives, and impacts to be considered in an EIS.

The first step in the EIS preparation process is to inform the public and other federal agencies of the intent to prepare an EIS. Such notice is made by an announcement in the Federal Register. Besides briefly describing the proposed action and alternatives, this Notice of Intent also includes an invitation to interested parties to participate in the scoping process. The Notice of Intent for the Mt. Hope Land Acquisition Rights-of-Way EIS will be published in late December, 1982, or early January, 1983, and scoping meetings will be held in Reno, Nevada on January 12, 1983, and Eureka, Nevada, on January 13, 1983.

This document has been prepared to enable the public and others having interest to more effectively participate in the scoping process. It contains a preliminary description of the proposed action, lists alternatives to be discussed in the EIS, identifies, on a preliminary basis, major and minor issues, and presents the EIS preparation schedule. The description of the proposed action is not based upon final engineering design and should not be considered a commitment on the part of the applicant.

Scoping Document

IV. Proposed Action and Alternatives

Although the land purchase application is the action which triggers the EIS process, there are other federal decisions which must be made before the applicant may proceed. Among these are the granting of rights-of-way and the approval of a plan-of-operation. Based upon the provisions of Section 1508.25 of the CEQ regulations to the effect that connected actions should be addressed in the same EIS, it has been determined that the EIS should also address these actions.

A. Proposed Action

1. Land Acquisition

EXXON has applied to the BLM to purchase a block of approximately 10,000 acres of federal land as shown on Figure 1. The land will be used to construct and operate a molybdenum ore mine and process plant.

The area to be disturbed is estimated as follows:

	Acres
Open pit mine and overburden disposal sites	3000
Process plant and general facilities	500
Tailing disposal impoundment	2500
Total disturbed area	6000

The excess acreage provides a manageable block of land for operational and environmental needs.

2. Rights-of-Way Granting

Site access will be from the north side of the land block on a branch road from existing State Highway 51, a portion of which would be relocated to accommodate the proposed tailing pond. Electric power will be obtained from the Mahachek substation near Eureka via a transmission line owned by Mt. Wheeler Power, Inc. Water for process and other uses will be obtained from a well field to be developed by EXXON in Kobeh Valley, assuming that water rights are obtained.

Rights-of-way for power and water lines and road relocation will be required. Proposed routings for the first two are shown in Figure 2, and the last is shown in Figure 3. Estimated lengths are shown below.

	Approximate Length (Miles)
Power line	20
Water line	10
State highway relocation	5

Scoping Document (continued)

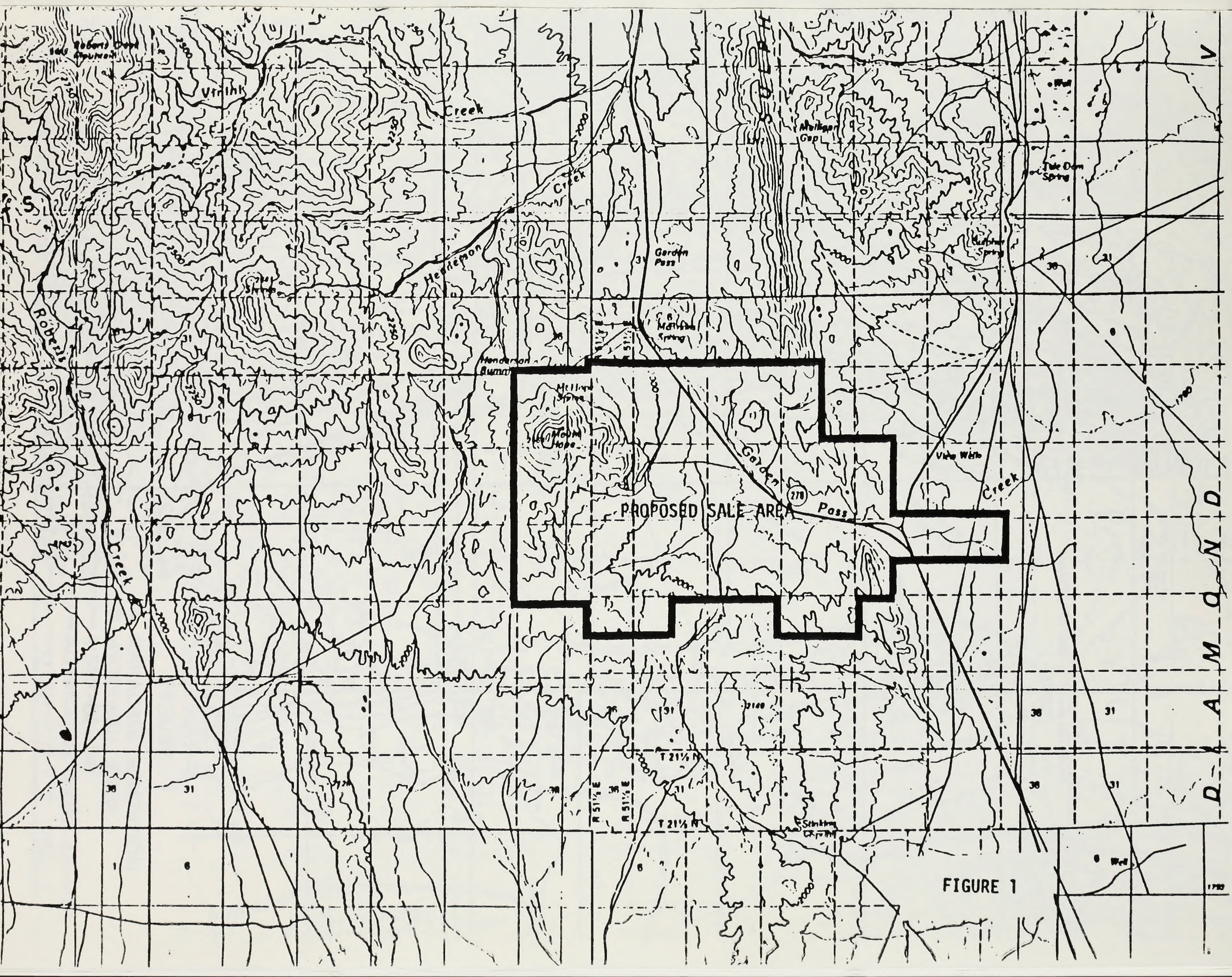
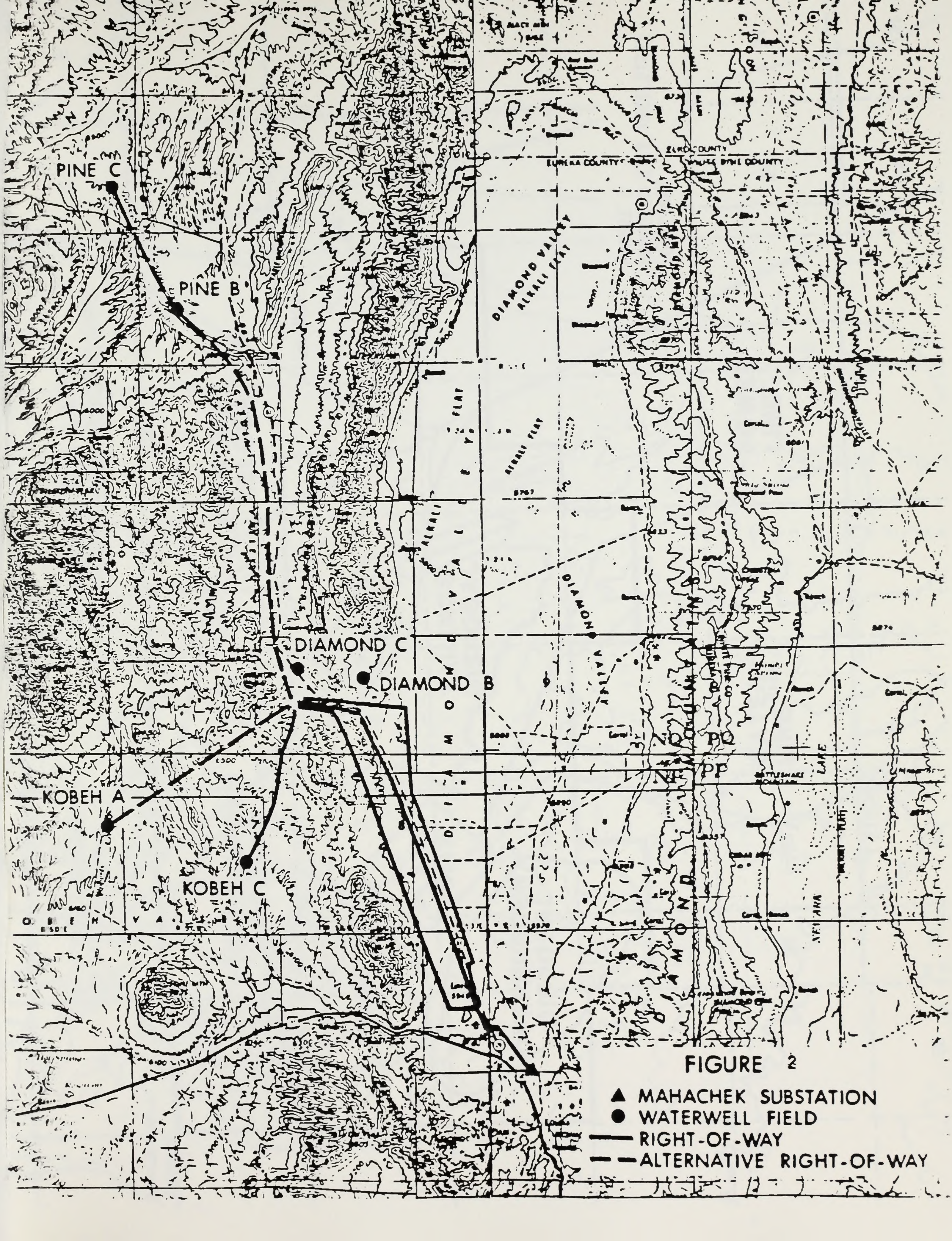

PROPOSED SALE AREA
Garden Pass
Garden Pass
278
Creek
Henderson
Henderson Summit
Mount Hope
Roberts
Creek
Creek
Mulligan Gap
Vibe Wells
T 21½ N
T 21½ N
R 51½ E
R 51½ E
Well
Well

FIGURE 1


PINE C
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DIAMOND B
KOBEH A
KOBEH C
EUREKA COUNTY
WHITE PINE COUNTY
ALKALI FLAT
DIAMOND VALLEY
▲ MAHACHEK SUBSTATION
● WATERWELL FIELD
RIGHT-OF-WAY
ALTERNATIVE RIGHT-OF-WAY

FIGURE 2

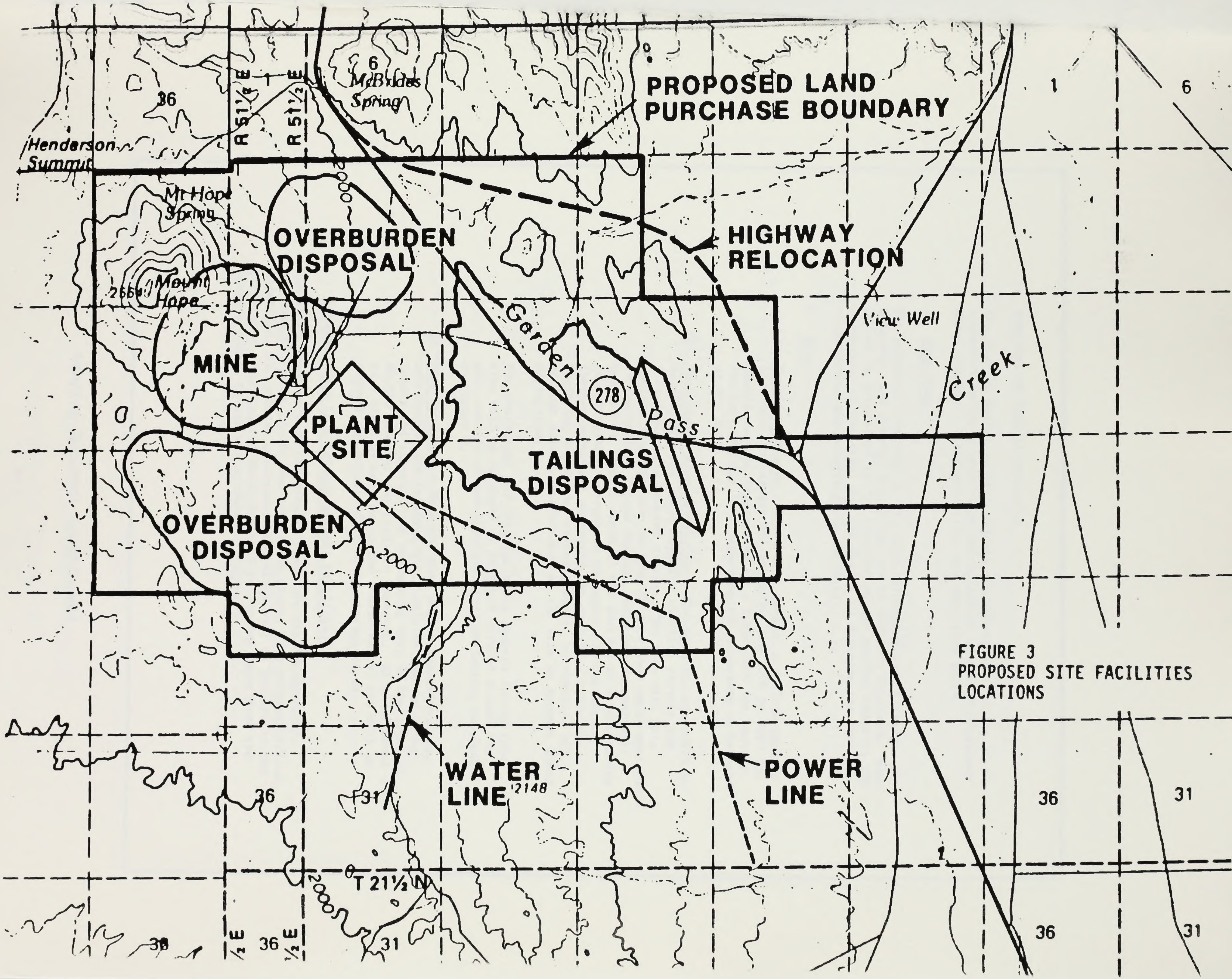


FIGURE 3
PROPOSED SITE FACILITIES
LOCATIONS

3. Approval of Plan of Operation

The plan of operation will address the on-site activities of the applicant during construction and operation of the mine/process plant complex. These activities are described below.

a. Site Plan

The proposed locations of the mine, process plant, tailing disposal, and general facilities are as shown on Figure 2. Site layout is determined by the location of the mineral deposit, the topography of the area, and the desire to minimize the cost of establishing and operating the facility.

b. Mine

1) Sampling Program - EXXON will develop a decline adit to intersect and sample the orebody. The 2000 to 3000 ton sample will be transported to a laboratory for testing. The test results will determine the processes to be used at Mt. Hope.

2) Preliminary Mine Development - The open pit mine will be developed using large capacity electric shovels and diesel-electric powered trucks. The mine will be a typical open pit mine as seen in most base metal operations in the western United States. Mine development will begin 1 to 2 years ahead of the startup of actual mining and processing operations to remove the overburden (barren material) overlying the orebody. Prior to beginning overburden removal, shops, warehouses, and offices will be constructed at the site to support these activities.

The overburden and internal waste removed during this time will be disposed of at sites located around the pit, outside of the expected final perimeter, as shown on Figure 3.

3) Mine Operation - When the mine begins operation, ore, overburden, and internal waste will be removed using trucks and shovels. An ore mining rate on the order of 30,000 tons per day (tpd) is expected. Each day about 2 to 3 times as much waste and overburden as ore will be removed and deposited in waste storage areas.

c. Process Plant (and related general facilities)

The three components of the process plant are the concentrator, hydrometallurgical plant, and conversion plant. The general offices, warehouse, and general maintenance buildings will be located in the plant area. The tailing basin designed to receive waste from the process plant, is located as shown on Figure 3.

Scoping Document (continued)

1) Construction - The process plant and the tailing basin starter dam will be constructed over a period of about two years using contractors brought to or hired from the area specifically for this purpose.

2) Operation (process description)

a) Concentrator - The Mt. Hope ore must be processed to convert the molybdenum minerals into a salable form. The ore will be crushed, ground, and treated to recover the molybdenum mineral in a concentrate. The remaining fraction of the ore is rejected as a tailing. The grinding and recovery processes are carried out in water medium. Reagents are used to effect a separation.

b) Hydrometallurgical plant - The concentrate will be further processed in a hydrometallurgical plant where acid will be used to dissolve and remove impurities and improve its quality.

c) Conversion plant - The leached concentrate will be fed to a conversion plant where the sulfur contained in the molybdenum mineral will be removed, forming molybdic oxide. Some of the molybdic oxide will be packaged and sold. The remainder will be further converted into ferromolybdenum.

d) Tailing basin - The tailing basin will be designed as a storage and separator pond for process water, and as a repository for the tailing generated by the concentrator. In addition, it will collect runoff from the process and mine areas. Water produced in mine dewatering will flow to this basin for use in the process. It is planned that there will be no point discharge from the basin.

d. Effluents

As currently planned, the effluents from each process area and their disposition (in parentheses) are identified below:

1) Concentrator

- Crushing circuit dust collector discharge (to atmosphere)
- Crushing circuit dust collector sludge (to process)
- Tailing (to tailing basin)

2) Hydrometallurgical plant

- Neutralized bleed stream (to evaporation ponds with burial of residue)

Scoping Document (continued)

3) Conversion Plant

- Roaster scrubber discharge (to atmosphere)
- Roaster scrubber sludge (to evaporation ponds with burial of residue)
- Ferromolybdenum process dust collector discharge (to atmosphere)
- Ferromolybdenum process dust collector sludge (to tailing basin)

4) General Waste

- Sewage treatment plant effluent (to tailing basin or drainfield)
- Sewage treatment plant sludge (to landfill)
- Plant garbage (to landfill).

e. Offsites

1) Electric power will be delivered to the site through a powerline located in the corridor described previously. A sub-station, located in the process plant area, will receive and distribute power to the mine and to the process plant.

2) As presently envisioned, and assuming an appropriation is obtained, a water well field will be developed in Kobeh Valley. These wells will supply the water required for the process. Water will be pumped through a pipeline to the process plant area. An estimated 5400 gallons of water per minute will be required.

f. Project Schedule - The project schedule is uncertain at this time. It will be defined later based on the results of studies performed by EXXON.

g. Workforce - The construction workforce will peak at approximately 1400. The permanent workforce is expected to be about 550 employees.

Housing for construction and permanent employees and the related infrastructure is a specific item currently under study by EXXON.

B. Alternatives

The following alternatives have been identified as those that should be addressed in the EIS.

1. No Action

2. Land Acquisition Alternatives, Individually and in Combination

   a. Federal Land Policy and Management Act (FLPMA) Exchange
   b. Federal Land Policy and Management Act (FLPMA) Use Permit
   c. Lode Claims and Millsite Claims

3. Alternative Rights-of-Way Routings

Scoping-Document (Continued)

4. Mine/Process Plant Alternatives

   a. Alternative Mill Sites
   b. Alternative Overburden and Waste Rock Disposal Sites
   c. Alternative Tailing Pond Sites
   d. Housing Development
      1) Provide No Housing
      2) Provide Housing

V. <u>Issues</u>

The following is a preliminary list of issues as identified by the BLM and the applicant.

Air Quality
Cultural Resources
Groundwater Resources
Visual Effects
Socioeconomic Effects
Land Use Changes
Water Rights Acquisition
Seismic Effects
Erosion
Ecology
Rare and Endangered Species
Natural Resources

VI. <u>Schedule</u>

The following is a list of milestones associated with the EIS process and their targeted completion dates.

Notice of Intent	December, 1982
Scoping Meeting - Reno	January 12, 1983
Scoping Meeting - Eureka	January 13, 1983
Public Input Due	January 31, 1983
EIR Submitted to BLM	June, 1983
DEIS Available for Public Comment	September, 1983
FEIS Filed with EPA	February, 1984

VII. <u>Information Requested</u>

Interested parties are requested to forward to the BLM any information which they believe is relevant to an accurate and complete analysis of environmental impacts. Among the types of information sought are:

1. Information that will contribute to the agency's definition of scope including separation of major and minor issues.

Scoping Document (continued)

2. Information on any public environmental assessments and other environmental impact statements which are being or will be prepared, and that are related to but are not part of, the impact statement under consideration.

3. Information on other environmental review and consultation requirements, so the lead and cooperating agencies may prepare other required analyses and studies for integration into the environmental impact statement.

4. Information that will aid in the characterization of baseline physical/chemical, biological, and socioeconomic environments.

0267I
12/3/82

Scoping-Document (Continued)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Shoshone-Eureka Resource Area
P.O. Box 194
Battle Mountain, Nevada 89820

IN REPLY REFER TO:
1792
(N-6615)

Exxon Minerals Company is proposing to develop and operate a mine complex for a molybdenum ore deposit located near Eureka, Nevada. The proposed action has been entitled the Mount Hope Project. A draft Environmental Impact Statement (EIS), developed by a third party contractor under the guidance of the Bureau of Land Management (BLM), is scheduled to be issued to the public during late 1983.

As part of the EIS process, scoping began at an early stage. The purpose of the scoping process is to determine the scope of the issues to be addressed and identify significant issues related to the proposed action.

Public involvement included the mailing of over 200 scoping documents to interested parties, a meeting with the Nevada State Clearinghouse on January 11, 1983 and open houses in Reno and Eureka on January 12th and 13th respectively. Both open houses were well attended and additional scoping documents were distributed. The public comment period was December 20, 1982 through January 31, 1983.

The public input received is appreciated and will be taken into consideration during EIS preparation.

The next official public comment period will be after issuance of the draft EIS, expected during late 1983. However, public comments or questions are always welcome.

Please feel free to contact the Shoshone-Eureka Resource Area, Bureau of Land Management, P.O. Box 194, Battle Mountain, Nevada 89820 or call (702) 635-5181.

Sincerely,

Neil D. Talbot

Neil D. Talbot
Area Manager

Enclosure: Scope of EIS, Analysis of Issues

Issues Identification Letter

SCOPE OF EIS, ANALYSIS OF ISSUES

The scope of the Mount Hope EIS was derived from issues and priorities determined at the three scoping meetings and from preliminary research done by the EIS parties. Letters identifying additional concerns were also considered.

On December 6, 1982, EXXON Minerals Company (EXXON), a division of EXXON Corporation formally notified the Bureau of Land Management (BLM) that it wished to acquire public land and rights-of-way for the purpose of developing a molybdenum mine/process plant complex in the vicinity of Mount Hope near Eureka, Nevada.

Within each action option (e.g., proposed action, no action alternative), the EIS will cover construction, operation, and termination phases. Various components of the project to be analyzed will be the processing complex, open pit, tailings and nonmineralized material storage areas.

Impacts in eight broad issue topics will be analyzed. The issue topics are: topography and geology; air quality and noise; water resource; soils; biota; cultural resource; socio-economics including land use and transportation and EIS/Project related concerns. The emphasis within each topic as noted during the scoping meetings is highlighted below:

Topography and Geology

The geology and topography of the proposed mine/mill site and proposed and alternate water/electrical/transportation routes will be given a general overview. Geologic hazards (earthquakes, faults, landslides, subsidence) in the project area will be given special emphasis in the EIS. Topography will be considered with respect to visual impacts to surrounding areas resulting from mine development.

Issues Identification Letter (continued)

Air Quality and Noise

Impacts to air quality will be given specific treatment in the EIS. An air quality computer model will be run to determine whether the mill complex will require a Prevention of Significant Deterioration permit from U.S. Environmental Protection Agency. Any potential impacts to Class I areas within 10 miles of the project will be highlighted in the EIS. Impacts to vegetation and visibility will also be assessed. Fugitive dust and resulting impacts during and after construction (wind erosion) will be generally discussed in the EIS. Noise impacts from construction activities and mine/mill operation will be briefly treated in the EIS.

Water Resources

Water resources will be given specific emphasis in the EIS. Impact to water rights and quantity, pollution potential, wildlife and livestock protection, and flood control will be assessed. The major type of water issues will be related as to supply and possible groundwater contamination. Erosion control will be discussed in terms of soils characteristics.

Soils

Impacts to soils will be given an overall general treatment. Site-specific sensitive areas with soil problems will be highlighted in the EIS. Erosion-control procedures will be incorporated as part of the reclamation plan. Soils and subsurface geology will be assessed as to potential groundwater impacts. Soils reclamation capability will be discussed.

Issues Identification Letter (continued)

Biota (Wildlife and Vegetation)

Effects to Threatened and Endangered or other significant wildlife and plant species will be analyzed in the EIS. Overall discussion of wildlife and vegetation will be general with the following sensitive areas highlighted:

- Impacts to deer and wild horses in the project area. Appropriate mitigation measures will be proposed.

- Impacts to any special vegetated areas such as spring vegetation, harvestable resource, and unique vegetation species.

Land Use

Land use compatibility will be reviewed and impact assessed in the EIS. Issues brought forward during the scoping process which will be emphasized in the EIS include:

Method and extent of land acquisition
Reclamation
Livestock use
Wildlife use
Wilderness area conflict potential (visual resources)
Agricultural effects
Transportation routing

Cultural Resources

Project impact to cultural resources will be specifically emphasized in the EIS in two subtopic areas: land disturbance and socio-economic related. Land disturbance impacts will be discussed in terms of mine/mill, road, and water pipeline/transmission location or routing. Any sensitive cultural sites within the proposed project boundaries or along proposed or alternative routes will be highlighted in the EIS. Cultural Resources discussion and impact assessment will include archaeological, historical, architectural, Native Americans, and Pony Express Trail.

Issues Identification Letter (continued)

Socio-economic related impacts to cultural resources will emphasize the historic nature of Eureka Township and potential effects of population and economic growth in terms of historic maintenance and lifestyle changes will be discussed.

Socio-economics

Analysis of socio-economic effects will receive major emphasis in the EIS. Effects during construction and during operation and maintenance of the proposed project will be particularly highlighted. Benefits to local communities including tax revenues, increased employment opportunities, and other increased revenue will be analyzed.

Potential non-benefits to local communities, particularly small towns with limited resources, will be studied with specific emphasis on impacts from increased population on various infrastructure (streets, sewer and water systems, housing, health services, utilities, schools).

Overall socio-economic impacts will be analyzed in the following sensitive areas:

1. Eureka, Nevada
2. Eureka County, Nevada
3. Carlin, Nevada
4. Elko, Nevada

EIS discussion will include alternate housing plans and community involvement opportunities as mitigative planning. A complete review of project socio-economic loading (work force required, skills required, etc.) will be presented in the EIS.

Issues Identification Letter (continued)

EIS and Project Related Concerns

The EIS will respond to the following general concerns as identified in the scoping meetings:

1. All alternatives to the Proposed Action will be given substantial treatment when analyzing impacts and mitigation, as required by the Council on Environmental Quality and the National Environmental Policy Act.

2. The EIS will also analyze all impacts of the proposed and alternate actions.

3. The need for the project will be analyzed as part of the EIS.

Proper environmental analysis will be conducted for air, water, soils, vegetation, wildlife, wild horses, range contaminants, hydrology, erosion, cultural resources, visual impacts, etc. The EIS will identify the potential locations of all related facilities.

Issues Identification Letter (continued)

APPENDIX B
INFORMATION PERTINENT TO POWER LINE AND STATE ROUTE 278 ACTIVITY

1.0 Introduction

Initiation of the Mt. Hope project has included planning participation by both Mt. Wheeler Power, Inc. (electric power requirements) and the Nevada Department of Transportation (State Route 278 relocation). This Appendix presents pertinent data presented by both groups during the Mt. Hope EIS period. Both Mt. Wheeler Power, Inc. and the Nevada Department of Transportation, would individually apply for right-of-way granting, although this EIS serves to address environmental considerations.

In 1983, Mt. Wheeler Power, Inc. (MWP) provided an Environmental Impact Report (EIR) to allow EIS preparers access to information necessary to evaluate impact extent and to formulate mitigation planning if necessary. Section 2.0 of this Appendix abstracts the MWP EIR and includes notes, as necessary, concerning mitigative changes incorporated into the MWP plan as a result of EIS preparers review.

The Nevada Department of Transportation (NDOT) directly responded to an EXXON request for plans relative to realignment of State Route 278. In response, the NDOT presented a topographic map depicting realignment routing, discussed plans of cultural and surface water (McBrides Spring) avoidance, and provided details of construction workforce personnel, equipment and scheduling. Section 3.0 of this Appendix is limited to a duplicate copy of a detail letter received from the NDOT. The additional data provided by the NDOT is directly incorporated into Chapters 2, 3 and 4 of the EIS.

2.0 Mt. Wheeler Power EIR Information

The power system proposed for the Exxon Mt. Hope Project is a 230 kV a-c system designed to deliver 50 MW from the Mt. Wheeler Power, Inc. (MWP) 230 kV system to the project site.

The power requirements for the project are of such magnitude (50 MW), it is assumed that reliability of electric service will require that the project have alternate sources of power to the EMC site. A new 230 kV power line will be constructed to the MWP Gonder Substation near Ely, Nevada from MWP Utah resources by 1985 or early 1986.

In addition, MWP will have additional resources by 1989 from its participation in the White Pine Power Project (WPPP) 1,500 MW Plant in White Pine County, Nevada. Construction of this generating plant is scheduled to begin in July, 1984. Three (3) prime sites remain under consideration at the present time and selection for the final location is to be made during June, 1983, providing the selection date remains on schedule (MWP EIR, 1983).

Since the MWP report was being prepared during January, 1983, MWP developed preliminary plans to provide the power requirements of the project from any one of the three (3) White Pine Power sites still under consideration.

2.1 Location

Figure No. B-1 shows the MWP system within its certificated service area. The three (3) prime sites for the WPPP are also shown as well as the proposed routing of the various power line alternatives. (EIS Note: Only that portion of the power line from Machacek substation to the Mt. Hope project site has been evaluated in this EIS. In accordance with the NEPA concept of tiering, the analysis of other-line development by Mt. Wheeler Power has been conducted in other EIS work and is scheduled to occur regardless of the Mt. Hope project development. Additionally, the the EXXON Mt. Hope project plans only incorporate power line access from the Machacek substation as opposed to the various alternatives, e.g., direct access from WPPP, discussed in the MWP information provided below).

a. Assume SOUTH SPRING VALLEY Site selected for WPPP - A 230 kV line would be constructed by the WPPP to the MWP Gonder Substation. From Gonder Substation to the Machacek Substation, a 66.5 Mile 230 kV line would be constructed parallel to the Sierra Pacific Power Company (SPPCO) 230 kV line. From the Machacek Substation, a 23 Mile 230 kV line would be constructed to the Mt. Hope site.

b. Assume NORTH STEPTOE VALLEY Site selected for WPPP - a 76 mile, 230 kV line would be constructed direct to the EMC Plant Site as well as a 23 mile, 230 kV Line from the Machacek Substation to the Mt. Hope site.

c. Assume BUTTE VALLEY Site selected for WPPP - a 54 mile, 230 kV line would be constructed direct to the EMC Plant Site as well as a 23 mile, 230 kV line from the Machacek Substation to the Mt. Hope site.

d. An alternate to (c) above would consist of a 17.5 Mile, 230 kV line constructed southwest to intercept the 230 kV corridor of the SPPCo 230 kV line, then 33.5 miles of 230 kV to the Machacek Substation, then 23 miles of 230 kV line from the Machacek Substation to the Mt. Hope site.

e. The right-of-way requirements for 230 kV power line would vary from 110 to 125 feet in width and would require from 13.3 to 15.2 acres per mile of line.

2.2 Construction Activities

2.2.1 Duration

The duration of the construction of the project is estimated to be 50 weeks if the North Steptoe Valley Site is selected and 38 weeks if the Butte Valley site is selected. The construction period for the other alternative routings lie between the above maximum and minimum periods. Time to construct from the Machacek substation to the Mt. Hope site is estimated to equal 11.5 weeks.

Area to be Disturbed. Some amount of land clearing would be necessary to permit movement of construction equipment. Land clearing would be restricted to the minimum necessary for the safe construction and operation of the line and would consist of crushing and uprooting brush. Clearing of desert vegetation would be restricted to the minimum required for placement of poles, anchors and wire pulling sites.

Pole site clearing would normally require a circular space, approximately on a 5 foot (5') radius to protect the wood poles from wild fires. This clearing, normally an ongoing operation and maintenance activity to protect the pole line from fire, has been eliminated from planning in order to assure minimum environmental disturbance.

Removal of trees would be limited to those that constitute a hazard to the power line and whose tops are within 20 feet of the conductor and

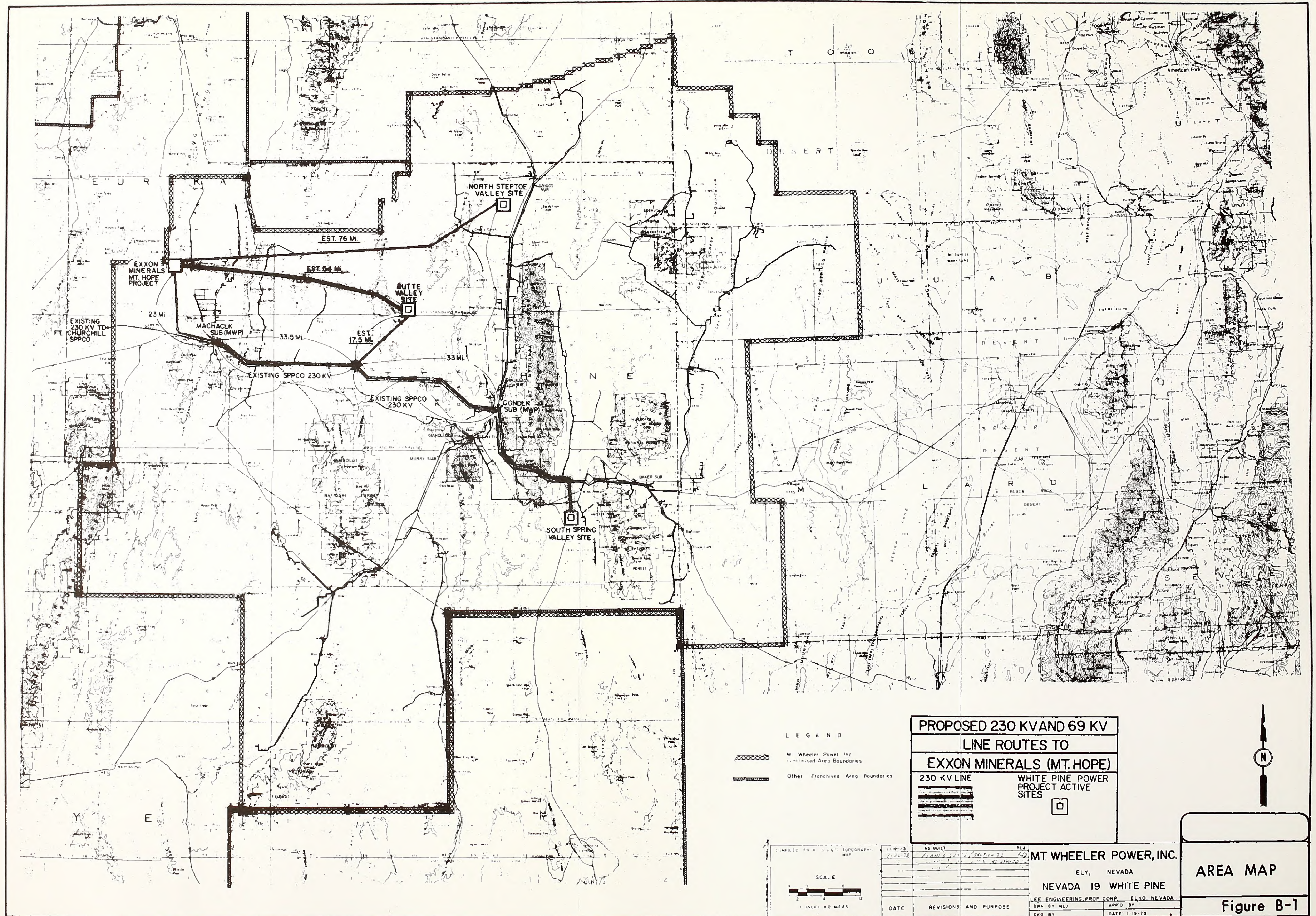

NORTH STEPTOE VALLEY SITE
EST. 76 Mi.
EXXON MINERALS MT. HOPE PROJECT
EST. 54 Mi.
BUTTE VALLEY SITE
23 Mi
EXISTING 230 KV TO FT. CHURCHILL SPPCO
MACHACEK SUB (MWP)
33.5 Mi.
EST. 17.5 Mi.
33 Mi.
EXISTING SPPCO 230 KV
EXISTING SPPCO 230 KV
GONDER SUB (MWP)
SOUTH SPRING VALLEY SITE
T O O E L E
D E S E R T
J U A B
S E V I E R
D E S E R T
M I L L A R D
E U R E K A
N E
Y E
LEGEND
Mt. Wheeler Power Inc Franchised Area Boundaries
Other Franchised Area Boundaries
PROPOSED 230 KV AND 69 KV
LINE ROUTES TO
EXXON MINERALS (MT. HOPE)
230 KV LINE
WHITE PINE POWER PROJECT ACTIVE SITES
N
SCALE
1 INCH = 80 MILES
DATE
REVISIONS AND PURPOSE
MT. WHEELER POWER, INC.
ELY, NEVADA
NEVADA 19 WHITE PINE
LEE ENGINEERING, PROF. CORP. ELKO, NEVADA
AREA MAP

Figure B-1

which cannot be topped. The clearing of trees which could create a hazard would be done after conductor installation wherever possible to minimize tree trimming or removal to provide a feathered right of-way.

2.2.3 Construction Labor Force

The power line construction labor force would be composed of the major skills or categories of lineman, groundmen, operating engineers, electrical workers, non-manuals and 'others'. Non-manuals would predominantly be field engineers, surveyors and inspectors. 'Others' would include office personnel and support personnel such as superintendents, foremen, mechanics, fuel and lubemen.

It is estimated that the total labor force necessary to accomplish the proposed construction would number between 45 and 60 people working one eight to ten hour shift a day, five days a week.

2.2.4 Construction Equipment Requirements

Typical 230 kV power line construction equipment would be approximately as follows:

Cars	Pole Trailer
Pickups 1/2 Ton	Wire Trailer
Office Trailer	Reel Stands
Dozer	Fork Lift
Road Grader	Conductor/Static Line Tensioners
4x4 Pickups with Auger	Traveler Truck with 6-Ton Boom
Air Compressor	Conductor Travelers
Backhoe	6x6 with Aerial Platform
6x6 Flat Bed Trucks	4x4 6-Man Carry-Alls
Fuel/Lube Trucks	
25-Ton Crane	

2.2.5 Access Roads

Existing public and private roads would be used where available. Some roads may require upgrading to accommodate construction traffic. All existing roads used for construction would be left in the same or better condition than originally found.

New access roads would be constructed along the power line right-of-way where suitable existing roads are not available. Access roads would consist of a main road running the length of the power line right-of-way with stub roads providing access to each structure location. At times it would be necessary to locate access roads outside the right-of-way limits due to geological, ecological or topographical consideration. In these cases, all applicable permits would be obtained and all regulations adhered to.

All access roads would be constructed in accordance with the specifications and regulations of the entity having jurisdiction of the lands crossed.

All fences crossed by the power line would be provided with a gate as required by the landholder, to provide access for the construction force as well as operation/maintenance personnel after construction was completed.

2.3 Maintenance Activitites

2.3.1 Duration

Maintenance would include the operations needed to keep the lines and associated facilities in service. The lines and right-of-way would be inspected during planned periodic ground patrols, approximately two times per year. Emergency patrols by air as well as emergency maintenance on the ground would be performed in the event of any line failure.

2.3.2 Area to be Maintained Clear of Vegetation

In some cases it may be necessary to physically clear taller vegetation to aid in fire prevention.

2.3.3 Maintenance Personnel

Routine patrols would consist of a lineman and groundman making a structure inspection of the pole line. In emergencies as many as fifteen (15) to twenty (20) personnel would be utilized to complete repairs as rapidly as possible.

2.3.4 Maintenance Equipment

Vechicles for maintenance would primarily consist of four-wheel drive pickup trucks and rubber-tired winch trucks. Tracked vehicles would be needed only during times of emergency repair.

2.3.5 Access Roads

Access roads constructed during the construction of the power line would be utilized for all maintenance and emergency repair of the line.

2.4 Transmission Structures

2.4.1 230 kV Structure Drawings

Figures B-2, B-3 and B-4 represent standard REA structure drawings for 230 kV Construction. Dimension and conductor spacing is shown for each of these drawings.

Figure B-2 - Tangent Structure (TH-230)
Figure B-3 - Medium Angle Structure (TH-233)
Figure B-4 - Deadend Structure (TH-235)

2.4.2 Structure Hazards

Hazards to people, due to the structures, would be the possibility of collisions with the pole(s) and guy wires by off-road vehicles and aircraft collisions with the structure(s) and conductor(s) during inclement weather. The guy wires would have an 8 foot yellow marker attached from the ground line up the guy strand.

The structure would not be a hazard to livestock or wildlife except for raptors who use the structure as a predatory perch and will be an easy target for the "sportsmen".

2.5 Mitigating Measures

2.5.1 General

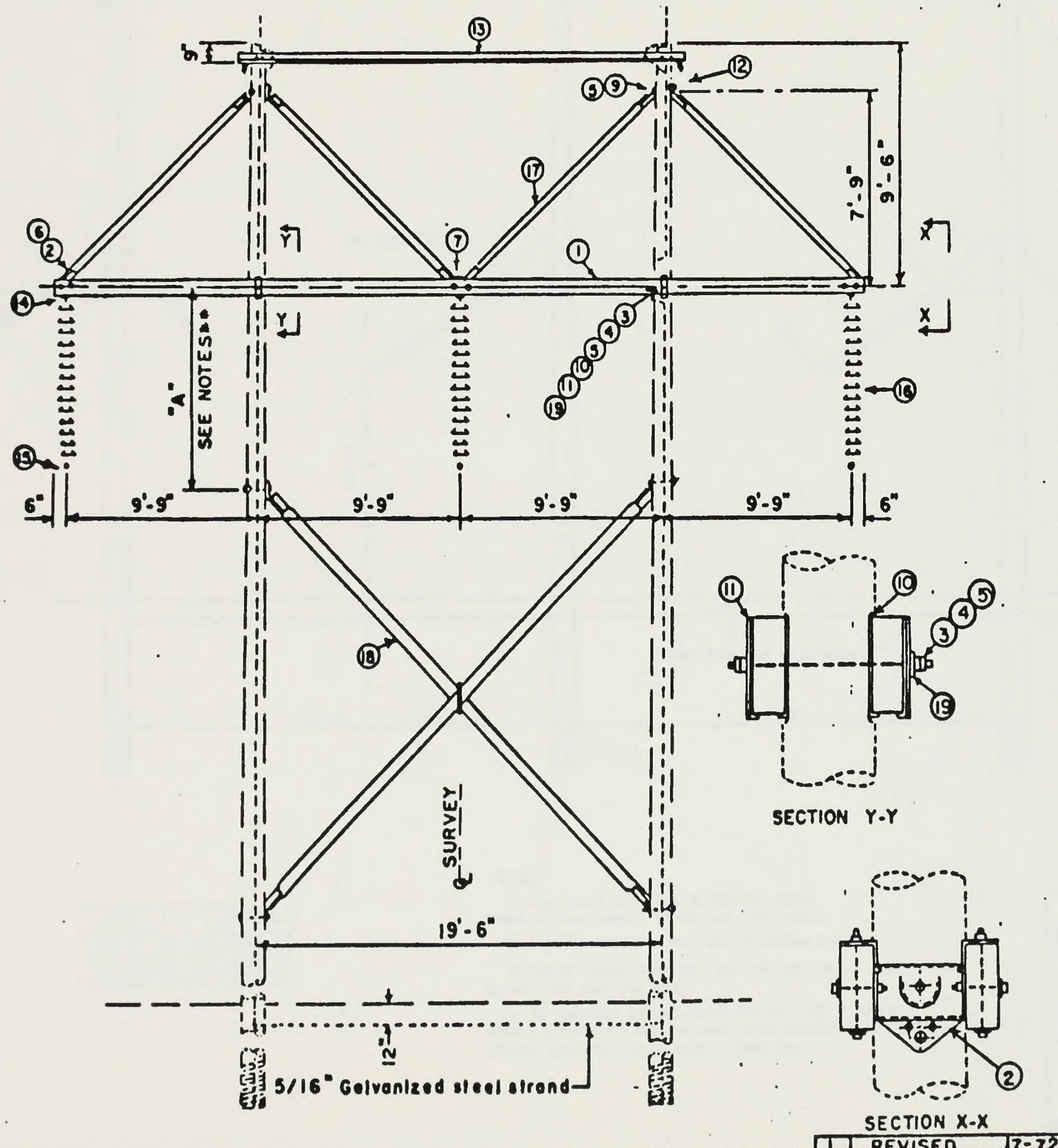
Power lines would be located parallel to existing power line rights-of-way when practicable. Power lines would be located, wherever possible, to use the natural terrain as background on screening.

Existing access roads would be used where practicable. Soil excavated during construction would be evenly distributed over cleared areas. Watering of access road surfaces would be done if necessary to minimize fugutive dust emissions.

2.6 Environmental Criteria

The policy and practice of Mt. Wheeler Power, Inc. is to protect the environment of the service area to the fullest extent practicable within the constraints of technological and economic feasibility while fulfilling its primary responsibility of supplying low cost electric service to its consumers.

In this regard, the design, construction, cleanup, restoration and maintenance of the proposed project



NOTES:

* 1. As required see Drg. TM-1.

2. Cotter keys in insulator strings and clamps shall be oriented in same direction and shall face pole.

3. Any field drilled pole holes shall be pressure treated.

4. Structures shall have suitable pole foundation to resist uplift.

**5. Dimension "A" shall be as shown on Drg. TM-204.

6. Double crossarms shall be shipped complete with factory assembled hardware.

7. For other requirements of assemblies refer to Specification T-8.

** * CROSSARM TYPE 81

LIST OF MATERIALS

DRG. REF.	REQ'D	DESCRIPTION	ITEM
1	2	Crossarm 3 5/8" X 9 3/8" 40'-0" long * * *	
2	3	Spacer Fitting Ass'y, Separation as req'd	
3	2	Threaded rod 7/8" X req'd length	
4	4	Nut for 7/8" bolt	
5	6	Locknut for 7/8" bolt M.F. type	
6	2	Bent bolt 7/8" X 5 1/2"	>gy
7	1	Bent stud 7/8" X 8" with th'd washer & nut	
9	2	Machine bolt 7/8" X required length	
10	4	Gain plate 3" X 9 1/2" X 1/4"	
11	4	Ribbed tie plate 3" X 9 1/2" X 1/4"	
12	2	Single curved grid plate 4" X 4" Min. 15/16" hole	
13	1	OHGW support assembly TM 109B	
14	3	Suspension hook	
15	3	Suspension clamp and connecting piece	el
16	*	Insulator, suspension 5 3/4" X 10" X 15,000 lb. M&E	k
17	4	V-braces 3 3/8" X 5 3/8" X req'd length	gy
18	1	X-brace Assembly TM-110A	vx
19	2	Spring washer 15/16" hole	gy

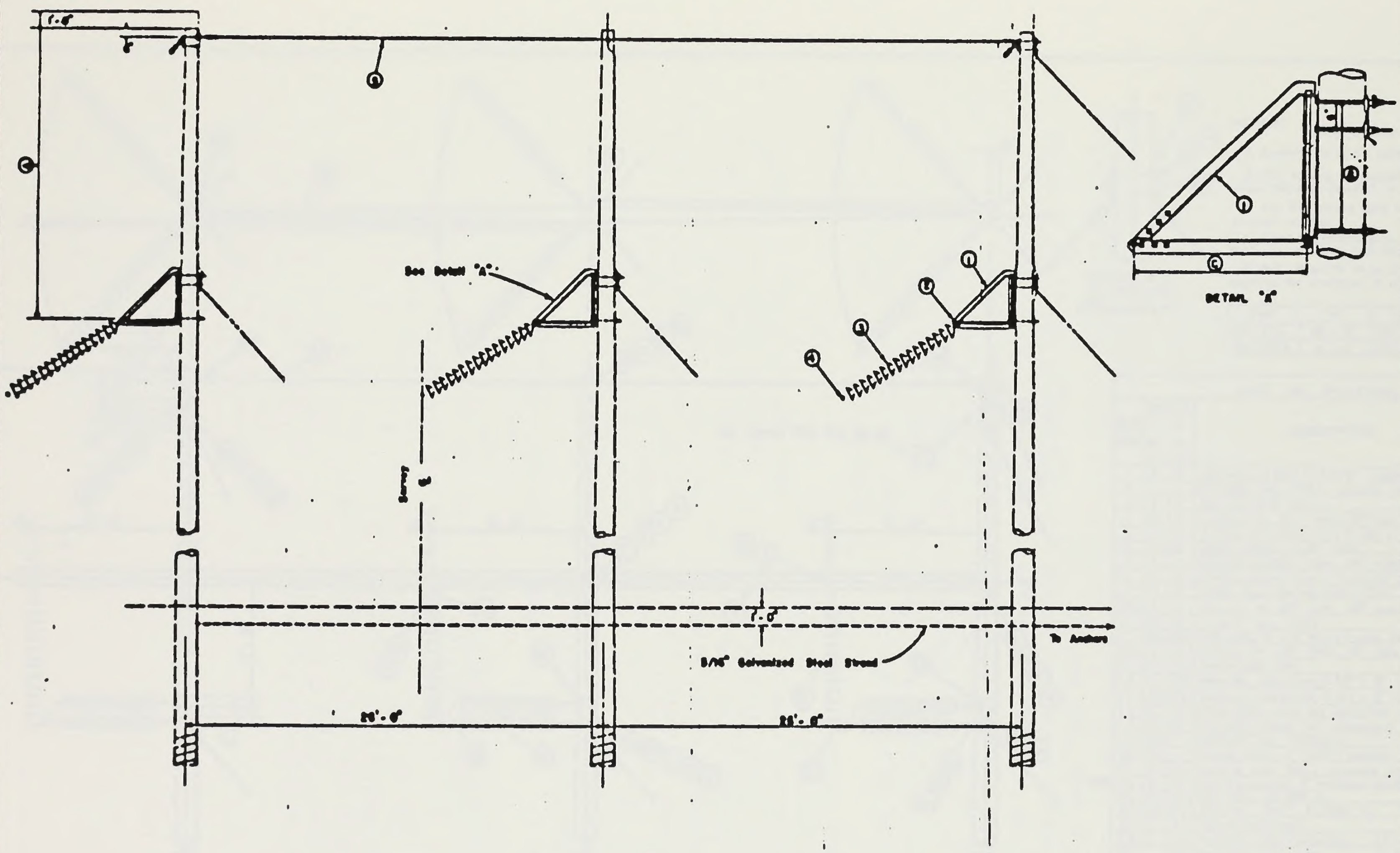
TRANSMISSION LINE TANGENT STRUCTURE

230 KV H-FRAME SUSPENSION - TWO POLE

May 1983

FIGURE B-2

TM-230



Type Structure			
[illegible]	[illegible]	[illegible]	[illegible]

NOTES:

1. Pole spacing to conform to dimensions shown unless otherwise indicated on Plan and Profile sheets.

2. Any field drilled pole holes shall be pressure treated.

3. Tighten machine bolts until grid gain teeth are imbedded full depth into pole.

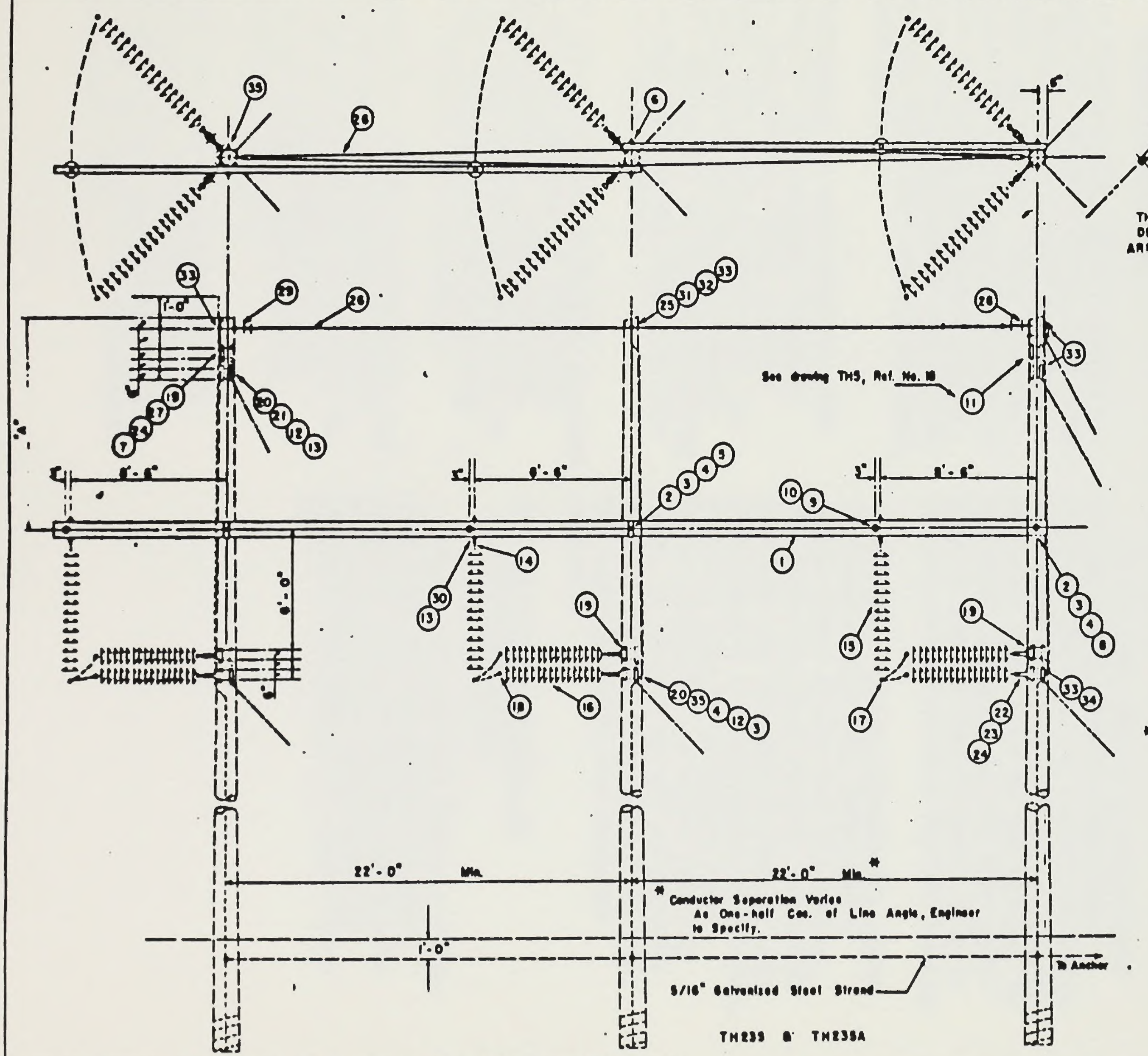
4. TO ENGINEER: Overhead ground wires are shown for optimum lightning protection and guying. In areas having galloping conductor problems, crossover ground wire may be moved to middle pole.

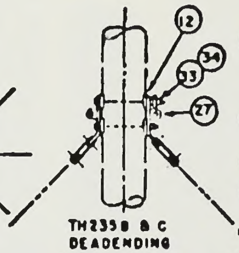
LIST OF MATERIALS

DWG REF	REQ	DESCRIPTION	ITEM
1	3	Angle bracket assembly, TM111A-TM111B	
2	3	Suspension bolt, 25000 lb.	
3	48	Insulator, suspension, 5 3/4" x 10", 15000 lb. M&E	
4	3	Suspension clamp and connecting clevis	
5	1	Pole tie assembly, TA104	

TRANSMISSION LINE MEDIUM ANGLE STRUCTURE
H-FRAME SUSPENSION - THREE POLE
(230 KV MAXIMUM)

FIGURE B-3





TH235B & C DEADENDING ARRANGEMENT

NOTES: CROSSARM TYPE 92

1. Engineer to check pole column stability.

2. Pole spacing to conform to spacing shown unless otherwise indicated on plan and profile sheets.

3. Any field drilled pole holes shall be pressure treated.

4. Tighten machine bolts until grid gain teeth are indented full depth into pole.

5. ** Engineer to specify strap lengths required for clearance to guy.

DWG	"A"	DWG.	"A"
TH 235	10'-0"	TH 235B	10'-0"
TH 235A	14'-6"	TH 235C	14'-6"

LIST OF MATERIALS

DRG. REF.	REQ'D — & A	REQ'D B & C	DESCRIPTION	ITEM
1	2	2	Crossarm, 3 5/8" x 9 3/8" required length	[illegible]
2	1	1	Threaded rod, 7/8" x required length	[illegible]
3	8	5	Nut for 7/8" bolt	
4	10	7	Locknut for 7/8" bolt, MF type	[illegible]
5	4	4	Ribbed tie plate, 3" x 9 1/2" x 1/4"	
6	3	3	Spring washer, 15/16" hole	
7	4	4	OHGW Deadend clamp and connecting piece	i
8	2	2	Washer, square, curved, 4 x 4 x 1/4 x 15/16" hole	
9	3	3	Washer head machine bolt 1/2 x 5" w/ washer nut	
10	3	3	Locknut for 1/2" bolt, MF type	[illegible]
11	2	2	3-bolt guy clamp	[illegible]
12	20	20	Grid gain, 4 x 4 min x req'd hole	
13	5	3	Locknut for 3/4" bolt, MF type	[illegible]
14	3	3	Suspension hook	[illegible]
15	39	39	Insulator, suspension, 5 3/4" x 10" - 15,000 lb MBE	[illegible]
16	96	96	Insulator, suspension, 5 3/4" x 10" - 25,000 lb MBE	[illegible]
17	3	3	Suspension clamp and connecting piece	[illegible]
18	6	6	Deadend clamp and connecting piece	[illegible]
19	10		Deadend tee, 25000 lb	
20	10		Guying plate, 3" x 5/8" x required length 25000 lb	
21	8	4	Machine bolt, 3/4" x required length	c
** 22	6	6	Clevis eye strap, 2' minimum length 25,000 lb	
23	6	6	Ball eye, 25,000 lb.	
24	10	10	Shackle, 3/4", 25,000 lb	
25	2	2	Messenger clamp	
26	1	1	Overhead guy assembly, TG-15	
27		10	Deadend and guying tee, 25,000 lb.	
28	1		Guy attachment assembly, TG-21	
29	1	2	Guy attachment assembly, TG-19	
30	3	3	Shoulder eye bolt, 3/4" x 12" with 3 1/2" max. dia. washer nut	
31	1	1	Machine bolt, 5/8" x required length	c
32	2	2	Locknut for 5/8" bolt, MF type	[illegible]
33	13	8	Ground wire clamp	[illegible]
34	13	8	Spring lock washer	
35	14	8	Bolt, machine, 7/8" x required length	c
36	6	4	Nut for 3/4" bolt	

TRANSMISSION LINE
DOUBLE DEADEND STRUCTURE – THREE POLE
(230 KV MAXIMUM)

Scale: none

FIGURE B-4

Date: Mar 18, 1965

TH 235 SERIES

2 REVISION T-72

NOTE TO ENGINEER: Overhead ground wires are shown for optimum lightning protection and guying. In areas having galloping conductor problems, crossover ground wire may be moved to middle pole.

would follow the applicable criteria in the "Environmental Criteria for Electric Transmission Systems" published jointly by the U.S. Department of Interior and the U.S. Department of Agriculture.

In addition, the stipulations of the jurisdictional agencies involved would be strictly followed.

2.7 Power Supply Planning - Mt. Wheeler Power, Inc.

On February 24, 1971 a contract between Mt. Wheeler Power, Inc. (MWP) and Sierra Pacific Power Company (SPPCO) was signed. This contract provided MWP with capacity rights of 40,000 kW during the summer season (April through September) and 22,000 kW during the winter season (October through March).

Subsequent to this contract, MWP joined the Intermountain Consumer Power Association (ICPA) in Utah whereby ICPA acted as agent for the MWP Colorado River Storage Project (CRSP) allocation of 22,000 kW during the summer season and 12,800 kW during the winter season.

In the mid-70's, it became apparent that all the members of ICPA would require additional power supplies. The planning by ICPA has resulted in MWP participating in the following power supplies for its system.

a. Formation of Desert Generation and Transmission Cooperative (DG&T) which purchased 100 MW in Unit No. 2 of the Utah Power and Light Company Hunter steam-electric generating station.

b. DG&T has under construction its Bonanza No. 1, 400 MW (360 Net) steam-electric generating station in Utah which is to be operational by January, 1985.

c. Intermountain Power Project (IPP) which is constructing a 1,500 MW Plant in Utah and which is to be operational in mid-1986. It is from this plant that a new 230 kV power line will be constructed to the MWP Gonder Substation North of Ely, Nevada to increase capacity to the MWP System. MWP anticipated construction of this line in 1985, prior to operation of the IPP Plant.

On its own, MWP is a participant in the proposed White Pine Power Project (WPPP) to be located in White Pine County and which will be a 1,500 MW Plant that is to be operational in mid-1989. Included in the WPPP planning is another 230 kV power line to be interconnected with the MWP System.

MWP has, acting through its agent ICPA and on its own, developed a future power supply for its system. The Exxon Mt. Hope project potential load was not included in any of this planning and if development proceeded, it would only be necessary that Exxon notify MWP at least four (4) years in advance of the operational date of the Mt. Hope project so that MWP could schedule the required capacity.

3.0 Nevada Department of Transportation

Figure B-5 and B-6 depict a duplicate copy of information in part, received from the Nevada Department of Transportation concerning the proposed realignment of State Route 278.

NEVADA DEPARTMENT OF TRANSPORTATION

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION

1263 SOUTH STEWART STREET
CARSON CITY, NEVADA 89712

A. E. STONE
Director

June 8, 1983

IN REPLY REFER TO
Exxon - Mt. Hope
SR 278

Ms. Kit Krickenberger
Exxon Minerals Company
P. O. Box 4508
Houston, TX 77210

Dear Ms. Krickenberger:

The following information is submitted in accordance with our cooperative Agreement No. R150-83-010. Attached is a map which depicts the general alignment based on previously submitted contours. Also attached is a typical section which shows the anticipated widths, slope configurations and a typical drainage structure crossing.

In general, the 6.0 mile project is estimated to cost $3,400,000 with an estimated start to finish time of one construction season.

Overall cut and fill volumes, paving descriptions, depths and the number and type of drainage structures will not be made available until more detailed design work is accomplished.

A summary of other pertinent details follows:

Area Disturbed During Construction

84 Ft.± width	20,592 feet
105 Ft.± width	9,504 feet
126 Ft.± width	1,584 feet

Area Permanently Disturbed

80 Ft.± width	20,592 feet
100 Ft.± width	9,504 feet
120 Ft.± width	1,584 feet

Equipment Typically on Site During Construction

TYPE	H.P.	POWERED	NUMBER
Dozers D-8	300	Diesel	2
Scrapers 631	450	"	5
Backhoie 1 Cu. Yd.	55	"	1
Loaders 966	200	"	2
Rollers (Pneum.)	100	"	2
Rollers (Steel)	87	"	2
Trucks (Hauling)	200	"	10
Trucks (Water)	150	"	2
Motor Grader 135	180	"	2
Crushing Plant	300	"	1
Hot Plant	100	"	1
Paver	122	"	1

It is estimated a work crew of 30-50 persons will be required working an 8-hour day, 40 hour week. The work crew will likely consist of operating engineers, teamsters laborers and fence erectors.

As an additional note, our Agreement No. R150-83-010 states in the preambles the project extends from approximate mileposts EU 51.44 to EU 56.55. Those are apparently in error with the actual mileposts being EU 15.00± to EU 22.00±. I apologize for any inconvenience this may have caused you.

If you have any questions please contact Bill Bowman, Project Designer at (702) 885-5609 or myself.

Sincerely,

Michael W. McFall

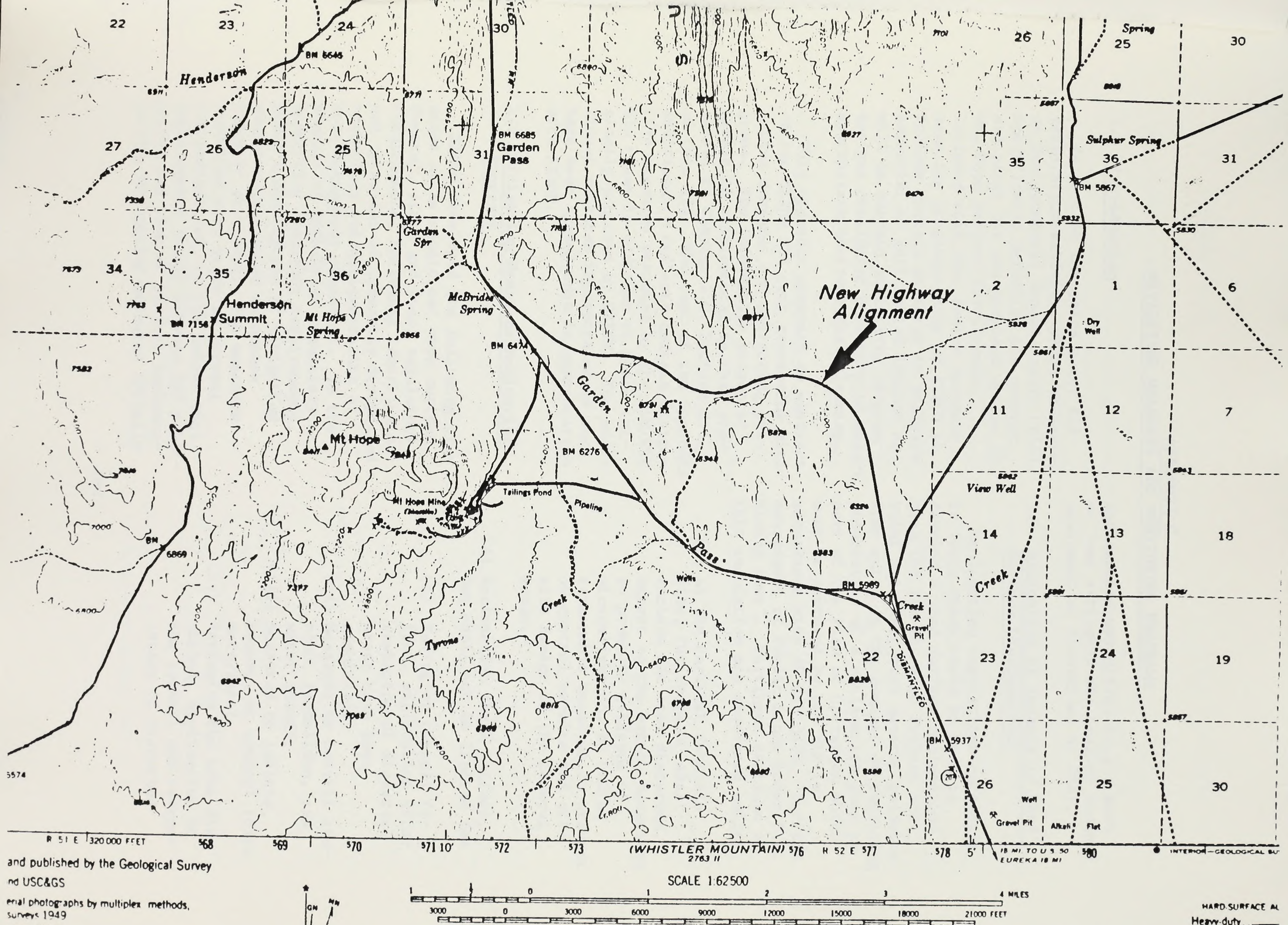
Michael W. McFall
Assistant Chief Road Design Engineer

MWM:kl

Attach.

cc: Jim Cress

FIGURE B-5



New Highway Alignment
Henderson
Henderson Summit
BM 7156
BM 6646
Mt Hope Spring
Garden Spr
McBrides Spring
BM 6685
Garden Pass
BM 6474
Garden
Pass
BM 6276
Mt Hope
Mt Hope Mine
Tailings Pond
Pipeline
Creek
Tyrone
Wells
BM 5989
Creek
Gravel Pit
DISMANTLED
BM 5937
View Well
Creek
Dry Well
Sulphur Spring
BM 5867
Spring
Well
Gravel Pit
Alkali Flat
R 51 E
320 000 FEET
(WHISTLER MOUNTAIN)
2763 II
R 52 E
18 MI TO U S 50
EUREKA 18 MI
INTERIOR—GEOLOGICAL SU
and published by the Geological Survey
nd USC&GS
erial photographs by multiplex methods,
surveys 1949
taken 1946
1927 North American datum
SCALE 1:62500
4 MILES
21000 FEET
5 KILOMETRES
HARD SURFACE
Heavy duty
Medium duty
Loose surface

FIGURE B-6

APPENDIX C
MITIGATING MEASURES AND MONITORING PROGRAMS

1.0 Introduction

As part of the third party EIS preparation activity, EXXON presented an Environmental Impact Report (EIR), specifically detailing its concept and plans for the proposed action of Mt. Hope project development. Included with that source document were the proposed plans of EXXON to include certain measures to mitigate potential or anticipated impacts as well as certain monitoring program designs considered necessary to assure appropriate environmental planning.

This Appendix presents an abstract of the EXXON EIR text concerning mitigative measures and monitoring programs. The information presented herein is supplemental to that presented in Chapter 2.0, Section 2.5, of this EIS. The text of the Appendix additionally reflects certain mitigative measures proposed by the BLM/WRC EIS teams in addition to those originally proposed by EXXON. The additional measures incorporated as such have been agreed upon in consultation with EXXON.

2.0 Mitigating Measures/Monitoring Programs

EXXON developed the following programs to be consistent with current federal, state and local regulatory requirements, including installation and operation of federally designated technology and implementation of best management practices. In the absence of definitive regulatory or permitting authority requirements, EXXON's description of mitigating measures were based on common industry practices. The measures described were based on current information and, to the extent that requirements change between EIS publication and time of project implementation, mitigating measures actually implemented may differ (e.g., more or less stringent air quality control equipment as determined by EPA).

2.1 Mitigation of Impacts to Land Surface (Reclamation)

Reclamation regulations currently in force which could be used to develop a land surface reclamation plan for the Mt. Hope Project are brief and offer only generic guidance. They exist in the context of requiring preparation of a reclamation plan as part of the Plan of Operation which must be approved by the BLM in accordance with 40 CFR 3800, "Surface Management of Public Lands under U.S. Mining Laws". Pertinent sections of this regulation are excerpted below:

"(3) At the earliest feasible time, the operator shall reclaim the area disturbed, except to the extent necessary to preserve evidence of mineralization, by taking reasonable measures to prevent or control on-site and off-site damage of the federal lands.

(4) Reclamation shall include, but shall not be limited to:

- (i) Saving of topsoil for final application after reshaping of disturbed areas have been completed;
- (ii) Measures to control erosion, landslides, and water runoff;
- (iii) Measures to isolate, remove, or control toxic materials;
- (iv) Reshaping the area disturbed, application of the topsoil and revegetation of disturbed

areas, where reasonably practicable; and,

(v) Rehabilitation of fisheries and wildlife habitat."

In general, EXXON would carry out land surface reclamation in three phases; i.e., subsequent to the two-year construction period, intermittently on an as-needed basis during operation, and finally, at end-of-mine/process plant life. The final stage would involve the largest and most extensive effort and is the phase usually identified with the concept of reclamation.

The measures discussed in Sections 2.5.1 of the EIS were developed in line with what EXXON believed would fulfill the requirements of 40 CFR 3800 and what represented good management practices, based upon like experiences in similar terrain and climate. (See Section 2.5.1 of EIS).

2.2 Mitigation of Impacts to Hydrologic Regime

2.2.1 Surface Water

Mine/Process Plant Effluent. The Clean Water Act of 1977 (33 USC 1251) is the principal federal statute addressing water pollution control. In accordance with the authority this legislation provides, the U.S. EPA has promulgated effluent limitations governing discharges from industrial point source categories into navigable waters. On December 3, 1982, such limits were promulgated by the EPA for the ore mining and dressing point source category. Briefly, for the subcategory pertinent to molybdenum these standards allow for a combined discharge from the mine/ore dressing step that will not exceed the flow from the mine itself[1] nor the limits given on Table C-1.

On February 17, 1983, EPA proposed the first of two phases of effluent limitations guidelines for the nonferrous metals manufacturing point source category (48 FR 7032). The Phase II proposal, which will address molybdenum manufacturing, is scheduled to appear in September, 1983. It is anticipated these regulations will require that members of the molybdenum manufacturing point source category be required to attain the overall achievable concentrations identified in Proposed General Development Document for Effluent Limitations Guidelines and Standards for Nonferrous Metals Manufacturing Point Category (EPA, 1983) and shown in Table C-2 (Berlow, 1983).

These regulations are imposed upon industry by requiring industrial surface water dischargers to apply for and receive a National Pollutant Discharge Elimination System (NPDES) permit (Title IV of Clean Water Act). Normally, operations such as that proposed by EXXON at Mt. Hope would be required to obtain such an NPDES permit; discharge from the mine and concentrator would be governed by the ore mining and dressing regulations and discharge from the hydrometallurgical and conversion plant (TMO and FeMo production) would be potentially subject to the proposed non-ferrous metals manufacturing regulations. Because there are no surface waters in the vicinity of EXXON's Mt. Hope site to which a discharge could flow, EXXON would not be required to obtain this permit. However, its process design would achieve a no discharge standard for both point source category segments by employing measures recommended by the EPA, and considered by that Agency to be best available

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[1] Regulations allow for additional discharge in geographical areas of net precipitation and if recycling may cause contaminant build-up to the point of process interference.

Mt. Hope Molybdenum Project

Table C-1 Industrial Point Source Effluent Limitations, Ore Mining and Dressing

Effluent Characteristic	Effluent Limitations (mg/l)	
	Maximum for any 1 Day	Average of Daily Values for 30 Consecutive Days
Cu	0.30	0.15
Zn	1.5	0.75
Pb	0.6	0.3
Hg	0.002	0.001
Cd	0.10	0.05
pH	(+)	(+)
TSS	30.0	20.0

+ Within the range of 6.0 to 9.0

Table C-2 Industrial Point Source Effluent Limitations, Molybdenum Manufacturing

Effluent Characteristic	Effluent Limitation (mg/l)[1] Monthly Average	Maximum
Ammonia	58.6	133.0
As	0.57	1.39
Al	1.24	3.02
Cu	0.61	1.28
CN	0.08	0.20
Fl	17.6	39.7
Ni	0.37	0.55
Pb	0.09	0.10
Se	0.37	0.82
Sb	0.86	1.93
Zn	0.42	1.02
O&G	10.0	10.0
TSS	12.0	20.8

[1] Effluent limitations are actually expressed as mass per unit mass of product and are arrived at by multiplying an expected flow per unit mass of product and the above concentrations. Such a flow limit would probably also be imposed on the molybdenum manufacturing point source subcategory. Although it cannot dictate that industry use a specific treatment technology, the EPA must be able to show that technologies that can achieve the specified levels of treatment do exist.

demonstrated technology (BADT). Among these measures are recycling process water from the concentrator, employing the tailings pond and lined pond as evaporation/settling basins, and lime precipitating wastewater flow from the hydrometallurgical plant.

Sanitary Wastewater. Sanitary wastewater from both the subdivision and the mine/process plant would be treated to applicable state and federal standards. Applicable state requirements are those found in "Regulations Governing Individual Sewage Disposal Systems", adopted October 19, 1982 by the Nevada State Board of Health, and "Regulations Governing Mobile Homes and Mobile Home Parks (Trailer Courts)", adopted September 21, 1970 by the Nevada State Board of Health. In general, primary and secondary treatment would be used and levels of pollutants would not exceed those specified by EPA and shown in Table C-3. (40 CFR 133).

EXXON expects that the plant would have a treatment capacity of approximately 70,000 gpd. A 30,000 to 40,000 gal storage tank would be located ahead of the system to handle the surge at shift changes. The treated effluent would be discharged to the tailings pond and the sludge (approximately 100 lbs/day) would be disposed of on-site in the solid waste disposal facility.

2.2.2 Groundwater

(See section 2.5 of EIS; Appendix D regarding EPA toxicity).

2.3 Mitigation of Impacts to Air Quality

The Clean Air Act of 1970, as amended in 1977, is the federal umbrella statute that provides for the control of air pollution from stationary and mobile sources. In 1971, the nation was geographically divided into Air Quality Control Regions (AQCR's) (Section 107 of the Act). Section 109 of the Act directed EPA to develop primary and secondary National Ambient Air Quality Standards (NAAQS), the former to protect the public health and the latter to protect public welfare. Such standards have been promulgated for sulfur dioxide, particulate matter, carbon monoxide, ozone, nitrogen dioxide and lead. These standards need not take into account the cost of compliance nor whether control technology exists.

Upon promulgation of the NAAQS, air quality in the AQCR's was examined and each AQCR was classified as an attainment or non-attainment area on a per pollutant basis, depending on whether air quality was better or worse than the NAAQS. Attainment areas were further divided into three classes as defined by Congress in the Clean Air Act for the purpose of identifying the increment of degradation that could be allowed.

Section 110 requires that each state develop an implementation plan (SIP) that provides for bringing the entire state into compliance with NAAQS. For AQCR's with air quality better than NAAQS, the SIP must show how prevention of significant deterioration (PSD) will occur.

Additionally, Section 111 provides for the development of technology based new source performance standards (NSPS) on an industry by industry basis. Lastly, under the authority of Section 112, EPA may promulgate standards for hazardous pollutants (NESHAPS). Like NAAQS, these standards need not take into account cost of compliance or whether technology is available to meet the standard. Standards have been promulgated for abestos, beryllium, mercury and vinyl chloride (40 CFR 61).

Mt. Hope Molybdenum Project

Table C-3 Sanitary Wastewater Effluent Limitations

Pollutant	Limit
5-day Biochemical Oxygen Demand (BOD_5)	30 mg/l (30-day average) 45 mg/l (7-day average)
Total Suspended Solids (TSS)	30 mg/l (30-day average) 45 mg/l (7-day average)
pH	6.0-9.0

All of these aspects of the Clean Air Act and EPA's companion implementing regulations 40 CFR 50-99, combine to affect permitting an industrial facility.[1] EXXON's proposed Mt. Hope Project is located in a Class II attainment area for all of the NAAQS constituents. It is also a major source [Section 169(1)] and consequently will be required to acquire a PSD permit. However, it would emit none of the hazardous pollutants currently identified under NESHAPS.

As the above demonstrates, derivation of the emission limits that would ultimately appear in EXXON's Mt. Hope Project PSD permit is complex and the limits cannot be accurately predicted. Consequently, control technology that would be installed to achieve these limits cannot be finally identified. However, mitigating measures can be discussed in terms of legally allowable increments of degradation, technology identified by NSPS, and technology in use by other members of the industry.

Section 163 of the Act establishes allowable increments for the Class I, II and III areas. The Class II allowable increase is shown below:

Pollutant	Allowable Increase Microgram/Cubic Meter
Particulate matter	19
Annual geometric mean	37
24-hr maximum	
Sulfur dioxide	
Annual arithmetic mean	20
24-hr maximum	91
3-hr maximum	512

[1] PSD permitting is carried out by EPA as per 40 CFR 124 until a state has an approved SIP which by fiat includes delegation of permitting authority. Nevada does not yet have an approved SIP. When such approval is granted, state permitting procedures as in NRS 445 will apply.

Depending on the established baseline in the area ["the ambient concentration levels which exist at the time of the first application for a permit in an area subject to this (Section 169(4)], air quality monitoring data collected and air quality modeling performed by EXXON relative to preparing the permit application, and projected emissions from other sources, Exxon would be awarded an increment of the increment.

Exxon would also be required to achieve applicable new source performance standards. On August 24, 1982 (48 FR 36859), EPA proposed a particulate matter stack emission NSPS for Metallic Mineral Processing Plants, including molybdenum, of 0.05 gms per dry standard cubic meter.

2.3.1 Process Plant Emissions

Control technology commonly used by the industry is discussed below.

Particulate Emissions. Dust collection would be provided over the primary ore crusher, at conveyor feed points, on the multi-hearth roasters of the TMO plant and on the mold box (firing area) of the FeMo plant. Dust-laden air from primary ore crushing and at concentrator conveyor feed points would be water-scrubbed to remove particulates. Wet-grinding would also be effective in particulate removal. If promulgated, this segment of the plant would have to achieve the NSPS cited above.

Dust-laden air from the TMO plant pneumatic conveyor system would pass through a reverse jet bag filter. Emissions from the multi-hearth roasters of the TMO plant would be passed through multi-cyclones to control particulates.

SO_2 Emissions. SO_2 would be contained primarily in the roaster flue gas generated during TMO production. This gas would be combined with the bag filter exhaust and passed through the multi-cyclones (mentioned above). It would then go through an electrostatic precipitator to remove submicron particles, followed by a scrubber using $Ca(OH)_2$ slurry to remove SO_2 prior to discharge to the atmosphere. The resultant waste stream would contain $CaSO_3$ and $CaSO_4$. Emissions from the mold box (firing area) of the FeMo plant would be passed through a cyclone and a baghouse in series.

Also, vents from various material enclosures (e.g., dry concentrate storage bin, roaster feed bin, lime bin, TMO bin, sand bin, etc.) would be equipped with passive filters to remove particulates from air vented to the atmosphere. These filters would typically be cartridge, manually-replaceable types.

Chlorine Emissions. Air vented from the chlorine storage tanks, leach autoclaves and cooling vessel associated with the hydrometallurgical plant would be collected and passed through a scrubbing tower using a sodium hydroxide solution for chlorine fume removal prior to discharge to atmosphere. A dilute sodium hypochlorite solution would be generated and routed to the wastewater treatment plant.

2.3.2 Fugitive Emissions

(See section 2.5 of EIS).

2.4. Mitigation of Impacts from Solid Wastes

The Resource Conservation and Recovery Act of 1976 (RCRA) gave EPA the authority to regulate land disposal of wastes. Solid waste is defined under Section 1004(27) of RCRA as "any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semi-solid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities...". Subtitle C of RCRA addresses regulation of hazardous waste, a subset of solid waste, and Subtitle D provides for the management of nonhazardous wastes through the states.

On May 19, 1980, EPA completed rule-making on a major set of regulations implementing Subtitle C and providing a cradle to grave system of control and permitting covering generators, transporters and owners and operators of hazardous waste treatment, storage and disposal facilities (40 CFR 260-267 and 270, 271). The State of Nevada's Hazardous Waste Disposal Law may be found in NRS 444.700 to 444.778. State regulations governing hazardous waste management were effective October 16, 1980.

In fulfillment of Subtitle D, EPA has promulgated some regulatory guidance to the states regarding development of solid waste management plans and classification of landfills. The State of Nevada's solid waste disposal law (exclusive of hazardous wastes) may be found in NRS 444.440 to 444.630. Nevada has also published solid waste management regulations and Article 5 classifies and provides performance standards for land disposal sites.

The non-process wastes (trash, refuse, garbage, etc.) that would be generated by the Mt. Hope project and subdivision would be subject to the State of Nevada's NRS 444.440 to 444.630 statute and implementing regulation. However, although process solid wastes (solid fraction of tailings, slag, sludge from wastewater treatment plant) are clearly within the solid waste definition and subject to RCRA, controversy has arisen as to whether mining wastes should be considered hazardous or non-hazardous. When promulgated, the May 19, 1980, regulations were applicable to mining wastes, but on November 19, 1980 (Federal Register Special Supplement 63), mining wastes were excluded from regulation pending completion of a special study of the mining industry called for by Section 1008 of RCRA. The same exclusion was incorporated into Section 444.726 of Nevada's Hazardous Waste Disposal Law.

The following presents details of EXXON's proposed construction and operation of a land disposal facility for non-process wastes in accordance with State of Nevada solid waste management regulations.

2.4.1 Mt. Hope Site Wastes Only

In accordance with Nevada regulations, EXXON would construct and operate a Class III facility (improved dump). The facility would be designed to prevent scattering of lightweight materials (e.g., portable litter fences), control vehicular and livestock access, and control pooling and minimize percolation of surface waters. The facility would be operated so as not to be unsightly or create odors. The face of the working fill would be kept as narrow as is consistent with safe and efficient equipment operation. Solid wastes would be spread and compacted in thin layers, each layer would not be thicker than two (2) feet prior to compaction. On a weekly basis, wastes would be covered with a suitable material compacted to a thickness of six (6) inches. The final cover for the facility would be applied within ninety days of closure and would be twenty-four (24) inches thick and graded to drain surface water. The top slope would have a grade of two to four percent. The surface would be vegetated.

Sewage sludge would not be disposed of in the Class III facility, but a separate site designed in accordance with Section 2.6.1.1 of the Nevada Solid Waste Management Regulations would be constructed and operated.

2.4.2 Mt. Hope Site/Subdivision Solid Wastes

In accordance with Nevada regulations, Exxon would construct and operate a Class II facility (modified landfill). All of the requirements discussed above for a Class III facility would be equally applicable to a Class II facility. Additionally, application of the six-inch cover would occur every four days rather than weekly and application of the final cover would occur within 30 days of closure rather than 90 days.

Sewage sludge would not be disposed of in the Class II facility, but a separate site designed in accordance with Section 2.6.1.1 of the Nevada Solid Waste Management Regulations would be constructed and operated.

2.5 Mitigation of Impacts to Cultural Resources

(See section 2.5 of EIS).

2.6 Mitigation of Impacts to Wildlife

(See section 2.5 of EIS).

During the course of EIS preparation EXXON has taken into consideration mitigative proposals put forth to reduce the potential for mule deer road kills brought about by property fencing in the vicinity of State Route 278. To date, EXXON has accepted the proposals and modified the proposed fencing plan from one of total cyclone fencing to a plan incorporating Type D-2 fencing including the provision of smooth wire tops. It is anticipated that further discussion with the NDOW and BLM will continue and that ultimate fencing will represent an agreed upon effort to further reduce the potential for increase in mule deer road kills resultant of project implementation.

As standard operating procedure, EXXON would prohibit hunting or wildlife harassment within its project boundaries. Employee personnel would be notified of EXXON policy.

2.7 Mitigation of Impacts to Grazing

(See section 2.5 of EIS).

2.8 Monitoring Programs

Monitoring programs would be conducted by EXXON during the preconstruction phase to further characterize the baseline environment for the purpose of permitting and during operation to ensure that permit emission limits are being adhered to. Each of the programs, air and groundwater, are discussed below.

2.8.1 Air Monitoring Program

One year of air quality/meteorological data would be collected in conjunction with PSD permitting. The actual monitoring program would be jointly worked out with Region IX (San Francisco, California) of the EPA, the Nevada State Department of Environmental Protection and EXXON and would depend on the status of the State Implementation Plan (SIP) at the time. Based on existing regulatory framework and imminent modifications, monitoring for the parameters shown in Table C-4 would occur. Monitoring would take place at two stations at the Mt. Hope site.

Monitoring would be required to be conducted during operation as a condition of the Mt. Hope project's PSD permit. The parameters to be measured and frequency of analysis would depend upon the stipulations of the permit.

2.8.2 Groundwater Monitoring Program

The EXXON groundwater monitoring program would take place in two parts: 1) monitoring of groundwater availability in Kobeh Valley as per the State Engineer's conditions to granting EXXON water rights in Kobeh Valley; and, 2) monitoring of groundwater quality in the project vicinity and Kobeh Valley.

In accordance with EXXON's water rights permits three monitoring wells would be drilled at:

1. NE 1/4 Section 25, T. 22 N., R. 50 E.
2. SE 1/4 Section 35, T. 22 N., R. 50 E.
3. SE 1/4 Section 27, T. 22 N., R. 50 E.

These wells would be drilled and cased to an approximate minimum depth of 400 feet and approximately the bottom 100 feet of casing would be perforated. Groundwater depth in these wells would be monitored and reported to the State Division of Water Resources as follows:

Time Period	Monitoring Frequency	Reporting Frequency
Mine Construction (1st year)	monthly	quarterly
Remainder Mine Construction	quarterly	quarterly
Mine Production (1st 2 years)	quarterly	quarterly
Remainder Mine Production	semi-annually	semi-annually

Table C-4 Parameters to be Analyzed for During Pre-Construction Air Quality/Meteorological Monitoring Program

Station #	Parameter
1	NO_x
	SO_2
	TSP (collected with fine particle capture)1/
	Visibility
	Trace Metals/Elements2/
	Temperature
	Barometric Pressure
	Relative Humidity
	Precipitation
	Evaporation
	Wind Direction
	Wind Speed
2	TSP1/

1/ In accordance with State of Nevada monitoring network practices, particulate filters would be collected every six (6) days.

2/ Every other particulate filter would be analyzed for the trace metals/elements of cadmium, copper, lead, mercury, nitrate and sulfate for the first three months of the monitoring period. At the end of this period a determination will be made to continue or terminate these analyses.

The groundwater quality monitoring program agreed to by EXXON and the Nevada State Department of Environmental Protection in conjunction with the Zero Discharge/Groundwater Infiltration permit includes monthly analysis of samples from three wells for those parameters shown in Table C-5. The wells would be located at Mt. Hope spring, the Kobeh Valley water supply site and in the Garden Pass drainage subbasin (See TR No.5).

Monitoring wells would be installed at the foot of the tailings dam to regularly check for potential changes in groundwater quality related to seepage from the tailings pond. The frequency of monitoring and parameters tested for would be mutually agreed to by EXXON and the Nevada Division of Environmental Protection.

Table C-5 Constituents to be Analyzed for During Pre-Construction Groundwater Quality Monitoring Program[1]/

Aluminum	Oil and Grease
Ammonia	pH
Antimony	Phenols
Arsenic	Phosphorus (as P)
Barium	Radioactivity
Beryllium	Alpha
Bicarbonate	Beta
Boron	Radium, Total
Bromide	Radium 226, Total
Cadmium	Selenium
Calcium	Silicon
Carbonate	Silver
Chemical Oxygen Demand (COD)	Sodium
Chromium, Total	Strontium
Cobalt	Sulfate
Conductivity	Sulfide
Copper	Sulfite
Cyanide	Surfactants
Fluoride	Thallium
Hydrogen Sulfide	Tin
Iron	Titanium
Lead	Total Dissolved Solids (TDS)
Lithium	Total Organic Carbon (TOC)
Magnesium	Total Organic Nitrogen
Manganese	Total Suspended Solids (TSS)
Mercury	Tungsten
Molybdenum	Vanadium
Nickel	Zinc
Inorganic Nitrogen (NO_3-N)	Chloride

[1]/ The entire suite of parameters would be analyzed during the first three months. Those parameters that are consistently below detection limits would be dropped from the remainder of the program.

APPENDIX D
TOXICITY TESTING

1.0 Introduction

As part of the environmental analyses necessary to evaluate the impacts of tailings disposal, an EPA toxicity testing procedure was conducted on test material to determine degree of regulatory specified toxicity and potential of the tailings for acid-producing conditions. A synopsis of the testing results is presented in the following sections. Technical Report No.5 presents a detailed review of the analyses and impact determinations.

As summary to the following test results, the tailings material was determined not to present a toxicity problem of adverse significance. While the tailings material represents a net acid-producing condition, mitigation measures of pond reclamation and surface water runoff diversion were determined to effectively mitigate the potential for long term effects (e.g., no adverse significance).

2.0 Experimental Procedures

2.1 Acid Producing/Consuming Tests

- Five percent by volume of each slurry was taken:
  280 ml from scavenger tailings.
  250 ml from first cleaner scavenger tailings.
  126 ml from second cleaner scavenger tailings.

  Note: Volumes of the three tailings samples mentioned above do not reflect the actual volume proportion of the tailings coming out of the proposed flowsheet. In reality the volume of the scavenger tailings should be four times that shown above. At four times higher scavenger tailings volume, the acid producing capability would decrease to 19.2 pounds H_2SO_4 per ton of solid tailings, and acid consuming potential would increase proportionately.

- The slurry was mixed well and filtered to obtain a composite tailings sample.
- Four 7-gram samples underwent sulfur analysis.
- Four 12-gram samples were suspended in 100 ml distilled water and stirred for 15 minutes.
- Natural pH of the sample was recorded.
- The samples were titrated to pH 4.5, 4.0, 3.5, 3.0 with 1.0 Normal H_2SO_4. The titration was continued until less than 1 ml acid was added over a 30 minute period.
- The volumes of the acid added were recorded.
- The amount of acid consumed was converted to pounds of H_2SO_4/ton of tailings sample.
- The acidic solution generated from four tests were analyzed for Cu, Pb, Zn and Fe.
- Weight of dry residues was recorded.

2.2 EPA Toxicity Test

- The test sample for this study was the same as that used in the acid consuming and producing tests. A 130 gram wet (15.7% moisture) sample of the tailings was taken. Solids Weight = 109.6 gram.

- Assuming 30% slurry was taken from the flotation cell, 256 ml of filtrate was taken and saved.

- The solids were put in an extractor with sixteen times their weight of deionized water. Amount of deionized water added was 1,753 ml. The solids were not allowed to dry.

- Agitation was begun and the pH was measured. Since the pH was greater than 5.0, the pH was decreased to 5.0 $\pm$ 0.2 by adding 0.5 Normal acetic acid.

- The slurry was agitated for a 24 hour period.

- At the end of 24 hour period, deionized water was added to the extractor. The amount of water to be added was calculated according to:

  V = 20W-16W-A

  where V = ml of deionized water to be added
  W = weight of solid in grams
  A = amount of acetic acid added in ml

- The material in the extractor was separated into liquid and solid phases by filtration.

- The liquid was combined with the 256 ml filtrate that was in the original tailings. 250 ml of the solution was submitted for analysis of those elements listed.

3.0 Experimental Data and Calculations

3.1 Acid Producing/Consuming Tests

Third cycle scavenger tailings = 580 ml
Cleaner scavenger tailings #1 - 250 ml
Cleaner scavenger tailings #2 - 126 ml

3.1.1 Acid Producing Capability:

Sulfur assay of four samples (7 grams each)
1. 0.49%
2. 0.49%
3. 0.49%
4. 0.47%

Average sulfur = 0.485%

Basis: one ton of solid residue

Amount of sulfur (grams) in one ton tailings =

$$1{,}000 \text{ kg} \times \frac{0.485}{100} = 4{,}850 \text{ grams}$$

Assuming one mole of sulfur produces one mole of H_2SO_4, 4,850 grams sulfur will produce

$$= \frac{4{,}850 \times 98}{32 \times 454}$$

= 32.7 pounds of H_2SO_4 per ton of solid tailings (Note: It estimated that this number would decrease to 19.2 under the assumption of the proposed action).

3.1.2 Acid Consuming Potential:

Four 12-gram samples were taken at moisture content = 15.72% (12 x 0.1572 = 1.8864 grams water)

Weight of Sample = 12 grams - 1.9 grams = 10.1 grams

pH = 4.5
The amount of 1.0 Normal sulfuric acid consumed to lower the pH to 4.5 = 0.5 ml (initial pH = 9.32)

pH = 4.0
The amount of 1.0 Normal H_2SO_4 consumed to lower the pH to 4.0 = 0.6 ml (initial pH = 9.28)

pH = 3.5
The amount of 1.0 Normal H_2SO_4 consumed to lower the pH to 3.5 = 0.7 ml (initial pH = 9.22)

pH = 3.0
The amount of 1.0 Normal H_2SO_4 consumed to lower the pH to 3.0 = 0.9 ml (initial pH = 9.25)

3.1.3 Acid Consuming ability

at pH 4.5 =
$$\frac{0.5 \text{ ml} \times 0.049 \times 2{,}000}{10.1 \text{ grams}} = 4.8 \text{ lb/ton}$$

at pH 4.0 =
$$\frac{0.6 \text{ ml} \times 0.049 \times 2{,}000}{10.1 \text{ grams}} = 5.8 \text{ lb/ton}$$

at pH 3.5 =
$$\frac{0.7 \text{ ml} \times 0.049 \times 2{,}000}{10.1 \text{ grams}} = 6.8 \text{ lb/ton}$$

at pH 3.0 =
$$\frac{0.9 \text{ ml} \times 0.049 \times 2{,}000}{10.1 \text{ grams}} = 8.7 \text{ lb/ton}$$

These numbers could be higher if scavenger tailings volume in the sample is increased by four times. The acidic solution generated from four tests were analyzed for Cu, Pb, Zn and Fe (Table D-1).

3.2 EPA Toxicity Test

Amount of wet tailings = 130 grams at 15.7% moisture

Solids weight = 109.6 grams
Water added = 1,753 ml

At Time (t) = 0, initial pH = 9.46

Amount of acetic acid added = 37 ml

Amount of water added
V = 20 (109.6) - 16 (109.6) - 37 = 401.4 ml

Table D-2 indicates comparative review of test results with EPA specifications.

Table D-1 Acid Consuming Potential of the Flotation Tailings from the Major Composite

Acid Consuming Potential (lb H_2SO_4/ton Tailings)	pH	Acid Solution Assay, ppm Cu	Pb	Zn	Fe	Weight of Residue, grams
4.8	4.5	0.2	N.D.	1.0	4.9	10.9
5.81	4.0	0.2	N.D.	1.6	18.8	9.9
6.8	3.5	0.2	0.2	1.6	20.0	9.9
8.7	3.0	0.5	0.2	3.0	28.0	9.9

N.D. Not Detected

Source: EXXON Minerals Company

Table D-2 Composition of the Leach Liquor

Species	Sample ppm 1/	EPA Specification for Toxicity ppm 2/
As	0.06	5.0
Ba	0.92	100.0
Cd	0.042	1.0
Cr	<0.0015	5.0
Pb	<0.02	5.0
Hg	0.2 ppb 3/	0.2
Se	<0.02	1.0
Ag	0.005	5.0

Based on the results shown above, tailings could be classified as non-hazardous.

Source: EXXON Minerals Company

1/ ppm = parts per million

2/ Any samples exceeding these specifications are classified as toxic by the U.S. EPA and therefore are considered hazardous.

3/ ppb = parts per billion

APPENDIX E
STATE GENERAL FUND PROGRAM REDISTRIBUTION

1.0 Introduction

Nevada State sales taxes are composed of four separable tax levies which are earmarked as to use:

Local school support	1.5%
State General Fund	2.0
County city relief	0.5 (CCRT)
Supplemental CCRT	1.75
Total	5.75%

The fiscal impact analysis conducted for the Mt. Hope EIS has taken full account of the distribution of each levy among the revenue sources of counties, school districts and towns with the exception of the 2 percent allocation to the State General Fund. The final use of these revenues is described in the following section, where it is seen that the main employment of the 2 percent sales tax component in the past has been to provide additional support to the public school system.

2.0 Redistribution Summary

In fiscal years 1981 and 1982, the 2 percent sales tax amounted to approximately $130 million and represented about 37 percent of total general fund revenues of the state. General fund revenues were constituted of taxes, licenses, fees and fines, service charges, and interest earnings. Authorizations and appropriations out of this fund are recommended by the Governor, authorized by the legislature and approved by the Governor, for individual fiscal years. These authorizations are mainly by sector, as listed below, for which projects and programs within each sector are only generally identified in the Legislative Appropriations Reports.

General Government	Regulatory
Education	Conservation, Agriculture, Energy
Human Resources	Highways, Department of Motor Vehicles
Public Safety	Miscellaneous

The amounts allocated to education in 1981 and 1982 out of the State General Fund included funds for the University system and related facilities, as well as for the elementary and secondary school system. The education allocations totalled $195 million and $224 million, or about 52.5 percent of the total general fund disbursements, and as much as 143 percent and 172 percent of the amount paid in to the general fund in the form of the 2 percent sales tax. The allocation totals indicate that other funds from the commingled revenues of the general fund were added in these years to the education allocation, for return to the public school system.

The allocations to the elementary and secondary school system derive from a formula which initially guarantees an average basic dollar support to each student in the system, adjusted by the amount of funds available from the 1.5 percent local school support tax, to be balanced by state aid in the form of a Distributive School Fund. After local responsibility, state aid equals $157 million and $183 million, or the equivalent to 115 percent and 141 percent of the 2 percent state sales tax paid in to the general fund. In these calculations, financial resources outside the general fund are recorded: ad valorem taxes, motor vehicle taxes, etc., apparently as supplemental funds which may be drawn upon failing sufficient funds from "guaranteed support" from the State General Funds.

It is noted that, while taxes paid in to the state, such as vehicle, cigarette, liquor, gasoline, gaming, etc., return to the local jurisdictions in support of towns, counties and school districts, these taxes are specific levies not associated with the State Sales Tax, or the 2 percent component of that tax. Such specific levies are shown in the budget analysis of the Eureka and Elko jurisdictions as revenues to local governments deriving from the state. These tax revenues are only partly forecasted in the EIS fiscal impact analysis, as they are derived from spending by the new project-related populations, specifically gasoline, cigarette and liquor taxes.

Final allocations to the elementary and secondary school system (kindergarten through grade 12) out of the State General Fund are of two kinds: the Distributive School Fund and miscellaneous specific allocations to the handicapped, for vocational education, school lunch programs, etc. The Distributive School Fund alone in FY 1982 and 1982 amounts to $124 million and $152 million, respectively, or 91 percent and 117 percent of the 2 percent state sales tax revenues in the general fund. This appears to be the amount in each year finally settled upon as final for these programs. It is seen that in addition to the general fund revenues absorbed in the school support package. The availability of federal funds and other funds include an assortment of unrelated revenue items:

- federal slot tax rebates;
- federal mineral and lease taxes;
- out-of-state local school support taxes;
- interest earnings of permanent school fund.

These funds are commingled with the support to education given by the State General Fund (and the 2 percent state sales tax), such that the total revenue returned to local school districts in the form of the Distributive School Fund, or as specific allocations to school lunch, vocational education, etc., is a composite of various state and federal revenues, in addition to the State General Fund revenues and the inferred percentage relationship of the 2 percent state sales tax.

As stated in Chapter 4.0, the forecast of revenues to local jurisdictions contained in the EIS fiscal impact analysis does not include this re-distribution of the 2 percent sales tax, or the Distributive School Fund, or specific aids to education described above. The amounts paid in to the State General Fund in the form of the 2 percent sales tax, by Eureka and Elko Counties in Fiscal Year 1981-82, are reported to be: $124,141 and $2,780,960 respectively, for which they received, in return, in the School Distributive Fund, $525,841 (Eureka, 1982/3) and $5,395,979 (Elko, 1981/2). This amounts to a repayment of 4.2 times for Eureka and 1.9 times for Elko, in Distributive School Funds only.